

IBM i Memo to Users
7.3

Memo to Users



Note

Before using this information and the product it supports, read the information in [“Notices” on page 49.](#)

This edition applies to version IBM i 7.3 (product number 5770-SS1) and to all subsequent releases and modifications until otherwise indicated in new editions. This version does not run on all reduced instruction set computer (RISC) models nor does it run on CISC models.

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About IBM i Memo to Users

This information describes the changes in version 7, release 3, modification 0 (IBM® i 7.3) 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 IBM i 7.3 Memo to Users contains information that is critical for several audiences.

This memorandum has four sections:

- **Read this first** provides information to be considered before you install IBM i 7.3. This section is intended for system and application programmers and for the person responsible for system management.
- **Operating system** contains new release changes to basic operating system functions. This section includes changes to systems management functions, such as configuration and tailoring the system, and changes that could affect the way things operate or appear in the new release. This section is intended for all users of the IBM i computers.
- **Options** provides information about new release changes that affect specific program options of the operating system. This section is intended for all users of the IBM i computers.
- **Licensed programs** contains new release changes that might affect existing applications. These changes might also affect applications that are saved on an IBM i 7.3 system to be restored on a previous release server. This section is intended for application programmers and system programmers who use the IBM i computers 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 IBM i Memo to Users, updates to this document will be available in the English Internet version of the IBM Knowledge Center under IBM i 7.3 at this Web site:

http://www.ibm.com/support/knowledgecenter/ssw_ibm_i/welcome

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 PTF cover letters and Authorized Problem Analysis Reports (APAR) information at: <http://www.ibm.com/systems/support/i/databases/index.html>

For Preventive Service Planning - PSP information go to :

1. <http://www-01.ibm.com/support/docview.wss?uid=nas8N1021657>
2. Click **IBM i 730 PSPs**.

What's new

The following information was added or updated in this release of the information:

What's new

The following revisions or additions have been made to the Memorandum to Users documentation since the first IBM i 7.3 publication:



- **April 2021 update**
 - [“SYSDISKSTAT extended to return each disk path”](#) on page 24 was added.

- [“OBJECT_STATISTICS\(\) table function changes for *USRPRF objects” on page 20](#) was added.
- [“Updated EBCDIC Unicode maps for CCSIDs 1377 and 1388 ” on page 33](#) was added.
- [“IBM Navigator for i requires 64-bit Java SE 8” on page 27](#) was updated.
- [“Calls to SQLSetConnectAttr API may now return -1 with Message ID SQ99999” on page 25](#) was added.
- [“Open Source Package Management Interface Proxy Support ” on page 46](#) was added.
- [“Queries that compare a numeric value with blanks or an empty string will fail with SQLSTATE/SQLCODE ‘22023’/-302 or ‘53045’/-678” on page 25](#) was added.
- [“Change to authority required for registering Query Governor exit programs” on page 25](#) was added.
- **July 2020 update**
 - [“%TIMESTAMP now returns a timestamp with microsecond precision” on page 46](#) was added.
- **April 2020 update**
 - [“Changes to CL commands sending messages to *EXT” on page 14](#) was added.
 - [“QSYS2 SQL catalog files no longer restored with restore commands” on page 24](#) was added.
 - [“QHST file time stamp in UTC” on page 28](#) was added.
 - [Secure sockets layer \(SSL\) and Transport Layer Security \(TLS\) changes](#) was updated.
 - [Plan for your Operations Console installation or upgrade](#) was updated.
- **April 2019 update**
 - [“Upgrade planning ” on page 10](#) was updated.
 - [“SQE now default for Native queries” on page 18](#) was added.
 - [“QSYS2.ASP_INFO view change” on page 24](#) was added.
 - [“Using reserved words as correlation names” on page 18](#) was added.
 - [“SYS2.PTF_INFO and SYSTOOLS.GROUP_PTF_DETAILS view changes” on page 22](#) was added.
 - [“Backup Recovery and Media Services \(5770-BR1\)” on page 41](#) was updated.
 - [“IBM TCP/IP Connectivity Utilities for i \(5770-TC1\)” on page 44](#) was updated.
- **October 2018 update**
 - [“Support for the QDFTJRN data area” on page 26](#) was added.
- **August 2018 update**
 - [“SQL JSON functions duplicate key handling change” on page 23](#) was added.
- **June 2018 update**
 - [“Commands that have been changed by applying PTFs, might fail to compile with a CPD0043 when TGTRLS is not the current release” on page 16](#) was added.
 - [“IBM WebSphere Application Server 8.5 \(5733-W85\)” on page 37](#) was updated.
 - [“ILE RPG changes” on page 45](#) was updated.
- **April 2018 update**
 - [“Integrated Server Support \(5770-SS1 Option 29\)” on page 35](#) was updated.
 - [“ILE RPG changes” on page 45](#) was updated.
- **February 2018 update**
 - [“OVRDBF does not apply to CREATE TABLE AS \(select\)” on page 23](#) was added.
 - [“SQE changed to hold jobs when query related temporary storage exceeds MAXTMPSTG” on page 23](#) was added.
 - [“Minimum partition memory required for POWER9 ” on page 10](#) was added.
 - [“IBM WebSphere Application Server 8.5 \(5733-W85\)” on page 37](#) was updated.

- [“Backup Recovery and Media Services \(5770-BR1\)” on page 41](#) was updated.
- **October 2017 update**
 - [“Backup Recovery and Media Services \(5770-BR1\)” on page 41](#) was updated.
- **September 2017 update**
 - [“IBM WebSphere Application Server 8.5 \(5733-W85\)” on page 37](#) was updated.
 - [“ILE RPG changes” on page 45](#) was added.
- **June 2017 update**
 - Links to IBM i Preventative Service Planning - PSP documentation were updated.
- **April 2017 update**
 - [“IBM WebSphere Application Server 8.5 \(5733-W85\)” on page 37](#) was updated.
- **March 2017 update**
 - [“CREATE FUNCTION \(SQL scalar\) or CREATE FUNCTION \(SQL table\) with a data access classification of CONTAINS SQL may fail with SQLSTATE '2F004' and SQLCODE -579” on page 18](#) was added.
 - [“FULL OUTER JOIN change” on page 21](#) was added.
 - [“Changes to Instructions that Convert Numeric Values” on page 26](#) was updated.
- **November 2016 update**
 - [“IBM Navigator for i primary access methodology” on page 27](#) was added.
 - [“System SSL/TLS changes for default cipher specification list” on page 30](#) was added.
- **October 2016 update**
 - [“Planning for removal of support of adapters and configurations for releases following V7R3 of IBM i” on page 14](#) was added.
 - [“SYSTOOLS.GROUP_PTF_CURRENCY/SYSTOOLS.GROUP_PTF_DETAIL changes” on page 22](#) was added.
 - [“TIMESTAMP_FORMAT scalar function can return SQLSTATE '22007' and SQLCODE -20448” on page 21](#) was added.
 - [“Workload Capping and SMP degree *OPTIMIZE change” on page 22](#) was added.
 - [“DISPLAY_JOURNAL\(\) table function changes” on page 22](#) was added.
 - [“IBM PowerHA SystemMirror for i \(5770-HAS\)” on page 41](#) was updated.
- **July 2016 update**
 - [“Integrated web services server changes” on page 26](#) was updated.
 - [“IBM WebSphere Application Server 8.5 \(5733-W85\)” on page 37](#) was updated.
- **May 2016 update**
 - [#unique_51](#) was added.

How to see what's new or changed

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

- The  image to mark where new or changed information begins.
- The  image to mark where new or changed information ends.

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

Installing IBM i 7.3 over IBM i 7.1

If you are installing IBM i 7.3 over IBM i 7.1, you should also read the *IBM i Memo to Users* for i 7.2. It contains incompatibility-related information about the new functions and enhancements incorporated in IBM i 7.2.

You can order the 7.2 Memo to Users document by typing the following command: **SNDPTFORD SF98116**.

In addition to the SNDPTFORD command, you can also view the 7.1 *IBM i Memo to Users* in the IBM Knowledge Center under the IBM i 7.1 release :

https://www.ibm.com/support/knowledgecenter/ssw_ibm_i

Discontinued support for certain software and hardware

It is important that, as a customer, you 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 IBM i announcement material. To get the most current information about discontinued products or features along with suggested replacements, go to the Planning to upgrades to IBM i 7.3 page at:

<https://www.ibm.com/support/pages/node/668149>

PTF numbers in this memorandum

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

Memorandums for previous releases

How to access Memorandum to Users from previous releases.

You can view these documents in the IBM Knowledge Center under the IBM i release needed:

https://www.ibm.com/support/knowledgecenter/ssw_ibm_i

Prerequisite and related information

Use the IBM Knowledge Center as your starting point for looking up IBM i technical information.

http://www.ibm.com/support/knowledgecenter/#!/ssw_ibm_i/welcome

The IBM Knowledge Center contains information about important topics such as Java(TM), TCP/IP, Web serving, secured networks, logical partitions, high availability, control language (CL) commands, and system application programming interfaces (APIs). It also includes links to related IBM Redbooks® and Internet links to other IBM Web sites such as the IBM home page. With every new hardware order, you receive the IBM i Access Client Solutions CD. IBM i Access Client Solutions replaces its predecessor IBM i Access for Windows. IBM i Access Client Solutions may be used for console connections and is capable of running directly from the CD. See the Getting Started document in the Documentation directory on the IBM i Access Client Solutions CD for more information. The IBM i Access Family offers client/server capabilities for connecting personal computers to IBM i computers.

The IBM Prerequisite tool provides compatibility information for hardware features and helps to plan a successful system upgrade by providing prerequisite information for currently available features and features to be added to the system at a later date.

The IBM Prerequisite tool can be accessed here: http://www.ibm.com/systems/electronic/support/e_dir/eserverprereq.nsf

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 IBM i documentation, complete the readers' comment form at the back of this memorandum.

For comments on books or IBM i content in the IBM Knowledge Center, use the comment feature in the topic of interest within IBM Knowledge Center.

Read this first

Read this section before doing anything else.

Current customers - read before you install

Read the release planning documents before you install 7.3

The following publication contains additional information that you should read and understand before you install this release. All the sources that are referenced are on the Internet and can be found through various links at the following website: http://www.ibm.com/support/knowledgecenter/#!/ssw_ibm_i/welcome

Note: After the release of IBM i 7.3, updates to IBM i topics contained in the IBM Knowledge Center will be available in the English Internet version. To review these updates, click **Information Updates** under IBM i 7.3 in the IBM Knowledge Center.

Access the Internet version. The instructions refer you to several sources:

- The [Installing, upgrading, or deleting IBM i and related software](#) topic in the IBM Knowledge Center contains software preinstallation information and information about installing or upgrading the operating system release, part of the release, or related licensed programs. You can also order a printed version of this PDF (SC41-5120) with your software upgrade orders or new hardware orders.
- The Preventive Service Planning (PSP) Information provides information about software problems you might encounter as you install the new release. To access the PSP database:

1. Go to **Roadmap to IBM i Preventive Service Planning Documentation** at <https://www-01.ibm.com/support/docview.wss?uid=nas8N1021657>.
2. Scroll down and select **IBM i 730 PSPs**

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 installing IBM i 7.3 is SF98190.

The information within this PSP describes late-breaking installation information, and is grouped by product area. To receive this PSP information by using electronic customer support, type the following command on an IBM i command line:

SNDPTFORD SF98190

- The PSP identifier for information that pertains to problems discovered since the availability of the current cumulative PTF package is SF98730. Information within this PSP describes all PTFs released since the current cumulative PTF package began shipping. It also contains information about all known high-impact and pervasive problems that are not included in the latest cumulative PTF package. To receive this PSP information by using electronic customer support, type this command on an IBM i command line:

SNDPTFORD SF98730

- The PSP identifier for information that pertains to installing IBM i 7.3 hardware and HMC is MF98730. Review this PSP information before you install either new IBM i models or hardware devices. To receive this PSP information by using electronic customer support, type this command on an IBM i command line:

SNDPTFORD MF98730

- The PSP identifier for information that pertains to system upgrades and data migrations is SF98196. Information within this PSP describes upgrade and migration corrections. Review this PSP information before you upgrade your system model or migrate your data between systems. To receive this PSP information by using electronic customer support, type the following command on an IBM i command line:

SNDPTFORD SF98196

- The IBM i PTF maintenance strategy. A PTF maintenance strategy is recommended for all IBM i customers. This might reduce the impact to IBM i operations that result from unplanned outages or program failures.

Required PTFs before you upgrade to IBM 7.3

PTFs might be required before you upgrade to 7.3

As you plan for your IBM 7.3 installation or upgrade, ensure that you review the "Required PTFs for upgrading to IBM 7.3" topic within the IBM i and Related Software section of the IBM developerWorks® wiki.

To review the "Required PTFs for upgrading to IBM i 7.3", go to the wiki using the following link: <https://www.ibm.com/support/pages/node/1115967/> and select Updates and PTFs.

If you are upgrading from IBM i 7.1, for example, you need to load and apply certain PTFs to be able to accept online software agreements. If you are using image catalogs to upgrade from either IBM i 7.1 or IBM i 7.2 certain PTFs are required. Both of these preparation steps are included in the Installing, upgrading, or deleting IBM i and related software IBM Knowledge Center topic.

Upgrade planning

Documentation resources important to consult before you upgrade:

The Systems Management Planning web page <https://www.ibm.com/support/pages/node/668131> provides links to various planning tools and information.

The IBM i mapping web page <https://www.ibm.com/support/pages/node/6023368> lists operating system support by model.

On the Planning web page <https://www.ibm.com/support/pages/node/668155>, select Upgrade Planning and then Future Software/Hardware. Follow the link to Software for advanced planning information including BOSS option, LPP and LPP option availability changes.. Check this information and use it to plan future solutions for enhancements, upgrades, or migrations.

IBM i 7.3 is not supported on POWER6 systems

POWER® 6 systems will not support IBM i release 7.3:

- POWER6® BladeCenter models JS12, JS22, JS23, JS43 (7998-60X, 7998-61X, 7778-23X)
- POWER6 Power 520, 550, 560, 570, 595 (9407-M15, 9408-M25, 8203-E4A, 8261-E4S, 9409-M50, 8204-E8A, 8234-EMA, 9406-MMA, 9117-MMA 9119-FHA)

Minimum partition memory required for POWER9

For POWER9 or POWER9 compatibility mode, the minimum partition memory required to IPL and IBM i partition is 1 GB. The recommended minimum partition memory for an IBM i partition is 2 GB.

IBM i 7.3 is not supported on POWER7 BladeCenter or POWER7/ POWER7+ IBM Flex system compute nodes

IBM i 7.3 is not supported on:

- IBM Flex System™ p260 and p460 Compute Nodes for POWER7® or POWER7+ will not support IBM i release 7.3 (7895-22X , 7895-42X, 7895-23X, 7895-23A, 7895-43X, 7954-24X)
- IBM BladeCenter® PS700, PS701, PS702, PS703 or PS704 will not support IBM i release 7.3 (8406-70Y, 8406-71Y, 7891-73X, 7891-74X)

Plan for your Operations Console installation or upgrade

The console features matching the connectivity that you plan to use should be specified as part of the order for your new IBM i or Power system.

LAN attached Operations Console prerequisite information

Prerequisite information for LAN attached Operations Console users who are upgrading to, or installing, IBM i 7.3:

The service tool server which includes LAN console is removing support for SSL V3 ciphers which means the LAN console feature in the 7.1 IBM i Access for Windows client is no longer supported in 7.3. IBM i Access Client Solutions is now required for LAN console in 7.3. IBM i Access Client Solutions, which is shipped with the system, should be installed on your PC before installing the License Internal Code (LIC) on the IBM i. The LAN console feature in IBM i Access Client Solutions can connect to any supported IBM i release.

Note: The LAN console feature in the IBM i Access for Windows client will work for a D-mode install because SSL ciphers aren't used during the D-mode IPL but on the following A-mode IPL the IBM i Access for Windows LAN console will fail to connect. The IBM i Access for Windows client does not need to be removed from the PC but be aware the IBM i Access for Windows console will not continue working if the system is upgraded to 7.3.

If you are upgrading to 7.3 and you want to replace an existing console with a LAN attached Operations Console, upgrade the system before you migrate the console. This prevents any conflict between the existing console and the Operations Console.

For all upgrades and installations, you need to establish a connection between the system and the Operations Console PC using the 11111111 (eight 1's) service tools user ID. The default password for this user ID is 11111111; however, this password might have been changed following a previous installation. This default user ID ensures a successful re-authentication of the client connection to the system. When you receive the operating system release upgrade, the shipped service tools user IDs are expired. To re-authenticate the client connection to the system, enter the service tools user ID of 11111111 (eight 1's) and either the default password of eight 1's or the password you might have previously created for this user ID. This is especially important for automatic installations.

Important: During a manual IPL of the system, if no console has been specified before, you will receive two extra screens to confirm the setting of the console type. The first requires pressing F10 to accept your current console type and the second shows that a value did not previously exist (a zero is present for the old value) and the new value is shown. Pressing Enter exits and sets the console type automatically. The IPL continues to the IPL or Install the System screen. This condition is most likely to occur during the installation of a new partition but might happen on your first manual IPL of 7.3; for example, the A-mode IPL following the restore of Licensed Internal Code during the upgrade or install when a console value of zero is found.

IBM i operating system

This section describes changes to the IBM i operating system and its functions. Changes to systems management functions, such as configuring and tailoring the system, are also included.

Programming Considerations

Release to release programming considerations.

Output file(OUTFILE) changes

Release to release Output file(OUTFILE) considerations

Applications using LVLCHK(*YES) might be affected by changes to IBM-supplied system output files in this release. IBM commands and APIs that generate database output files might add new fields to the end of record formats, or use all or part of existing reserved fields for additional information returned each release. Adding new fields to the record format, even to the end of the record, changes the level check value for the file. This might cause an application with LVLCHK(*YES) to fail with a level check error. If a level check error does occur, review the application to determine which system file it uses. New fields have been added to IBM-supplied database files in each release of IBM i.

Output(*PRINT) changes

Release to release Output(*PRINT) considerations

Applications specifying OUTPUT(*PRINT) to generate spooled output from commands must be able to tolerate changes to the record layout in the spooled file. From release to release, commands that support that option can add, change, or remove records from the output. Any application that has a dependency on the record layout for a specific command might have to change.

Security audit record changes

Release to release Security audit record considerations

Changes made to security auditing for this release might affect applications that read those audit records. Actions that were not audited in previous releases might now be audited. Existing audit records might 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 might 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

Release to release considerations for programs that use customized version of IBM-supplied commands

Some IBM i functions that use IBM-supplied control language (CL) commands that are not library-qualified in this release might 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 retrieve command exit point (QIBM_QCA_RTV_COMMAND) or the change command exit point (QIBM_QCA_CHG_COMMAND) that allows your exit program to get control and possibly change the command that is used.

Changes to system printer files and other IBM-supplied objects

Release to release considerations for possible changes to system printer files and other IBM-supplied objects

The **MAXRCDS** parameter for **QSYSPRT** and **QPSAVOBJ** printer device files has always defaulted to 100000. During an upgrade, the default value has not changed for system printer files. Customization of IBM-supplied printer files is lost on a release upgrade. To preserve those changes, you need to rerun your changes to printer system files each release.

Changes to many types of IBM-supplied objects are lost during an upgrade because the copy of the object in the IBM product library is replaced by the new copy of the object.

Programs that use the Common I/O Feedback Area

The Write operation count, Read operation count, Write-read operation count, and current block count fields in the Common I/O Feedback area have been changed from a Binary 4 field to an Unsigned binary 4 field. Applications that use these fields should be modified to accommodate the changed fields.

Changes to CL commands sending messages to *EXT

IBM i CL commands document Escape messages that occur, but other messages issued are not documented.

Diagnostic messages may accompany these messages to provide additional information. Messages reflecting run-time activities or status are also occasionally issued.

These information, status, and diagnostic messages are not documented and can be issued to the joblog, QSYSOPR, QHST, and *EXT. The type and location of these messages occasionally change to support new function at a release boundary or via PTF.

Customer programs written to retrieve the info, status, or diagnostic messages issued by CL commands may be required to be modified when the CL commands are changed. Unless the changes are related to Escape messages that are normally documented for the CL command, the changes are not always documented specifically by an update to the Memo to Users (MTU) or in a PTF cover letter.

Planning for removal of support of adapters and configurations for releases following V7R3 of IBM i

Removal of commands supporting native SNA adapters:

Software support for these adapters will be removed. Hardware support for these adapters was withdrawn in prior releases. Software alternatives, such as Enterprise Extender for SNA, do not support these configurations. Affected configurations include SNA FAX, Finance, Retail and Remote workstation configurations.

Removal of support for DDI, Token-Ring, Wireless, Frame Relay, SDLC, TDLC, and X.25 protocols:

Software support for these protocols is being removed. Hardware support for these protocols was withdrawn in prior releases.

Removal of Network Interfaces configurations:

Software support for these adapters is being removed. Hardware support for these adapters was withdrawn in prior releases.

Removal of AnyNet[®] configurations:

Software support for AnyNet will formally be removed.

AnyNet was no longer supported in V7R1. Users should start to move to Enterprise Extender before upgrading to the new release.

For information on moving from AnyNet to Enterprise Extenders view the topic in the Knowledge Center: http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/rzajt/rzajtanytoee.htm

Allow write during save for directories

In previous releases, the "Allow write during save", or ***ALWCKPWRT**, attribute did not apply to directories. Users were restricted from linking, unlinking, or renaming objects in a directory while it was being saved. In this release, this attribute now applies to directories and the value of the ***ALWCKPWRT** attribute can be changed for directories as well as stream files. If the **SAV** command is specified with **SAVACTOPT(*ALL)** or **SAVACTOPT(*ALWCKPWRT)**, and the attribute value for a particular directory is "Yes", then objects can be linked, unlinked, or renamed in that directory while it is being saved. The value for any previously existing directory is "No", but the attribute value for any new directories is governed by the "Inherit allow checkpoint writer", or ***INHCKPWRT**, attribute of the new directory's parent directory. This could lead to a situation where some directories in a directory tree can not be changed during a save, but other directories in that tree could be changed during the save. To prevent this situation, you might wish to disable the inheritance of the ***ALWCKPWRT** attribute for directories. To disable the inheritance immediately, use the following program: **CALL PGM(QSYS/QP0FPTOS) PARM(*TRACE17ON)**. Used in this manner, the disablement of allow checkpoint writer will last until the next IPL. To automatically disable inheritance at each IPL, use the following command: **QSYS/CRTDTAARA DTAARA(QUSRSYS/QP0FTRC17) TYPE(*CHAR) LEN(1)**. To re-enable the inheritance immediately, use **CALL PGM(QSYS/QP0FPTOS) PARM(*TRACE17OFF)**. To stop automatically disabling inheritance at each IPL, use **QSYS/DLDTAARA DTAARA(QUSRSYS/QP0FTRC17)**.

API changes

Release to release API changes

Client Management Support APIs have been deprecated

The Client Management Support APIs have been deprecated and will be removed in a future release. It is recommended that applications use the **QIBM_QZCA_SNMPTRAP** exit point to detect new clients and the **snmpGet_v3()**, **snmpGetbulk_v3()**, and **snmpGetnext_v3()** APIs to retrieve client information. The deprecated APIs are **QZCAADDC**, **QzcaAddClient**, **QzcaGetClientHandle**, **QZCAREFC**, **QzcaRefreshClientInfo**, **QZCARMVC**, **QzcaRemoveClient**, **QZCAUPDC**, and **QzcaUpdateClientInfo**.

Get Attributes Qp01GetAttr() API output change

A number of problems were found in the output of the **Qp01GetAttr()** API in previous versions. Some programs could be coded consistent with the documentation but receive inconsistent results if they did not provide an output buffer large enough to hold all the requested attributes. In some cases, incomplete attribute entries placed in the output buffer would contain incorrect or misleading information that could cause some applications to reference storage that was not initialized by the API. The behavior of the API was changed to ensure consistent results regardless of the input. First, the minimum value of the **Buffer_Size_Provided** parameter is now 4 bytes. Second, if an application does not provide an output buffer large enough to hold all of the requested attribute entries, only complete attribute entries will be placed in the output buffer, including the bytes required to pad each attribute entry to an 8-byte boundary. This behavior change could cause some applications to fail to retrieve attribute entries that they currently retrieve. These applications must change to provide a buffer large enough to hold the entire attribute entry, including the pad bytes, even if they only wish to use a small part of the attribute entry data.

Retrieve Space User Data QbnRetrieveSpaceUserData API Message changes

PTFs for releases 7.1 and 7.2 introduced a new API QbnRetrieveSpaceUserData, to be used with the compiler preprocessor APIs. Some of the messages issued by QbnRetrieveSpaceUserData for release 7.3 differ from the messages issued in releases 7.1 and 7.2. The following three error messages replace the CPF9898 error messages signalled in previous releases:

1. CPF5CB0 - 'Constituent module &1 not found.' replaces CPF9898 - Specified module not found in program.
2. CPF5CB1 - ' *USERDATA not found in object &1 type &3 in library &2.' replaces CPF9898 - *USERDATA not found.
3. CPF5CF5 - '&1 in library &2 not bound program.' replaces CPF9898 - Specified program is not a bound program.

Change to limit terminated child process table entries

An application that uses ILE spawn() or PASE fork() to create child processes is responsible for removing process table entries when child processes terminate (using waitpid or an equivalent). Process table entries for terminated processes are sometimes known as "zombies" or "defunct processes". If an application doesn't remove zombies, the system does the work when the parent process ends. An excessive number of zombies can negatively impact the performance of all process table operations, and cause termination of the parent process to take a long time (many minutes).

System support is changed in IBM i 7.3 to fail child process creation (returning errno ENOMEM to ILE spawn() or PASE fork()) if the parent process has more than about 50,000 zombies. Unless the application is changed to remove zombies (using waitpid or an equivalent), the application (parent process) must be terminated and restarted to create additional child processes. With this limit, system cleanup of zombies typically adds no more than a few seconds to process termination.

IBM i command changes

Release to release IBM i command changes

Commands that have been changed by applying PTFs, might fail to compile with a CPD0043 when TGTRLS is not the current release

If a compile fails with CPD0043 - Keyword &2 not valid for this command message, and a previous release using the **TGTRLS** parameter was specified, it's probable that the command in the current release has been changed by an applied PTF. Copy the command from the current release into the library for previous release specified. QSYSVxRxMx and retry the compile.

Authorization list links preserved for objects in QSYS

The Save System **SAVSYS** and Save Security Data **SAVSECDDTA** commands will now save an internal list of objects in library QSYS that are linked to authorization lists. This will increase the duration of the **SAVSYS** and **SAVSECDDTA** commands.

The Restore User Profile **RSTUSRPRF USRPRF (*ALL)** and **RSTUSRPRF USRPRF (*NEW)** commands will restore the internal list.

The Restore Authority (**RSTAUT**) command will link the objects in library QSYS to the authorization lists if they are not already linked.

ADDUSRSNMP command changes

Add User for SNMP (**ADDUSRSNMP**) **PVYPCL** parameter change

The default value for the Privacy protocol (**PVYPCL**) parameter of the Add User for SNMP (**ADDUSRSNMP**) command will be changed from ***CBCDES** to ***CFBAES**. The CFB128-AES-128 protocol provides better data privacy than CBC-DES and should be used whenever possible.

CHGTCPIFC and ADDTCPIFC command changes

Change TCP/IP Interface (**CHGTCPIFC**) and Add TCP/IP Interface (**ADDTCPIFC**) parameter changes.

Parameter validation for the Change TCP/IP interface (**CHGTCPIFC**) and the Add TCP/IP interface (**ADDTCPIFC**) commands has been corrected and synchronized with support already present in IBM Navigator for i. This change corrects TCP interface command validation for configurations that should not have been allowed. Existing, invalid TCP/IP configurations are not automatically corrected. IBM i operating system code will tolerate and ignore a subset of the invalid configurations, while in other cases the invalid configurations may result in unpredictable behavior.

The TCP263D and TCP2652 diagnostic messages have been updated to reflect the enforcement of parameter values.

CL programs that may have been used to script the addition or change of TCP interfaces using these commands may no longer function when this new command validation is performed and may require changes.

PRTPUBAUT and PRTPVTAUT command changes

The first time the Print Public Authority (**PRTPUBAUT**) command or Print Private Authority (**PRTPVTAUT**) commands are run on IBM i 7.3 for a "root" (/), QOpenSys, or user-defined file system object type, a changed report may not be generated even when changed data exists. The file ID field, GFIID, in model file QASECGFI is now tagged with CCSID 65535 so that no CCSID conversion will be done on this field. Data existing prior to 7.3 had the GFIID field converted to job CCSID. On the first request for a changed report in 7.3 the previously converted job CCSID file ID and the un-converted file ID may no longer match. If they do not match then a change report will not be generated. After the first run of the command the un-converted file ID will be stored so subsequent running of the command will produce the appropriate changed report.

RADBKP command has been deprecated

The Restore APAR Data (**RADBKP**) command has been deprecated and will be removed in a future release. The Restore APAR Data (**RSTAPARDTA**) command, which provides identical function, should be used instead.

CP (User Profile Change) security audit journal entry

The CP audit journal entry will now log all the parameter values on the Create User Profile (**CRTUSRRPRF**) command except for the **TEXT** and **AUT** parameters. It will also log all the specified parameter values on the Change User Profile (**CHGUSRPRF**) command except for the **TEXT** parameter.

Database changes

Release to release Database changes that should be considered

New SQL reserved words and schema names

As the SQL language support for DB2® for i is extended, the lists of reserved words and schema names in Appendix I of the SQL Reference is updated. The new reserved words and schema names are not mentioned in the MTU, but the lists should always be reviewed when moving to a new release.

The lists in Appendix I can be referenced here: http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/db2/rbafzresword.htm

Using reserved words as correlation names

With IBM i 7.3 PTF SI67936, the use of reserved words as a table correlation name became more restrictive. The table correlation name is the identifier that follows a table name, table function, nested table expression, among others that can be used to qualify columns returned from the table.

To identify static SQL statements that might contain this problem, run a query like the following. This example is looking for the reserved word INNER when it is not used as join syntax.

```
SELECT b.statement_text, a.system_program_name, a.program_type
FROM qsys2.sysprogramstat a INNER JOIN
     qsys2.sysprogramsttstat b ON a.program_schema = b.program_schema AND
                                a.program_name = b.program_name AND
                                a.module_name = b.module_name
WHERE a.program_schema = 'MYLIB' AND
      b.statement_text LIKE '%INNER%' and b.statement_text NOT LIKE '%INNER JOIN%'
```

SQE now default for Native queries

As in previous releases, IBM® i 7.3 extends SQE to handle more queries, in this case native queries processed outside of the SQL interfaces.

In IBM i 7.3, there is a **QAQQINI** control called **SQE_NATIVE_ACCESS** with a default value of *YES. When *YES is used, the SQL Query Engine (SQE) attempts to run the query. If SQE is unable to process the query, the query is run using the Classic Query Engine (CQE). When **SQE_NATIVE_ACCESS** is changed to *NO, CQE is used first and SQE is only used when CQE is unable to run the query.

The **SQE_NATIVE_ACCESS** control value *NO should only be used temporarily by clients to give clients a means to easily and temporarily revert behavior back to CQE, if a behavior change or functional problem related to the Native Query support in SQE is encountered.

IBM i intends to remove the **SQE_NATIVE_ACCESS** control in the release after IBM i 7.3.

CREATE FUNCTION (SQL table) can return a new warning: SQLSTATE '01652' and SQLCODE +20159

In IBM i 7.3, in some cases, a CREATE FUNCTION (SQL table) will return a warning where unqualified success used to be returned. Instead of SQLSTATE of '00000' and SQLCODE = 0, CREATE FUNCTION (SQL table) may return an SQLSTATE of '01652' and SQLCODE +20159. The SQLSTATE '01652' warning indicates that the table function is eligible to be inlined and includes some attributes that would be ignored if the function were inlined into a query.

The warning indicates that the following attributes are ignored when a table function is inlined:

- CONCURRENT ACCESS RESOLUTION USE CURRENTLY COMMITTED or WAIT FOR OUTCOME
- SET OPTION CONACC = *CURCMT or *WAIT
- SET OPTION COMMIT = *CS or *ALL or *RR

CREATE FUNCTION (SQL scalar) or CREATE FUNCTION (SQL table) with a data access classification of CONTAINS SQL may fail with SQLSTATE '2F004' and SQLCODE -579

In IBM i 7.3 with PTF SI63583, in some cases, a CREATE FUNCTION (SQL scalar) or CREATE FUNCTION (SQL table) with a data access classification of CONTAINS SQL will return an error where unqualified success used to be returned. Instead of SQLSTATE of '00000' and SQLCODE = 0, CREATE FUNCTION (SQL scalar) or CREATE FUNCTION (SQL table) may return an SQLSTATE of '2F004' and SQLCODE -579. The

SQLSTATE '2F004' error indicates that reading SQL data is not permitted within the scalar function or table function. If the scalar function or table function returns a query, the function must have a data access classification of READS SQL DATA or MODIFIES SQL DATA. It cannot have a data access classification of CONTAINS SQL.

To determine whether you have this exposure, query the QSYS2/SYSROUTINES table:

Example:

```
SELECT *
FROM QSYS2.SYSROUTINES
WHERE (SQL_DATA_ACCESS = 'CONTAINS' AND
ROUTINE_TYPE = 'FUNCTION' AND
ROUTINE_BODY = 'SQL') AND
(FUNCTION_TYPE = 'T' OR
FUNCTION_TYPE = 'S') AND
(UPPER(ROUTINE_DEFINITION) LIKE '%SELECT%' OR
UPPER(ROUTINE_DEFINITION) LIKE '%UNION%')
```

To execute this query, you will need to make sure the job CCSID is set to a value other than 65535. Examine the contents of the ROUTINE_DEFINITION column for all returned routines. If the routine returns a query, the function should have its data access changed from CONTAINS SQL to either READS SQL DATA or MODIFIES SQL DATA to create successfully.

DROP SCHEMA CASCADE

Prior to IBM i 7.3, the SQL statement DROP SCHEMA CASCADE processing includes sending a CPA7025 inquiry message for each journal receiver in the schema. In 7.3, the inquiry message(s) will no longer be sent when the CASCADE keyword is specified on the DROP SCHEMA statement.

When DROP SCHEMA CASCADE is used, any QIBM_QJO_DLT_JRNRCV registered exit programs will not be called when the journal receivers are deleted.

CASCADE processing is not part the default behavior, so when DROP SCHEMA <schema-name> is used, there is no change in behavior.

QSYS2.JOBLOG_INFO User Defined Table Function (UDTF)

In IBM i 7.3, the size of the MESSAGE_TOKENS columns was increased in the QSYS2.JOBLOG_INFO() UDTF. By modifying this UDTF, any customer views which reference the UDTF are left in an unusable state.

An attempt to query the view when its in this unusable state will fail with SQL0443, preceded by CPF503E, CPF426A and MCH3601 failure messages.

Customers need to review their views to determine if they have any references to this UDTF. Any views that reference the UDTF need to be recreated after upgrading to IBM i 7.3.

To locate the views with this dependency, execute the following query:

```
SELECT VIEW_SCHEMA, VIEW_NAME, A.* FROM QSYS2.SYSVIEWDEP A
WHERE OBJECT_TYPE = 'FUNCTION' AND OBJECT_NAME = 'JOBLOG_INFO' AND
OBJECT_SCHEMA = 'QSYS2' AND VIEW_SCHEMA NOT IN ('QSYS2', 'SYSIBMADM');
```

An easy way to recreate the view is to use System i® Navigator's Generate SQL feature, choosing the OR REPLACE option. After the SQL is generated, simply execute the statement.

QSYS2.OBJECT_STATISTICS User Defined Table Function (UDTF)

In IBM i 7.3, many new result columns were added to the QSYS2.OBJECT_STATISTICS() UDTF. By adding columns to this UDTF, any customer views which reference the UDTF are left in an unusable state.

An attempt to query the view when its in this unusable state will fail with SQL0443, preceded by CPF503E, CPF426A and MCH3601 failure messages.

Customers need to review their views to determine if they have any references to this UDTF. Any views that reference the UDTF need to be recreated after upgrading to IBM i 7.3.

To locate the views with this dependency, execute the following query:

```
SELECT VIEW_SCHEMA, VIEW_NAME, A.* FROM QSYS2.SYSVIEWDEP A
WHERE OBJECT_TYPE = 'FUNCTION' AND OBJECT_NAME = 'OBJECT_STATISTICS' AND
OBJECT_SCHEMA = 'QSYS2' AND VIEW_SCHEMA NOT IN ('QSYS2', 'SYSIBMADM');
```

An easy way to recreate the view is to use System i Navigator's Generate SQL feature, choosing the OR REPLACE option. After the SQL is generated, simply execute the statement.

OBJECT_STATISTICS() table function changes for *USRPRF objects

In IBM i 7.3 with PTF SI74661, the QSYS2/OBJECT_STATISTICS() table function has been modified to only return result rows for user profiles to which the user has some authority (authority other than *EXCLUDE).

With this change, any views which use the QSYS2/OBJECT_STATISTICS() table function to list user profiles may have different results than it would have had before this change. This includes the following views:

- QSYS2.AUTHORITY_COLLECTION
- QSYS2.AUTHORIZATIONS
- QSYS2.GROUP_PROFILE_ENTRIES
- QSYS2.OBJECT_LOCK_INFO
- QSYS2.OBJECT_OWNERSHIP
- QSYS2.OBJECT_PRIVILEGES
- SYSIBM.AUTHORIZATIONS

This is not a complete list, but is representative of the types of views that may change behavior.

If it is desired for result rows to be returned for all user profiles, the QSYS2/OBJECT_STATISTICS() table function should be called by a user with *ALLOBJ special authority or a user which is authorized to the Database Security Administrator function of IBM i (QIBM_DB_SECADM).

LOCATE scalar function argument change

In IBM i 7.1 with PTF SI58004, IBM i 7.2 with PTF SI57943, and IBM i 7.3, the LOCATE scalar function no longer accepts a negative value or 0 for the 3rd argument.

- Prior to this change, the LOCATE scalar function allowed a negative value or 0 for the 3rd argument and produced the same result as if a value of 1 was specified.
- After this change, the LOCATE scalar function no longer accepts a negative value or 0 for the 3rd argument. An SQL0138 - Argument *N of substringing function not valid will now be signalled.

This behavior change applies to any dynamically executed SQL and to any embedded SQL within a program, view, trigger, or other object that uses the LOCATE scalar function after applying PTFs on IBM i 7.1 or 7.2 or moving to IBM i 7.3.

SQL scalar user-defined function (UDF) with routine body containing BEGIN ATOMIC changes

In IBM i 7.3, simple SQL scalar user-defined functions (UDFs) that get created with a routine body containing BEGIN ATOMIC will now be a candidate to be inlined for performance reasons into a query that references it. Previously, this reference prevented the UDF from being inlined.

- In releases before IBM i 7.3, simple SQL scalar user-defined functions (UDFs) that got created with a routine body containing BEGIN ATOMIC were never inlined into a query that references it.

- In IBM i 7.3, simple SQL scalar user-defined functions (UDFs) that get created with a routine body containing BEGIN ATOMIC will now be a candidate to be inlined into a query that references it.

This behavior change applies to any dynamically executed SQL and to any embedded SQL within a program, view, trigger, or other object that uses a simple SQL scalar user-defined function that is recreated after moving to IBM i 7.3.

To get the prior behavior, recreate the UDF with the NOT DETERMINISTIC (default) attribute.

SQL scalar user-defined function (UDF) with FENCED attribute changes

In IBM i 7.3, simple SQL scalar user-defined functions (UDFs) that get created with the FENCED attribute might not get inlined for performance reasons into a query that references it. Previously, this attribute did not prevent the UDF from being inlined.

- Without this change, simple SQL scalar user-defined functions (UDFs) that got created with the FENCED attribute were not prevented from being inlined into a query that references it due to this attribute.
- With this change, simple SQL scalar user-defined functions (UDFs) that get created with the FENCED attribute now might not be inlined into a query that references it, depending on authority characteristics.

This behavior change applies to any dynamically executed SQL and to any embedded SQL within a program, view, trigger, or other object that uses a simple SQL scalar user-defined function that is rebuilt after moving to IBM i 7.3.

To get the prior behavior, recreate the UDF with the NOT FENCED attribute.

TIMESTAMP_FORMAT scalar function can return SQLSTATE '22007' and SQLCODE -20448

In IBM i 7.3, the TIMESTAMP_FORMAT scalar function has been changed to enforce a failure when the string-expression contains numbers that do not have a corresponding element in the format-string. Prior to this change, the usage was permitted. After this change, the query will fail with SQ20448 and will be preceded by a CPF426B message with reason code: 13 -- The timestamp string can not be interpreted by the format string specified.

Note that TO_DATE and TO_TIMESTAMP are synonyms for TIMESTAMP_FORMAT. To overcome the failure, change the TIMESTAMP_FORMAT usage to have a compatible string-expression and format-string.

FULL OUTER JOIN change

In IBM i 7.3 with SI63877, the implementation of a query containing a FULL OUTER JOIN has changed. When a FROM clause contains a table followed by a comma prior to the FULL OUTER JOIN, the query will now be executed according to the SQL standard.

Prior to this PTF a query like this:

```
Select * from T1, T2 FULL OUTER JOIN T3 on t2.col1 = t3. col2
```

was incorrectly implemented like this:

```
Select * from (T1 CROSS JOIN T2) FULL OUTER JOIN T3 on t2.col1 = t3. col2
```

With this PTF, it will now be implemented correctly, like this:

```
Select * from T1 CROSS JOIN (T2 FULL OUTER JOIN T3 on t2.col1 = t3. col2)
```

References to T1 were correctly disallowed in the join condition prior to this PTF, so no errors will be issued due to this change.

SYSTOOLS.GROUP_PTF_CURRENCY/SYSTOOLS.GROUP_PTF_DETAIL changes

The IBM Preventative Service Planning (PSP) team has relocated the XML feeds that provide details about IBM i PTF Groups. Due to that transition, two popular IBM i Services (SYSTOOLS.GROUP_PTF_CURRENCY and SYSTOOLS.GROUP_PTF_DETAILS) have been rebuilt to use the new XML feeds. Once the previous XML feeds are disabled, queries to these services will fail with SQLCODE -4302 and SQLSTATE '38000'.

To avoid having a disruption in the use of these services, the following HIPER PTFs have been created to deliver the necessary changes to SYSTOOLS.GROUP_PTF_CURRENCY and SYSTOOLS.GROUP_PTF_DETAILS.

- PTF '5770SS1 V7R1M0 SI62612'
- PTF '5770SS1 V7R2M0 SI62620'
- PTF '5770SS1 V7R3M0 SI62621'

If TCP/IP was configured to enable access to the previous XML feed (129.42.160.32), the IP address corresponding to the new XML feed should be enabled. The new XML feed varies by geography.

1. ping www.ibm.com - to determine the IP address servicing your geography
2. Configure TCP/IP access to the IP address returned in step 1. See this technote for details on how to configure TCP/IP. <http://www-01.ibm.com/support/docview.wss?uid=nas8N1018980>

SYS2.PTF_INFO and SYSTOOLS.GROUP_PTF_DETAILS view changes

In IBM i 7.3, the QSYS2.PTF_INFO and SYSTOOLS.GROUP_PTF_DETAILS views introduced incompatible changes.

- The PTF_LOADED_STATUS column value of SUPERCEDED has been changed to SUPERSEDED
- The PTF_SUPERCEDED_BY_PTF column has been renamed to PTF_SUPERSEDED_BY_PTF

Any use of the previous column name will surface as an SQL0206 - Column or global variable &1 not found exception. If the column value is used in a query, incorrect results will likely be returned. To overcome the failure, adjust the SQL to use the revised names.

Workload Capping and SMP degree *OPTIMIZE change

When DB2 Symmetric Multiprocessing (SMP) is used with a value of *OPTIMIZE, the query optimizer calculates the maximum degree that can be used based on the number of processing units that are assigned to the partition. The conversion formula is that 100 units is equivalent to 1 whole processor. When workload capping was in effect, the optimizer was incorrectly multiplying the workload capping value by the number of SMT threads supported for the processor and then using the smaller of the number of whole processors and the calculated workload capping threads. To be consistent with how the degree is calculated for *OPTIMIZE, the optimizer will now use the smaller of the specified workload capping value and the number of whole processors. The number of SMT threads is no longer considered for *OPTIMIZE. The workload capping calculations for SMP of *MAX and *NBRTASKS are unchanged and include the number of SMT threads per processor.

DISPLAY_JOURNAL() table function changes

The QSYS2/DISPLAY_JOURNAL() table function and related System i Navigator Journal Viewer support has been changed to recognize the use of ROW ACCESS CONTROL and COLUMN ACCESS CONTROL. Database file record changes (journal entries of journal code R) are logged in a data journal. When DISPLAY_JOURNAL() or View Entries is used to access the database file record detail in those journal entries, DB2 for i will detect whether ROW ACCESS CONTROL or COLUMN ACCESS CONTROL exists and is activated for the target file. If Row and Column Access Control (RCAC) is active, the rule text logic within the Row Permission and/or Column Mask will be applied before returning the data to the user.

OVRDBF does not apply to CREATE TABLE AS (select)

In IBM i 7.3 with SI60199, the CREATE TABLE statement with an AS clause is changed such that it is no longer affected by the Override with Data Base File (**OVRDBF**) command.

Data Definition Language (DDL) statement documentation correctly describes this behavior, but the CREATE TABLE statement was mistakenly honoring the override.

Any CREATE TABLE AS statements that depend on an override need to be redesigned in order to reference the intended tables. Using an SQL Alias is an alternative technique for implementing redirection.

Previous Behavior:

OVRDBF FILE(MYTABLE) TOFILE(LIB2/YOURTABLE)

```
CREATE TABLE TEST1 AS (SELECT * FROM MYTABLE) WITH DATA;
```

TEST1 incorrectly referenced LIB2/YOURTABLE.

Alternative Solution:

```
CREATE OR REPLACE ALIAS MYTABLE FOR LIB2/YOURTABLE;
```

```
CREATE TABLE TEST1 AS (SELECT * FROM MYTABLE) WITH DATA;
```

With the Alias established, TEST1 uses LIB2/YOURTABLE.

SQE changed to hold jobs when query related temporary storage exceeds MAXTMPSTG

SQE queries allocate temporary storage charged to a shared bucket (Bucket number: 8; Global Bucket Name: *DATABASE Segment Cache), because the created objects may be shared across jobs when other users or jobs execute a query.

By attributing the temporary storage to a shared bucket, it is difficult to identify jobs that are causing an over-consumption of temporary storage.

Traditionally, administrators would protect against over-consumption by utilizing the Maximum temporary storage (MAXTMPSTG) limit set in the job or class.

PTFs MF64447, MF64448, MF64449, MF64450, SI66499 and SI66500 contain new support that will enforce a MAXTMPSTG parameter value other than *NOMAX during the execution of SQE queries. SQE storage charging will continue to be assigned to the *DATABASE Segment Cache bucket. However, if the amount of free space in SYSBASE falls below the Auxiliary storage lower limit (QSTGLOWLMT) system value, SQE will enforce the MAXTMPSTG value. When the amount of temporary storage charged to the job plus the storage allocated by the query exceeds the MAXTMPSTG value, the job will be held and a CPI112E message sent will be sent to the QSYSOPR message queue.

This enforcement will not occur when MAXTMPSTG is set to *NOMAX.

SQL JSON functions duplicate key handling change

In IBM i 7.3 with PTFs SI67886 and SI67816, the handling of duplicate keys in JSON functions has changed.

The JSON_TABLE, JSON_QUERY, JSON_VALUE, and JSON_TO_BSON functions will now tolerate documents containing duplicate key values and will process one of the values.

The default behavior of the JSON_OBJECT and JSON_OBJECTAGG functions has changed to allow generation of duplicate keys. A new clause has been added to the syntax, WITH UNIQUE KEYS or WITHOUT UNIQUE KEYS, to control whether keys generated by the function are enforced as unique. The default is WITHOUT UNIQUE KEYS.

Refer to the updated SQL Reference in the IBM Knowledge Center for more detail.

QSYS2.ASP_INFO view change

IBM i 7.3 PTF SI69172 contains support for a new value returned from the ASP_STATE column within the QSYS2.ASP_INFO view. The new value returned is FAILURE which indicates "The status of the ASP is failed."

QSYS2 SQL catalog files no longer restored with restore commands

In IBM i 7.3 with PTF SI71729, certain files in the QSYS2 library are not restored if they already exist. The following physical files in the QSYS2 library (in *SYSBAS or on an independent ASP) represent SQL catalog tables and are not restored if they already exist:

SQL Table Name	System File Name
SYSJARCONTENTS	SYSJARCONT
SYSJAROBJECTS	SYSJAROBJ
SYSPARMS	SYSPARMS
SYSROUTDEP	SYSROUTDEP
SYSROUTINES	SYSROUTINE
SYSSEQOBJECTS	SYSSEQOBJ
SYSTYPES	SYSTYPES
SYSVARIABLEDEP	SYSVARDEP
SYSVARIABLES	SYSVARS
XSRANNOTATIONINFO	XSRANNOTAT
XSROBJECTCOMPONENTS	XSROBJCOMP
XSROBJECTHIERARCHIES	XSROBJHIER
XSROBJECTS	XSROBJECTS

These physical files and any other logical files dependent on these physical files are not restored if the file already exists in the target library. The files are excluded from the restore. If one of these files must be restored from the save media, the target file must be deleted prior to the restore.

Prior to the application of the PTF, the QSYS2 SQL catalog tables would be restored which often caused SQL catalog problems.

SYSDISKSTAT extended to return each disk path

In IBM i 7.4 with Db2 for i PTF Group SF99704 Level 10 and IBM i 7.3 with Db2 for i PTF Group SF99703 Level 22, the QSYS2.SYSDISKSTAT IBM i Service was extended to return each disk path. If a disk unit has multiple resource names and *MULTIPLE_PATH_UNIT* is set to **YES**, a SQL query could return results that appear to be duplicate rows. These rows for one disk unit will have the same *UNIT_NUMBER*.

To avoid seeing the additional disk paths, use the **DISTINCT** clause.

To determine the unique path to each disk unit, include *RESOURCE_NAME* in the query .

Calls to SQLSetConnectAttr API may now return -1 with Message ID SQ99999

A call to SQLSetConnectAttr API with a null or missing required parameter was not flagged as an error until a subsequent call to SQLConnect. Now with IBM i 7.3 PTF SI75162 or IBM i 7.4 PTF SI75163, an error for an invalid parameter on the SQLSetConnectAttr API will be flagged on that call.

Parameter validation will be done to flag empty mandatory fields on the call to SQLSetConnectAttr. The new error shown for an invalid parameter on the SQLSetConnectAttr API is SQ99999 with error code 9: "Argument value not valid"

The previous error that would be issued from the SQLConnect call was SQL0104: Token <END-OF-STATEMENT> was not valid. Valid tokens: ? : USER CURRENT DEFAULT SYSTEM_USER.

Queries that compare a numeric value with blanks or an empty string will fail with SQLSTATE/SQLCODE '22023'/-302 or '53045'/-678

Previous to PTF SI76030 on IBM i 7.4 and PTF SI76035 on IBM i 7.3, a query that included an invalid comparison between a numeric value and blank(s) or a numeric value and an empty string would not result in an SQL failure.

Blank characters and empty strings are both incompatible with numeric values. Any such queries will now fail with SQLSTATE/SQLCODE: '22023'/-302 or '53045'/-678.

Change to authority required for registering Query Governor exit programs

In order to provide consistency with the Query Supervisor feature, the authority required to register programs for the Query Governor exit point has been changed with PTF SI75763 on IBM i 7.4 and with PTF SI75767 on IBM i 7.3.

To add or remove exit programs to the registration facility for the QIBM_QQQ_QUERY_GOVR exit point, ***ALLOBJ** special authority or **QIBM_DB_SQLADM** function usage is now required. Previously, both *ALLOBJ and *SECADM special authorities were required.

For more information about the Query Governor Exit Program, please see https://www.ibm.com/docs/en/i/7.3?topic=ssw_ibm_i_73/apis/xqrygovr.htm

Changes to the event file EVFEVENT

The following applies to event files created by commands other than the compile commands for C and C+.

- If the event file does not exist, it will now be created with a record length of 400. In earlier releases, the record length was 300.
- Some numeric values which usually have three digits in the event file, such as the position of an error message, may sometimes have values larger than 999. In this case the numbers will appear as 10-digit numbers in the event file. Note that the event file does not have a fixed layout, so you should not assume that any numeric value will have a fixed number of digits, or that any value will be at a fixed position in the record.

Integrated web application server changes

Support has been withdrawn for the integrated web application server (IAS) versions 7.1 and 8.1. Servers based on versions 7.1 and 8.1 will no longer run on IBM i 7.3. Applications running on unsupported versions of IAS will need to be redeployed to a more recent version of the server, preferably version 8.5 or newer.

Integrated web services server changes

Support has been withdrawn for the integrated web services (IWS) server versions 1.3 and 1.5. Servers based on versions 1.3 and 1.5 will no longer run on IBM i 7.3. Web services running on unsupported versions of the IWS server will need to be redeployed to a more recent version of the server, preferably version 2.6 or newer.

Web services can be copied from earlier versions of an IWS server to a more recent version by using the `saveWebServices.sh` and `restoreWebServices.sh` scripts located in the `/qibm/proddata/os/webservices/bin` directory. However, the WSDL for a web service on the latest IWS server has minor differences from the Web Services Description Language (WSDL) for versions 1.3 or 1.5 and thus you will need to send the WSDL to all clients that are using the SOAP service.

The integrated web services test client that allowed you to test SOAP web services has been removed.

Support for the QDFTJRN data area

Support for the QDFTJRN data area removed

Automatic journaling support using the QDFTJRN data area was introduced in i5/OS V5R3. In IBM i 6.1, this function was replaced by the Start Journal Library (**STRJRNLIB**) command. Support of the QDFTJRN data area will be withdrawn in a future release.

LDAP support changes

Vulnerable ciphers have been removed

In IBM i 7.3, vulnerable ciphers have been removed from the LDAP default list, including RC4-40-MD5, RC2-40-MD5, DES-56, RC4-128-MD5 and RC4-128-SHA. If an application depends on these ciphers, it will fail in 7.3. These vulnerable ciphers can be enabled using LDAP WebAdmin, IBM Navigator for i, or `ldapmodify` to change either the attribute `ibm-slapdSslCipherSpec` or the attribute `ibm-slapdSslCipherSpecs` of the entry `'cn=SSL, cn=Configuration'` to the correct values if they are temporarily required.

Attribute `ibm-slapdAllowAnon` default value has been changed

The default value of the attribute `ibm-slapdAllowAnon` has been changed from TRUE to FALSE in 7.3. An anonymous user is forbidden to connect to LDAP. If an anonymous user is allowed to connect to LDAP, the attribute should be manually changed to TRUE using LDAP WebAdmin, IBM Navigator for i, or `ldapmodify`.

Library Conversion

*LIB objects will be converted.

All libraries (*LIB objects) on the system will be converted. Conversion of libraries will be done automatically during installation of the operating system, on an IPL, and vary on of an independent auxiliary storage pool (IASP). Libraries that are created on a restore operation will be created using the new format.

No cleanup is required by users before install.

Machine Instruction changes

Release to release changes for Machine Instructions (MI).

Changes to Instructions that Convert Numeric Values

System support for the Copy Numeric Value instruction (**CPYNV[RBI]** and **LBCPYNV[R]**), the Convert Character to Numeric instruction (**CVTCN**), and the Convert Numeric to Character instruction (**CVTNC**) in

IBM i 7.3, is changed to correct defects, enhance support, and improve performance. Some error cases signal different exceptions than prior releases. Here are some examples:

- Conversions that specify an invalid data type or invalid field length (in source or receiver attributes) now reliably signal MCH5001 (Scalar Type Invalid) or MCH5002 (Scalar Attributes Invalid). Prior releases signaled MCH1202 (Decimal Data) for many of these errors.
- Conversions to decimal floating point with decimal rounding (**CPYNVR** and **LBCPYNR**) now signal MCH5001 (Scalar Type Invalid). Prior releases did the conversion using the rounding mode in thread computational attributes, and did not signal an exception.
- Conversions from negative signed binary to unsigned binary now reliably signal MCH1210 (Size) unless program attributes suppress binary size exceptions. Prior releases did not always signal the exception.
- Conversions from signed or unsigned binary to packed or zoned decimal now reliably signal MCH1210 (Size) if the source value does not fit in the receiver. Prior releases did not always signal the exception.
- Conversions between decimal floating point and zoned decimal are now supported.
- Conversions to packed decimal with more than 31 digits now produce a reliable condition for branch and indicator forms. Prior releases sometimes produced an incorrect condition (differing from the converted receiver value).

Materialize Process Message (MATPRMSG) change

New **MATPRMSG** option to return timestamps in UTC

A new option has been added to the selection template (operand 4) of **MATPRMSG** to indicate whether timestamps should be returned as local system time or UTC. By default the time will be returned as local system time. Additionally UTC time is only available for messages created in release 7.3 and above. Specifying the UTC option for messages before release 7.3 will result in the timestamps returning 0.

IBM Navigator for i requires 64-bit Java SE 8

The Admin2 HTTP server now requires 64-bit Java™ SE 8. Formerly the requirement was for 64-bit Java SE 7. IBM® Navigator for i web application depends on the Admin2 server. In order for the Admin2 server and IBM Navigator for i to function properly, 64-bit Java SE 8 needs to be installed. This is product 5770JV1 option 17.

IBM Navigator for i primary access methodology

The IBM Navigator for i web based system management interface is changing the primary access methodology. For the past many years, this interface has been shipped with SSL enabled by default. This was done leveraging a self-signed certificate created by IBM. This practice over the past few years has become no longer accepted by the general community. It causes a many issues with browsers as they no longer accept this type of certificate. This has caused a great deal of difficulty for users and with the continued focus on Security in the industry, this will continue to get worse. To help customers be able to access IBM Navigator and give them easy control of their security practices, we are making the following changes:

- IBM Navigator will no longer be secured by SSL by default
- When using the URL 'http://hostname:2001' ; The routing by default will change from HTTPS port 2005, to HTTP and port 2004.
- A wizard in the Web Admin GUI interface gives users an easy interface to configure Navigator to use HTTPS and can reactivate port 2005. Details on how to configure can be found on the IBM Support - <https://www.ibm.com/support/pages/node/1142704>

IBM i NetServer Shared Printer Changes

There is a new version of the Server Message Block (SMB) protocol. Version 2 (SMB2) has been added and is now the default that is negotiated with IBM i NetServer clients. The new protocol handles printing differently, and printer functions will no longer work as they did in prior releases. Documents can still be printed to shared printer queues from Windows clients, but additional steps are required to configure the printer.

1. Open the Windows command prompt and use the NET USE command to map the IBM i NetServer printer share to an unused local LPT printer port.

Example: **NET USE LPTx \\server\share** (where x is a valid LPT port number)

2. Add the printer share as a local printer on the LPT port used in step 1 with the correct printer driver for the shared printer.

Printers added in this way will allow spooling output to the network printer share, but advanced queue management for the mapped printer is not supported at this time. SMB2 support can be disabled on the system if the printing limitations are incompatible with existing network printer use. The following command can be used to permanently disable SMB2 support for IBM i NetServer:

CALL QZLSMAINT PARM('40' '1' '0x80')

Changes to Packed Decimal Support

System support for packed decimal numbers is changed in IBM i 7.3 to correct defects for operations that produce an intermediate result of more than 63 digits (for example, multiplying two 35-digit numbers produces a 70-digit intermediate result):

- Packed decimal operations that produce a large intermediate result now reliably ignore the excess digit (leftmost 4 bits) in input packed decimal numbers with an even number of digits. Prior releases sometimes used the excess digit to produce the wrong result or an MCH1202 (Decimal data) exception.
- Packed decimal operations that produce a large intermediate result now reliably detect and report overflow. Prior releases would sometimes signal MCH1210 (Size) when no overflow occurred, or fail to signal the exception when overflow occurred.

QAUDLVL and QAUDLVL2 Special Value *NETCMN Changed

The **QAUDLVL** and **QAUDLVL2** system value definition for ***NETCMN** will be changed so that it no longer includes sending SK-A (socket accept) and SK-C (socket connect) records. In previous releases these records were logged when **QAUDLVL/QAUDLVL2** contained ***NETCMN** or ***NETSCK**. They will no longer be logged when **QAUDLVL/QAUDLVL2** contains ***NETCMN**. They will now only be sent when **QAUDLVL/QAUDLVL2** contains ***NETSCK**.

To get the same ***NETCMN** audit records as you got in previous releases you will now need to specify both ***NETCMN** and ***NETSCK**.

When IBM i 7.1 or 7.2 is upgraded to IBM i 7.3, ***NETSCK** is automatically added to either **QAUDLVL** or **QAUDLVL2** if either of them currently contains ***NETCMN**.

QHST file time stamp in UTC

In IBM i 7.3, the internal time stamp in history file records is in UTC (Coordinated Universal Time) to improve searching the history log when multiple time zones are used.

The internal time stamp is the field located in the first 8 positions in records in the QHSTxxxx. The external formatted date and times within the records are unchanged.

In previous releases the internal time stamp was in the local system time in effect when the message was sent.

SAVE menu Unmount file system prompt

Options 21, 22, and 23 on the **SAVE** menu now attempt to remount file systems at the end of the operation if you choose to unmount file systems for the save operation.

Secure sockets layer (SSL) and Transport Layer Security (TLS) changes

TLSv1.3 protocol has been enabled for System SSL/TLS

The Transport Layer Security protocol version 1.3 (TLSv1.3) is now enabled and used by default for System SSL/TLS when the **QSSLPC**L system value is set to ***OPSYS**.

TLSv1.3 can be disabled by changing the **QSSLPC**L system value from ***OPSYS** and explicitly setting the desired protocols. Removing TLSv1.3 from **QSSLPC**L removes the protocol from both the supported and default protocol lists. If TLSv1.3 must be removed from only the default protocol list, use **TLSCONFIG** option `eligibleDefaultProtocols` to remove the value from the default protocol list.

TLS protocol version 1.3 may require manual configuration in DCM

DCM application definitions have the TLS protocol set to either ***PGM** or the desired protocols selected from a list. If the application definition has the TLS protocol set to ***PGM** and the application uses the default protocol list, the application automatically supports TLSv1.3 when TLSv1.3 is in the default protocol list. If the application definition currently specifies the TLS protocols from a list, TLSv1.3 is not automatically included as a desired protocol. Update the application definition to include TLSv1.3 in the TLS protocols list to enable TLSv1.3 as a preferred protocol for that application definition.

For additional information, see the [Secure Sockets Layer/Transport Layer Security](#) topic in Knowledge Center.

System SSL/TLS changes for cipher specification list

The system value **QSSLCS**L cipher specification list generated when system value **QSSLCS**LCTL is ***OPSYS** has changed from the previous release. The IBM i 7.3 list contains only cipher suites considered okay for use by security compliance definitions at the time the 7.3 was originally released. It is impossible for an application using System SSL/TLS to use a cipher suite not listed in **QSSLCS**L.

Administrators can control the ciphers supported by System SSL/TLS via the system value **QSSLCS**L when **QSSLCS**LCTL is set to ***USRDFN**.

List change highlights:

- The Rivest Cipher 4 (RC4) 128-bit ciphers are removed.
- The Galois/Counter Mode (GCM) ciphers are now listed first making them preferred over the Cipher Block Chaining (CBC) ciphers.
- All ciphers with less than 128-bit are removed.
- Add TLSv1.3 cipher suites and add ChaCha20Poly1305 cipher suite support for TLSv1.2.

The 7.3 ***OPSYS** list is now:

- AES_128_GCM_SHA256
- AES_256_GCM_SHA384
- CHACHA20_POLY1305_SHA256
- ECDHE_ECDSA_AES_128_GCM_SHA256
- ECDHE_ECDSA_AES_256_GCM_SHA384

- ECDHE_RSA_AES_128_GCM_SHA256
- ECDHE_RSA_AES_256_GCM_SHA384
- ECDHE_ECDSA_CHACHA20_POLY1305_SHA256
- ECDHE_RSA_CHACHA20_POLY1305_SHA256
- RSA_AES_128_GCM_SHA256
- RSA_AES_256_GCM_SHA384
- ECDHE_ECDSA_AES_128_CBC_SHA256
- ECDHE_ECDSA_AES_256_CBC_SHA384
- ECDHE_RSA_AES_128_CBC_SHA256
- ECDHE_RSA_AES_256_CBC_SHA384
- RSA_AES_128_CBC_SHA256
- RSA_AES_128_CBC_SHA
- RSA_AES_256_CBC_SHA256
- RSA_AES_256_CBC_SHA
- ECDHE_ECDSA_3DES_EDE_CBC_SHA
- ECDHE_RSA_3DES_EDE_CBC_SHA
- RSA_3DES_EDE_CBC_SHA

The System SSL/TLS default cipher specification list is the intersection of the enabled cipher suites from **QSSLCSL** and the eligible default cipher suites. The eligible default cipher suites list is configured by using the System Service Tools (SST) Advanced Analysis command **TLSCONFIG**. The order of the default cipher suite list is the order the cipher suites appear in the **QSSLCSL** system value. To change the order, change **QSSLCSL**. When an application does not specify the cipher suites to enable, the ordered System SSL/TLS default cipher suite list is used. See the [Secure Sockets Layer/Transport Layer Security](#) topic in the Knowledge Center for additional details.

System SSL/TLS changes for default cipher specification list

The default cipher specification list has changed for System SSL/TLS.

The System SSL/TLS default cipher specification list no longer contains any ciphers that use the Triple DES (3DES) algorithm. The ciphers no longer in the default cipher specification list are still supported by System SSL/TLS for applications that code to specifically use those ciphers. The shipped default cipher specification list values but not order can be changed by using System Service Tools (SST) Advanced Analysis Command **TLSCONFIG**. For additional information see the help text for **TLSCONFIG**. The System SSL/TLS default cipher specification list is now as follows:

- AES_128_GCM_SHA256
- AES_256_GCM_SHA384
- CHACHA20_POLY1305_SHA256
- ECDHE_ECDSA_AES_128_GCM_SHA256
- ECDHE_ECDSA_AES_256_GCM_SHA384
- ECDHE_RSA_AES_128_GCM_SHA256
- ECDHE_RSA_AES_256_GCM_SHA384
- ECDHE_ECDSA_CHACHA20_POLY1305_SHA256
- ECDHE_RSA_CHACHA20_POLY1305_SHA256
- RSA_AES_128_GCM_SHA256
- RSA_AES_256_GCM_SHA384
- ECDHE_ECDSA_AES_128_CBC_SHA256

- ECDHE_ECDSA_AES_256_CBC_SHA384
- ECDHE_RSA_AES_128_CBC_SHA256
- ECDHE_RSA_AES_256_CBC_SHA384
- RSA_AES_128_CBC_SHA256
- RSA_AES_128_CBC_SHA
- RSA_AES_256_CBC_SHA256
- RSA_AES_256_CBC_SHA

For additional information, see the [Secure Sockets Layer/Transport Layer Security](#) topic in the Knowledge Center.

System SSL/TLS default signature algorithm list has changed

The System SSL/TLS default signature algorithm list no longer contains the MD5 signature algorithm. Administrators can control the signature algorithms supported by System SSL/TLS using the System Service Tools (SST) Advanced Analysis command **TLSCONFIG**. The System SSL/TLS default signature algorithm list is now:

- ECDSA with SHA512
- ECDSA with SHA384
- ECDSA with SHA256
- ECDSA with SHA224
- ECDSA with SHA1
- RSA_PSS_SHA512
- RSA_PSS_SHA384
- RSA_PSS_SHA256
- RSA with SHA512
- RSA with SHA384
- RSA with SHA256
- RSA with SHA224
- RSA with SHA1

System SSL/TLS named elliptic curve group list has changed

The System SSL/TLS default named elliptic curve group list no longer contains curves with a size less than 256. Elliptic curve support for Curve25519(x25519) and Curve448(x448) were added to both the supported and default lists of supported groups.

The System SSL/TLS supported named elliptic curve group list is now:

- Secp521r1
- Secp384r1
- x25519
- Secp256r1
- x448
- Secp224r1
- Secp192r1

The System SSL/TLS default named elliptic curve group list is now:

- Secp521r1
- Secp384r1

- x25519
- Secp256r1
- x448

Administrators can control the list of supported and default named curves for System SSL/TLS using the System Service Tools (SST) Advanced Analysis command **TLSCONFIG**.

Universal Connection changes

Universal Connection is changing the IP address and ports used by the Send Service Request (**SNDSVRQ**) and Send PTF Order (**SNDPTFORD**) CL commands when connecting to IBM service. All requests will be routed to host name esupport.ibm.com on ports 443 or 80. This may require firewall configuration changes to ensure that outbound connections to IBM service are not blocked. For IPv4, we recommend opening 129.42.0.0/18 for both ports. For IPv6, we recommend opening 2620:0:6c0::/45 for both ports.

Virtual Device Selection (QIBM_QPA_DEVSEL) exit point deprecated

The system device selection processing changed in IBM i 6.1 to dramatically reduce the overhead and contention that previously affected the system when selecting an available automatically created virtual device. These devices are most commonly used by Telnet and Pass-through to the system.

These changes have deprecated the use of the Virtual Device Selection (QIBM_QPA_DEVSEL) exit point. This exit program was utilized by the system when the QAUTOVRT system value is configured to *REGFAC.

The Virtual Device Selection (QIBM_QPA_DEVSEL) exit point allowed a number defaults to be modified including the automatic configuration limits, default naming conventions and the ability to allow or reject some connections.

In IBM i 7.3, if the QAUTOVRT system value is set to *REGFAC, the system will work the same as if the QAUTOVRT system value was set to 0. This turns off the automatic configuration of virtual devices.

The QAUTOVRT system value should be configured to the desired limit.

The Virtual Device Selection (QIBM_QPA_DEVSEL) exit point, since it has been deprecated, will no longer be available to change the default naming conventions used for the automatic configuration of virtual devices.

The Telnet Device Initialization (QIBM_QTG_DEVINIT) exit point is available to perform some of the related functions.

Workload groups

The QSYS/QWTWLCGRP data area is obsolete.

Customers that use the data area QSYS/QWTWLCGRP to get a subsystem monitor job to use a workload group for jobs started in that subsystem must change to use the **WLCGRP** parameter on the Create Subsystem Description (**CRTSBSD**) or Change Subsystem Description (**CHGSBSD**) command. The default for the **SBSD** is **WLCGRP (*NONE)**. In 7.3, the QSYS/QWTWLCGRP data area will be ignored.

QWQREPOS and QWQCENT libraries changed to user libraries

Libraries QWQREPOS and QWQCENT will be treated as user libraries. For example, they will be saved with **SAVLIB LIB(*ALLUSR)** and no longer will be saved by **SAVLIB LIB(*IBM)**.

Updated EBCDIC Unicode maps for CCSIDs 1377 and 1388

The IBM i CCSID conversion support to and from Unicode has been updated for data stored in EBCDIC **CCSIDs 1377 or 1388** (normally used for Chinese data). This new support reflects some new Unicode assignments for existing CCSID 1377 or 1388 characters.

The conversion to the new Unicode mapping will occur automatically with no intervention. If your CCSID 1377 or 1388 data is converted from Unicode, the old codepoints will convert to the same 1388 or 1377 codepoint. But when converted back to Unicode, the new Unicode codepoint will be used.

If you need to preserve the current mapping, two new CCSIDs have been provided to allow the old conversions. The new CCSIDs to use are:

- **CCSID 13676** instead of 1388
- **CCSID 5473** instead of 1377

These new CCSIDs provide the old codepoint mappings for 1377 and 1388 without the new characters.

See KnowledgeCenter for the list of changed characters.

IBM i 7.3 PTFs for changes to CCSIDs 1377 and 1388 are:

- SI71948
- SI71942
- MF67069
- SI72060
- MF66942
- MF67120

IBM i 7.3 PTFs for new CCSIDs 13676 and 5473 are (these supersede the PTFs for changes to CCSIDs 1377 and 1388):

- MF67844
- SI74350
- SI74353
- SI74357
- SI74415

Note: These PTFs are being withheld from CUM packages and resaves. Unless the PTFs are specifically ordered, the CCSID maps will not be updated.

Options

This sections describes changes to options of the IBM i operating system.

Integrated Server Support (5770-SS1 Option 29)

iSCSI support stabilization

The IBM i Integrated Server solution will only be supported with the hardware and operating system versions that are currently listed in the iSCSI Solution Guide.

- There are no new planned enhancements to the IBM i Integrated Server product.
- There are no plans to support any new System x hardware.
- There are no plans to support any non-IBM hardware.
- There are no plans to support IBM i 7.3

Details on the supported hardware models and operating system versions can be found at the iSCSI Support Page : https://www.ibm.com/developerworks/community/wikis/form/anonymous/api/wiki/beb2d3aa-565f-41f2-b8ed-55a791b93f4f/page/bef3243f-7ad9-4d46-b1fd-a032ab838fd2/attachment/aa00ece4-6e3a-4027-b657-4c31a5d8e795/media/systems_po%E2%80%8Bwer_ibmi_i%E2%80%8Bscsi_solut%E2%80%8Bion_guide.%E2%80%8Bpdf

For alternative solutions, refer to the iSCSI External Web Page : <https://www.ibm.com/support/pages/node/1119645>

Digital Certificate Manager (5770-SS1 Option 34)

When creating a certificate store using Digital Certificate Manager in IBM i 7.3, the default list of Root Certificate Authority (CA) certificates no longer get automatically added to the certificate store. To add CA Root certificates to a newly created certificate store, select “Manage Certificate Store” from the left side pane and then select the option to “Populate with CA certificates”.

The “Populate with CA certificates” panel allows you to select the CA Root and Intermediate certificates you trust to be added to the certificate store by placing a checkbox next to the desired certificates and then clicking on the “Continue” button. The certificates which are listed include secure versions using Secure Hash Algorithm (SHA-2) signature algorithms with an RSA key size of 2048 bits or greater or an ECDSA key size of 256 bit or greater.

Licensed programs

This section contains information about individual licensed programs that have been modified or changed for IBM i 7.3.

Collaboration and Social Products (formerly Lotus) supported on IBM i 7.3

Refer to the Lotus® Software for IBM i Compatibility Guide on the IBM systems Web site at http://www.ibm.com/systems/resources/systems_power_ibmi_lotus_releasesupport.pdf for information about the minimum releases of Lotus products required to run on IBM i 7.3.

WebSphere MQ (5724-H72) changes

WebSphere® MQ version 7.0.1 and lower is NOT supported on IBM i 7.3. WebSphere MQ versions 7.1.0.7 or 8.0.0.4 are required as a minimum.

For more information, reference the System Requirements for WebSphere MQ Web site: <http://www-01.ibm.com/support/docview.wss?uid=swg27006467>.

IBM WebSphere Application Server 8.5 (5733-W85)

Installation of WebSphere Application Server

IBM WebSphere Application Server V8.0 and earlier versions are not supported and will not function on IBM i 7.3.

Java™ SE 6 32 bit (5770-JV1 option 11) and Java SE 6 64 bit (5770-JV1 option 12) are not supported and will not function on IBM i 7.3.

IBM WebSphere® Application Server (WAS) Product Types:

- Classic Profile Type Installations: The Classic profile of WAS. It can only be installed using the IBM Installation Manager (IM) product via the IBM Web Administration console or the `"/QIBM/ProdData/InstallationManager/eclipse/tools/imcl install` command. The product description does NOT contain the word "Liberty".
- Liberty Profile Archive Type Installations: The Liberty profile of WAS. It is installed by downloading the product JAR file from IBM Support Fix Central and manually restoring its contents to the IBM i IFS. This installation type will NOT show up in the IBM Installation Manager product. The `"product.ibm.websphere.productInstallType"` property will equal "Archive" in the contents of the `<wlp_root>/lib/versions/WebSphereApplicationServer.properties` file on the IBM i IFS.
- Liberty Profile IBM Installation Manager Type Installations: The Liberty profile of WAS. It is installed using the IBM Installation Manager (IM) product via the IBM Web Administration console or the `"/QIBM/ProdData/InstallationManager/eclipse/tools/imcl install` command. The product description will contain the word "Liberty". The `"com.ibm.websphere.productInstallType"` property will equal "InstallationManager" in the contents of the `<wlp_root>/lib/versions/WebSphereApplicationServer.properties` file on the IBM i IFS.

Minimum Required IBM WebSphere® Application Server (WAS) Product media for new installation:

A new install of WebSphere Application Server requires V8.5.5.9 or newer media. This media can be downloaded using ESS. Instructions for ESS WAS downloads are located here : <http://www.ibm.com/support/docview.wss?uid=nas8N1010905>

Minimum Required IBM WebSphere® Application Server (WAS) Product Fix Pack Level required fix level:

For the Classic Profile installation type of the IBM WebSphere Application Server product, the minimum required fix pack level is 8.5.5.10 for IBM i 7.3.

Note: IBM Installation Manager (IM) v1.8.4 or newer is required to be installed PRIOR TO installing WAS fix pack level 8.5.5.10. Refer to the URL : <http://www.ibm.com/support/docview.wss?uid=nas8N1010434>, for information on how to display the IM version currently installed on your IBM i and upgrade it to a newer version if required.

For the Liberty Profile (Archive and IM installations) of the IBM WebSphere Application Server product, the minimum required fix pack level is 8.5.5.0 which is the initial release.

You can identify your current WAS product fix pack level by following the instructions under the section “How to identify your current WAS fix pack level?” below.

How to identify your current WAS fix pack level?

- Classic Profile Installations:

Review the <app_server_root>/properties/version/ WAS.product file on the IBM i IFS, where <app_server_root> is the root directory of the IBM WebSphere Application Server product installation.

Example:

```
WRKLNK 'QIBM/ProdData/WebSphere/AppServer/V85/Express/properties/version/WAS.product'
```

Enter Option 5 next to the WAS.product file to display its contents.

The version information will be listed next to the <version> tag just like the example below. The minimum version supported at IBM i 7.3 OS is 8.5.5.10.

Note: The following product version DOES NOT meet the minimum required version.

```
<product name="IBMWebSphere Application Server - Express®">
<id>EXPRESS</id>
<version>8.5.5.9</version>
<build-info
date="8/20/15"
level="cf071533.01"/>
</product>
```

- Liberty Profile (Archive and IM Type) Installations:

There is no need to examine the fix pack level because 8.5.5.0, which is the initial release of the Liberty Profile, is the required minimum.

Upgrading IBM WebSphere® Application Server to IBM i 7.3:

1. Ensure one of the following pre-requisite 5770-JV1 Licensed Program Products (LPPs) is installed prior to migrating WAS. Only one of the LPPs is required for migration, but IBM recommends both LPPs are installed.
 - 5770-JV1 Option 14 (Java SE 7 32 bit)

- 5770-JV1 Option 15 (Java SE 7 64 bit – required for JVMs with heap sizes over 2GB)
2. Ensure IBM Installation Manager (IM) v1.8.4 or newer is installed. Refer to the URL :<http://www.ibm.com/support/docview.wss?uid=nas8N1010434>, for information on how to display the IM version currently installed on your IBM i and upgrade it to a newer version if required.
 3. Before or after upgrading to IBM i 7.3, ensure that all IBM WAS installations meet the minimum required fix pack levels. Refer to the "Minimum Required IBM WebSphere® Application Server (WAS) Product Fix Pack Level" section above for more information.

Note: IBM recommends the latest WAS v8.5 Group PTF and fix pack be installed AFTER the migration to IBM i 7.3 OS if possible.

Classic Profile Installation Migration:

If you currently have the IBM WebSphere Application Server (WAS) version 8.0 or earlier product installed and are upgrading to IBM i 7.3, you will need to migrate your WAS Classic Profile installation and profiles to IBM WebSphere Application Server v8.5.5.10 fix pack level or higher.

1. **IMPORTANT:** If the IBM WebSphere Application Server v8.5 product installation has been upgraded to fix pack level 8.5.5.10 or higher BEFORE the IBM i 7.3 upgrade, then you MUST update the WAS service programs and default JDK by following the steps below, before utilizing the WAS product for the first time after the migration. If you have multiple profiles, for example, an ND deployment with more than one profile, then follow the instructions in the following tech note: <http://www.ibm.com/support/docview.wss?uid=nas8N1022559> to update each profile's command SDK.

Note: This step does not apply to the WAS Liberty profile installation types.

Prior to updating the service programs and SDK defaults, ensure the following conditions are met:

- All IBM WebSphere Application Server instances and the QWAS85 subsystem are ended.
- The IBM i system value, QALWOBJRST, is set to *ALL.
- The IBM i User Profile running the command has the following special authorities set: *ALLOBJ and *SECADM

To update the programs and the default SDK:

- Start the Qshell interpreter:**STRQSH**
- cd to <app_server_root>/bin, where <app_server_root> is the root directory of the WebSphere Application Server installation.
- Call the _postfpexit script : ./_postfpexit<app_server_root>
- Call the _setupDefaultSDK script : ./_setupDefaultSDK

Example:

STRQSH

```
cd /QIBM/ProdData/WebSphere/AppServer/V85/Express/bin
```

```
./_postfpexit /QIBM/ProdData/WebSphere/AppServer/V85/Express ./_setupDefaultSDK
```

2. Execute the managesdk command to update the existing WebSphere Application Server profile(s) SDK to a version newer than Java SE 6.0.

List all profiles and their SDK's:

- Start the Qshell interpreter:**STRQSH**
- cd to <app_server_root>/bin, where <app_server_root> is the root directory of the WebSphere Application Server installation.
- Execute the "./managesdk -listEnabledProfileAll" command. The command will display a list of all profiles in an installation and the SDK names that each profile is currently configured to use.

Example:

STRQSH

```
cd /QIBM/ProdData/WebSphere/AppServer/V85/Express/bin
```

```
./managesdk -listEnabledProfileAll
CWSDK1004I: Profile profile_name :
CWSDK1006I: PROFILE_COMMAND.SDK = 1.6_32
CWSDK1008I: Node MACHINE_profile_name SDK name: 1.6_32
CWSDK1009I: Server profile_name SDK name: 1.6_32
```

3. If the SDK value of “Server profile_name SDK name” is either 1.6_32 or 1.6_64, then you will need to enable the server to use a newer SDK version (1.7_32, 1.7_64, 1.7.1_32, 1.7.1_64, 1.8_32, 1.8_64).

- Start the Qshell interpreter: **STRQSH**
- cd to <app_server_root>/bin, where <app_server_root> is the root directory of the WebSphere Application Server installation.
- Execute the “./managesdk -listAvailable” command. The command will display a list of all available SDK names on the system.
- Execute the “./managesdk -enableProfile -profileName profile_name -sdkname sdk_name -enableServers [-user user_name] [-password password_value]” command to change the SDK for the specified profile name.

Example:

STRQSH

```
cd /QIBM/ProdData/WebSphere/AppServer/V85/Express/bin
./managesdk -listAvailable
CWSDK1003I: Available SDKs :
CWSDK1005I: SDK name: 1.7_64
CWSDK1005I: SDK name: 1.7_32
CWSDK1005I: SDK name: 1.7.1_64
CWSDK1005I: SDK name: 1.7.1_32
CWSDK1001I: Successfully performed the requested managesdk task.
./managesdk -enableProfile -profileName WASprofile -sdkname 1.7.1_32 -enableServers
CWSDK1017I: Profile WASprofile now enabled to use SDK 1.7.1_32.
CWSDK1001I: Successfully performed the requested managesdk task.
```

Please see <http://www.ibm.com/support/docview.wss?uid=nas8N1019730> for detailed managesdk command usage.

Liberty Profile Installation Migration (Installation Manager and Archive Type Installations):

All WAS Liberty Profiles will need to be configured to use JDK 7.0 or newer to function correctly at IBM i 7.3 OS.

Please see <http://www.ibm.com/support/docview.wss?uid=nas8N1021106> for detailed information on how to configure your IBM WebSphere Application Server Liberty Profile installation and application servers to use IBM JDK v7.0 or newer.

IBM DB2 Web Query for i (5733-WQX) changes

IBM DB2 Web Query for i V2.1 and earlier versions are not supported and will not function on IBM i 7.3. Upgrade to Web Query version 2.2.0 or later. Web Query version 2.2.0 is supported on IBM i 7.3, 7.2, or 7.1. It requires IBM Technology for Java 7.1 32 bit (JV1 option 14).

For more information on DB2 Web Query for i, refer to the product wiki at <http://ibm.co/db2wqwiki>.

The IBM DB2 Web Query for i (5733-WQX) libraries QWQREPOS and QWQCENT will be treated as user libraries. For example, they will be saved with SAVLIB LIB(*ALLUSR) and no longer will be saved by SAVLIB LIB(*IBM).

IBM Developer Kit for Java (5770-JV1)

JV1 options support on IBM i 7.3

The JV1 options for IBM Technology for Java(IT4J) 6.0 (option 11 and 12) are no longer supported on IBM i 7.3. The default JVM on IBM i 7.3 is IBM Technology for Java 8.0 32bit (option 16).

For more information of J9 on IBM i, see the IBM i Technology Updates website: <https://www.ibm.com/support/pages/java-ibm-i>

IBM Advanced Function Printing Utilities (5770-AF1)

IBM Advanced Function Printing Utilities (5770-AF1) is no longer supported.

The last release for IBM Advanced Function Printing Utilities (5770-AF1) was IBM i 7.2. The Advance Function Presentation data stream is now an open architecture managed by the AFP Consortium. Replacement products, which offer support for a wider range of image formats and modern font technologies, are available from several of the companies that are members of the AFP Consortium. Among the replacement products are DocPath Boulder Suite (from DocPath) and Overview AFP Designer for iSeries (from Isis-Papyrus). This is not a comprehensive list of replacement products, as other companies may also offer function which replaces Advanced Function Printing Utilities.

Backup Recovery and Media Services (5770-BR1)

Prior to upgrading BRMS

It is important to ensure no user created dependencies exist on BRMS files in QUSRBRM before upgrading BRMS. Use DSPDBR on all physical and logical files in QUSRBRM to ensure only IBM BRMS files are listed. If any other non-IBM dependencies exists, they need to be removed before starting an upgrade.

If using OUTPUT(*OUTFILE) on any BRMS commands, it is recommended that the current outfiles be deleted prior to upgrading or after upgrading to a new release. Changes to files may have occurred and new fields added or changed.

BRMS client changes

The BRMS client has converted some client panels for better performance and appearance. Because of this, the BRMS client is only supported through IBM Navigator for i.

SAVLIBBRM command changes

The Save Library using BRM (**SAVLIBBRM**) command default for the Journalled objects (**OBJJRN**) parameter has changed to *YES.

IBM PowerHA SystemMirror for i (5770-HAS)

IBM PowerHA SystemMirror for i (5770-HAS) changes

Support for IOP switching technology (sometimes referred to as switched disk technology) is being dropped in 7.3. This technology was part of the IBM i operating system, with user interfaces in the IBM PowerHA SystemMirror for i product (5770-HAS). IOP switching was used primarily by customers with internal disk who wanted two IBM i partitions but only one copy of the independent auxiliary storage pool (IASP). Customers still on internal disk have the option of either synchronous or asynchronous geographic mirroring, which replicates the data from one IASP to a backup copy. Customers using external storage can use PowerHA's LUN switching technology which will remain fully supported, as well as the other replication technologies available on external storage. Once you have upgraded to IBM i 7.3, it will no longer be possible to configure or manage an IOP switching environment.

7.2 IBM PowerHA SystemMirror for i works with IBM i operating system 7.2 or 7.3.

A 7.2 new function PTF was created to support DS8000® HyperSwap® with IASPs. This new function requires PowerHA for i Enterprise Edition. For more information about this new function, see High availability overview.

With the support for DS8000 HyperSwap with IASPs, the HyperSwap Storage description commands were replaced by high availability configuration description commands. For more information about these commands, see Implementing High Availability.

Here is a link: http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/rzaig/rzaigimplementkickoff.htm

HMC is dropping support of Common Information Model (CIM)

The Hardware Monitor Console (HMC) is being updated to replace the existing Common Information Model (CIM) server with a new representational state transfer (REST) server. HMC V8R8.5.0 is the last version of HMC to support the CIM server, and is the first version of HMC to support all REST server. IBM® PowerHA® for i enhanced advanced node failure detection to support a new REST server through a new function PowerHA PTFs. PTFs have been provided for 7.1, 7.2, and 7.3 PowerHA LP. See High Availability in Knowledge Center for more information.

Link for High Availability: http://www-03preprod.ibm.com/support/knowledgecenter/ssw_ibm_i_72/rzahg/rzahgha.htm

IBM Content Manager OnDemand for i (5770-RD1)

IBM Content Manager OnDemand for i upgrade requirements

If you are upgrading from a previous version of IBM Content Manager OnDemand, you must be running Content Manager OnDemand server version 8.4.1.3 (or higher) before you upgrade to Content Manager OnDemand for i 7.3. For instructions on how to determine your current server version, see the Content Manager OnDemand for i: Common Server Planning and Installation Guide which can be accessed using links from the Content Manager OnDemand for i version 7.3 Read This First document which can be found on the web at <http://www.ibm.com/support/docview.wss?uid=swg21233584>.

Content Manager OnDemand client software must be upgraded to version 8.5.0.5 (or higher) before you upgrade to Content Manager OnDemand for i 7.3. This includes, but is not limited to, the OnDemand Windows (end-user) client and the ODWEK CGI, Servlet, and Java APIs. If you use WEBi or IBM Content Navigator (ICN), see the appropriate documentation for those products to determine minimum software requirements. II4C is not supported at IBM i 7.3. You should upgrade to IBM Content Navigator (ICN) either before or at the same time you upgrade to IBM i 7.3.

The OnDemand Administrator client must be at the same version or higher as the Content Manager OnDemand server. For Content Manager OnDemand for i 7.3, the OnDemand Administrator client must be at version 9.5.0.4 or higher.

New web-based administration interface

A new web-based Content Manager OnDemand component of IBM Navigator for i was introduced in IBM i 7.1. This new administration interface replaces the OnDemand Archive plug-in of System i® Navigator. Either one of the interfaces can be used to administer 7.1 systems but only the new web-based interface can be used on IBM i 7.2 or 7.3. Customers running Content Manager OnDemand for i on IBM i 7.2 or 7.3 must use this new tool instead of System i Navigator to administer storage management objects such as migration policies and various archive media definitions, as well as output queue and directory monitor definitions. The OnDemand Administrator client continues to be the interface to maintain Content Manager OnDemand objects such as users, applications, application groups, folders, printers, and so on.

Command changes

In Content Manager OnDemand for i 7.3, various commands have changed as described below. See the Content Manager OnDemand for i: Common Server Planning and Installation Guide, Common Server Administration Guide, and online help for more information.

- A warning was added to the help text for the End server (**ENDSVR**) parameter of the Start Monitor (**STRMONOD**) command to call attention to the fact that specifying a value of *YES to end the instance server job when this monitor ends might cause the instance server job to end while other monitors are still processing input files, end users are retrieving documents, administrators are manually storing files or using the administrative client to update definitions, or storage management functions are running. Do not use *YES unless you are certain that no other Content Manager OnDemand functions will be active at the time that this monitor ends.
- The Start Archived Storage Management (**STRASMOND**) command parameter named Start server (**STRSVR**) with a value of *NO is ignored because the server must be started in order to place a copy of the Archived Storage Management reports into the Content Manager OnDemand System Log folder after the ASM process completes. The Content Manager OnDemand server is started for you automatically if the server is not already started, regardless of the value specified for the **STRSVR** parameter.

Inquiry message requires reply when you start the first Content Manager OnDemand instance server

When you start your first Content Manager OnDemand instance (by using the Start TCP/IP Server (**STRTCPSVR**) command) after upgrading to IBM i 7.3, you might receive a message in the QSYSOPR message queue that requires a response. The message is sent if you are upgrading to IBM i 7.3 from a Content Manager OnDemand server version prior to 9.5.0.4. For example, if you are running IBM i 7.2 with server version 9.0.0.3 and you upgrade to IBM i 7.3 which runs server version 9.5.0.4, you will receive the message. The message text is: The Content Manager OnDemand server will be upgraded to server version 9504. (C G).

If you have reviewed the Content Manager OnDemand for i Read This First document for IBM i 7.3, and are ready to upgrade to version 9.5.0.4, reply G to Go. Your Content Manager OnDemand instance servers will not start until you respond with a G. If you respond with a C to Cancel, the instance server will not start and the message will continue to be sent each time you attempt to start an instance server until you respond with a G to Go.

The Content Manager OnDemand for i 7.3 Read This First document which can be found on the web at <http://www.ibm.com/support/docview.wss?uid=swg21233584>.

First start of a Content Manager OnDemand instance or the Archive Storage Management (ASM) process takes longer

The first start of a Content Manager OnDemand instance (by using the Start TCP/IP Server (**STRTCPSVR**) command) or the Archive Storage Management (ASM) process (by using the Start Archived Storage Management (**STRASMOND**) command) after an upgrade to Content Manager OnDemand for i 7.3 might take longer if you are not already at Content Manager OnDemand server version 9.5.0.x before you upgrade. The delay is due to database changes in the server tables.

- Do not end the server job or the ASM job because you are concerned that it is not progressing.
- Messages are issued during the database changes. You can check the job log to confirm that the job is progressing.

New and discontinued product options

The product options for Content Manager OnDemand for i have been updated to include a new option 15 (Content Manager OnDemand Distribution Facility) and to remove option 13 (Content Manager OnDemand

AFP Transforms) that is no longer available. The individual product options for IBM i 7.3 (which install separately) are as follows:

- ***BASE** - Content Manager OnDemand Base (required for all others)
*BASE includes Content Manager OnDemand Common Server (previously option 10) and Content Manager OnDemand Web Enablement Kit (previously option 11). This option also includes the IBM Navigator for i - Content Manager OnDemand component (previously named IBM Navigator for i - OnDemand Administration).
- **12** - Content Manager OnDemand PDF Indexer (optional)
- **14** - Content Manager OnDemand Enhanced Retention Management (optional)
- **15** - Content Manager OnDemand Distribution Facility (optional)

Full text indexing support is also available for use with Content Manager OnDemand for i 7.3.

Note that if you display your installed licensed programs by using option 10 from the Work with Licensed Programs (**GO LICPGM**) menu on your IBM i 7.2 system, it will list option 13 as Content Manager OnDemand Enhanced Retention Management and option 14 as Content Manager OnDemand AFP Transforms if the options are installed. The product option names are incorrect. Product option 13 actually contains AFP Transforms and product option 14 contains Enhanced Retention Management as shown in the bulleted list above.

Beginning in IBM i 7.2, product options 10 and 11 (Content Manager OnDemand Common Server and Content Manager OnDemand Web Enablement Kit) are now included in *BASE and no longer require installation of a separate option. **Important:** If product options 10 or 11 exist on your system, they are deleted during the upgrade process. If product option 13 (Content Manager OnDemand AFP Transforms) exists on your system, it is not deleted, but it is no longer available as a Content Manager OnDemand for i product option. If you do not have product option 13 and are interested in purchasing an Advanced Function Presentation (AFP) transform, you must contact your preferred transform vendor directly.

End of support for Tivoli Storage Manager (TSM) APIs

Previous versions of Content Manager OnDemand for i supported the use of IBM Tivoli® Storage Manager (TSM) in addition to ASM or in place of ASM, or simply as another media choice for use in ASM migration policies. The Tivoli Storage Manager APIs for IBM i were withdrawn from support on April 30, 2015. This end of support affects customers using Tivoli Storage Manager as their storage manager and customers using Tivoli Storage Manager as a level within an ASM migration policy. Tivoli Storage Manager can no longer be used as a media choice in ASM migration policies. For customers using TSM as their storage manager, Tivoli Storage Manager can only be used with Content Manager OnDemand for i if you add a Content Manager OnDemand for Multiplatforms object server between your IBM i partition and your Tivoli Storage Manager server.

If you are currently using Tivoli Storage Manager or System Storage® Archive Manager (SSAM) with Content Manager OnDemand for i, you need to make changes to continue to access your archived data. If you want to begin using Tivoli Storage Manager with a Content Manager OnDemand for Multiplatforms object server, you need to configure the object server. See the Content Manager OnDemand Read This First document for IBM i 7.3 for additional information.

IBM TCP/IP Connectivity Utilities for i (5770-TC1)

SMTP command changes

The Authorization Requires SSL (**AUTREQSSL**) parameter has been removed from the Change SMTP Attributes (**CHGSMTPA**) command. CL programs that invoke the command using this parameter might need to be updated.

Upgrading IBM i SMTP Server to IBM i 7.3

If you have upgraded your system from IBM i 7.1 or a previous release to IBM i 7.3, then use the Change SMTP Attributes (**CHGSMTPA**) command to check the values for the **OVRRTCNL**, **ALWBARELF**, and **VFYID** parameters and make sure they are still consistent with what they were before the upgrade. The upgrade might have reset them to the default values of **OVRRTCNL(*YES)**, **ALWBARELF(*NO)**, and **VFYID(*YES)**. If the values have been changed, use the **CHGSMTPA** command to set them to the pre-install values.

IBM Rational Development Studio for i (5770-WDS)

ILE C compiler changes

In releases before IBM i 7.3, the ILE C compiler allows conversion between a function pointer and a space pointer, but the conversion result may not be what the user is expecting. In IBM i 7.3, changes have been made in the ILE C compiler to forbid conversion between a function pointer and a space pointer (like `int *`, `char *`, etc) by default. A conversion between a function pointer and a space pointer will result in a compilation failure with error message CZM0324 by default. By specifying compiler service option CSOPT('qallowfppspcast'), the message CZM0324 will be downgraded to warning and the compilation will pass.

ILE COBOL PROCEDURE DIVISION USING phrase

In previous releases, when multiple arguments were received into the same identifier in a Procedure Division USING phrase, the last argument was associated with the identifier. In IBM i 7.3, the results are unpredictable. All identifiers in a Procedure Division USING phrase should be unique. This applies to all ILE COBOL compile commands (**CRTBNDCBL**, **CRTCBMOD**, **CRTSQLCBLI**, **CRTCICSCBL**) and all TGTRLS values (***CURRENT**, ***PRV**, **V7R3M0**, **V7R2M0**, **V7R1M0**).

ILE RPG changes

%GRAPH(alphanumeric) now checks for a shift-out character at the beginning of the operand

When the operand of the %GRAPH built-in function is alphanumeric with an EBCDIC CCSID, then the first character must be the shift-out character X'OE'.

Prior to 7.2, the first character was ignored. Starting in 7.2, if the first character is not the shift-out character, message RNX0450 is issued (EBCDIC character value not entirely enclosed by shift-out and shift-in).

RESET *ALL is no longer allowed for an array of data structures in free-form calculations

It is not valid to specify RESET *ALL for an array, including an array of data structures. An error in the compiler previously allowed this, but the error has been corrected for the RESET operation in free-form calculations. No change has been made to fixed-form calculations.

A program with a free-form RESET *ALL for an array of data structures will no longer compile for TGTRLS(*CURRENT) with PTF SI66150 applied, or for TGTRLS(V7R2M0) with PTF SI66153 applied.

The compile will fail with message RNF5393 Factor 2 of a CLEAR or RESET operation is not valid.

To correct the error, remove *ALL from the RESET statement.

Specifying an index of (*) for RESET is no longer supported in free-form RPG

It is not valid to specify an index of * (for example, RESET myArray(*)) for an array in a RESET operation. An error in the compiler previously allowed this, but the error has been corrected for the RESET operation in free-form calculations. No change has been made to fixed-form calculations.

Note that specifying an array name for a RESET operation automatically resets every element in the array.

A program with a RESET operation in the form RESET array(*) will no longer compile for TGTRLS(*CURRENT) with PTF SI66150 applied or for TGTRLS(V7R2M0) with PTF SI66153 applied. The compile will fail with message RNF5343 (Array has too many missing indexes.) To correct the error, remove the indexing from the array name.

%TIMESTAMP now returns a timestamp with microsecond precision

%TIMESTAMP now returns a timestamp with microsecond precision unless you enable an environment variable on the system where the program is compiled. In prior releases, **%TIMESTAMP** returned a timestamp with only millisecond precision. The final three digits of the microseconds portion of the timestamp were always zero. Starting in 7.3 with PTFs SI73189 and SI73190, **%TIMESTAMP** returns a timestamp with microsecond precision. All the digits of the microsecond portion of the timestamp may have a non-zero value. To obtain a timestamp with only milliseconds, specify **%TIMESTAMP(3)**. When a program is compiled on 7.3 with PTF SI73190, and the program is restored on another system, the other system must have PTF SI73189 applied.

Note: To prevent the microsecond precision change to **%TIMESTAMP**, do the following:

On the system where the program is compiled, add environment variable **QIBM_RPG_DISABLE_TIMESTAMP_MICROSEC 'Y'**. When you compile a program with this environment variable set, no PTFs related to this change will be needed on other systems where the program is restored. The millisecond precision will be used when this environment variable is set as shown.

```
====> ADDENVVAR QIBM_RPG_DISABLE_TIMESTAMP_MICROSEC VALUE('Y')
```

IBM i Access for Web (5770-XH2) changes

IBM i Access for Web (5770-XH2) changes.

7.2 IBM i Access for Web PTF SI56971 must be applied on your IBM i partition.

If you currently have a configured, running version of IBM i Access for Web on your IBM i partition, after upgrading to IBM i 7.3, you must run the Configure Access for Web (**CFGACCWEB**) command again for each configured web application server environment before you can use the product.

If you currently have IBM i Access for Web configured in a web application server environment which is not supported on IBM i 7.3 (such as a version 7.1 or version 8.1 integrated web application server instance), you must migrate the configuration to a supported web application server environment (such as a version 8.5 integrated web application server instance). IBM i Access for Web can migrate user-generated data from an unsupported web application server environment to a new web application server environment. To migrate user-generated data, use the **CFGACCWEB** command and specify values for the **SRCSVRTYPE**, **SRCVRINST**, **SRCAPPSVR**, **SRCINSDIR**, and **SHRUSRDTA** parameters. User-generated data will only be migrated the first time the **CFGACCWEB** command is used to configure a web application server environment. IBM i Access for Web also allows you to remove the IBM i Access for Web configuration from an unsupported web application server environment using the Remove Access for Web (**RMVACCWEB**) command. Be sure that the latest 7.2 IBM i Access for Web PTFs are applied before attempting to migrate or remove configurations.

IBM i Access Client Solutions (5733-XJ1)

Open Source Package Management Interface Proxy Support

Proxy support was added for the Open Source Package Management Interface that is part of IBM i Access Client Solutions (ACS). This proxy support allows an IBM i system that does not have any access to the internet to use a Windows or Mac OS system as the proxy host to access the RPM repository hosted by IBM.

Two new function usage IDs have been added to provide specific authority for this proxy support. These need to be set in order to have access to this support.

The function usage IDs are:

- **QIBM_ACS_HTTP_PROXY**
- **QIBM_ACS_HTTP_PROXY_OSPM**

Use **CHGFCNUSG** to set:

```
> CHGFCNUSG FCNID(QIBM_ACS_HTTP_PROXY) USER(usrprofile) USAGE(*ALLOWED)
```

```
> CHGFCNUSG FCNID(QIBM_ACS_HTTP_PROXY_OSPM) USER(usrprofile) USAGE(*ALLOWED)
```

Without the function usage IDs set appropriately, if you try to launch HTTPProxy and connect to your machine you could get the following error:

Application Administration settings prevent this feature from running or completing. To change this restriction, see your system administrator.
(QIBM_ACS_HTTP_PROXY)

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