IBM i Memo to Users
7.4

Memo to Users

Note

Before using this information and the product it supports, read the information in “Notices” on page 57.

This edition applies to version IBM i 7.4 (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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Contents

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About IBM i Memo to Users

This information describes the changes in version 7, release 4, modification 0 (IBM® i 7.4) 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 7.4 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 7.4. 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 7.4 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 7.4 at this Web site:

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

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

For Preventive Service Planning - PSP information go to :

1. http://www.ibm.com/support/docview.wss?uid=nas8N1021657
2. Click **IBM i 740 PSPs**.

What's new

The following revisions or additions have been made to the Memorandum to Users documentation since the first IBM i 7.4 publication. These entries will be found only in the English version of the memo to users.

What’s new

The updates for each Memo to Users entry were made at the specified time frame for the section. The actual release date of some changes documented may not be until the next Technical Refresh (TR) date. Check dates on the PTF specified for each entry to verify release dates.

October 2023

- “Db2 Mirror database IASP vary off processing change” on page 50 was added.
- “Behavior changes for RGZPFM with ALWCANCEL(*YES)” on page 33 was added.

- "RNF5393 is now issued for CLEAR *ALL or RESET *ALL for an array of data structures" on page 55 was added.
- "QSYS2.PTF_INFO view requires *USE authority" on page 34 was added.
- Updates to the following sections have been made:
  - "%TIMESTAMP now returns a timestamp with microsecond precision" on page 54
  - "New database monitor field indicating shared common table expressions for SQL queries" on page 30
  - "Change to implementation of some shared common table expressions for SQL queries" on page 29
  - "QSYS2.GROUP_PTF_INFO view requires *USE authority" on page 34

May 2023 update

- "Db2 Mirror suspend due to storage threshold" on page 50 was added.

April 2023 update

- "CHGSMTPA KEEPUNTIL now has two retention time parameters for successful and unsuccessful final status" on page 24 was added.
- "Heritage Digital Certificate Manager is disabled" on page 56 was added.
- "Heritage IBM Navigator for i is disabled" on page 45 was added.
- "Heritage IBM Navigator for i permanently removed from the system" on page 45 was added.
- "QSYS2.GROUP_PTF_INFO view requires *USE authority" on page 34 was added.
- "STACK_INFO unauthorized access default behavior change" on page 32 was added.
- "Generate Data Definition Language (QSQGNDDL) API will now produce SQL table names for VIEW and MQT definitions" on page 32 was added.
- "ADDPFTRG/CHGPFTRG command changes" on page 36 was added.
- "CREATE TRIGGER and ALTER TRIGGER - MIRROR YES option removed" on page 32 was added.
- "Password parameters removed from db2mtool command" on page 49 was added.

October 2022 update

- "Db2 Mirror resume processing change" on page 50 was added.
- "SM (Systems Management Change) audit journal entry change" on page 34 was added.
- "*JOBCTL special authority is required to view Java jobs" on page 34 was added.
- "CHGDEVTAP UNLOAD change now allowed while device is varied on" on page 34 was added.
- "Access to lazy-load tables through NEWNAV in QNEWNAVSRV" on page 45 was added.
- "Backup Recovery and Media Services (5770-BR1)" on page 52 was updated.

April 2022 update

- "CHGSMTPA KEEPUNTIL now has two retention time parameters for successful and unsuccessful final status" on page 24 was added.
- "QIBM_NAV_ALL_FUNCTION Function Usage ID now shipped with default of *DENIED" on page 44 was added.
- "Check Parameters and Data Areas used in BRMS" on page 53 was added.
- "Database changes" on page 25
  - "Change to implementation of some shared common table expressions for SQL queries" on page 29 was added.
  - "Generate SQL will now produce SQL table names for VIEW and MQT definitions" on page 31 was added.
  - "RESTRICT ON DROP clause is no longer ignored, and will cause an error" on page 31 was added.
  - "Change in LISTAGG error" on page 31 was added.

  - "QSYS2.SYSTEM_STATUS table function, QSYS2.SYSTEM_STATUS_INFO view, and QSYS2.SYSTEM_STATUS_INFO_BASIC view changes" on page 32 was added.
- "Db2 Mirror security changes" on page 47 was added.
  - "Changes to authority required for QSYS2.COMPARE_RESYNC_STATUS() table function" on page 47 was moved to this new section.
  - "QMRDBAPI service program default public authority changed from *USE to *EXCLUDE" on page 48 was moved to this new section.
  - "Setup tools default public authority changed to *EXCLUDE" on page 48 was added.
  - "Replication Criteria List (RCL) default public authority changed to *EXCLUDE" on page 48 was added.
  - "Compare services now require *ALLOBJ special authority" on page 48 was added.
  - "QSYS2.EVALUATE_PENDING_REPLICATION_CRITERIA default public authority changed to *EXCLUDE" on page 49 was added.

January 2022 update

- "CHGRDBDIRE command authority requirements change" on page 33 was added.
- "Change to implementation of some shared common table expressions for SQL queries" on page 29 was added.
- "New database monitor field indicating shared common table expressions for SQL queries" on page 30 was added.
- **November 2021 update**
- – "Connection Type parameter changes to Save-Restore commands" on page 24 was added.
  - "IBM Universal Manageability Enablement (5770-UME) changes" on page 56 was added.
  - "Changes to authority required for QSYS2.COMPARE_RESYNC_STATUS() table function" on page 47 was added.
- **September 2021 update**
  - "IBM Navigator for i" on page 43 was modified.
    - "Re-created Navigator for i" on page 43 was added.
    - "IBM Navigator for i requires 64-bit Java™ SE 8 or greater" on page 44 was updated.
    - IBM Navigator for i "Primary Access Methodology" on page 44 was updated.
    - IBM Navigator for i "Integrated Server GUI" on page 44was updated.
  - "SQLGetData increased buffer length" on page 29 was added.
  - "Behavior change for SQL GENERATED ALWAYS AS (USER or SESSION USER)" on page 29 was added.
  - "QMRDBAPI service program default public authority changed from *USE to *EXCLUDE" on page 48 was added.
  - "DATA_QUEUE_ENTRIES() table function key length enforcement" on page 29 was added.
  - "System Limits removal of old rows" on page 29 was added.
- **May 2021 update**
  - "Db2 Mirror Object Replication Capability Extended to User Indexes, User Spaces, and Data Queues" on page 47 was added.
- **April 2021 update**
  - "SYSDISKSTAT extended to return each disk path" on page 28 was added.
  - "Updated EBCDIC Unicode maps for CCSIDs 1377 and 1388 " on page 41 was added.
  - "Native JDBC driver can fail with SQL0191 (Mixed data or UTF-8 data not properly formed)" on page 37 was added.

- “OBJECT_STATISTICS() table function changes for *USRPRF objects” on page 27 was added.
- “Calls to SQLSetConnectAttr API may now return -1 with Message ID SQ99999” on page 28 was added.
- IBM Navigator for i requires 64-bit Java SE 8 was added.
- “Open Source Package Management Interface Proxy Support ” on page 55 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 28 was added.
- “Change to authority required for registering Query Governor exit programs” on page 28 was added.

- **October 2020 update**
  - “Open Source Package Management Interface Proxy Support ” on page 55 was added.
  - “TLSv1.3 enablement may require changes to GSKit client to prevent GSK_WOULD_BLOCK or EWOULDBLOCK advisory condition” on page 39 was added.
  - Service Monitor autostart job entry removed from QUSRWRK subsystem description was added.
  - “An RPG file defined with USAGE(*UPDATE) is no longer opened delete-capable” on page 54 was added.
  - “XML-SAX with "ccsid=1200" or "ccsid=13488", when the default UCS-2 CCSID for the module is a different CCSID” on page 40 was added.
  - “%TIMESTAMP now returns a timestamp with microsecond precision” on page 54was added.
  - Links were updated in the following sections:
    1. “IBM Developer Kit for Java (5770-JV1)” on page 52
    2. “Discontinued support for certain software and hardware” on page 7
    3. “Upgrade planning ” on page 10
    4. “Required PTFs before you upgrade to IBM 7.4” on page 10
- **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 26 was added.
  - Plan for your Operations Console installation or upgrade was updated.
- **May 2019 update**
  - “Mitigating Spectre and Meltdown vulnerabilities in new and existing programs” on page 40 was added.
  - “Percent of Permanent Addresses Used Calculation” on page 40 was updated.
- **April 2019 update**
  - “Upgrade planning ” on page 10 was updated.
  - “QSYS2.ASP_INFO view change” on page 26 was added.
  - “SQE_NATIVE_ACCESS QAQQINI control is deprecated” on page 26 was added.
  - “IBM WebSphere Application Server 8.5 (5733-W85) and 9.0 (5733-W90)” on page 50 was updated.

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 7.4 over IBM i 7.2

If you are installing IBM i 7.4 over IBM i 7.2, you should also read the *IBM i Memo to Users* for IBM i 7.3. It contains incompatibility-related information about the new functions and enhancements incorporated in IBM i 7.3.

You can also view the IBM i 7.3 *IBM i Memo to Users* in the IBM Knowledge Center under the IBM i 7.3 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 "Planning to Upgrade to IBM i 7.4" at:

https://www.ibm.com/support/pages/node/880105

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.

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

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: https://www14.software.ibm.com/support/customercare/iprt/home

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 IBM i 7.4

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/

Note: After the release of IBM i 7.4, 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 7.4 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 pre-installation 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 tohttp://www.ibm.com/support/docview.wss?uid=nas8N1021657.
  2. Click **IBM i 740 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 7.4 is SF98200.

    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 SF98200

  – The PSP identifier for information that pertains to problems discovered since the availability of the current cumulative PTF package is SF98740. Information within this PSP describes 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 SF98740

  – The PSP identifier for information that pertains to installing IBM i 7.4 hardware and HMC is MF98740. 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 MF98740

  – The PSP identifier for information that pertains to system upgrades and data migrations is SF98206. 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 SF98206

- 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 7.4

PTFs might be required before you upgrade to IBM i 7.4

To review the "Required PTFs for upgrading to IBM i 7.4", go to the support pages using the following link: https://www.ibm.com/support/pages/node/3032649. Also select "Updates and PTFs" on that page for more information.

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: 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.

Minimum partition memory required for IBM i 7.4

The minimum memory size for an IBM i 7.4 partition is 2 GB. However, at least 4 GB of memory is recommended for most partitions.

IBM i 7.4 is not supported on POWER7 systems

POWER7® systems will not support IBM i 7.4:

- POWER7 BladeCenter models (8406-70Y, 8406-71Y, 7891-73X, 7891-74X)
- POWER7 710, 720, 730, 740, 750, 760, 770, 780, 795, (8202-E4B, 8202-E4C, 8202-E4D, 8205-E6B, 8205-E6C, 8205-E6D, 8231-E1D, 8231-E2B, 8233-E8B, 8408-E8D, 9109-RMD, 9117-MMB, 9117-MMC, 9117-MMD, 9119-FHB, 9179-MHB, 9179-MHC, 9179-MHD)

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 7.4:

The service tool server which includes LAN console is removing support for SSL V3 ciphers which means the LAN console feature in the IBM i 7.1 Access for Windows client is no longer supported in IBM i 7.4. IBM i Access Client Solutions is now required for LAN console in IBM i 7.4. 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 IBM i 7.4.

If you are upgrading to IBM i 7.4 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 IBM i 7.4; 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.

Command Output cautions

Release to release Command Output considerations

Applications that specify OUTPUT(*PRINT) or OUTPUT(*) must be able to tolerate changes to the record layout in either the spooled file or the screen ouput. From release to release, commands 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.

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.

Removal of support of adapters and configurations in release IBM i 7.4

Removal of commands supporting native SNA adapters:

Software support for these adapters has been 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 has been removed. Hardware support for these protocols was withdrawn in prior releases.

Removal of Network Interfaces configurations:

Software support for these adapters has been removed. Hardware support for these adapters was withdrawn in prior releases.

Removal of AnyNet configurations:

AnyNet® has not been supported since prior to IBM i 7.1. 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_74/rzajt/rzajtanytoee.htm

IBM i command changes

Release to release IBM i command changes

ADDTCPIFC and CHGTCPIFC command changes

The Add TCP/IP Interface (**ADDTCPIFC**) and Change TCP/IP Interface (**CHGTCPIFC**) commands have changed.

The following parameters have been removed :

- PVC logical channel identifier (**PVCLGLCHLI**)
- X.25 idle circuit timeout (**IDLVCTTIMO**)
- X.25 maximum virtual circuits (**MAXSVC**)
- X.25 DDN interface (**DDN**)
- TRLAN bit sequencing (**BITSEQ**)

Interfaces will no longer be allowed for Line description (LIND) that are DDI, Frame relay, SDLC, TDLC, Token-Ring, Wireless or X.25.

Any existing CL programs that use these commands might need to be modified.

Existing TCP/IP Interfaces for line descriptions types that are no longer supported (DDI, Frame relay, SDLC, TDLC, Token-Ring, Wireless or X.25) should be removed using the Remove TCP/IP Interface (**RMVTCPIFC**) command.

ADDUSRSNMP command changes

On the Add User for SNMP (**ADDUSRSNMP**) command, the default value of the Key type (**KEYTYPE**) parameter has been changed from *LOCALIZED to *NONLOCALIZED. Having a non-localized key allows the user to be available for incoming SNMPv3 trap messages in addition to already being available for incoming get, get next, or set requests.

APYJRNCHGX command

The Apply Journaled Changes Extended (**APYJRNCHGX**) command will be removed in a future release.

The support for the Apply Journaled Change Extended (**APYJRNCHGX**) command will be removed in a future release. The (**APYJRNCHGX**) command was first delivered in i5/OS V5R2 and provided additional functions that the Apply Journaled Changes (**APYJRNCHG**) command did not have. In IBM i 7.1 and subsequent releases, the **APYJRNCHG** command and other CL commands provide the functions that were provided by the **APYJRNCHGX** command.

CHGASPACT and CHGCLURCY command authority changes

The public authority of the Change Cluster Recovery (**CHGCLURCY**) command and the Change ASP Activity (**CHGASPACT**) command have changed from *USE to *EXCLUDE.

CHGCTLAPPC and CRTCTLAPPC command changes

The Create Ctl Desc (APPC) (**CRTCTLAPPC**) and Change Ctl Desc (APPC) **CHGCTLAPPC**) have changed.

The Link type (**LINKTYPE**) parameter special values *ANYNW, *FAX, *FR, *ILAN, *LAN, *SDLC, *TDLC, *X25 are no longer supported.

These protocol parameters have been removed :

- Short hold mode (**SHM**)
- Switched network backup (**SNBU**)
- Activate swt network backup (**ACTSNBU**)

- APPN-capable (**APPN**)
- Controller type (**TYPE**)
- Attached nonswitched line (**LINE**)
- Switched line list (**SWTLINLST**)
- Connection number (**CNNNBR**)
- Answer number (**ANSNBR**)
- Outgoing connection list (**CNNLSTOUT**)
- Connection list entry (**CNNLSTOUTE**)
- IDLC window size (**IDLCWDWSIZ**)
- IDLC frame retry (**IDLCFRMRTY**)
- IDLC response timer (**IDLCRSPTMR**)
- IDLC connect retry (**IDLCCNNRTY**)
- Predial delay (**PREDIALDLY**)
- Redial delay (**REDIALDLY**)
- Dial retry (**DIALRTY**)
- SHM disconnect limit (**SHMDSCLMT**)
- SHM disconnect timer (**SHMDSCTMR**)
- Station address (**STNADR**)
- SDLC poll priority (**POLLPTY**)
- SDLC poll limit (**POLLLMT**)
- SDLC out limit (**OUTLMT**)
- SDLC connect poll retry (**CNNPOLLRTY**)
- SDLC NDM poll timer (**NDMPOLLTMR**)
- LAN remote adapter address (**ADPTADR**)
- LAN frame retry (**LANFRMRTY**)
- LAN connection retry (**LANCNNRTY**)
- LAN response timer (**LANRSPTMR**)
- LAN connection timer (**LANCNNTMR**)
- LAN acknowledgment timer (**LANACKTMR**)
- LAN inactivity timer (**LANINACTMR**)
- LAN acknowledgment frequency (**LANACKFRQ**)
- LAN max outstanding frames (**LANMAXOUT**)
- LAN access priority (**LANACCPTY**)
- LAN window step (**LANWDWSTP**)
- X.25 network level (**NETLVL**)
- X.25 link level protocol (**LINKPCL**)
- X.25 connection password (**CNNPWD**)
- X.25 switched line selection (**SWTLINSLCT**)
- X.25 default packet size (**DFTPKTSIZE**)
- X.25 default window size (**DFTWDWSIZE**)
- X.25 user group identifier (**USRGRPID**)
- X.25 reverse charging (**RVSCRG**)
- X.25 frame retry (**X25FRMRTY**)

- X.25 connection retry (**X25CNNRTY**)
- X.25 response timer (**X25RSPTMR**)
- X.25 connection timer (**X25CNNTMR**)
- X.25 delayed connection timer (**X25DLYTMR**)
- X.25 acknowledgment timer (**X25ACKTMR**)
- X.25 inactivity timer (**X25INACTMR**)
- User facilities (**USRFCL**)
- APPN/HPR capable (**HPR**)
- Model controller description (**MDLCTL**)
- Connection network ID (**CNNNETID**)
- Connection network CP (**CNNCPNAME**)

Any existing CL programs that use these commands might need to be modified.

Existing APPC Controller Descriptions configured with a Link type (**LINKTYPE**) *ANYNW, *FAX, *FR, *IDLC, *ILAN, *LAN, *SDLC, *TDLC, *X25 should be removed using the Delete Controller Description (**DLTCTLD**) CL command.

CHGCTLASC and CRTCTLASC command changes

The Create Ctl Desc (Async) (**CRTCTLASC**) and Change Ctl Desc (Async) (**CHGCTLASC**) commands have changed.

The Link type (**LINKTYPE**) parameter special value *X25 is no longer supported .

These protocol parameters have been removed :

- Answer number (**ANSNBR**)
- X.25 logical channel ID (**LGLCHLID**)
- Remote verify (**RMTVFY**)
- PAD Emulation (**PADEML**)
- X.25 switched line selection (**SWTLINSLCT**)
- X.25 default packet size (**DFTPKTSIZE**)
- X.25 default window size (**DFTWDWSIZE**)
- X.25 user group identifier (**USRGRPID**)
- X.25 reverse charging (**RVSCRG**)
- User facilities (**USRFCL**)

Any existing CL programs that use these commands might need to be modified.

Existing Async Controller Descriptions configured for X.25 should be removed using the Delete Controller Description (**DLTCTLD**) CL command.

CHGCTLHOST and CRTCTLHOST command changes

The Create Ctl Desc (SNA Host) (**CRTCTLHOST**) and Change Ctl Desc (SNA Host) (**CHGCTLHOST**) commands have changed.

The special values *FR, *LAN, *SDLC, *X25 for the Link type (**LINKTYPE**) parameter are no longer supported.

These protocol parameters have been removed :

- Short hold mode (**SHM**)
- Switched network backup (**SNBU**)
- Activate swt network backup (**ACTSNBU**)

- Attached nonswitched line (**LINE**)
- Switched line list (**SWTLINLST**)
- Maximum frame size (**MAXFRAME**)
- Remote network identifier (**RMTNETID**)
- Remote control point (**RMTCPNAME**)
- Adjacent link station (**ADJLNKSTN**)
- Connection number (**CNNNBR**)
- Answer number (**ANSNBR**)
- Outgoing connection list (**CNNLSTOUT**)
- Connection list entry (**CNNLSTOUTE**)
- Station address (**STNADR**)
- LAN remote adapter address (**ADPTADR**)
- X.25 network level (**NETLVL**)
- X.25 link level protocol (**LINKPCL**)
- X.25 logical channel ID (**LGLCHLID**)
- X.25 connection password (**CNNPWD**)
- APPN CP session support (**CPSSN**)
- Remote APPN node type (**NODETYPE**)
- Branch extender role (**BEXROLE**)
- APPN/HPR capable (**HPR**)
- HPR path switching (**HPRPTHSWT**)
- APPN transmission group number (**TMSGRPNBR**)
- Autocreate device (**AUTOCRTDEV**)
- Autodelete device (**AUTODLTDEV**)
- User-defined 1 (**USRDFN1**)
- User-defined 2 (**USRDFN2**)
- User-defined 3 (**USRDFN3**)
- Recontact on vary off (**RECONTACT**)
- IDLC window size (**IDLCWDWSIZ**)
- IDLC frame retry (**IDLCFRMRTY**)
- IDLC response timer (**IDLCRSPTMR**)
- IDLC connect retry (**IDLCCNNRTY**)
- Predial delay (**PREDIALDLY**)
- Redial delay (**REDIALDLY**)
- Dial retry (**DIALRTY**)
- LAN DSAP (**DSAP**)
- LAN SSAP (**SSAP**)
- LAN frame retry (**LANFRMRTY**)
- LAN connection retry (**LANCNNRTY**)
- LAN response timer (**LANRSPTMR**)
- LAN connection timer (**LANCNNTMR**)
- LAN acknowledgment timer (**LANACKTMR**)
- LAN inactivity timer (**LANINACTMR**)

- LAN acknowledgement frequency (**LANACKFRQ**)
- LAN max outstanding frames (**LANMAXOUT**)
- LAN access priority (**LANACCPTY**)
- LAN window step (**LANWDWSTP**)
- X.25 switched line selection (**SWTLINSLCT**)
- X.25 default packet size (**DFTPKTSIZE**)
- X.25 default window size (**DFTWDWSIZE**)
- X.25 user group identifier (**USRGRPID**)
- X.25 reverse charging (**RVSCRG**)
- X.25 frame retry (**X25FRMRTY**)
- X.25 response timer (**X25RSPTMR**)
- X.25 acknowledgment timer (**X25ACKTMR**)
- X.25 inactivity timer (**X25INACTMR**)
- User facilities (**USRFCL**)

Any existing CL programs that use these commands might need to be modified.

Existing SNA Host Controller Descriptions configured with a Link type (**LINKTYPE**) *FR, *IDLC, *LAN, *SDLC, *X25 should be removed using the Delete Controller Description (**DLTCTLD**) CL command.

CHGDEVDSP and CRTDEVDSP command changes

The Create Device Desc (Display) (**CRTDEVDSP**) and Change Device Desc (Display) (**CHGDEVDSP**) commands have changed.

The Maximum length of request unit (**MAXLENRU**) parameter has been removed.

Any existing CL programs that use these commands might need to be modified.

CHGDEVHOST and CRTDEVHOST command changes

The Create Device Desc (SNA Host) (**CRTDEVHOST**) and Change Device Desc (SNA Host) (**CHGDEVHOST**) commands have changed.

The Maximum length of request unit (**MAXLENRU**) parameter no longer supports the X.25 values 241, 247, 497, 503, 1009, and 1015.

Any existing CL programs that use these commands might need to be modified.

CHGDEVPRT and CRTDEVPRT command changes

The Create Device Desc (Printer) (**CRTDEVPRT**) and Change Device Desc (Printer) (**CHGDEVPRT**) commands have changed.

The Maximum length of request unit (**MAXLENRU**) parameter has been removed.

Any existing CL programs that use this command might need to be modified.

CHGSNMPA command changes

Specifying the value *SYSGEN for the System description (**SYSD**) parameter of the Change SNMP Attributes (**CHGSNMPA**) command will no longer generate a textual description of the system at the time the command is run. If you have previously specified *SYSGEN and then prompt the **CHGSNMPA** command, it will show the value *SYSGEN instead of generated text. This does not affect the information returned by the IBM i SNMP agent when processing a get, get next, or get bulk request for the system description (sysDescr).

CRTLINETH and CHGLINETH command changes

The Create Line Desc (Ethernet) (**CRTLINETH**) and Change Line Desc (Ethernet) (**CHGLINETH**) commands have changed.

The Resource name (**RSRCNAME**) parameter special value *NWID is no longer supported.

The following parameters have been removed :

- Attached NWI (**NWI**)
- NWI type (**NWITYPE**)
- DLC identifier (**NWIDLCI**)
- Exchange identifier (**EXCHID**)
- ATM access type (**ACCTYPE**)
- PVC identifiers (**PVCID**)
- Use LECS address (**USELECSADR)**)
- LES ATM address (**LESATMADR**)
- Emulated LAN name (**EMLLANNAME**)
- LEC disconnect time out (**LECDSCTIMO**)
- Error threshold level (**THRESHOLD**)
- Generate test frame (**GENTSTFRM**)
- Link speed (**LINKSPEED**)
- Cost/connect time (**COSTCNN**)
- Cost/byte (**COSTBYTE**)
- Security for line (**SECURITY**)
- Propagation delay (**PRPDLY**)
- User-defined 1 (**USRDFN1**)
- User-defined 2 (**USRDFN2**)
- User-defined 3 (**USRDFN3**)
- Autocreate controller (**AUTOCRTCTL**)
- Autodelete controller (**AUTODLTCTL**)

Any existing CL programs that use these commands might need to be modified.

Existing configuration objects for these types cannot be used and should be removed using the Delete Line Description (**DLTLIND**) command.

CHGNETA command changes

Parameter changes for the Change Network Attributes (**CHGNETA**) command

Default ISDN connection list (**DFTCNNLST**) parameter has been removed.

The Allow AnyNet support (**ALWANYNET**) parameter has been removed. It will treated as *NO and AnyNet will no longer be started or useable. Customers currently using AnyNet should convert to Enterprise Extender before installing IBM i 7.4.

RTVCFGSRC command changes and output

Parameter changes for the Retrieve configuration source (**RTVCFGSRC**) command

The (**CFGTYPE**) parameter no longer supports :

- *NWID - Network Interface Descriptions
- *CNNL - Connection Lists

Configuration object that have had the create commands removed will no longer be retrieved, even when the objects still exist. Message CPF26B0 will be signaled to identify which objects were not retrieved and a comment will be included in the retrieved source file.

- Create Ctl Desc (Finance) (**CRTCTLFNC**)
- Create Ctl Desc (Retail) (**CRTCTLRTL**)
- Create Ctl Desc (Remote WS) (**CRTCTLRWS**)
- Create Device Desc (Finance) (**CRTDEVFNC**)
- Create Device Desc (Retail) (**CRTDEVRTL**)
- Create Line Desc (DDI) (**CRTLINDDI**)
- Create Line Desc (Fax) (**CRTLINFAX**)
- Create Line Desc (Frame Relay) (**CRTLINFR**)
- Create Line Desc (SDLC) (**CRTLINSDLC**)
- Create Line Desc (TDLC) (**CRTLINTDLC**)
- Create Line Desc (Token-Ring) (**CRTLINTRN**)
- Create Line Desc (Wireless) (**CRTLINWLS**)
- Create Line Desc (X.25) (**CRTLINX25**)
- Create Network Interface (FR) (**CRTNWIFR**)

Configuration objects with configuration parameters that are no longer supported will no longer be retrieved, even when the objects still exist. Message CPF26B0 will be generated to identify which objects were not retrieved and a comment will be included in the retrieved source file.

- Create Ctl Desc (APPC) (**CRTCTLAPPC**) with Link type (**LINKTYPE**) parameter values: *ANYNW, *FR, *ILAN, *LAN, *SDLC, *TDLC and *X25
- Create Ctl Desc (SNA Host) (**CRTCTLHOST**) with Link type (**LINKTYPE**) for *FR, *LAN, *SDLC and *X25
- Create Line Desc (Ethernet) (**CRTLINETH**) with Resource name (**RSRCNAME**) of *NWID

A CL config source file retrieved using **RTVCFGSRC** in a prior release and saved in a file may not be useable due to the parameters and values that have been removed. If that retrieved config file is edited using SEU, and the CL command(s) are prompted, those parameters that are no longer valid will be reported in error and removed. Invalid parameter values will also be flagged in error and may need to be changed or removed. Once the CL command has been corrected and is valid for the new IBM i 7.4 syntax, it can then be saved in the file for use at the current release.

STRTRPMGR command default change

Controlling the Local Trap Manager using the SNMP Attributes

The default for the Start Trap Manager (**STRTRPMGR**) command parameter Forward traps (**FWDTRP**) is changing from *NO to *SNMPA. This will allow the local trap manager to be configured and controlled with the Change SNMP Attributes **CHGSNMPA** command using the new Local trap manager (**LCLTRPMGR**) parameter. With the new **LCLTRPMGR** parameter, programs such as the system start-up program could be changed to remove any invocation of the **STRTRPMGR**. Likewise, programs using the End Trap Manager (**ENDTRPMGR**) command can be changed to remove any invocation of **ENDTRPMGR**.

TRCCNN command changes

The Trace Connection (**TRCCNN**) command has allowed multiple values to be specified for the Trace type (**TRCTYPE**)parameter since its introduction in OS/400® V4R5. The command is never used in this manner. The option to specify multiple **TRCTYPE** values has been eliminated.

The **TRCTYPE** parameter is replacing the *SSL value with *TLS to accurately reflect that Secure Sockets Layer (SSL) has been replaced by Transport Layer Security (TLS).

The TCP/IP data (**TCPDTA**) parameter, Protocal element *ARP has been removed.

CL programs that use the **TRCCNN** command may need to be updated and recompiled to accommodate these changes.

VRYCFG command changes

Parameter changes for the Vary configuration **VRYCFG** command

The (**CFGTYPE**) parameter no longer supports the *NWI - Network Interface Descriptions value.

The (**CFGOBJ**) parameter no longer supports the *ANYNW - All controller descriptions that specify a link type of *ANYNW value.

Removal of commands requiring native adapters

Software support for these adapters is formally being removed. Hardware support for these adapters was withdrawn in prior releases. Software alternatives, such as Enterprise Extender for SNA, do not support these configurations.

These CL configuration commands to create and change controllers or devices that require native SNA adapters have been removed in IBM i 7.4:

- Create Ctl Desc (Finance) (**CRTCTLFNC**)
- Create Ctl Desc (Retail) (**CRTCTLRTL**)
- Create Ctl Desc (Remote WS) (**CRTCTLRWS**)
- Change Ctl Desc (Finance) (**CHGCTLFNC**)
- Change Ctl Desc (Retail) (**CHGCTLRTL**)
- Change Ctl Desc (Remote WS) (**CHGCTLRWS**)
- Create Device Desc (Finance) (**CRTDEVFNC**)
- Create Device Desc (Retail) (**CRTDEVRTL**)
- Change Device Desc (Finance) (**CHGDEVFNC**)
- Change Device Desc (Retail) (**CHGDEVRTL**)
- Create Line Description (Fax) (**CRTLINFAX**)
- Change Line Description (Fax) (**CHGLINFAX**)

Existing configuration objects for these types cannot be used and should be removed using the corresponding Delete description CL command.

- Delete Controller Description (**DLTCTLD**)
- Delete Device Description (**DLTDEVD**)
- Delete Line Description (**DLTLIND**)

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

Software support for DDI, Token-Ring, Wireless, Frame Relay, SDLC, TDLC, and X.25 protocols is formally being removed. Hardware support for these protocols was withdrawn in prior releases.

These CL configuration commands to create and change line descriptions for DDI, FAX, Token-Ring, Wireless, Frame Relay, SDLC, TDLC and X.25 protocols have been removed in IBM i 7.4:

- Create Line Desc (DDI) (**CRTLINDDI**)
- Create Line Desc (Frame Relay) (**CRTLINFR**)
- Create Line Desc (SDLC) (**CRTLINSDLC**)
- Create Line Desc (TDLC) (**CRTLINTDLC**)
- Create Line Desc (Token-Ring) (**CRTLINTRN**)

- Create Line Desc (Wireless) (**CRTLINWLS**)
- Create Line Desc (X.25) (**CRTLINX25**)
- Change Line Desc (DDI) (**CHGLINDDI**)
- Change Line Desc (Frame Relay) (**CHGLINFR**)
- Change Line Desc (SDLC) (**CHGLINSDLC**)
- Change Line Desc (TDLC) (**CHGLINTDLC**)
- Change Line Desc (Token-Ring) (**CHGLINTRN**)
- Change Line Desc (X.25) (**CHGLINX25**)

Any existing CL programs that use these commands might need to be modified.

Existing configuration objects for these types cannot be used and should be removed using the corresponding Delete description CL command.

- Delete Controller Description (**DLTCTLD**)
- Delete Device Description (**DLTDEVD**)
- Delete Line Description (**DLTLIND**)

Removal of IP over SNA commands

These IP over SNA commands used by AnyNet have been removed in IBM i 7.4:

- Add IP over SNA Interface (**ADDIPSIFC**I)
- Add IP over SNA Location (**ADDIPSLOC**)
- Add IP over SNA Route (**ADDIPSRTE**)
- Change IP over SNA Interface (**CHGIPSIFC**)
- Change IP over SNA Location (**CHGIPSLOC**)
- Change IP over SNA TOS (**CHGIPSTOS**)
- Convert IP Address (**CVTIPSIFC**)
- Convert Network ID / Location (**CVTIPSLOC**)
- End IP over SNA Interface (**ENDIPSIFC**)
- Print IP over SNA (**PRTIPSCFG**)
- Remove IP over SNA Interface (**RMVIPSIFC**)
- Remove IP over SNA Location (**RMVIPSLOC**)
- Remove IP over SNA Route (**RMVIPSRTE**)
- Start IP over SNA Interface (**STRIPSIFC**)

Any existing CL programs that use these commands might need to be modified.

Removal of commands for Network Interfaces

Software support for these adapters is formally being removed. Hardware support for these adapters was withdrawn in prior releases. These CL configuration commands for Network Interfaces that require adapters have been removed in IBM i 7.4:

- Create Network Interface (FR) (**CRTNWIFR**I)
- Change Network Interface (FR) (**CHGNWIFR**)
- End Network Interface Recovery (**ENDNWIRCY**)
- Resume NWI Recovery (**RSMNWIRCY**)

Any existing CL programs that use these commands might need to be modified.

Existing configuration objects for these types cannot be used and should be removed using the Delete Network Interface Desc (**DLTNWID**) command.

Connection Type parameter changes to Save-Restore commands

The following CL commands for Save Restore have been modified:

- SAVRSTOBJ
- SAVRSTLIB
- SAVRSTCFG
- SAVRSTCHG
- SAVRSTDLO
- SAVRST

With IBM i 7.4 PTF SI76042, a new parameter **CNNTYPE**, is added and the parameter **RMTLOCNAME** is a single element parameter.

Connection type (**CNNTYPE**) - Specifies the type of connection with the remote system. The possible types are:

***SNA**
Default - The remote system is accessed using a Systems Network Architecture (SNA) address and protocol.

***IP**
The target system is found using a host name or an internet address over a TCP/IP connection.

***DB2MIRROR**
The remote system is accessed using the System Object Replication NRG configured by Db2 Mirror GUI or Db2 Mirror services.

With certain IBM i 7.4 PTFs installed, the CL parameter **RMTLOCNAME** was changed to an element list with a second element "Type" to support the *IP connection type. The following list provides detail on which IBM i PTFs created the change in the parameter, RMTLOCNAME, as well as which PTFs removed the compatibility issue:

- With PTF SI73777, SI74970, or SI75827 installed, but not PTF SI76042 (or PTFs which supersede SI76042) installed, the RMTLOCNAME parameter is an element list.
- With PTF SI73777, SI74970, or SI75827 installed, and also PTF SI76042 (or PTFs which supersede SI76042) installed, the RMTLOCNAME parameter change is removed and the parameter is a single element.
- Without IBM i PTF SI73777, SI74970, or SI75827 installed, there is no change in the RMTLOCNAME parameter.

Certain levels of the IBM i 7.4 Backup Recovery Solutions Group PTF SF99664 may also contain these PTFs. Level 18 contains IBM i 7.4 PTF SI74970. Level 20 contains IBM i 7.4 PTF SI75827.

Any CL scripts or programs that were coded to include the connection type element of **RMTLOCNAME** will need to be changed to specify the new **CNNTYPE** parameter.

CHGSMTPA KEEPUNTIL now has two retention time parameters for successful and unsuccessful final status

Before IBM i 7.4 PTF SI80666 is applied, Change SMTP Attributes (**CHGSMTPA**) KEEPUNTIL (1-1240000) set any e-mail tracking information for the specified maximum number of seconds after the e-mail has been put into a final state regardless of the e-mail delivery status. Now the **KEEPUNTIL** parameter of **CHGSMTPA** supports two parameter elements:

Element 1
The maximum number of seconds to retain e-mail tracking information after the e-mail has been put into “Successful final state”.

Element 2 (Optional)
The maximum number of seconds to retain e-mail tracking information after the e-mail has been put into “Unsuccessful final state”.

If only one parameter element is specified, it will be used for the "Successful final state".

With both parameter elements specified, the length of time for “Successful final state” is set to the first value specified on KEEPUNTIL; and the length of time for “Unsuccessful final state” is set to the second value.

Note: If the system is upgraded from a previous release, then the maximum retention time for “Successful final state” remains the same value as previously set with the KEEPUNTIL parameter. The maximum retention time for “Unsuccessful final state” will be set to the same value as "Successful final state".

Database changes

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_74/db2/rbafzresword.htm

SQE MAXTMPSTG query processing

In prior releases, support for the Maximum temporary storage (**MAXTMPSTG**), configured in class descriptions, for executing SQE queries was predicated on the amount of free space in SYSBAS falling below the configured Auxiliary storage lower limit (**QSTGLOWLMT**) system value.

Starting in IBM i 7.4, the **MAXTMPSTG** enforcement will no longer be dependent on the **QSTGLOWLMT** system value. Therefore, if the **MAXTMPSTG** value for a class description is changed to any value other than *NOMAX, the maximum amount of temporary storage used by queries executed in the associated job(s) needs to be taken into consideration. This IBM Developer article provides some guidance in choosing a value: https://developer.ibm.com/articles/i-temp-storage-3/.

HASH scalar function change

In IBM i 7.4, the HASH function has been renamed to HASH_VALUES. Any use of the HASH function as defined prior to IBM i 7.4 must be changed to use the renamed version of this function, HASH_VALUES.

This change was required to allow the introduction of a new Db2® standard function named HASH.

A reference to the prior HASH function is likely to encounter several errors since the input parameters and result data type of the new HASH function are different. Some common SQLCODEs are: SQL0303 when attempting to assign the result of HASH to a variable, SQL0171 if the data type of the second argument is not correct, and SQL0170 if more than 2 arguments are specified.

To identify static statements in embedded SQL programs and service programs that use a function named HASH, run the following SQL statement.

```
WITH program_statements(naming_mode, dec_point, string_delim, stmt_text,
    program_library, program_name, program_type)
    AS (SELECT a.naming, a.decimal_point, a.sql_string_delimiter, b.statement_text,
```

```
               a.program_schema, a.program_name, a.program_type
          FROM qsys2.sysprogramstat a INNER JOIN
               qsys2.sysprogramstmtstat b ON a.program_schema = b.program_schema AND
                                             a.program_name = b.program_name AND
                                             a.module_name = b.module_name
          WHERE  a.number_statements > 0)
SELECT program_library, program_name, program_type, stmt_text
    FROM program_statements,
    TABLE(qsys2.parse_statement(stmt_text, naming_mode, dec_point, string_delim)) c
    WHERE c.name_type = 'FUNCTION' and c.name = 'HASH'
    ORDER BY 1, 2;
```

QSYS2.PARSE_STATEMENT table function returns warnings

The QSYS2.PARSE_STATEMENT table function has changed to return SQLCODE = +462 and SQLSTATE = '01H52' when:

- The SQL statement fails to parse
- The SQL statement parameter value is a blank string or NULL

QSYS2.ASP_INFO view change

IBM i 7.4 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."

SQE_NATIVE_ACCESS QAQQINI control is deprecated

In IBM i 7.4, the **SQE_NATIVE_ACCESS QAQQINI** control is deprecated. Its use will be tolerated in the **QAQQINI** control file, but the use will have no effect and an SQE implementation will be attempted for all queries.

SQL precompiler changes

sql_source() pragma not generated if target release IBM i 7.4 specified

The **CRTSQLCI** and **CRTSQLCPPI** commands invoke the SQL precompiler. In prior releases, when the precompiler ran, it generated an sql_source() pragma in the intermediate file that was fed to the C/C++ compiler. In IBM i 7.4, the precompiler will no longer generate this pragma if the target release of the compile is 7.4

Source compiled at release IBM i 7.4 will fail at compile on release N-x with message CPF5D2B

In prior releases, if the SQL precompiler was run on release N using the **SRCSTMF** parameter and the output was sent to a specific file with the **TOSRCFILE** parameter, attempts to compile the source in the output file on an N-x machine, using the **CRTxMOD** command, would fail to create with diagnostic message CPD5CF1- `A preprocessor release of &2 is more recent than the specified compiler target release of &1`. On IBM i 7.4, if release N is 7.4 and the **TGTRLS** N-x is not specified, the attempt to compile on release N-x will now fail with message CPF5D2B - `Tag found in user storage area is not valid.`

QSYS2 SQL catalog files no longer restored with restore commands

In IBM i 7.4 with PTF SI71741, 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:

Table 1. SQL catalog files not restored with restore commands	
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.

OBJECT_STATISTICS() table function changes for *USRPRF objects

In IBM i 7.4 with PTF SI74690, 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.AUTHORITY_COLLECTION_LIBRARIES`
- `QSYS2.AUTHORITY_COLLECTION_OBJECT`
- `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).

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: '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

QSYS2.PTF_INFO and SYSTOOLS.GROUP_PTF_DETAILS view changes

In IBM i 7.4, 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.

SQLGetData increased buffer length

The **SQLGetData()** function has been enhanced to provide sufficient space in the returned character field for the number of UTF-8 bytes potentially needed to represent the CHAR field.

With IBM i 7.3 PTF SI75759 and IBM i 7.4 PTF SI75760, using SQLCLI Call Level Interface (CLI)'s SQLGetData() API against EBCDIC CHAR fields may result in longer output. The data provider must now increase the buffer length to accommodate conversion from single-byte EBCDIC (for example, CCSID 37) strings to two-byte Unicode (CCSID 1208 / UTF-8) strings.

When the field is a CHAR field, it will be padded out to the maximum length (doubled).

Behavior change for SQL GENERATED ALWAYS AS (USER or SESSION USER)

With IBM i 7.3 PTF SI76150 and IBM i 7.4 PTF SI76151, incorrect behavior of a database generated column has been corrected.

Prior to these PTFs, the database would not recognize that the effective user of the thread had changed, and would incorrectly use a value that corresponds to SYSTEM_USER.

With these PTFs, the database will correctly use the effective user of the thread when processing the generated expression.

DATA_QUEUE_ENTRIES() table function key length enforcement

In IBM i 7.4 with Db2 for i PTF Group SF99704 Level 15 and IBM i 7.3 with Db2 for i PTF Group SF99703 Level 26, the **DATA_QUEUE_ENTRIES** table function is changed to enforce the length of **KEY_DATA** input. The length of key-data must be the length specified on the **KEYLEN** parameter on the Create Data Queue (CRTDTAQ) command. If the key-data length is incorrect, DATA_QUEUE_ENTRIES table function will fail with SQLSTATE 22023 and message:

```
"KEY_DATA MUST HAVE A LENGTH OF XX"
```

System Limits removal of old rows

Database tracking of System Limits consumption occurs in the QSYS2/SYSLIMTBL table. Previously, System Limits would only automatically delete rows from this table based upon the number of entries for each specific limit.

In IBM® i 7.4 with Db2 for i PTF Group SF99704 Level 15 and IBM i 7.3 with Db2 for i PTF Group SF99703 Level 26, new controls are added to also automatically delete rows based upon age. If a row in the system limits consumption table exceeds the set age, that row will be deleted. By default, rows that are older than 90 days will be deleted when the nightly System Limits pruning process runs.

There are new system-provided global variables that can be used to change the number of days. They are documented here: https://ibmdocs-test.mybluemix.net/docs/en/i/7.4?topic=services-IBM-system-limits-global-variables.

Change to implementation of some shared common table expressions for SQL queries

On IBM i 7.4 with Db2 for i PTF Group SF99704 Level 23, the query optimizer has changed how it implements queries in which a Common Table Expression (CTE) is referenced multiple times within that same query. This change completes the implementation of changes initially delivered in PTF Group SF99704 Level 18. The following detail applies only to queries that reference a CTE multiple times.

Without these changes, the optimizer had two options for implementing these CTEs. The optimizer would choose the option that it estimated would run the fastest.

The options were:

1. **Capture**
   "Capture" results set of the CTE. The full CTE is run once by itself, and the resulting data is stored in a temporary data structure to be shared wherever the CTE is referenced in that query.
2. **Merge**
   "Merge" each CTE as defined into the tree and handle each CTE reference separately. This would treat each CTE reference as its own entity, duplicating the underlying tree and allowing the optimizer to decide how each reference to that tree is run based on the context of that reference.

It has been determined that option (2) is not consistent with the SQL standard. Because the CTE's underlying tree is duplicated, changes to underlying tables while the query is running may cause a CTE reference to return a different result set. This could cause unexpected results, as an individual CTE is expected to return the same data wherever it is referenced.

To provide consistent query results and to ensure compliance with the SQL standard, the query optimizer with the above PTFs applied will now always use option (1). As a side-effect, some CTE queries that were previously implemented with option (2) may run slower. In other cases, run time may be improved.

In all cases, the CTE query will return predictable results.

Capturing the results set into a temporary data structure also prevents the use of a sensitive cursor or ALWCPYDTA(*NO) with these queries. Queries that previously were able to run in such an environment because they used option (2) will need to be re-written, or they will now fail with SQLCODE -243 or SQLCODE -527.

If the underlying tables are known not to be changing during query execution and the performance of option (1) is not acceptable, the DETERMINISTIC keyword may be added to the CTE definition. This will allow the optimizer to consider option (2) for these CTEs. If the underlying data does change, the use of the DETERMINISTIC clause may result in behavior that is not consistent with the SQL standard definition for CTEs. Users who implement DETERMINISTIC CTEs assume this risk. The DETERMINISTIC keyword is available in PTFs SI84058 for IBM i 7.5 and SI84057 for IBM i 7.4

For more information on detecting shared CTEs, see "New database monitor field indicating shared common table expressions for SQL queries".

New database monitor field indicating shared common table expressions for SQL queries

On IBM® i 7.4 with PTFs MF69231, MF69234, and MF69235, the query optimizer has added additional information about shared common table expressions (CTEs) to the 3014 Database Monitor record.

CTEs that are shared (referenced more than once in a query) require special handling by the query optimizer in order to maintain compatibility with the SQL standard. In some cases, the special handling may cause queries to perform more slowly than expected. When the database monitor is run or a plan cache snapshot is captured after the listed PTFs are applied, the QQSMINT1 field of the 3014 record will indicate whether the query has a shared CTE.

This information is intended to help the database engineer or programmer find these queries for remediation. IBM recommends limiting the use of shared CTEs, especially in cases where the CTE is complex or selects a large amount of data. This recommendation holds even if the query is not currently experiencing query performance degradation. Remediation steps can include using an SQL view in place of the CTE or splitting each CTE reference to use its own CTE definition.

Possible values for QQSMINT1 are:

0
Query does not contain CTEs with multiple references. These queries are not considered problematic

1
Query contains at least one CTE with multiple references. These queries may be susceptible to potential query performance degradation due to constraints imposed by the SQL standard.

2
Query contains at least one CTE with multiple references and at least one of these CTEs is considered complex by the optimizer. These queries are the most likely to suffer potential query performance degradation.

255
Query contains at least one CTE with multiple references and at least one of these CTEs has been marked as DETERMINISTIC. The DETERMINISTIC keyword allows the optimizer to use implementations that are not aligned with the SQL standard.

A simple example of a query that contains a multiply referenced CTE is:

```
with cte1 as (select col1, col2 from table1)
select * from cte1 where col1 < 100
union all
select * from cte1 where col1 > 1000;
```

This query could be rewritten to avoid the multiple CTE references as:

```
with cte1 as (select col1, col2 from table1)
cte2 as (select col1, col2 from table1),
select * from cte1 where col1 < 100
union all
select * from cte2 where col1 > 1000;
```

RESTRICT ON DROP clause is no longer ignored, and will cause an error

With IBM i 7.4 PTF SI78483, the RESTRICT ON DROP clause used in SQL CREATE TABLE or ALTER TABLE statements will return an error with SQLCODE -104, "SQL0104 - Token &1 was not valid. Valid tokens: &2" instead of the previously issued warning of SQLCODE +20367 indicating the clause is ignored.

Previous to this PTF, RESTRICT ON DROP was a clause tolerated and ignored by Db2 for i.

Generate SQL will now produce SQL table names for VIEW and MQT definitions

With IBM i 7.4 PTF SI77910, the QSYS2.GENERATE_SQL and QSYS2.GENERATE_SQL_OBJECTS procedures will generate the SQL table names for view and MQT definitions. Previously, the GENERATE_SQL and GENERATE_SQL_OBJECTS procedures would always generate the system file name. With this change, the SQL table name will be generated even if the original create statement used the system name.

For example, the previous output generated the file names like this:

```
FROM CUST_LIB.CUSTO00001, CUST_LIB.CUSTO00002
```

The new output could be like this now:

```
FROM CUST_LIB.CUSTOMER_ID, CUST_LIB.CUSTOMER_ADDRESS
```

Change in LISTAGG error

This changed behavior affects the LISTAGG() SQL aggregate function when no ON OVERFLOW clause is specified or when ON OVERFLOW ERROR is specified.

Previously, when the aggregated result string exceeded the result length, an SQL warning (SQLCODE +802, SQLSTATE '01004') would be produced. The LISTAGG result would be in error, and the query would run to completion.

On IBM i 7.4 with PTF MF69760 installed and IBM i 7.3 with PTF MF69761 installed, an aggregated string that exceeds the result length will cause the query to fail with an SQL error:

```
 (SQLCODE -802, SQLSTATE '22001'), referencing error type 12: Result of a concatenation operation
on a varying-length field exceeded the maximum allowed length of the result type.
```

QSYS2.SYSTEM_STATUS table function, QSYS2.SYSTEM_STATUS_INFO view, and QSYS2.SYSTEM_STATUS_INFO_BASIC view changes

In IBM i 7.4 with Db2 for i PTF Group SF99704 Level 20 and IBM i 7.3 with Db2 for i PTF Group SF99703 Level 28, the columns AVERAGE_CPU_RATE, AVERAGE_CPU_UTILIZATION MINIMUM_CPU_UTILIZATION, and MAXIMUM_CPU_UTILIZATION will always return a value of 0. This change improves the performance of the system status services by two seconds or more. These columns have been relocated to a new table function named QSYS2.SYSTEM_ACTIVITY_INFO.

In the release after IBM i 7.5, these four columns and the SQL_CPU_UTILIZATION column will be removed from the table function and the two views.

CREATE TRIGGER and ALTER TRIGGER - MIRROR YES option removed

In IBM i 7.4 with PTF SI82638, the **MIRROR YES** option is removed from the **CREATE TRIGGER** and **ALTER TRIGGER** SQL statements. This option is no longer supported.

Existing SQL triggers with MIRROR YES are not affected.

STACK_INFO unauthorized access default behavior change

In IBM i 7.4 with PTF SI83052, the default behavior for the QSYS2.STACK_INFO table function when the specified job cannot be accessed has changed. After application of the PTF, when a user is not authorized to access a job or a job is not found, the QSYS2.STACK_INFO table function will return a warning condition with an empty result set. An authorization problem is returned as SQLSTATE '01548' and a job not found is returned as SQLSTATE '01532'.

A new optional **IGNORE_ERRORS** parameter has been added to the table function to control this behavior. If the original behavior is desired, the **IGNORE_ERRORS** parameter must be specified with a value of 'NO' so an error condition will occur when the job cannot be accessed.

Prior to the application of this PTF, when a user was not authorized to access a job or a job was not found, the QSYS2.STACK_INFO table function would return an error condition. An authorization problem was returned as SQLSTATE '42501' and a job not found was returned as SQLSTATE '42704'.

Generate Data Definition Language (QSQGNDDL) API will now produce SQL table names for VIEW and MQT definitions

In IBM i 7.4 PTF SI77910, the Generate Data Definition Language (QSQGNDDL) API will generate the SQL table names for view and MQT definitions. Previously, the Generate Data Definition Language (QSQGNDDL) API would always generate the system file name. With this change, the SQL table name will be generated even if the original create statement used the system name.

For example, the previous output generated the file names like this:

```
FROM CUST_LIB.CUST000001,
          CUST_LIB.CUST000002
```

The new output could be like this now:

```
FROM CUST_LIB.CUSTOMER_ID,
          CUST_LIB.CUSTOMER_ADDRESS
```

Behavior changes for RGZPFM with ALWCANCEL(*YES)

The behavior of the Reorganize Physical File Member (**RGZPFM**) CL command has changed, when used with ALWCANCEL(*YES) on IBM i 7.4 with PTF SI82518 and on IBM i 7.5 with PTF SI82519.

Prior to this change the reorganize processing would delete and (re)insert records to remove fragmentation in the file. For a short amount of time, active records would temporarily not exist in the file, and could not be found in the table or through an index until the (re)insertion had completed.

After this change, the active records in a file being reorganized are never deleted from the file during RGZPFM processing. Instead, the active records are moved from one relative record number to another. This move operation still appears as a delete and an insert within the data journal (R DL and R PX journal entries). With the behavior change, active rows always remain intact and accessible during the reorganize operation.

To accomplish the new reorganize processing, there are situations where active records will temporarily be moved to the end of the file. The number of records that need to be moved in this way is dependent on the KEYFILE parameter, the job's Symmetric Multiprocessing (SMP) setting, and the size and layout of file. In severe cases hundreds or even thousands of records may have been moved to the end of the file at any point during processing. As such, it is possible that during reorganize processing that the file will appear to grow in size instead of shrinking. Once the reorganize processing is complete, that additional space and the space consumed by the deleted records will be returned.

Canceling the reorganizing process will leave the reorganization unfinished, leaving any records that were moved to the end of the file where they are when the cancel request was processed. Thus, the file may be larger and have more deleted records than it had before the reorganize processing began. To minimize this condition, the Key file (KEYFILE) parameter can be set to *RPLDLTRCD. When **KEYFILE(*RPLDLTRCD)** is used, the reorganize processing will simply fill in the deleted records throughout the file, as opposed to rearranging the records. This can greatly reduce the need to move records to the end of the file and may provide a significant performance improvement. If preserving the arrival sequence is required, or if you want to reorder the records based on an index, it is beneficial to use a lower SMP setting to reduce the amount of internal contention and the number of records that will need to be moved to the end of the file.

When using **KEYFILE(*NONE)** for a file that is set to not reuse deleted records (REUSEDLT(*NO)), the reorganize processing will ensure the record order remains the same, even when canceled. This requires handling all records temporarily moved to the end of the file by putting them back into their correct ordering before allowing the cancelation request to complete. To minimize the amount of time this will take, the operating system will disregard the SMP setting when using RGZPFM KEYFILE(*NONE) for a file with REUSEDLT(*NO). For this situation, the reorganize processing will run in a single thread and not use parallelism.

Security Related Changes

Release to release Security changes that should be considered

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.

CHGRDBDIRE command authority requirements change

On IBM i 7.4, with Db2 for i PTF group SF99704 level 17 and IBM i 7.3, with Db2 for i PTF group SF99703 level 28, the authority requirements for the Change RDB Directory Entry (**CHGRDBDIRE**) and Remove RDB

Directory Entry (RMVRDBDIRE) commands have changed to be consistent with the Change DDM TCP/IP Attributes (**CHGDDMTCPA**) command.

Special authorities *SECADM, *ALLOBJ, and *IOSYSCFG are required to use this command when changing or removing the *LOCAL RDB entry.

*IOSYSCFG is the only required special authority needed to use these commands when changing or removing an RDB entry associated with an IASP.

SM (Systems Management Change) audit journal entry change

With Db2 for i 7.5 PTF Group SF99950 level 3 and Db2 for i 7.4 PTF Group SF99704 level 23, the SM (Systems Management Change) audit journal entry is changed when the entry relates to use of the Change DDM TCP/IP Attributes (CHGDDMTCPA) CL command. For this situation, the Entry Type will contain the value 'M' (Change DDM TCP/IP Attributes (CHGDDMTCPA) CL command), where it previously contained 'D' (DRDA).

*JOBCTL special authority is required to view Java jobs

*JOBCTL special authority is required to work with Java™ jobs from the Work JVM Job (**WRKJVMJOB**) Command, Generate JVM Dumps (**GENJVMDMP**), and Print JVM Job (**PRTJVMJOB**) commands. If the user does not have *JOBCTL special authority, they can work with JVM jobs where the current user of the JVM job matches their user profile name.

The **QSYS2.JVM_INFO** IBM i Service is changed to return NULL for work management related columns, when the user doesn't have *JOBCTL special authority, or is not running in the same job as one of the JVM jobs.

Command change PTF numbers:

- IBM i 7.5: SI81190, SI81191
- IBM i 7.4: SI81283, SI81284
- IBM i 7.3: SI81285, SI81286

SQL Service change PTF numbers:

- IBM i 7.3 PTF SI81295
- IBM i 7.4 PTF SI81294
- IBM i 7.5 PTF SI81293

CHGDEVTAP UNLOAD change now allowed while device is varied on

With IBM i 7.4 PTF MF70243, the **Change Device Desc (Tape)** command (**CHGDEVTAP**) will now allow the UNLOAD (Unload device at vary off) parameter to be modified while the device is varied on.

QSYS2.GROUP_PTF_INFO view requires *USE authority

In IBM i 7.4 with PTF SI82813, the caller must have *USE authority to the Work with PTF Groups (WRKPTFGRP) command to use the QSYS2.GROUP_PTF_INFO view.

QSYS2.PTF_INFO view requires *USE authority

In IBM i 7.4 with PTF SI83510, the caller must have *USE authority to the Display Program Temporary Fix (DSPPTF) command to use the QSYS2.PTF_INFO view.

Exit point and QPWDVLDPGM system value behavior changes

When running in a system job, subsystem job or the SCPF job, exit programs will not be called for the program specified for the **QPWDVLDPGM** system value or for exit points:

- QIBM_QSY_VLD_PASSWRD
- QIBM_QSY_CHK_PASSWRD
- QIBM_QSY_RST_PROFILE
- QIBM_QSY_CHG_PROFILE
- QIBM_QSY_DLT_PROFILE
- QIBM_QSY_CRT_PROFILE

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. In IBM i 7.4, the QDFTJRN data area is no longer supported and if it exists it will be ignored.

Integrated web application server changes

Java 7 is no longer supported by the integrated web application server. The default JVM on IBM i 7.4 is IBM Technology for Java 8.0 64bit (option 17). You can update the Java version for a server by using the IBM Web Administration GUI for i. Select the server, then click on the Server->Properties link and you will be able to select a Java version from a selection list. If you do not see a suitable version, you will need to install the licensed product that contains the Java version you desire. More information may be found in the following support document link: https://www.ibm.com/support/docview.wss?uid=nas8N1022189.

Integrated web services server changes

Java 7 is no longer supported by the integrated web services server. The default JVM on IBM i 7.4 is IBM Technology for Java 8.0 64bit (option 17). The Java runtime version for the integrated web services (IWS) server will automatically be changed to run on a supported version. To ensure IWS servers start successfully, ensure that Java 8 64bit is installed. More information may be found in the following support document link: https://www.ibm.com/support/docview.wss?uid=nas8N1022189.

Create Index (CRTINX) MI change

The Create Independent Index (**CRTINX**) MI instruction will fail with an MCH5601 - `Template value not valid for instruction` exception when invoked with a non-zero value for the reserved field at offset 115 in the longer template.

Changes to instructions that materialize the Wait time-out pending interrupt

Wait Time-Out Interrupt pending removed

Wait time-out processing has been simplified to improve system performance and scaling. Wait time-out will no longer be observable in instructions that materialize pending interrupts for a thread. This includes:

- **TESTINTR**- In pending thread interrupts, the Wait time-out bit is retired; 0 is returned.
- **MATTHIF** Hex 10 - In pending thread interrupts, the Wait time-out bit is retired; 0 is returned.
- **MATPRATR** Hex 20 - In pending thread interrupts, the Wait time-out bit is retired; 0 is returned.
- **MATPRATR** Hex 24 - In pending thread interrupts, the Wait time-out bit is retired; 0 is returned.

- **MATPRATR** Hex 37 - In pending thread interrupts, the Wait time-out bit is retired; 0 is returned.

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- **MATPRATR** Hex 20 - In pending thread interrupts, the Wait time-out bit is retired; 0 is returned.
- **MATPRATR** Hex 24 - In pending thread interrupts, the Wait time-out bit is retired; 0 is returned.
- **MATPRATR** Hex 37 - In pending thread interrupts, the Wait time-out bit is retired; 0 is returned.

Modify Space Attributes (MODS) MI change

The underlying algorithm used by the machine for space allocation has changed. The amount of space allocated or truncated on create, extend, or truncate may not be the same as in previous releases. Rather than calling the Materialize Space Attributes (**MATS**) MI instruction after the Modify Space Attributes (**MODS**) MI instruction to find the new size of the space, you may now request MODS return the new size. The MODS MI instruction was updated to include a new field, *return size of space*. When this field is set to one, the size of the space after modification is returned in a new field in the template, *size of space after modification*.

The **MODS** MI instruction was also updated to verify that the reserved fields at the end of the modification selection field in operand two are zero. If the reserved fields are not zero, an MCH5601 `Template value not valid for instruction` exception will be signaled.

ADDPFTRG/CHGPFTRG command changes

In IBM i 7.4 with PTF SI82938, the **MIRROR** parameter for the Add Physical File Trigger (**ADDPFTRG**) command and the Change Physical File Trigger (**CHGPFTRG**) command is modified to remove the *YES value. This value is no longer supported. Existing physical file triggers with **MIRROR(*YES)** are not affected.

Java Changes

Release to release Java changes that should be considered

Default Java file.encoding and default charset changed to UTF-8

When the IBM Java Virtual Machine starts up, it selects a file.encoding value based on the PASE CCSID. Starting with IBM i 7.4, the PASE CCSID defaults to 1208 , which means that the default Java file.encoding is now UTF-8. Refer to : PASE CCSID and Locale changed to UTF-8 for more information on the PASE CCSID change.

The file.encoding value influences the default charset used by the JVM among other things. This impacts reading and writing data in files, the String(byte[] bytes) constructor, and more. For more information about how file.encoding affects Java applications, refer to : JAVA character encodings

Applications wanting to use the prior behavior can set the environment variable PASE_DEFAULT_UTF8 to N in their job before starting a Java application. Refer to : Default file.encoding values for which file.encoding and default charset is used in that case.

Additionally, Java applications can explicitly set their preferred file.encoding in numerous ways, including :

- Using the -D option to the java shell command, for example : java -Dfile.encoding=ISO8859_1 myProgram
- Using the PROP option of the RUNJVA command, for example : RUNJVA CLASS(myProgram) PROP(file.encoding ISO8859_1)
- Set the property in the QIBM_RPG_JAVA_PROPERTIES environment variable. See : Controlling how the JAVA virtual machine is set up for more information.
- Add the property to the SystemDefault.properties: See : SystemDefault.properties file for more information.

Native JDBC driver can fail with SQL0191 (Mixed data or UTF-8 data not properly formed)

The Native JDBC driver on IBM i 7.3 and earlier uses PASE translation routines for most CCSIDs. The PASE mapping was incomplete for some code points in certain mixed CCSIDs. This means that some characters could be lost during translation for the following CCSIDs (on IBM i 7.3 and earlier):

930, 933, 935, 939, 1122, 1132, 1388, 1399, 5026, 5035

On IBM i 7.4 and later, the Native JDBC driver was changed to avoid the problem of losing characters during character translation by binding the data as UTF-16, thus forcing the database to do the translation. If invalid or uninitialized mixed CCSID data is sent to the database engine for translation, the translation will fail with **SQL0191**. The error message:" Mixed data or UTF-8 data not properly formed" is sent from the database engine when it tries to convert invalid data to UTF-16.

Default PASE CCSID and Locale Changed to UTF-8

When a PASE application is started using the QP2TERM and QSH shell environments or QP2SHELL and QP2SHELL2 APIs, a matching PASE CCSID and PASE locale are selected based on the current job's LANGID and CNTRYID. For most LANGID/CNTRYID pairs, in IBM i 7.3 and prior releases, a single byte encoding such as ISO-8859-1 (819) was used and a matching single byte PASE locale was selected. For any LANGID/CNTRYID pair which did not have a corresponding PASE locale, the POSIX locale was used with CCSID 819.

In IBM i 7.4, the default is now UTF-8 (1208) for all locales. If a valid PASE locale is not found for the current LANGID/CNTRYID, the POSIX locale is still used, but the CCSID is set to 1208.

Setting the environment variable PASE_DEFAULT_UTF8 to "N" in the current job will allow the prior behavior to be used. Any active QP2TERM or QSH sessions will have to be ended and restarted to take effect.

PASE applications started by Qp2RunPase or fork/exec are not affected by this change.

These LANGID/CNTRYID pairs are also not affected by this change as they only support UTF-8:

- CHS, CN
- CHT, TW
- EST, EE
- JPN, JP
- KOR, KR
- LTU, LT
- LVA, LV
- VIE, VN

PASE environment variable change

In IBM i 7.4, the default value of the PASE environment variable - PASE_USRGRP_LIMITED has been changed from 'Y' to 'N'. This could have an effect on certain APIs such as getpwuid and getgrpid.

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

TLS enabled and default cipher specification lists have changed for System TLS

The System TLS enabled cipher specification list no longer contains Triple Des (3DES), Cipher Block Chaining (CBC), or RSA key exchange ciphers when the **QSSLCSLCTL** system value is *OPSYS.

If one of those ciphers is needed, the administrator must add it to system value **QSSLCSL**. Administrators control the ciphers enabled for System TLS using the system values **QSSLCSL** and **QSSLCSLCTL**.

The System TLS shipped eligible default cipher specification list no longer contains Triple Des (3DES), Cipher Block Chaining (CBC), or RSA key exchange ciphers.

If one of these ciphers must be added to the default protocol list after it has been added to the enabled list, use the System Service tools Advanced Analysis command **TLSCONFIG** option eligibleDefaultCipherSuites to add the value.

See the System TLS topic in the IBM Knowledge Center for additional information.

The System TLS default cipher specification 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

System TLS support for SSLv2 has been removed

The Secure Sockets Layer version 2.0 protocol (SSLv2) can not be turned on for System TLS. *SSLv2 can not be added to the **QSSLPCL** system value. If present, *SSLv2 will be removed from CHGSYSVAL list for the **QSSLPCL** system value.

TLSv1.3 protocol has been enabled for System TLS

The Transport Layer Security version 1.3 protocol (TLSv1.3) is now enabled and used by default for System TLS. TLSv1.3 can be disabled by changing the **QSSLPCL** system value. If TLSv1.3 must be removed from the default protocol list, use System Service tools Advanced Analysis command **TLSCONFIG** option eligibleDefaultProtocols to remove the value.

See the System TLS topic in the IBM Knowledge Center for additional information.

TLSv1.1 and TLSv1.0 protocols have been disabled for System TLS

The Transport Layer Security version 1.1 protocol (TLSv1.1) and Transport Layer Security version 1.0 protocol (TLSv1.0) are now disabled by default for System TLS.

TLSv1.1 or TLSv1.0 can be re-enabled by changing the **QSSLPCL** system value. If TLSv1.1 or TLSv1.0 must be added to the default protocol list, use System Service tools Advanced Analysis command **TLSCONFIG** option eligibleDefaultProtocols to add the value.

See the System TLS topic in the information center for additional information.

TLS default signature algorithm certificate list has changed for System TLS

The System TLS default signature algorithm certificate list no longer contains ECDSA_SHA224, ECDSA_SHA1, RSA_SHA224, RSA_SHA1, or RSA_MD5 signature algorithms. The enabled signature algorithm certificate list still contains those values.

For applications using the default list, certificates with those signatures will not be allowed. Applications can explicitly set the list if the default list is too restrictive. The most limited way to accomplish this is to use Digital Certificate Manager to change the explicit list for only the specific Application Definition requiring these algorithms.

If one of these algorithms must be added to the default signature algorithm certificate list, use System Service tools Advanced Analysis command **TLSCONFIG** option defaultSignatureAlgorithmCertificateList to add the value.

For additional information about the signature algorithm certificate list, see Certificate selection.

TLSv1.3 enablement may require changes to GSKit client to prevent GSK_WOULD_BLOCK or EWOULDBLOCK advisory condition

The enablement of TLSv1.3 altered the code path in System TLS, resulting in latency and response time improvements for some operations. This has exposed secure non-blocking sockets applications that do not handle a blocking condition. Based on timing, some invocations of the `gsk_secure_soc_read()` or SSL_Read() API reach a block condition before the remote data is available from the wire. This results in *GSK_WOULD_BLOCK* returned for `gsk_secure_soc_read()` API or *SSL_ERROR_IO* with *errno* set to *EWOULDBLOCK* for the SSL_Read() API. These advisory return codes notify the application to retry the read operation. However, some applications treat the return codes as fatal.

TLS reads will fail during the read operation resulting in a TLS read error. The symptom of this situation is that gsk_secure_soc_read() or SSL_Read() API completes and no data is returned.

To resolve this issue, switch your GSKit client application to implement retry logic or use blocking sockets and set the *GSK_IBMI_READ_TIMEOUT* attribute to the number of seconds you wish to block before timing out the secure connection. This would be set by the `gsk_attribute_set_numeric_value()` API after the `gsk_environment_open()` API is called. You would set this attribute along with any other GSKit attributes being set before the `gsk_environment_init()` API is called.

For more information on this and detailed instructions, see the IBM Support page here: https://www.ibm.com/support/pages/node/6237392

QMAXACTLVL system value

QMAXACTLVL system value is no longer used

The **QMAXACTLVL** system value is no longer used by the operating system. In previous releases, it could be used to limit the total of all threads in all pools running concurrently within a partition. In IBM i 7.4 and future releases, regardless of what you set the **QMAXACTLVL** value to, the operating system will perform as if the value were set to *NOMAX. You can still set the activity level at the pool level (See the 'Max Active' column on the Work Shared Storage Pool (**WRKSHRPOOL**) or Work System Status (**WRKSYSSTS**) commands, or the 'Activity level' parameter on the Change Shared Storage Pool (**CHGSHRPOOL**) or Change Subsystem Description (**CHGSBSD**) commands).

Mitigating Spectre and Meltdown vulnerabilities in new and existing programs

The ability to mitigate program objects for Spectre and Meltdown vulnerabilities was introduced via PTF for releases IBM i 7.1, 7.2, and 7.3. If you are upgrading your system from one of those releases, the mitigation setting will be carried forward. If you are installing on a new system or logical partition, or are installing Licensed Internal Code using an option that removes all data from your system, you should evaluate whether or not to enable mitigations for program objects. For information about program mitigation, see the Mitigating Spectre and Meltdown vulnerabilities in new and existing programs topic in the Knowledge Center: http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_74/rzamv/rzamvmitigatingSpectreMeltdown.htm

Percent of Permanent Addresses Used Calculation

Systems that have used Independent Auxiliary Storage Pools (IASPs) will see an increase of 12.5% in the percentage of permanent addresses used when upgrading to IBM i 7.4 release. This is due to a change in how this number is calculated when IASPs are involved.

ILE RPG Runtime Changes

Release to release ILE RPG runtime changes that should be considered

XML-SAX with "ccsid=1200" or "ccsid=13488", when the default UCS-2 CCSID for the module is a different CCSID

In prior releases, when option **"ccsid=1200"** was specified for the XML-SAX operation, and keyword **CCSID(*UCS2:1200)** was not specified in the control statements, the RPG runtime did not pass the correct parameters for string events. The length parameter was the number of characters, while it should have been the number of bytes in the string. For the *XML_PREDEF_REF and *XML_ATTR_PREDEF_REF events, the value was passed as a UTF-8 value, and the length parameter had a value of 1, while it should have been passed as a UCS-2 value with a length of 2.

Similar problems occurred when option **"ccsid=13488"** was specified for the XML-SAX operation, and keyword **CCSID(*UCS2:1200)** was specified in the control statements.

Starting in IBM i 7.4, the RPG runtime now handles string events correctly when option **"ccsid=1200"** or **"ccsid=13488"** is specified. The length parameter for string events represents the number of bytes in the string. For the *XML_PREDEF_REF and *XML_ATTR_PREDEF_REF events, the string is a UCS-2 value and the length is 2.

If you wrote your XML-SAX handler procedure to expect the *XML_PREDEF_REF and *XML_ATTR_PREDEF_REF events to be a **UTF-8** value instead of the documented **UCS-2** value, the handler procedure must be changed to expect a **UCS-2** value for these events.

This change affects all ILE RPG programs running on IBM i 7.4, even programs compiled for an earlier target release.

Service Monitor autostart job entry removed from QUSRWRK subsystem description

The QPDETSSN autostart job entry has been removed from the QUSRWRK subsystem description in IBM i 7.4 because it is not used by the Service Monitor.

The autostart job was added to the QUSRWRK subsystem description in previous releases with the following command:

```
ADDAJE SBSD(QSYS/QUSRWRK) JOB(QPDETSSN) JOBD(QSYS/QPDETSSN)
```

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 and 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 7.4 PTFs for changes to CCSIDS 1377 and 1388 are:

- SI71938
- SI71937
- SI71982
- MF67073
- SI72073
- MF67039
- MF66935

IBM i 7.4 PTFs for new CCSIDs 13676 and 5473 are (these supersede the PTFs for changes to CCSIDs 1377 and 1388):

- MF67843
- SI74349
- SI74352
- SI74356
- SI74414

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.

IBM Navigator for i

Changes in Navigator for i that should be considered.

Re-created Navigator for i

With IBM i 7.4 PTF SI76981 and IBM i 7.3 PTF SI76982, IBM Navigator for i has been re-created in a new framework and user interface that replaces the heritage IBM Navigator for i. This new IBM Navigator for i runs under the **ADMIN1** server and by default listens on port 2002. To access this new version of Navigator, use URL:http://hostname:2002/Navigator.

The heritage version of Navigator which is still running under the ADMIN2 server, remains at its same URL: http://hostname:2001 and is redirected to the URL: http:hostname:2004/ibm/console as before.

New function usage IDs required for new Navigator

The new IBM Navigator for i interface has different function usage IDs that can be leveraged to provide additional controls over what a user is allowed to access and use within the Navigator interface. These new function usage IDs are in addition to the existing IBM i user profile authorizations.

The function usage IDs specified with Application Administration in heritage Navigator do not apply to the new IBM Navigator for i. None of the function usage IDs set up from Application Administration are used by the new Navigator interface. The existing function usage IDs will continue to apply to the windows-based support.

See https://www.ibm.com/support/pages/node/6485853 to determine how to set up the new function usage IDs for control of features and function for users within IBM Navigator for i.

The new function usage IDs are shown in the following table:

Table 2. Function Usage IDs

Function ID	Description	Default Authority	*ALLOBJ
QIBM_NAV_WRK_MGT	Work Management	*ALLOWED	*USED
QIBM_NAV_CONF_SRV	Configuration and Service	*ALLOWED	*USED
QIBM_NAV_SYSTEM	System	*ALLOWED	*USED
QIBM_NAV_MONITORS	Monitors	*ALLOWED	*USED
QIBM_NAV_NETWORK	Network	*ALLOWED	*USED
QIBM_NAV_SECURITY	Security	*ALLOWED	*USED
QIBM_NAV_USERS_GROUPS	Users and Groups	*ALLOWED	*USED
QIBM_NAV_PERFORMANCE	Performance	*ALLOWED	*USED
QIBM_NAV_FILE_SYSTEM	File System	*ALLOWED	*USED
QIBM_NAV_SERVICEABILITY	Serviceability	***DENIED**	*USED
QIBM_NAV_CUSTOM_CHARTS	Custom Charts	*ALLOWED	*USED
QIBM_NAV_ALL_FUNCTION	Use of IBM Navigator for i functions	***DENIED**	*USED

For more details on the re-created IBM Navigator for i, see documentation at: https://www.ibm.com/support/pages/node/6483299

IBM Navigator for i requires 64-bit Java™ SE 8 or greater

Both the ADMIN1 and ADMIN2 IAS servers require 64-bit Java™ SE 8 or greater. The two releases of IBM® Navigator for i web application depend on the ADMIN1 (newer) and ADMIN2 (heritage) servers. In order for these servers and IBM Navigator for i to function properly, at least 64-bit Java™ SE 8 needs to be installed. This is product 5770JV1 option 15.

For the heritage Navigator running under ADMIN2, the requirement was formerly 64-bit Java SE 7 and now can only run on 64-bit Java™ SE 8. ADMIN2 will not be updated to run on Java SE 11.

For the newer Navigator running under ADMIN1, Navigator can also run on Java™ SE 11.

Primary Access Methodology

Starting on IBM i 7.4, the IBM Navigator for i web-based system management interface changed the primary access methodology for the heritage Navigator running under ADMIN2.

Previously, SSL was enabled by default 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 issues with browsers as they no longer accept this type of certificate. SSL enabled has caused a great deal of difficulty for users. With the continued focus on security in the industry, it will only get worse. To help customers access IBM Navigator and give them easy control of their security practices, we are making the following changes:

- Heritage IBM Navigator running under ADMIN2 will no longer be secured by SSL by default
- A wizard in the Web Admin GUI interface gives users an easy interface to configure either the heritage or the newer Navigator to use HTTPS. To configure the new interface, point at the ADMIN1 server. To configure the heritage interface, use ADMIN2. Details on how to configure can be found on the IBM Support - https://www.ibm.com/support/pages/node/1142704

Integrated Server GUI

The Integrated Server GUI support for IBM Navigator for i is removed on IBM i 7.4 and will not be provided in the newer IBM Navigator for i running under ADMIN1 for either IBM i 7.3 or IBM i 7.4. This includes the following components:

- Network Server Host Adapters
- Remote Systems, Service Processors
- Connection Security
- Launch Web Console
- Synchronize Software

The main navigation node name "Integrated Server Administration" has been changed to "Guest Partition Administration".

QIBM_NAV_ALL_FUNCTION Function Usage ID now shipped with default of *DENIED

Starting with IBM i 7.4 HTTP Group PTF SF99662 level 20 and 7.3 HTTP Group PTF SF99722 level 39, IBM Navigator for i will ship the **QIBM_NAV_ALL_FUNCTION** function usage ID with default authority of **DENIED*.

This is a change from the original shipped value of *ALLOWED in previous HTTP Group PTF levels. *SECOFR profiles and user profiles with *ALLOBJ authority are able to access IBM Navigator for i. Other profiles require a change to grant access. The recommended method to grant access is to add a profile to

the specific function ID for the functions required. See the support page, https://www.ibm.com/support/pages/node/6485853#register.

This change means that user profiles that previously were allowed to access IBM Navigator for i function, may now require a change to continue to access the same functionality. A system administrator could also decide to change the function usage value back to *ALLOWED.

Refer to the Function Usage ID table at "New function usage IDs required for new Navigator" on page 43.

Access to lazy-load tables through NEWNAV in QNEWNAVSRV

IBM Navigator for i uses a lazy-load function to provide large lists of data more efficiently to the user. The lazy-load service uses the NEWNAV procedure which has moved from library QUSRSYS to library QNEWNAVSRV. This process changed in the June 2022 PTFs - HTTP Group PTF for IBM i 7.5 SF99952 level 03, IBM i 7.4 SF99662 level 21, and IBM i 7.3 SF99722 level 40.

When the lazy load function is first set up, the user logged in is required to have enough authority for the NEWNAV service program to be set up in QNEWNAVSRV library. This is a requirement for Navigator.

If the first user is a limited user (*USER) with no special authorities, the lazy load function will fail with message that there is not enough authority: `[Error SQL0551] Not authorized to object QNEWNAVSRV in QSYS type *LIB`

When a subsequent IBM Navigator for i PTF is applied after the QNEWNAVSRV/NEWNAV service program is created, the PTF exit program changes the owner of QNEWNAVSRV/NEWNAV to QWEBADMIN.

The lazy load function is in use by the following tables: active job, users, printer output, event logs, collection authorities, and PTF. Others not listed here will be added as needed.

Heritage IBM Navigator for i is disabled

The heritage IBM Navigator for i is disabled by default with the following 5770SS1 PTFs:

- **IBM i 7.4:** SI82187
- **IBM i 7.3:** SI82188

It is recommended to use the new **IBM Navigator for i** user interface accessible via URL http://*systemname*:2002/Navigator.

If there is a requirement to access the heritage version of IBM Navigator for i, it can be temporarily enabled by following the steps provided in this support document: https://www.ibm.com/support/pages/node/6556828

Heritage IBM Navigator for i permanently removed from the system

The code required for running heritage IBM Navigator for i is permanently removed from the system with the following 5770SS1 PTFs:

IBM i 7.4
SI82995 and SI82996

IBM i 7.3
SI82997 and SI82998

IBM i 7.2
SI83098 and SI83099

It is recommended to use the new **IBM Navigator for i** user interface accessible via URL http://*systemname*:2002/Navigator. Documentation on IBM Navigator for i can be found here: https://www.ibm.com/support/pages/node/6483299.

Integrated Server Support (5770-SS1 Option 29)

Integrated Server Support removal

The IBM i Integrated Server Support (5770-SS1 Option 29) is no longer supported and the option has been removed in IBM i 7.4.

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

Licensed programs

This section contains information about individual licensed programs that have been modified or changed for IBM i 7.4.

IBM Db2 Mirror for i (5770-DBM)

Changes to Db2 Mirror that should be considered.

Db2 Mirror Object Replication Capability Extended to User Indexes, User Spaces, and Data Queues

IBM Db2 Mirror for i PTF Group SF99668 Level 10 enables Db2 Mirror object replication capability for User Indexes (*USRIDX) and User Spaces (*USRSPC).

IBM Db2 Mirror for i PTF Group SF99668 Level 11 extends the Db2 Mirror object replication capability for Data Queues (*DTAQ).

If Db2 Mirror is being used with a Default Inclusion State of *INCLUDE, or if Replication Criteria List (RCL) rules are in place to INCLUDE all replication eligible objects within a library, the application of SF99668 Level 10 or Level 11 will automatically extend the coverage of replication to include these object types.

After PTF SI74263 (included in SF99668 Level 10) or PTF SI76222 (included in SF99668 Level 11) has been applied to both Db2 Mirror nodes, the RCL will be used by Db2 Mirror to reevaluate the object replication eligibility. This reevaluation of the RCL rules will determine if any non-replicated objects should be added to Db2 Mirror replication. Any objects added to replication are then added to the Object Tracking List (OTL) on the primary and/or secondary nodes to establish replication for those objects.

If an object being added to replication is found on both nodes and the object is not already in sync, the object will be added separately to the OTL on both nodes.

Db2 Mirror resynchronization includes a comparison of the OTLs on the primary and secondary nodes. If the comparison identifies objects which conflict, resynchronization will fail. The admin will then need to determine which version of the object should be used for replication by Db2 Mirror. For additional information on managing the OTL or the resynchronization processing refer to the section in the Db2 Mirror publication at: https://www.ibm.com/docs/en/i/7.4?topic=environment-managing-object-tracking-list

See the “What's new for IBM i 7.4” section in the Db2 Mirror publication for a summary of the changes that will be included during the upgrade of RCL at: https://www.ibm.com/docs/en/i/7.4?topic=mirror-whats-new-i-74

Db2 Mirror security changes

Changes to authority required for QSYS2.COMPARE_RESYNC_STATUS() table function

In IBM i 7.4 with PTF SI77278 (included in IBM Db2 Mirror for i PTF Group SF99668 Level 14), the authorization required to call the QSYS2/COMPARE_RESYNC_STATUS() table function has been modified to require a user which is authorized to the Db2 Mirror Administrator (QIBM_DB2_MIRROR) function usage of IBM i.

The service program used to implement this Db2 Mirror service was changed from QSYS2/CMPRSENT to QSYS/QMRDBSSRTV. Both service programs are shipped with *PUBLIC *USE authority.

QMRDBAPI service program default public authority changed from *USE to *EXCLUDE

With IBM i PTF SI76830 on 7.4, the default public (*PUBLIC) authority of *SRVPGM QMRDBAPI has been changed from ***USE** to ***EXCLUDE**. This may affect a user's ability to call this service program during the setup or management of IBM Db2 Mirror for i unless they have been granted proper authority to the service program.

This PTF comes with special instructions detailing the command required to run if the operating system for a partition with this PTF is saved and then restored on one or more other partitions. The following command should be run on any partitions where the operating system was restored. For a multiple-system user who intends to install PTFs on a host partition and then save and restore the operating system onto other partitions, this command should be run on the non-host systems:

```
QSYS/GRTOBJAUT OBJ(QSYS/QMRDBAPI) OBJTYPE(*SRVPGM) USER(*PUBLIC) AUT(*EXCLUDE)
```

Setup tools default public authority changed to *EXCLUDE

In Db2 Mirror for i 7.4 with PTF Group SF99668 level 19, the default public authority of the following list of objects changed to *EXCLUDE. These objects are used during the set up of Db2 Mirror.

- /QIBM/ProdData/QDB2MIR/MRDB/TOOLS/db2mtool.sh
- /QIBM/ProdData/QDB2MIR/MRDB/TOOLS/mrdbSetupTools.jar
- /QIBM/ProdData/QDB2MIR/MRDB/TOOLS/plugin4mirror.jar

Replication Criteria List (RCL) default public authority changed to *EXCLUDE

In Db2 Mirror for i 7.4 with Db2 Mirror for i PTF Group SF99668 level 19, the default public authority of the Replication Criteria List (RCL) physical table changed to *EXCLUDE. This affects the following objects:

- QSYS2/MIRROR_RCL for the system ASP
- QSYS2nnnnn/MIR_RCLnnn for each database IASP

Due to the default public authority changes to the RCL, the following Db2 Mirror services authority requirements have changed. See the documentation for each service for the detailed authority requirements.

- QSYS2.ADD_REPLICATION_CRITERIA
- QSYS2.INSPECT_REPLICATION_CRITERIA
- QSYS2.PROCESS_PENDING_REPLICATION_CRITERIA
- QSYS2.REMOVE_REPLICATION_CRITERIA
- QSYS2.REPLICATION_CRITERIA_INFO
- QSYS2.VALIDATE_PENDING_REPLICATION_CRITERIA

The default authority for the view QSYS2.REPLICATION_CRITERIA_INFO was left unchanged with *PUBLIC *USE authority.

Compare services now require *ALLOBJ special authority

In Db2 Mirror for i 7.4 with Db2 Mirror for i PTF group SF99668 level 19, the authorization required by the Db2 Mirror compare services has been modified to require *ALLOBJ special authority. This includes the following services:

- QSYS2.MIRROR_COMPARE_LIBRARY procedure
- QSYS2.MIRROR_COMPARE_NODE procedure
- QSYS2.MIRROR_COMPARE_OBJECT table function

QSYS2.EVALUATE_PENDING_REPLICATION_CRITERIA default public authority changed to *EXCLUDE

In Db2 Mirror for i 7.4 with Db2 Mirror for i PTF group SF99668 level 19, the service program used to implement the Db2 Mirror Replication service QSYS2.EVALUATE_PENDING_REPLICATION_CRITERIA was changed from QSYS2/QMRDBSSRTV which was shipped with *PUBLIC *USE authority to QSYS/QMRDBSSDBA which is shipped with *PUBLIC *EXCLUDE authority.

Password parameters removed from db2mtool command

In Db2 Mirror for i 7.4 with PTF Group SF99668 level 22, some of the parameters for the Qshell **db2mtool** command are removed.

Passing passwords as clear-text parameters to the **db2mtool** command is a security weakness. This is fixed by removing the password-related parameters and replacing them with a new parameter named **promptPasswords**. The **promptPasswords** parameter prompts for the parameters that are requested by the calling user.

Table 3. Removed parameters and replacement parameters

Removed parameter	New replacement parameter
csmPassword	promptPasswords=csm
dscli	None. DSCLI not used anymore.
ibmikspass	promptPasswords=ibmiks
ksPass	promptPasswords=keystore
lclIBMiPass	promptPasswords=lclibmi
lclPowerHmcPass	promptPasswords=lclhmc
lclStgPass	promptPasswords=lclstg
newrestpassword	None. Commands that required the old parameter now always prompt.
powerHMCPass	None. Commands that required the old parameter now always prompt.
preSharedKey	promptPasswords=presharedkey
pwEncrypted	None. Commands that required the old parameter now always prompt.
quorumPassword	promptPasswords=quorum
restpassword	None. Commands that required the old parameter now always prompt.
rmtIBMiPass	promptPasswords=rmtibmi
rmtPowerHMCPass	promptPasswords=rmthmc
rmtStgPass	promptPasswords=rmtstg
setupSrcPassword	None. Commands that required the old parameter now always prompt.

For more information about the db2mtool command, see the db2mtool command reference.

Db2 Mirror resume processing change

In Db2 Mirror for i 7.4 with Db2 for IBM i PTF Group SF99704 level 23 and IBM Db2 Mirror for i PTF Group SF99668 level 21, active replication between nodes will not resume until all jobs with Db2 Mirror database connections have completed their suspend processing of a previous suspend request. In this case, the replication detail of one of the nodes will show: (8660) - Suspended due to jobs existing which have not completed processing for a prior suspend. A resume request can be re-requested after all jobs have completed their suspend processing. For more information, see Jobs preventing resume.

Db2 Mirror suspend due to storage threshold

Db2 Mirror for i 7.4 with Db2 Mirror for IBM i PTF Group SF99668 level 22 enables new Db2 Mirror Health Monitor capabilities. The Health Monitor is a feature of Db2 Mirror that is used to continuously monitor for any issues that might arise relating to the Db2 Mirror environment and act when an issue is detected.

One resource the Health Monitor watches is the amount of available storage remaining. It monitors the amount of storage remaining in *SYSBAS and for each registered database independent auxiliary storage pool (IASP). When the available storage remaining drops below three percent, replication is suspended. The replication detail of one of the nodes will show: (8690) - Suspended due to storage threshold reached. The storage issue must be resolved before active replication can be resumed.

The shipped default setting for available storage threshold is three percent. This threshold is configurable and can be defined by using the AVAILABLE_STORAGE_THRESHOLD parameter of the QSYS2.CHANGE_MIRROR_HEALTH_MONITOR SQL procedure for *SYSBAS and each database IASP registered with Db2 Mirror. Suspending due to an available storage threshold reached can be disabled by using the special value, NONE, for the parameter value.

For more information about the QSYS2.CHANGE_MIRROR_HEALTH_MONITOR procedure, see https://www.ibm.com/docs/en/ssw_ibm_i_74/db2mi/db2mprocchangehealthmonitor.htm.

For more information about the Db2 Mirror Health Monitor, see https://www.ibm.com/docs/en/ssw_ibm_i_74/db2mi/db2mmonitorhealth.htm.

Db2 Mirror database IASP vary off processing change

In Db2 Mirror for i 7.4 with IBM Db2 Mirror for i PTF Group SF99668 level 23, database IASP vary off processing will not successfully complete until all jobs with Db2 Mirror database connections have completed their suspend processing. In this case, the IASP vary off request will fail and a diagnostic CPDC926 message will be sent to both the job log of the job issuing the vary off request and to the QSYSOPR message queue. An IASP vary off request can be re-requested after all jobs have completed their suspend processing. For more information, see Jobs preventing IASP vary off.

Collaboration software (formerly Lotus®) supported on IBM i 7.4

Refer to the Collaboration Software for IBM i Compatibility Guide at https://support.hcltechsw.com/csm?id=kb_article&sysparm_article=KB0074918&sys_kb_id=f7cecd35dbe8ec14a45ad9fcd39619d2 for information about the minimum releases of Collaboration products required to run on IBM i 7.4.

IBM WebSphere Application Server 8.5 (5733-W85) and 9.0 (5733-W90)

Migration requirements if you have IBM WebSphere Application Server V8.0 or an earlier version

IBM WebSphere® Application Server V8.0 and earlier versions are not supported and will not function on IBM i 7.4.

- If you currently have the IBM WebSphere Application Server (WAS) version 8.0 or earlier product installed and are upgrading to IBM i 7.4, you will need to migrate your traditional WAS Classic Profile installation and profiles to either IBM WebSphere Application Server V8.5 at the 8.5.5.15 product fix pack level or higher or to V9.0 at the 9.0.0.11 product fix pack level or higher.
- Java SE 8 32 bit (5770-JV1 option 16), Java SE 8 64 bit (5770-JV1 option 17) are required to be installed on IBM i 7.4.

  Refer to the URL: https://www-01.ibm.com/support/docview.wss?uid=nas8N1020692 for information on how to install IBM Java SE 8.
- IBM Installation Manager (IM) V1.8.9.4 or newer is required to be installed.

  Refer to the URL: http://www-01.ibm.com/support/docview.wss?uid=nas8N1022458 for information on how to display the current IM version and how to upgrade it to a newer version if required.
- For additional information on the support of WebSphere Application Server at IBM i 7.4, review the URL: http://www-01.ibm.com/support/docview.wss?uid=nas8N1020185

Existing WAS Installations

Minimum required IBM WebSphere® Application Server (WAS) versions

- The minimum recommended version of WAS 8.5 is 8.5.5.15 or later. The minimum required version is 8.5.5.9. The WAS default SDK and all WAS profiles must be configured to use JDK 8.0. You have 2 options to consider:
  1. **Before IBM i 7.4 upgrade (recommended)**. Refer to URL: https://www.ibm.com/support/docview.wss?uid=ibm10795736 for instructions.
  2. **After IBM i 7.4 upgrade**. Refer to URL:

     https://www.ibm.com/support/docview.wss?uid=ibm10796142 for instructions.
- The minimum required version of WAS V9.0 is 9.0.0.0 which is the first release. No additional steps are required.

New WAS Installations

A new install of WebSphere Application Server version 8.5 requires V8.5.5.15 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. A new install of WebSphere Application Server version 9.0 requires V9.0.0.0 or newer media. It is recommended to install WAS version V9.0.

For WAS V8.5, you have two options to consider depending on when WAS V8.5.5.15 is installed:

1. **After IBM i 7.4 upgrade**. No other steps are required.
2. **Before IBM i 7.4 upgrade**. The WAS default SDK and all WAS profiles and default SDK must be configured to use JDK 8.0.

   Refer to URL: https://www.ibm.com/support/docview.wss?uid=ibm10795736 for instructions.

For WAS V9.0, no additional steps are required.

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

The minimum required version of Liberty profile is 17.0.0.3.

All WAS Liberty Profiles will need to be configured to use JDK 8.0 or newer to function correctly at IBM i 7.4.

Refer to 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 V8.0 or newer.

IBM Db2 Web Query for i (5733-WQX) changes

IBM Db2 Web Query for i V2.2.0 and earlier versions are not supported and will not function on IBM i 7.4. Upgrade to Web Query version 2.2.1 or later. If Web Query 2.2.1 is installed on IBM i 7.4, you will need to apply the Web Query group PTF SF99653 before starting Web Query the first time. IBM Technology for Java SE 8 32 bit (5770-JV1 option 16) is also required for Web Query on IBM i 7.4.

For more information on Db2 Web Query for i, refer to the product wiki at http://ibm.co/db2wqwiki.

IBM Developer Kit for Java (5770-JV1)

The JV1 options for IBM Technology for Java(IT4J) 7.0 and 7.1 (option 14 and 15) are no longer supported on IBM i 7.4. The default JVM on IBM i 7.4 is IBM Technology for Java 8.0 64bit (option 17).

For more information about J9 on IBM i, see the IBM i Technology Updates page for Java.

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 exits, they need to be removed before starting an upgrade.

SQL can be used to potentially find user created files in QUSRBRM:

```
select * from table(qsys2.object_statistics('QUSRBRM', 'FILE')) x
           where OBJOWNER <> 'QBRMS';
```

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.

It is important to ensure that no temporary PTF objects exist in library **QBRM** before upgrading BRMS. All BRMS PTFs must be *permanently* applied before the upgrade using the following command:

```
APYPTF LICPGM(5770BR1) SELECT(*ALL) APY(*PERM)
```

SAVLIBBRM and SAVOBJBRM command changes

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

Backup Policy change

The Work with Policies using BRM (**WRKPCYBRM**) **TYPE(*BKU)** default value for Save Journaled Objects when saving changed objects has changed to *YES.

Initialize BRMS graphical interface

The Initialize BRMS (**INZBRM**) command parameter **OPTION(*SECUREDDM)** with ACTION(*SET) has been disabled and will fail with message BRM412B. BRMS encourages using the alternate method of implementing the Add Server Authentication Entry (**ADDSVRAUTE**) command parameter **SERVER(QDDMDRDASERVER)**.

WRKMEDPCY TYPE(*MED)

The Work with Media Policies (**WRKPCYBRM *MED**) command interface to create or change a media policy with a Media Class special value of *ADSM has been disabled and will fail with message BRM1174.

Check Parameters and Data Areas used in BRMS

Prior to updating, check parameters in BRMS (e.g. target release in control group attributes) to determine if any contain values which may become invalid.

If a data area is still used and supported, check 'Data Areas Used in BRMS' at https://www.ibm.com/support/pages/node/643389.

IBM Content Manager OnDemand for i (5770-RD1)

Document command changes

The default function of the Report ID (RPTID) parameter on the Print Document (**PRTDOCOND**), Query Document (**QRYDOCOND**), and Retrieve Document (**RTVDOCOND**) commands has changed. Previously, when documents were selected by using a Report ID, documents were returned in the order in which they were loaded, but any documents with updated index values were not returned. In Content Manager OnDemand for i 7.4, the default function has changed. When documents are selected by using a Report ID, all documents are returned, including documents with updated index values, but they might not be returned in the order in which they were originally loaded. Customers wanting to continue to use the previous functionality should specify the new Retrieve in load order (RTVLODORD) parameter with a value of *YES.

PDF Indexer requirements

Product IBM Portable Utilities for i (5733-SC1) is now required for customers using the PDF indexer. Product options *BASE and option 1 are both required.

IBM Rational Development Studio for i (5770-WDS)

ILE COBOL Reserved words

The ILE COBOL language has added ALLOCATE, DEFAULT, and FREE to the list of reserved words. Reserved words can only be used as specified in the COBOL language defined formats. Use of these words as a user-defined word will not be allowed by the compiler and the user-defined word must be changed.

The ILE COBOL Reserved Word List has been updated to include a number of other words that are not currently used by the compiler. These words will receive a low severity diagnostic message by the compiler and it is recommended that these words not be used as user-defined words. See the ILE COBOL Reserved Word List appendix in the ILE COBOL Reference guide for a complete list of reserved words.

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'0E'.

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.

An RPG file defined with USAGE(*UPDATE) is no longer opened delete-capable

Prior to release IBM i 7.4, a file defined in a free-form definition with **`USAGE(*UPDATE)`** was opened to be delete-capable.

For programs compiled with **`TGTRLS(V7R4M0)`** and higher, a file defined in a free-form definition will no longer be opened delete-capable unless **`*DELETE`** is specified in the **`USAGE`** keyword.

With this change, if the file is shared, and a second program attempts to open the file to be delete-capable, the second **`OPEN`** operation will receive diagnostic message CPF4123:

```
Open options ignored for shared open
```

If the second program attempts to delete a record, the DELETE operation will fail with CPF5149 :

```
Operation for program device or member E69714A140, file is not valid
```

%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 IBM i 7.4 with PTFs 5770SS1 SI73191 and 5770WDS SI73192 or 5770WDS SI73193, **`%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, do one of the following:

- Specify **%TIMESTAMP(3)**
- 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')
  ```

The following conditions can result in a program failing with MCH4437 `Program import not found`:

1. Compile a program on IBM i 7.4 with either 5770WDS PTF SI73192 or SI73193 applied but without either of the superseding 5770WDS PTFs SI74613 or SI74614 applied.
2. Restore that program on another system without one of the following PTFs applied:
   - IBM i 7.3 system 5770SS1 PTF SI73189
   - IBM i 7.4 system 5770SS1 PTF SI73191

   Having the listed PTF on the appropriate release applied will prevent the MCH4437 error.

RNF5393 is now issued for CLEAR *ALL or RESET *ALL for an array of data structures

On IBM i 7.4 the TGTRLS(*CURRENT) version of the ILE RPG compiler now issues RNF5393 "`Factor 2 of a CLEAR or RESET operation is not valid`" when `*ALL` is specified in factor 2 for a **CLEAR** or **RESET** operation for an array of data structures defined with the DIM keyword.

It is not valid to specify *ALL for an array. In earlier releases, the compiler failed to diagnose this error for arrays of data structures.

To fix your code, remove *ALL from factor 2 when a data structure array is specified in the result field. The CLEAR or RESET operation will behave the same as before since the CLEAR or RESET operation always affects all the elements of an array when an index is not specified.

IBM i Access for Windows (5770-XE1)

IBM i Access for Windows is out of Service as of April 30, 2019. The suggested replacement is IBM i Access Client Solutions (5733-XJ1). For information about IBM i Access Client Solutions visit : https://www.ibm.com/support/docview.wss?uid=isg3T1026805

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)
```

IBM Universal Manageability Enablement (5770-UME) changes

CIM server TLSv1.1 protocol disabled

TLSv1.1 protocol is disabled with IBM i 7.4 PTF SI77271. After this PTF is applied, the CIM client can only connect to the CIM server using TLSv1.2 or TLSv1.3 protocols. If your CIM client uses TLSv1.1, you need to upgrade the CIM client to support a TLSv1.2 or TLSv1.3 connection.

IBM HTTP Server for i (5770DG1)

Release to release IBM HTTP Server for i changes that should be considered.

Heritage Digital Certificate Manager is disabled

The heritage Digital Certificate Manager is disabled by default when applying the following 5770DG1 PTFs:

- IBM i 7.5: SI81417
- IBM i 7.4: SI81418
- IBM i 7.3: SI81419

It is recommended to use the new **IBM Digital Certificate Manager for i** user interface accessible via URL http://*systemname*:2001/dcm.

If there is a requirement to access the heritage version of Digital Certificate Manager, it can be temporarily enabled by following the steps provided in this support document: https://www.ibm.com/support/pages/node/6837767

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