

IBM i 7.4 and IBM i Portfolio give strong foundation for continuing innovation

Table of contents

2 Overview	25 Publications
4 Key requirements	25 Technical information
4 Planned availability date	26 Ordering information
4 Description	31 Terms and conditions
21 Product positioning	35 Prices
22 Statement of general direction	35 Order now
23 Program number	36 Corrections

At a glance

IBM^(R) i 7.4 brings a wealth of enhancements to all areas of the IBM i Portfolio, including the base OS, selected Licensed Program Products (LPPs), hardware, and firmware. Some of the highlights are:

- Security enhancements include expanding the set of rules for SST user ID passwords, automating certificate management using DCM APIs, and extending Authority Collection to collect information for specific objects.
- Work Management has been enhanced with updates to workload groups, adding exit points to Job Queue job tracking, and adding new capabilities to retrieving Processor Multitasking information.
- Networking enhancements have been updated to include the latest industry standards for TLS, SNMPv3, SMB3, and SMTP.
- Clients interested in upgrading their availability environments will be interested in the enhancements for save and restore operations, and clustering.
- In this release, IBM Db2^(R) for i is focused on improving the functionality and performance of SQL as well as adding new function for database engineers.
- Application developers in both traditional environments and open source will see enhancements to RPG IV, COBOL, the System Debugger, Node.JS, and Python, and the addition of new tools and the R language.
- Rest APIs have been extended to now allow SQL to be called directly using the HTTP connection.
- A new LPP, IBM Db2 Mirror for i, provides near-continuous availability.
- In the IBM i Portfolio, many of the LPPs such as IBM Backup, Recovery and Media Services for i (BRMS), IBM PowerHA^(R) SystemMirror^(R) for i, and Administration Runtime Expert have had significant function added.
- Users of the desktop tools for application development, IBM Rational^(R) Developer for i (RDi), system management, and IBM i Access Client Solutions (ACS), will enjoy significant new functionality.
- New fast start with the new IBM Db2 Web Query for i EZ-Install package.
- IBM Domino^(R) 10.0.1 and IBM Traveler 10.0.1.1 are now supported on the IBM i operating system.
- ARCAD Observer for IBM i and ARCAD Converter for IBM i have been refreshed for traditional developers.
- IBM Content Manager OnDemand for i 7.4 supports backing up to the cloud using Cloud Storage Solutions for i and provides enhancements to several commands.
- As with every release, many other enhancements have been made, driven by user requests.

Overview

IBM i 7.4 updates span the entire breadth of the portfolio from the base operating system, Db2 for i, and application development through to availability. As always, the new functions are delivered while retaining the industry-leading securability features for which IBM i is known. In response to many user requests, updates and additions have been made to many other parts of the IBM i Portfolio.

The new enhancements and additions in IBM i 7.4 provide a strong foundation for the ongoing innovation being done by IBM i clients. Around the world, clients are extending IBM business applications to include technology such as AI and the Internet of Things. Many of these enhancements will support this continuous innovation.

Highlights of the IBM i 7.4 enhancements include:

- New password rules have been added for service tools user IDs. The password rules can be managed using DST, SST, or by the new CHGSSTSECA command. New commands have been added that provide the ability to create, change, or delete service tools user IDs.
- Digital Certificate Manager (DCM) APIs now allow the management of certificates to be automated. The three categories of API functionality are application definition certificate assignment, certificate authority (CA) trust list management, and request a certificate renewal and import certificate into system store.
- Authority Collection support is enhanced to include the collection of authority information for specific objects. Previously, authority information could be collected only for users, where authority information was collected for all objects accessed by a specific user.
- Workload groups can now be configured by job description. Previously, workload groups could be configured only at the subsystem level, and every job in the subsystem ran in the same workload group. Now, jobs can run in different workload groups within the same subsystem by setting a workload group name on the job description.
- A new system job, QHST, is automatically started at IPL to perform message logging to the history log. This function was done in the SCPF job in previous releases. This change was made to improve availability of the system.
- The Retrieve Processor Multitasking Information (QWCRTVPR) API now returns the current and maximum number of secondary hardware threads in addition to the configured number of secondary hardware threads per processor.
- New exit points have been created to better track and manage jobs submitted to a job queue. The exit points for Submit Job and Change Job can be used, along with the existing Job Notification exit point, to keep track of information needed to resubmit jobs to a JOBQ.
- IBM i System TLS has been enhanced to support the latest industry standard of Transport Layer Security version 1.3 (TLSv1.3) protocol.
- The Simple Network Management Protocol version 3 (SNMPv3) support has been enhanced with the ability to securely send, receive, and forward SNMPv3 Trap and Inform messages, providing additional network security.
- Management of a cluster is now easier. New clustering policies allow for more automation of an administrative domain, particularly when adding and deleting resources. Enhancements have also been made to the behavior for a restore operation and for a primary node failure. The new Container Cluster Resource Group (CRG) allows management of a group of CRGs as a single entity for the purposes of operations. A new option has been added for starting an administrative domain CRG to indicate which node to treat as the source node when changes are made.
- The save and restore menus have been enhanced with a new option to "Start controlling subsystem" that can allow the system to stay in restricted state after the save or restore operation. This can be helpful if you want to install PTFs, perform system maintenance, or IPL the system.

- Service Tools are enhanced to make it easier to set up for debug and remote support, and to allow a larger amount of debug information to be maintained before wrapping occurs.
- As with previous releases, select system limits are raised.
- The Integrated Web Services (IWS) server support is extended to enable the easy creation of REST or SOAP APIs that leverage SQL directly. In the past, an ILE program was required, and now SQL can be used directly through the HTTP request.
- System Debugger is enhanced to allow the relocation of the debug source.
- The Display Module (DSPMOD) command now shows the location (path name) of a module's source code for source that is from a stream file (IFS), providing a similar type of information as for a traditional source file that is specified with LIBRARY/FILE/MEMBER.
- In IBM i 7.4, Db2 for i brings variations for SQL commands, allowing easier ways to do inquiries into data.
- Additional IBM i services are added to IBM i, providing an alternative to using commands and APIs.
- IBM is introducing a new LPP, IBM Db2 Mirror for i, to provide near-continuous availability through an IBM i exclusive Db2 active-active two-system configuration.
- The Node.js and Python ecosystems continue to grow. This includes several package additions and enhancements, as well as newly added IBM i support for popular frameworks. It's easier than ever to integrate these languages with IBM i or write advanced programs that utilize cryptography, data science, or machine learning.
- Several enhancements also allow for better general connectivity through SSL or ODBC. These enhancements can benefit all PASE technologies.
- Other additions include the R programming language and a host of new tools for both users and developers.
- IBM Rational Development Studio for i provides several enhancements for ILE RPG and ILE COBOL.
- Access Client Solutions (ACS) has new features and functions specifically for system managers and database engineers.
- Administration Runtime Expert improves PTF management and improves control through the ARE console capabilities.
- IBM Rational Developer for i provides features improving reliability, productivity, security, and currency.
- IBM PowerHA SystemMirror for i 7.4 provides several new advanced capabilities requested by many clients. Support for DS8000^(R) HyperSwap^(R) with a Global Mirror link provides continuously available storage plus support for a remote location. Administrative domain automation provides the capability to add or delete monitored resource entries (MREs). In addition, PowerHA SystemMirror for i 7.4 has integrated support for disaster recovery of a Db2 Mirror for i deployment and support for the replication of IFS data in a Db2 Mirror deployment.
- BRMS is the number one solution choice of IBM i clients for the automation of backup recovery operations. The enhancements for BRMS include a new tape device, faster restore operations, turn-key control group backup recovery automation, and more.
- Get a fast start to advanced, visual reporting, and business intelligence with Db2 Web Query for i.
- ARCAD Observer for IBM i and ARCAD Converter for IBM i are being refreshed to include the latest versions of these products.
- IBM i 7.4 will also support the latest firmware, providing the most up-to-date IBM POWER9[™] functionality.
- New support for I/O adapters, devices, and the new PCIe3 6-slot fan-out module is also included in IBM i 7.4.
- IBM Domino 10.0.1 and IBM Traveler 10.0.1.1 are now supported on the IBM i Operating System.
- Content Manager OnDemand for i 7.4 provides new archive capability to cloud storage and management of cloud storage resources. In addition, there are

enhancements to storage management commands and improved management of printing, querying, and retrieving documents.

For more information

Technical detail for IBM i enhancements delivered with IBM i 7.4 can be found in the [IBM i 7.4 Overview](#) topic in IBM Knowledge Center.

Additional technical detail is posted on the IBM i developerWorks^(R) Technology Updates wiki. This wiki has existed since 2010 and contains information about IBM i enhancements, organized by subject matter.

To make it easy to find IBM i 7.4 specific enhancements, see the aggregated list of enhancements found on the [wiki](#) landing page. Note that this aggregation link will go live sometime shortly after announce.

Key requirements

IBM i 7.4 is supported on IBM Power^(R) Systems servers with IBM POWER9 and IBM POWER8^(R) technology-based processors.

See the [Technical information](#) section for specific hardware and software prerequisites.

Planned availability date

June 21, 2019

Description

IBM i Operating System

IBM i 7.4 includes many enhancements and additions to the base operating system, including increased usability, security, and availability. For easier reference and understanding, these enhancements and additions have been grouped into the following operating system categories:

- Security
- System management
- Networking
- Availability
- Application development
- Miscellaneous

Security

Service tools enhancements

In response to many requests to provide consistency across IBM i, the service tools security options now support service tools user ID password composition rules similar to those allowed for operating system user profile passwords. The following password composition rules can be configured for service tools user IDs:

- Limit profile name
- Hours to block password change
- Minimum password length
- Maximum password length

- Use chars from three groups
- Limit adjacent characters
- Limit repeating characters
- Limit characters same position
- Minimum digits
- Maximum digits
- Limit adjacent digits
- Limit digit first position
- Limit digit last position
- Minimum letters
- Maximum letters
- Limit adjacent letters
- Limit letter first position
- Limit letter last position
- Number of mixed case letters
- Minimum special characters
- Maximum special characters
- Limit adjacent special characters
- Limit special character first position
- Limit special character last position

Service tools password composition rules can be configured using DST, SST, or the new SST Security Attribute commands:

- Change SST Security Attributes (CHGSSTSECA)
- Display SST Security Attributes (DSPSSTSECA)

In addition to password rule attributes, the commands support the "service tools password level" attribute and the "allow security-related system values to be changed" attribute.

New commands were added for service tools user ID management. These commands configure the same SST privileges managed through DST or SST:

- Create Service Tools User ID (CRTSSTUSR)
- Change Service Tools User ID (CHGSSTUSR)
- Delete Service Tools User ID (DLTSSTUSR)

For more information, see the [Service Tools](#) topic in IBM Knowledge Center.

Digital Certificate Manager

Digital Certificate Manager (DCM) APIs have been added to automate the management of certificates. An application that is written using one or more of these new APIs can renew a certificate residing in the system certificate store, update an application identifier to use the renewed certificate, and update the trust list with the Certificate Authority (CA) that issued the renewed certificate.

An Application Definition, also known as *Application ID*, is created and maintained in DCM for use by System TLS based applications. These three APIs provide Application Definition certificate assignment capabilities:

- Remove a certificate assignment from an application (QycdRemoveCertUsage).
- Add a certificate assignment to an application (QycdUpdateCertUsage).
- Retrieve information about the certificate currently assigned to an application (QycdRetrieveCertUsageInfo).

A Certificate Authority (CA) Trust List is an optional configuration for Application Definitions. The list allows individual applications to trust a different set of CAs from other applications. These three APIs provide CA Trust List configuration capabilities:

- Add a CA certificate to the CA certificate trust list (QycdAddCACertTrust).
- Remove a CA certificate from the CA certificate trust list (QycdRemoveCACertTrust).
- Check if CA certificate is in the CA certificate trust list (QycdCheckCACertTrust).

This API is used in a two-step process to renew an existing certificate residing in the system certificate store:

- Request a certificate renewal and import certificate into system store (QycdRenewCertificate).

With the first call, a CSR (Certificate Signing Request) is generated based on an existing certificate. After out-of-band processing of the CSR is complete, the second call imports the issued certificate into the system certificate store.

For more information, see the [Digital Certificate Management APIs](#) in IBM Knowledge Center.

IBM i Authority Collection

Authority Collection captures data that is associated with the runtime authority checking that is built into IBM i. This data is logged to a repository, and interfaces are available to display and analyze the data. A security administrator or application provider can analyze the captured data to determine the minimum authority that is required to the objects to allow the application to run successfully. Setting a minimum authority on the objects improves the security and provides more protection against possible access from outside the application.

Additionally, IBM i 7.4 Authority Collection support now allows the collection of authority information for specific objects when accessed by *any* user. Previously, the IBM i 7.3 version collected authority information for all objects accessed by a *specific* user.

New command:

- Change Authority Collection (CHGAUTCOL)

Updated interfaces:

- Start Authority Collection (STRAUTCOL).
- End Authority Collection (ENDAUTCOL).
- Delete Authority Collection (DLTAUTCOL).
- Display Security Attributes (DSPSECA) command and Retrieve Security Attributes (QSYRTVSA) API show if an Authority collection for objects is active.
- Interfaces that show object attributes now include the authority collection value for the object.

The Authority Collection value for an object can be set with the new Change Authority Collection (CHGAUTCOL) command. When Authority Collection for objects is started using the enhanced Start Authority Collection (STRAUTCOL) command, authority information is collected for the specific objects that have this value set. Any user access of these objects is then collected and written to the authority collection repository for objects.

New SQL views have been added to display and analyze the authority collection data for objects:

- QSYS2.AUTHORITY_COLLECTION_OBJECT view - for QSYS objects; use this when the number of entries in the authority collection is large and you are looking for a specific object or objects in a specific library.

- QSYS2.AUTHORITY_COLLECTION_LIBRARIES view - for QSYS objects; use this when the number of entries in the authority collection is small or you are looking for all, or most, objects in the authority collection.
- QSYS2.AUTHORITY_COLLECTION_FSOBJ view - for file system objects in the "root" (/), QOpenSys, and user-defined file systems
- QSYS2.AUTHORITY_COLLECTION_DLO view - for document and folder objects

Note: QSYS2.AUTHORITY_COLLECTION_OBJECT and QSYS2.AUTHORITY_COLLECTION_LIBRARIES return the same results and exist to provide alternative approaches to access the same detail.

For complete details on the enhanced authority collection support, see the [Authority Collection](#) section of the Security reference topic in IBM Knowledge Center.

System management

Workload groups

Workload groups, introduced in 2011, allow the isolation of specific workloads into a limited processing environment. Until now, workload groups were set at the subsystem level only, and every job in a subsystem ran in the same workload group. In IBM i 7.4, workload groups can now be configured by job description using the new WLCGRP parameter on Create Job Description (CRTJOB) or Change Job Description (CHGJOB) commands. Jobs can run in different workload groups within the same subsystem by setting a workload group name on the job description.

The workload group (WLCGRP) name can be viewed for a job description using the Display Job Description (DSPJOB) command or the Retrieve Job Description (QWDRJOB) API. If a workload group name has not been explicitly set in the job description, it will default to *SBSD, which means that jobs started with the job description will use the workload group defined in the subsystem description.

It is possible to change the workload group (WLCGRP) in the JOB) while the subsystem is active. New jobs will be able to use the new workload group without restarting the subsystem.

Processor Multitasking Information

In previous releases, the Retrieve Processor Multitasking Information (QWCRTVPR) API has been used to retrieve the maximum number of secondary hardware threads per processor. With IBM i 7.4, the Retrieve Processor Multitasking Information (QWCRTVPR) API now returns the current and maximum number of secondary hardware threads, in addition to the configured number of secondary hardware threads, per processor.

The Change Processor Multitasking Information (QWCCHGPR) API can be used to limit the number of processing threads on systems that are using simultaneous multithreading (QPRCMLTTSK system value). In previous releases, the QWCRTVPR API returned only the value set by the QWCCHGPR API with no way to determine the actual value used by the system or the maximum value supported by the hardware.

In IBM i 7.4, QWCRTVPR introduces two new parameters that can be used to retrieve the number of secondary threads that are currently active, as well as the maximum number of secondary hardware threads per processor that can be supported.

Managing / tracking jobs on a job queue

In response to user requests, two new exit points have been created to better track and manage jobs submitted to a job queue:

- The Submit Job exit point (QIBM_QWT_SBMJOB) can be used to call a user exit program in a job that calls the SBMJOB command, prior to the job being placed on the job queue.
- The Change Job exit point (QIBM_QWT_CHGJOB) can be used to call a user exit program when the CHGJOB command or API is called to change a job while the

job is on a job queue. This allows the program to keep track of any changes made to the JOBQ job after it was submitted but before it becomes active.

These new exit points, along with the existing Job Notification exit point, can be used to keep track of the information needed to resubmit jobs to a JOBQ.

QHST job

The new system job QHST is started at IPL to perform message logging to the history log. This function was previously done by the SCPF job. This change has been made to move message logging out of the critical system job, which requires an IPL to restart it. In IBM i 7.4, this function runs in QHST, which is a separate job. If excessive messaging to the history log causes the QHST job to end unexpectedly, a new QHST job will automatically start and replace it.

Improved searching with DSPLOG command

Improved search capabilities have been added to the Display Log (DSPLOG) command when searching for messages in the history log by job name. The command now allows searching for messages by user name instead of requiring the three-part job name. The command also allows searching by job name or number, as well as generic support for the name.

The IBM i service qsys2.history_log_info provides a powerful way to understand the data in the history log by leveraging the power of SQL to sort, filter, and analyze the history data in ways the command is not capable. Examples of parsing this data can be found under 'Insert from Examples' in the Run SQL Scripts interface of Access Client Solutions.

Networking

TLSv1.3

Transport Layer Security (TLS) is an encryption method that is used to encrypt a communication channel between two systems. In this release, the latest in TLS standards are being implemented to ensure security of critical applications and data.

With IBM i 7.4, IBM i System TLS has been enhanced to support the latest industry standard of Transport Layer Security version 1.3 (TLSv1.3) protocol. TLSv1.3 is enabled and used by default for partitions with system value QSSLPLC set to *OPSYS. Applications designed to use the System TLS default protocols will immediately support TLSv1.3 if the system value settings allow TLSv1.3. Other applications may require configuration or code changes to enable TLSv1.3.

See the [Transport Layer Security](#) topic in IBM Knowledge Center for additional details.

To make working with TLS easier, IBM i 7.4 is providing a new Retrieve TLS Attributes (QsoRtvTLISA) API, allowing the retrieval of the system-wide System TLS current default properties. The properties can be changed and viewed with TLSCONFIG. The benefit of QsoRtvTLISA is that it can be included in programs or scripts for health check actions. See the [QsoRtvTLISA](#) topic in IBM Knowledge Center for more details on its use.

SNMPv3

The IBM i support for Simple Network Management Protocol version 3 (SNMPv3) has been enhanced with the ability to securely send SNMPv3 Trap and Inform messages. The IBM i local trap manager has been enhanced with the ability to securely receive and forward SNMPv3 Trap and Inform messages. Additionally, traps generated by third-party sub-agents can be sent as SNMPv3 Traps or Informs without any changes to the sub-agent code. See the [Change SNMP Attributes \(CHGSNMPA\)](#) topic in IBM Knowledge Center for additional information.

Server Message Block Version 3 (SMB3)

The IBM i QNTC file system and IBM i NetServer file system allow connectivity and sharing with clients on the network. In IBM i 7.4, both NetServer and QNTC have been upgraded to the latest industry standard for connectivity, SMB3. This new level includes many new features, such as:

- End-to-end data encryption for entire client/server conversations or just on access to specific shares.
- Support for larger read and write sizes (512 KB in IBM i 7.4), improving the performance in high latency networks.
- QNTC can now support share names longer than 15 characters.
- NetServer has been updated to improve the support for macOS.

SMTP

SMTP (Simple Mail Transfer Protocol) has been available on IBM i for many years. It is a TCP/IP protocol used when sending and receiving email. In IBM i 7.4, SMTP has been refreshed.

The SNDSMTPEMM command has been updated and now allows:

- Up to 255 characters for the subject of an email
- Up to 5,000 characters for the main body of an email

New CL commands have been added to support the creating, adding, editing, and removing of distribution lists for directory types *SMTP and *SMTPMSF.

Availability

Save and Restore

The SAVE and RESTORE menus have been enhanced with a new option to "Start controlling subsystem". Previously, the controlling subsystem always started automatically when the save or restore operation completed. In IBM i 7.4, it is now possible to leave the system in restricted state after the save or restore operation, by not starting the controlling subsystem. This can be helpful for installing PTFs, performing system maintenance, or IPLing the system. See the [Backing up your system](#) and [Recovering your system](#) topics in IBM Knowledge Center for more information.

Clustering

IBM is announcing some enhancements to the clustering technologies resident in the base operating system. Many of these technologies are seamlessly integrated into IBM PowerHA SystemMirror for i.

New usability enhancements to the IBM i clustering policies allow for more automation of an administrative domain. Resources may be automatically added to the cluster administrative domain when they are created or added on a node. Previously, this was a two-step process; each monitored resource entry (MRE) had to be added manually after it was created. Similarly, it is possible to automatically delete resources and remove them from the cluster administrative domain in one step. Previously, a delete needed to be issued on each system in the cluster. See the [Cluster Policy APIs](#) topic in IBM Knowledge Center for more information.

Enhancements have been made to the behavior of restore handling in a cluster administrative domain to honor the restored values. Previously, after a restore the administrative domain would essentially undo the restore operation.

In IBM i 7.4, if a new policy for cancel failover is defined for a cluster resource group, the IASP will no longer be varied off on the failing node when a failover is canceled. Prior to this policy, when a failover was canceled, the IASP would be varied off on the failing node.

This release introduces the Container CRG, which allows for management of a group of CRGs as a single entity for the purposes of operations.

A restriction has been removed, and an IASP may now be specified in more than one CRG. This function is especially useful in Db2 Mirror configurations. Previously, an IASP was limited to a single CRG. When an IASP appears in more than one CRG, the CRG recovery domains must have no nodes in common.

Application development

Integrated Web Services server

The Integrated Web Services (IWS) server support enables users to create APIs based on ILE programs and service programs. In IBM i 7.4, IWS API support has been enhanced to allow the creation of REST and SOAP APIs based on SQL statements. The SQL statements are processed against Db2 for i database management systems. The support enables the creation of APIs that can process XML, JSON, and user-defined media resources. This now means that the database on IBM i can be accessed directly using the HTTP REST support. No JDBC or ODBC connection is needed when using the IWS support.

For additional details, see the [Integrated Web Services for IBM i](#) web page.

System Debugger

The System Debugger is the tool used to debug programs written in both ILE and OPM languages as well as Java™ that run on the system. Program information stored with the object, along with the program observability, are used by the System Debugger. In IBM i 7.4, the System Debugger is enhanced with some limited ability to relocate the debug source.

The Change Program Data (QBNCHGPD) API is enhanced to update the debug source location. This relocation, the moving of source files to another location, can be done for both library physical files and IFS stream files. The steps are:

- Compile a program from IFS stream source files or library physical files with DBGVIEW(*SOURCE).
- Move the source files to another location.
- Use API QBNCHGPD to update the old source location to the new one with new format CHGP0200.
- Debug the target program. System debugger will show the source files correctly from the new location.

Locating module source

The Display Module (DSPMOD) command now shows the location (path name) of a module's source code stored in a stream file (IFS). This will be very useful to C, C++, RPG, COBOL, and CL programmers because compilers for those languages all support compiling source from IFS.

TEXT options on CRTSRVPGM

Two new TEXT options are provided, in addition to *BLANK, for the Create Service Program (CRTSRVPGM) command. These new options allow propagation of the text from the export source file or the first module used to create the service program. See [Create Service Program](#) for more information.

Updated MI instructions

A couple of MI instructions have been enhanced:

- GENUUID can now generate a version 4 Universally Unique Identifier (UUID), which is a randomly generated UUID that is consistent with the Internet Engineering Task Force (IETF) specification as described in [RFC 4122](#). See the [GENUUID MI Instruction](#) topic in IBM Knowledge Center for more information.

- MODS can return the size of the modified space, avoiding a call to MATS to get the size of a modified space. See the [MODS MI Instruction](#) topic in IBM Knowledge Center for more information.

Easier retranslation of program objects

No retranslation of programs is required to work with IBM i 7.4. However, there are times when a retranslation may be beneficial to ensure that programs are using the latest technology updates for performance, efficiency, and so on. For this purpose, IBM is providing the new QBNCVTPGM tool. See the [Simple IBM i program and module conversion](#) technical article on developerWorks for more information.

Miscellaneous

Service Tool debug enhancements

The Mainstore Dump Copy screens now have a column that indicates the size of a dump to help plan for proper handling of a dump.

An option on the Remote Modem Support screens for configuring LANs makes it easier to set up access for remote support.

Limits for the Licensed Internal Code (LIC) log have been increased so important debug information does not wrap out of the log too soon. Note that the LIC Log sizes are selectable by the client, but have minimum, default, and maximum values. See the [Licensed Internal Code log](#) topic in IBM Knowledge Center for more information.

Selected operating system limits increased

- The maximum number of disk arms in all basic auxiliary storage pools has been increased to 3999.
- The maximum number of disk arms in all independent auxiliary storage pools has been increased to 5999.
- The maximum LUN size (for LUNs with 4160 or 4096 byte block sizes) has been increased to 16 TB.

For more information about these limits, and others, see the [Miscellaneous Limits](#) topic in IBM Knowledge Center.

Db2 for i

With IBM i 7.4, Db2 for i continues to focus on new and advanced SQL capabilities and the ability to use SQL to access IBM i operating system detail. Further, Db2 for i delivers new capabilities for the database engineer.

Database application developers have new capabilities for constructing data-centric SQL solutions:

- A new variant of INSERT can be used to populate rows using default values.
- The RPG SQL Precompiler is enhanced to support constants as host variables.
- The SYSTOOLS.SPLIT User Defined Table Function (UDTF) can be used to deconstruct aggregated lists of values using SQL.

In the tradition of recent Technology Refreshes, IBM i Services are added and enhanced, providing useful SQL-based alternatives to IBM i commands and APIs:

- The DATA_AREA_INFO view and UDTF enable SQL users to query the existence, attributes, and data within data areas (*DTAARA).
- The ASP_JOB_INFO view returns one row for each job that is currently using a specific ASP. This service is an SQL alternative to the Work with ASP Jobs (WRKASPJOB) CL command.
- The OBJECT_PRIVILEGES view is enhanced to return authorization list detail, bringing equivalent functionality to the SQL alternative to the Display Object Authority (DSPOBJAUT) CL command.

- The MESSAGE_FILE_DATA view returns data that can be found using the Display Message Description (DSPMSGD) CL command, opening up new options for managing messages using SQL.

Examples of these new services can be found in the latest versions of Access Client Solutions within the Run SQL Scripts interface under the category "Insert from Examples".

New capabilities are added for the database engineer:

- The CREATE INDEX statement has been enhanced to include result column names matching the behavior of the ALIAS and RENAME keywords that are supported for logical files.
- The PARSE_STATEMENT UDTF is enhanced to return detail for DROP statements and referential constraints, making it easier to deploy advanced impact analysis.
- System Limits processing has been extended to additionally track the growth of database files by size, providing the data needed for clients to proactively manage their IBM i.

These and other enhancements are delivered through Db2 PTF Group SF99704. See the [IBM i Technology Updates](#) wiki on developerWorks to learn more about these and other Db2 for i enhancements.

Open source

Node.js ecosystem enhancements

The idb-connector and idb-pconnector packages 1.x releases are now generally available and are no longer in technology preview status. The idb-connector package provides direct API access to Db2 using the conventional (callback-based) JavaScript™ conventions.

The itoolkit package, which allows a Node.js application to call IBM i functions, such as service programs, programs, commands, and so on, is enhanced to allow for new transport methods. With this enhancement, SSH or ODBC connections can be used to communicate with IBM i through the itoolkit package.

A Db2 for i dialect has been created for Sequelize.js. Sequelize is a popular, promise-based ORM for Node.js.

A new connector allows Db2 for i to be used as a data source for LoopBack^(R) applications. LoopBack is a JavaScript framework that allows for rapid creation and deployment of REST APIs. It comes with a built-in API explorer and the ability to define a robust data model for your application. It can also be used with IBM API Connect^(R) and several other tools.

Python ecosystem enhancements

A number of Python packages have been made available in RPM form. This enables the packages to be easily installed with the yum package manager. The new packages allow for security enhancements, and more options for application development, data science, and machine learning.

The updated Python Machine Learning and Data Science libraries are included in the following packages:

- Pillow
- asn1crypto
- bcrypt
- cffi
- cryptography
- devel
- ibm_db

- idna
- itoolkit
- lxml
- numpy
- pandas
- pip
- pycparser
- pynacl
- scikit-learn
- scipy
- tkinter

General connectivity enhancements

The delivery of SSL certificates through a ca-certificates RPM allows for easier SSL communication with standard sources. For instance, interactions with https-based APIs or websites may no longer need manual certificate setup.

The IBM i Access ODBC driver has been ported to IBM i. This allows any standard ODBC client to be able to communicate to the local database on i. It also allows an application to be developed using the IBM i Access ODBC driver for Windows™ / Linux^(R) and deployed to IBM i using the same ODBC driver.

R

R brings another programming language to IBM i. Although it has a wide variety of uses, R excels at statistical computing and data mining. Db2 can be accessed from R by installing the RODBC package and using the newly delivered ODBC driver.

Newly added tools

The number of developer and user tools available continues to grow rapidly. A few examples include the following packages, available in RPM form:

- Apache ActiveMQ, a robust message broker
- Apache Ant and Maven, build automation tools
- vim, a terminal-based editor
- yum-utils, a collection of tools and programs for managing yum repositories and installed software for more advanced users
- Midnight Commander, a terminal-based utility for exploring the filesystem and performing various tasks like FTP transfers, file compares, and much more

IBM i Portfolio: Licensed Program Products (LPP)

IBM Db2 Mirror for i

Today, in conjunction with the announcement of IBM i 7.4, IBM is announcing a new Licensed Program Product (LPP) for the IBM i Portfolio: IBM Db2 Mirror for i. This new product offering, available for IBM i 7.4 clients, enables near-continuous availability through an IBM i exclusive Db2 active-active two-system configuration.

For more information, see Software Announcement [219-216](#), dated April 23, 2019.

Rational Development Studio for i

The Development Studio for i is being updated to transform the development languages of IBM i to meet the ever-changing world of modern development. The RPG language is evolving into a modern business language. In this release, COBOL is also being enhanced to include many requirements from the industry.

RPG

There are many enhancements to the RPG Language in this release (some of these were made available in earlier TRs through PTFs):

- A varying-dimension array is defined with DIM(*AUTO:maximum_elements) or DIM(*VAR:maximum_elements). The second parameter of the DIM keyword indicates the maximum number of elements in the array.
 - The dimension of a varying-dimension array can be changed by assigning a value to the %ELEM built-in function.
 - The dimension of a varying-dimension array defined with DIM(*AUTO) increases when there is an assignment statement to an element that is greater than the current number of elements.
 - You can specify *NEXT as the index for an array defined with DIM(*AUTO) when the array is modified by an assignment statement. The dimension of the array increases by one.
- Specify DIM(*CTDATA) to specify that the dimension of a compile-time array or table is determined by the number of records in the compile-time data.
- The SAMEPOS keyword positions a subfield at the same starting position as another subfield.
- New PSDS subfields:
 - Internal job ID, in positions 380 to 395
 - System name, in positions 396 - 403
- The ON-EXIT section runs every time that a procedure ends, whether the procedure ends normally or abnormally.
- When a qualified data structure is defined using free-form RPG syntax, a subfield can be directly defined as a nested data structure subfield using DCL-DS and END-DS to define the subfield.
- The new DATA-INTO operation code reads data from a structured document, such as JSON, into an RPG variable. It requires a parser to parse the document. The DATA-INTO operation calls the parser, and the parser passes the information in the document back to the DATA-INTO operation, which places the information into the RPG variable.
- Built-in function %PROC() returns the external name of the current procedure.
- Complex qualified names can be used in more places:
 - Built-in function %ELEM
 - Built-in function %SIZE
 - Operation code DEALLOC
 - Operation code RESET
- New built-in functions %MAX and %MIN can be used in definition statements and calculation statements.
- ALIGN(*FULL) defines the length of a data structure as a multiple of its alignment. This is important for avoiding storage-corruption problems when calling functions written in ILE C.
- The CRTBNDRPG and CRTRPGMOD commands now support compiling from Unicode source by specifying either an EBCDIC CCSID or *JOB for the new TGTCCSID parameter.

For more information about the RPG IV enhancements, including the PTFs that provide the enhancements, see the [RPG Cafe](#).

COBOL

New enhancements are available for the COBOL compiler:

- The new ALLOCATE statement obtains dynamic storage, while the new FREE statement releases dynamic storage that was previously obtained with an ALLOCATE statement.
- The EXIT statement includes the following new formats, which provide a structured way to exit without using a GO TO statement:

- Format 5, EXIT PERFORM statement for exiting from an inline PERFORM statement
- Format 6, EXIT PARAGRAPH or EXIT SECTION statement for exiting from the middle of a paragraph or exiting from a section respectively
- Enhancements are made to the INITIALIZE statement:
 - A new FILLER phrase is added so that FILLER data items can be initialized with the INITIALIZE statement.
 - A new VALUE phrase is added so that elementary data items can be initialized to the literal specified in the VALUE clause.
 - The INITIALIZE statement supports NATIONAL-EDITED as a REPLACING category and can initialize national groups and numeric or numeric-edited data that has USAGE NATIONAL.
- A new format of the SORT statement, the table SORT statement, arranges table elements in a user-specified sequence.
- The following new compiler directives are added to support conditional compilation:
 - The DEFINE directive defines or undefines a compilation variable.
 - The EVALUATE directive provides a multibranch method of choosing the source lines to include in a compilation group.
 - The IF directive provides for a one-way or two-way conditional compilation.
 - The new DEFINE parameter for the CRTBNDCBL and CRTCBMOD commands provides a way to define compilation variables before the compilation begins.
 - A new floating comment indicator (the character string '*>') can be coded to indicate that the ensuing text on a line is an inline comment.

IBM i Access Client Solutions (ACS) V1.1.8.2

IBM i Access Client Solutions is the strategic interface for accessing and managing IBM i. A new version (1.1.8.2) includes many new features and updates for both an IBM i system manager and a database engineer.

Run SQL Scripts

- Open and Save support to IFS and stream files extends the options for how scripts are maintained and used.
- When a "Database of Choice" has been selected, the information is retained, making it easier to resume work. Additionally, connections to an IASP are retained.
- The Insert from Examples capability is extended to include new SQL examples, making it easier and faster to include precoded examples.
- New JDBC Connection properties are available for assigning alternate server name and other attributes.
- The new design of the Formatter enables it to understand SQL syntax, creating more consistency for formatting, especially with complex SQL statements.
- The new formatter also provides the ability to verify the syntax of your SQL, highlighting error information, line numbers, and issues.
- Leveraging the new "for Update" option, users who have access can update and edit the data values within a database table directly from Run SQL Scripts.

Schemas

- To facilitate the creation of new projects, the ability to copy and paste schemas has been added.

Printer Output

- Most printed output displays the system name. Based on requests from clients, ACS 1.1.8.2 allows for removing the system name from the Printer Output download path.

Integrated File System

- Prompt for the location of the current IFS download location on the target PC.
- A new "Include" filter to improve performance by limiting the data returned from the server when viewing directories with a large number of files.

ODBC Driver for i

- The IBM i Access ODBC driver has been ported to IBM i. This allows any standard ODBC client to be able to communicate to the local database on i. It also allows an application to be developed using the IBM i Access ODBC driver for Windows/Linux and deployed to IBM i using the same ODBC driver.

System Configuration

- The System Configuration panel can now be leveraged as the primary location for launching ACS activities.
- Keyboard shortcuts have been added to menu options, improving navigation and simplifying the user's experience. Also, right-clicking on a system on the System Configuration panel will show a context menu of available actions.
- To accommodate different user preferences, you can sort the data within a column on the System Configuration panel.
- Easily see the specified description field to understand the system being selected.
- The Hardware Management Interface has undergone dramatic improvement. Some of these are:
 - A customized list of possible interfaces has been added.
 - It is possible to now specify more than two options.
 - The main ACS panel will be updated based on the configured Hardware Management Interfaces for the selected system.

Additional enhancements

- Japanese new era support has been added to ACS.
- Prior to ACS V1.1.7.2, when importing an ACS configuration to a target machine, it was necessary to have the user profile of the saved configuration already on the target. With ACS V1.1.8.2, this requirement is removed and the saved default user profile is not required to exist when importing a configuration.
- New ability to specify a list of included components, thereby excluding those not on the list.

Improved Entitled System Support (ESS) delivery

In response to client feedback regarding making Access Client Solutions easier to find and download on the ESS website, feature 6290 under 5770-SS1 will be automatically defaulted on orders of 5770-SS1 for version 7.2 and later releases. On the ESS website, under Software Downloads, select 5770-SS1 IBM i, then select your language group, then in the download packages, refer to feature "6290: Access Client Solutions".

For the latest updates and access to the most recent version, see the [IBM i Access - Client Solutions](#) web page.

Administration Runtime Expert

Administration Runtime Expert is used by system administrators to enhance the abilities to manage the systems in their environment. In IBM i 7.4, Administration Runtime Expert has made significant enhancements to the product. PTF management now includes the ability to manage PTFs with preconditions as well as handling delayed PTFs. With the ability of Administration Runtime Expert to compare and manage PTFs across multiple systems, this provides more usability. Additional enhancements are:

- The dashboard interface has been updated to handle an independent workset for every user to easily allow the dashboard to be used for a call center environment.

- Result history now shows the formatted view instead of just the text view.
- Support for case-sensitive template rename.
- Attach the zip file of a verification result to the notification mail.
- Restrict user's access by the role. If a user's role is "operator", the user has access only to console and has no ability to edit groups and systems.

Rational Developer for i, 9.6.x

Rational Developer for i (RDi), 9.6.x, is the strategic suite of tools for IBM i developers. This desktop environment gives developers an efficient and highly productive environment for writing business applications. The primary focus of these and other recent enhancements has been to provide continuous improvement in the areas of reliability, productivity, security, and currency.

- Added an API to allow SystemTextEditors to report an IBM i connection and member properties, thereby making actions and third-party vendors independent of the parser for this information.
- Users can zoom in and out in the editor using command keys, allowing a more efficient way to hone in code more quickly.
- Settings are now available to allow free-form RPG comments to be repeated from a previous operation code.
- Code coverage has undergone two significant improvements:
 - Code coverage results have an improved web-faced view.
 - Code coverage source view now displays in Browse mode.
- PDM Perspective, brought to RDi users in 2018, has been refined and includes new enhancements to make the view even more compatible with PDM.
 - Added Alt-F13 to enable users to repeat options in a manner similar to PDM on the options field of the Member Object table view
 - Added new multiple entry actions to improve Object Table multiple object actions, enabling users to copy repeat options in one panel instead of a series of pop-up commands
- JTopen, ACS, and Java have been updated to be compatible with IBM i 7.4.
- The RPG verifier and syntax checker will support the new ILE RPG enhancements in IBM i 7.4.
- RPG ILE Parser includes the capability to search for code that appears to be out of place and reports these discoveries with annotations, allowing developers to quickly find anomalies in their code.
- Improved SQL formatting
 - Smart enter key is included, allowing easier line splitting.
 - Developers can now choose either automatic formatting or to specifically request when formatting should occur.
- RDi has added a Toggle editor to the outline view, allowing the display of procedure and subroutine names while navigating in the editor.

For these new enhancements, additional updates, and APAR fixes, see the [Fix list for Rational Developer for i](#) website.

PowerHA SystemMirror for i

A key value proposition for PowerHA on IBM i is that it integrates the functionality of IBM SAN storage: in particular, the DS8000 and the IBM Storwize^(R) family of storage servers. This integration enables PowerHA for i to manage the storage operations as an integral part of clustering operations such as failover/fallback operations and FlashCopy^(R) operations. With PowerHA SystemMirror for i Enterprise Edition, the integration with the IBM Copy Services Manager for the DS8000 enables PowerHA to support HyperSwap with a Global Mirror link. HyperSwap is an active/active storage configuration whereby two of the DS8000s are linked through Metro Mirror, while at the user/application level, it actually appears as a single shared storage resource (switchable LUN configuration). If one of the storage servers in the HyperSwap configuration goes away, the application workload simply continues I/O operations

to the alternate DS8000 in the HyperSwap pair without interruption. Adding the capability to support a Global Mirror link to the HyperSwap pair provides the third site for disaster recovery operations, all under the management of the PowerHA for i cluster.

In addition, PowerHA for i, 7.4 Enterprise Edition enables a Db2 Mirror disaster recovery capability.

PowerHA SystemMirror for i, 7.4 Standard Edition has been enhanced with ease-of-use and automation capabilities:

- New policies that automate adding monitored resource entries (MREs) upon object creation, the deletion of MREs upon object deletion, and restore operations for MREs.
- Improved control over administrative domain synchronization options; for example, the capability to choose which node is to be the source of updates to push to the other nodes when using Start Cluster Administrative Domain. Previously, when resource changes were made to nodes in an inactive administrative domain, multiple nodes could change the same resource and there was no coordination for multiple different changes to the same resource.
- Integrated ability to cancel automatic CRG failovers with a new PowerHA policy.
- Support for replication of IFS data in a Db2 Mirror for i environment.

For more information, see the [IBM PowerHA SystemMirror for i](#) wiki page.

Backup, Recovery, and Media Services for i (BRMS)

The BRMS 7.4 enhancements include:

- Turn-key cloud control group deployment that enables clients to easily set up custom control groups for cloud.
- Ability to enable the green screen command to change control group attributes, which were previously available only in the GUI.
- Backup for changes to journaled objects is now the default setting; that is, the default for SAVLIBBRM command has been changed to OBJJRN(*YES).
- New *OBJ list named QALLSPLF to back up all spooled files, which improves restore performance.
- Support for the 3592-60F tape drive with *FMT3592A6 and FMT3592A6E densities.
- Enhanced log information that uses the system timestamp to preserve message order when messages are logged at the same second. They are displayed using DSPLOGBRM.

For more information, see the [IBM Backup, Recovery & Media Services \(BRMS\) for i](#) wiki page.

Db2 Web Query

Get a fast start to advanced, visual reporting and business intelligence with Db2 Web Query for i. Get running quickly using Web Query's newly enhanced EZ-Install package. Flatten the learning curve through readily available tutorials, a new Date Dimension table creation procedure, and new sample reports for the IBM i Systems Administrator. To learn more about EZ-Install, see the [DB2^{\(R\)} Web Query for i](#) installation web page.

ARCAD Observer (Version 1.1.2)

ARCAD Observer for IBM i supports the understanding of business applications. It includes graphical diagramming, I/O diagramming, and other analysis capabilities to understand business applications.

Note: The latest version of ARCAD Observer (10.08.02) is being incorporated into this LPP.

ARCAD Converter (Version 1.1.2)

ARCAD RPG Converter for IBM i automates the conversion of any RPG IV source code to free-form RPG, achieving near 100% conversion accuracy. It supports unitary or mass conversion.

Note: The latest version of ARCAD Transformer (10.09.03) is being incorporated into this LPP.

Firmware and hardware

IBM i supports FW930, which provides the most up-to-date POWER9 functionality.

Additional I/O support includes several Power features:

- Enhanced support for the PCIe Gen4 dual port 100 Gb Ethernet adapter. IBM i adds both dedicated and native SR-IOV support for the Network Interface Card (NIC) function. This adapter is already available for use in IBM i configurations with Virtual I/O Server (VIOS). IBM i also adds both dedicated and native SR-IOV support for RDMA over Converged Ethernet (RoCE) to allow remote direct memory access (RDMA) in IBM Db2 Mirror for i configurations.
- Both dedicated and native SR-IOV support for RoCE for PCIe Gen3 Ethernet adapters. Sharing these adapters with SR-IOV allows more configuration flexibility. Multiple 2-port cards are available: 100 Gb, 25/10 Gb, and 10 Gb.
- New PCIe3 6-Slot Fanout Module for the PCIe3 Expansion Drawer.
- New optical cable cards for attaching the PCIe3 I/O Expansion drawer with the new PCIe3 6-Slot Fanout Module. The new cards for the Scale Out models are now single wide so they do not block the adjacent PCIe Gen4 x16 card slot.
- New 387 GB, 775 GB, and 1.55 TB Enterprise SAS 4k and 5xx SFF-3 and SFF-2 SSDs.
- New 931 GB, 1.86 TB, 3.72 TB, and 7.45 TB Mainstream SAS 4K SFF-3 and SFF-2 SSDs.

Other

Domino 10.0.1

A significant new release for the Domino product has been released. Some of the highlights include:

- Automatic Notes^(R) client updates
- MarvelClient Essentials for IBM Notes Management solution
- Publishing statistics to external services
- Larger database (256 GB) and folders
- Apache Tika conversion filter for attachments searches
- Features that save you time, such as Indexing/clusters/database replicas management

For more details on all the latest features, see Software Announcement [218-538](#), dated December 18, 2018.

IBM Content Manager OnDemand for i (5770-RD1)

IBM Content Manager OnDemand for i is providing significant new function in the latest release, exploiting new technologies available in IBM i. Some of the enhancements are listed below:

- Cloud storage for archive media: Cloud storage is now supported as an archive media for Content Manager OnDemand for i. Cloud support requires the IBM CloudTM Storage Solutions for i (5733-ICC) licensed program product.
- 400 indexer enhancements: The OS/400^(R) indexer has been renamed to the 400 *indexer*. The 400 indexer has been updated for improved performance and

enhanced serviceability. In addition, the 400 indexer can now use AFP resources located in IFS directories.

- Content Manager OnDemand component of IBM Navigator for i enhancements: A new option has been added to create and manage cloud storage resources. The design of the Content Manager OnDemand component of IBM Navigator for i has also been updated to reflect a format similar to the operating system components.
- Start Archived Storage Management (STRASMOND) command enhancement: The Start Archived Storage Management (STRASMOND) command has a new Trace (TRACE) parameter to facilitate tracing when requested by software support.
- Start Disk Storage Management (STRDSMOND) command enhancement: The Start Disk Storage Management (STRDSMOND) command has a new Force ASM to end (ENDASM) parameter to enable you to end the Archived Storage Management (ASM) process (which, by default, runs after DSM completes) at a specified time or after a specified number of hours. Prior to version 7.4, the ENDASM parameter was only available on the Start Archived Storage Management (STRASMOND) command.
- Print Report (PRTRPTOND), Print document (PRTDOCOND), Query document (QRYDOCOND), and Retrieve document (RTVDOCOND) command enhancements: The Print Report (PRTRPTOND), Print document (PRTDOCOND), Query document (QRYDOCOND), and Retrieve document (RTVDOCOND) commands have a new Retrieve in load order (RTVLORD) parameter to control which documents are included and in what order the documents are included. See the command help for the RTVLORD parameter for more information.

See the [Customer Notices and information -IBM i 7.3](#) website for additional Content Manager OnDemand for i 7.3 enhancements that are available through PTFs and are also included in Content Manager OnDemand for i for IBM i 7.4. These enhancements are related to encryption, managing documents, administering objects, and allowing coexistence of 32-bit and 64-bit clients and/or 9.5 and 10.1 clients on a single workstation.

Content Manager OnDemand's software requirements will depend on your implementation. See the [Content Manager OnDemand for i](#) topic in IBM Knowledge Center.

Content Manager OnDemand for i is available to order through Passport Advantage^(R). See the [Passport Advantage and Passport Advantage Express^{\(R\)}](#) website.

Software progression

The following table is used to show the updates for various products.

Program updates

V5R4	i 6.1	i 7.1	i 7.2	i 7.3	i 7.4
5722-SS1	5761-SS1	5770-SS1	5770-SS1	5770-SS1	5770-SS1
-	-	-	5733-AC1	5733-AC1	5733-AC1
-	-	-	5733-AO1	5733-AO1	5733-AO1
-	5761-AMT	5770-AMT	5770-AMT	*	*
-	5733-ARE	*	*#	*#	*#
5722-AF1	5761-AF1	5770-AF1	5770-AF1	NA	NA
5722-AP1	5761-AP1	*	*	*	*
5722-BR1	5761-BR1	5770-BR1	5770-BR1	5770-BR1	5770-BR1
5722-CM1	5761-CM1	*	*	*	*
5733-CY1	5733-CY2	5733-CY3	5733-CY3	5733-CY3	5733-CY3
5722-DB1	5761-DB1	*	*	*	*
-	-	-	-	-	5770-DBM
5722-DFH	5761-DFH	5770-DFH	5770-DFH#	*#	*#
5722-DS1	5761-DS2	*	*	*	*

V5R4	i 6.1	i 7.1	i 7.2	i 7.3	i 7.4
5798-FAX	*	*	5798-FAX#	*#	*#
5769-FN1	*	*	*	*	*
5769-FNT	*	*	*	*	*
5648-E77	5648-E77	*	*	*	*
5733-ID1	*	*	*	NA	NA
5722-IP1	*	*	*	*	*
-	5761-HAS	5770-HAS	5770-HAS	*	5770-HAS
5733-ITL	5733-ITL	5733-ITL	5733-ITL	5733-ITL	5733-ITL
-	-	5733-ICC	5733-ICC	*	*
5722-JS1	5761-JS1	5770-JS1	5770-JS1	*	*
5722-MG1	5761-MG1	5770-MG1	5770-MG1#	5770-MG1#	5770-MG1#
5722-NLV	5761-NLV	5770-NLV	5770-NLV	5770-NLV	5770-NLV
-	5733-OMF	5733-OMF	5733-OMF	5733-OMF	5733-OMF
5722-PT1	5761-PT1	5770-PT1	5770-PT1	5770-PT1	5770-PT1
5722-QU1	5761-QU1	5770-QU1	5770-QU1	5770-QU1	5770-QU1
5733-QU2	5733-WQX	5733-WQX	5733-WQX	5733-WQX	*
5733-QU3	5733-WQX	5733-WQX	5733-WQX	5733-WQX	*
5733-QU4	5733-WQX	5733-WQX	5733-WQX	5733-WQX	*
5761-RD1	5770-RD1	PN	PN	PN	PN
5722-WDS	5761-WDS	5770-WDS	5770-WDS	5770-WDS	5770-WDS
-	5733-RDW	5733-RDW	5733-RDW	5733-RDW	*
5733-SC1	#	#	5733-SC1#	#	#
5722-SM1	5761-SM1	5770-SM1	5770-SM1#	5770-SM1#	5770-SM1#
5722-ST1	5761-ST1	5770-ST1	5770-ST1	5770-ST1	5770-ST1
5722-WE2	*	*	*	*	5722-WE2
5733-WE3	*	5733-WE3	*	*	5733-WE3
5722-XW1	5761-XW1	5770-XW1	5770-XW1	5770-XW1	5770-XW1
5733-XT2	5733-XT2	5733-XT2	*	*	*

- indicates product is not orderable.

* indicates which products are not being refreshed for this release but are still available.

indicates product was orderable but has become a bonus program with the operating system.

PN (part number) indicates product has moved to Passport ordering.

NA (not available) indicates product is no longer orderable with the operating system.

Note: Products 5770-WE2 and 5770-WE3 are only updating the fix levels, not release levels.

Accessibility by people with disabilities

A US Section 508 Accessibility Compliance Report containing details on accessibility compliance can be found on the [Product accessibility information](#) website.

Product positioning

IBM i 7.4 is the latest version of the IBM i operating environment.

IBM i running on a Power System server provides a highly scalable and robust architecture with a proven reputation for exceptional business resilience and low operational costs. Running applications based on IBM i has helped companies over many years to focus on innovation and delivering new value to their business, not on managing their solution stack.

IBM i is a fully integrated and optimized combination of relational database, trusted object-based security model, integrated networking, and the storage management capabilities required to run business applications. The integrated SQL standards-compliant Db2 for i database includes advanced database management utilities. IBM i also includes additional integrated middleware components such as multiple file systems, LDAP directory, an HTTP Web-server, IBM WebSphere^(R) Application Server, and an integrated industry-leading security environment.

IBM's integration, optimization, and testing of IBM i are a key factor in helping companies to realize lower operations costs by enabling them to deploy applications faster and maintain them with fewer staff. IBM assumes the responsibility for developing, testing, and preloading the core middleware components of IBM i together.

This strong integration provides exceptional stability and availability. It is these key features that provide the peace of mind that the client's business will continue to run well into the future.

Additionally, the integrated language environments have been extended further to include open source options. Open source is the language of the Internet of Things, AI, and other cognitive innovation. The addition of open source to the IBM i platform has encouraged integration and innovation with modern technologies.

Using IBM i today, clients have a multitude of options for answering the requirements of their businesses, more than ever before. They can run traditional business applications. They can include application solutions that do Machine Learning. Clients can attach mobile devices, robots, and sensors to IBM i applications and glean additional business benefit from process automation. Using IBM i on Power Systems, clients can solve whatever business problem needs to be solved.

Statement of general direction

IBM plans to add native support for Non-Volatile Memory Express^(R) (NVMe) devices into the IBM i Operating System.

Statements by IBM regarding its plans, directions, and intent are subject to change or withdrawal without notice at the sole discretion of IBM. Information regarding potential future products is intended to outline general product direction and should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for IBM products remain at the sole discretion of IBM.

Reference information

For additional information on IBM i, see:

- Software Announcement [219-216](#), dated April 23, 2019, (IBM Db2 Mirror for i)
- Software Announcement [219-213](#), dated April 23, 2019, (IBM i 7.3 TR6)
- Hardware Announcement [119-001](#), dated April 23, 2019, (IBM Power Systems enhancements)

- Software Announcement [219-182](#), dated April 23, 2019, (IBM Power Virtualization offers new enhancements)
- Software Announcement [219-183](#), dated April 23, 2019, (IBM Power Systems Hardware Management Console (HMC) Virtual Appliance Version 9 offers new enhancements)
- Software Announcement [218-538](#), dated December 18, 2018, (IBM Domino V10.0.1)
- Software Announcement [219-117](#), dated February 5, 2019, (Notes^(R) and Domino 10.0.1 and IBM i Series 10.0)

Program number

Program number	VRM	Program name
5770-SS1	7.4	IBM i
5733-AC1	1.1.2	ARCAD RPG Converter
5733-AO1	1.1.2	ARCAD Observer
5770-BR1	7.4	IBM Backup, Recovery and Media Services for i
5733-CY3	7.4	IBM Cryptographic Device Manager for i
5770-DBM	7.4	IBM Db2 Mirror for i
5770-HAS	7.4	IBM PowerHA SystemMirror for i
5770-NLV	7.4	IBM National Languages for i
5770-PT1	7.4	IBM Performance Tools for i
5770-QU1	7.4	IBM Query for i
5770-ST1	7.4	IBM DB2 ^(R) Query Manager and SQL Development Kit for i
5770-WDS	7.4	IBM Rational Development Studio for i
5770-XW1	7.4	IBM i Access Family
5733-OMF	1.5	OmniFind Text Search Server for DB2 for i
5722-WE2	5.3.1	IBM Web Enablement for i5/OS
5733-WE3	1.1.1	IBM Web Enablement for i

The following products are available with IBM i 7.4 but are not being refreshed:

Program number	VRM	Program name
5770-AMT	7.2	IBM Rational Application Management Tool Set for i
5770-JS1	7.2	IBM Advanced Job Scheduler for i
5733-B45	3.1	IBM AFP Font Collection for Workstations and OS/400 ^(R)
5648-E77	1.1	IBM Infoprint Fonts for Multiplatforms
5722-IP1	5.3	IBM Infoprint Server for iSeries
5733-ARE	1.1	IBM Application Runtime Expert for i
5733-ITL	1.1	IBM Software Temporary License for i

Program number	VRM	Program name
5733-RDW	9.6	IBM Rational Developer for i
5733-WQX	2.2	IBM DB2 Web Query for i
5733-XT2	1.2	IBM XML Toolkit for i
5761-AP1	6.1	IBM Advanced DBCS Printer Support for iSeries
5761-CM1	6.1	IBM Communications Utilities for System i ^(R)
5761-DB1	6.1	IBM System/38 Utilities for System i
5761-DS2	6.1	IBM Business Graphics Utility for System i
5769-FN1	4.2	IBM Advanced Function Printing DBCS Fonts for AS/400
5769-FNT	4.2	IBM Advanced Function Printing Fonts for AS/400
5733-NKY	5.2	Remove Keys/ePOEs for Transferred Software

Additional products

The following products are shipped with the IBM i Operating System (5770-SS1):

- IBM HTTP Server for i (5770-DG1)
- IBM CICS^(R) Transaction Server for i (5770-DFH)
- IBM Facsimile Support for i (5798-FAX)
- IBM Managed System Services for i (5770-MG1)
- IBM System Manager for i (5770-SM1)
- IBM i OptiConnect, Option 23 (5770-SS1)
- IBM Application Runtime Expert for i (5733-ARE)
- IBM HTTP Server for i (5770-DG1)
- IBM Developer Kit for JavaTM (5770-JV1)
- IBM Network Authentication Enablement for i (5770-NAE)
- IBM Portable Utilities for i (5733-SC1)
- IBM TCP/IP Connectivity Utilities for i (5770-TC1)
- IBM Transform Services for i (5770-TS1)
- IBM Universal Manageability Enablement for i (5770-UME)
- IBM i Open Source Solutions (5733-OPS) (Available only on the Web at the [IBM i open source RPM](#) website)
- Zend Server Community Edition for i (5639-ZC1) (ESS only)
- IBM i Access Client Solutions (5733-XJ1)¹
- IBM i Access for Web (5770-XH2)¹

¹ Some of the functions of these products require an entitlement for IBM i Access Family (5770-XW1).

Program number	Maintenance 1-year program number	Maintenance 3-year program number
5770-SS1	5733-SPP	5733-SP3
		5733-SPE

Offering Information

Product information is available on the [IBM Offering Information](#) website.

Publications

No publications are shipped with this program.

To access the IBM Publications Center portal, go to the IBM [Publications Center](#) website.

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided. A large number of publications are available online in various file formats, and they can all be downloaded by all countries.

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Technical information

Specified operating environment

Hardware requirements

IBM i 7.4 is supported on selected Power Systems servers with POWER9 and POWER8 processors.

For up-to-date information on all types of code levels needed for support of a particular feature, see the [IBM Prerequisite](#) website.

For additional information, see the [System to IBM i maps](#) website.

Software requirements

For specific software requirements, see the [Memo to Users](#) in IBM Knowledge Center.

Limitations

For additional information, see the [Usage restrictions](#) section or the License Information document that is available on the [IBM Software License Agreement](#) website.

The IBM Support Community

The [IBM Support Community](#) is your gateway to technical support tools and resources that are designed to help you save time and simplify support. Support Community tools can help you find answers to questions, download fixes, troubleshoot, automate data collection, submit and track problems, and build skills.

You can also access the [Service requests and PMRs](#) tool for more support.

Planning information

Planning statements provide insight into IBM's current plans, directions, and intent, and are subject to change or withdrawal without notice. Any reliance on these planning statements is at the relying party's sole risk and will not create liability or obligation for IBM.

For additional planning information for IBM i 7.4, see the [IBM i Support: Upgrade planning](#) website.

Packaging

This offering is delivered electronically. Alternatively, one can order physical media.

Security, auditability, and control

IBM i uses the security and auditability features of IBM i.

The client is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communication facilities.

Ordering information

Consult your IBM representative.

New feature numbers

IBM i (5770-SS1)

Program number	Feature description	Supply feature number
5770-SS1	I 7.4 Machine Code	5874
5770-SS1	I7.4 USB License Mach. Code	5974
5770-SS1	Lang Grp 1 Supply	5841
5770-SS1	Lang Grp 2 Supply	5842
5770-SS1	Lang Grp 3 Supply	5843
5770-SS1	DB2 Multisystem Supply	5945
5770-SS1	DB2 Symm Multi Supply	5943
5770-SS1	HA Journal Perf Supply	5951
5770-SS1	HA Switch Res Supply	5952
5770-SS1	M&S Extensions Supply	5941
5770-SS1	PSF 1-100 IPM Prtr Supp	5947
5770-SS1	PSF/400 1-55 IPM Supply	5946
5770-SS1	PSF Any Speed Supply	5954
5770-SS1	Db2 Data Mirroring Supply	5953
5770-SS1	IBM i Access Client Sol Supply	6290

ARCAD RPG Converter (5733-AC1)

Program number	Feature description	Supply feature number
5733-AC1	ARCAD RPG Converter Supply	5819

ARCAD Observer (5733-AO1)

Program number	Feature description	Supply feature number
5733-AO1	ARCAD Observer Supply	5819

Cryptographic Device Manager for i (5733-CY3)

Program number	Feature description	Supply feature number
5733-CY3	Cryptographic Device Manager for i	5839

OmniFind Text Search Server for DB2 for i (5733-OMF)

Program number	Feature description	Supply feature number
5733-OMF	OmniFind Text Search Server for DB2 for i	5859

Backup, Recovery, and Media Services for i (5770-BR1)

Program number	Feature description	Supply feature number
5770-BR1	Language Group 1	5847
5770-BR1	Language Group 2	5848
5770-BR1	Language Group 3	5849
5770-BR1	Language Group 1 Network	5920
5770-BR1	Language Group 2 Network	5921
5770-BR1	Language Group 3 Network	5922
5770-BR1	Language Group 1 Advanced	5923
5770-BR1	Language Group 2 Advanced	5924
5770-BR1	Language Group 3 Advanced	5925

IBM PowerHA SystemMirror for i (5770-HAS)

Program number	Feature description	Supply feature number
5770-HAS	i 7.4 Lang Grp 1 Exp Ed Supply	5730
5770-HAS	i 7.4 Lang Grp 2 Exp Ed Supply	5731
5770-HAS	i 7.4 Lang Grp 3 Exp Ed Supply	5732
5770-HAS	i 7.4 Lang Grp 1 Std Ed Supply	5830
5770-HAS	i 7.4 Lang Grp 2 Std Ed Supply	5831
5770-HAS	i 7.4 Lang Grp 3 Std Ed Supply	5832
5770-HAS	i 7.4 Lang Grp 1 Ent Ed Supply	5950
5770-HAS	i 7.4 Lang Grp 2 Ent Ed Supply	5951
5770-HAS	i 7.4 Lang Grp 3 Ent Ed Supply	5952

Performance Tools for i (5770-PT1)

Program number	Feature description	Supply feature number
5770-PT1	Language Group 1	5840
5770-PT1	Language Group 2	5841
5770-PT1	Language Group 3	5842
5770-PT1	Language Group 1 Manager	5920
5770-PT1	Language Group 2 Manager	5921
5770-PT1	Language Group 3 Manager	5922
5770-PT1	Language Group 1 Agent	5930

Program number	Feature description	Supply feature number
5770-PT1	Language Group 2 Agent	5931
5770-PT1	Language Group 3 Agent	5932
5770-PT1	Language Group 1 Job Watcher	5940
5770-PT1	Language Group 2 Job Watcher	5941
5770-PT1	Language Group 3 Job Watcher	5942

Query for i (5770-QU1)

Program number	Feature description	Supply feature number
5770-QU1	Language Group 1	5847
5770-QU1	Language Group 2	5848
5770-QU1	Language Group 3	5849

DB2 Query Manager and SQL Dev Kit for i (5770-ST1)

Program number	Feature description	Supply feature number
5770-ST1	Language Group 1	5847
5770-ST1	Language Group 2	5848
5770-ST1	Language Group 3	5849

Rational Development Studio (5770-WDS)

Program number	Feature description	Supply feature number
5770-WDS	Language Group 1	5847
5770-WDS	Language Group 2	5848
5770-WDS	Language Group 3	5849
5770-WDS	Language Group 1 ILE Compilers	5960
5770-WDS	Language Group 2 ILE Compilers	5961
5770-WDS	Language Group 3 ILE Compilers	5962
5770-WDS	Language Group 1 Heritage Compilers	5980
5770-WDS	Language Group 2 Heritage Compilers	5981
5770-WDS	Language Group 3 Heritage Compilers	5982
5770-WDS	Language Group 1 Application Development ToolSet	5992
5770-WDS	Language Group 2 Application Development ToolSet	5993
5770-WDS	Language Group 3 Application Development ToolSet	5994

IBM i Access Family (5770-XW1)

Program number	Feature description	Supply feature number
5770-XW1	Language Group 1 Processor based	5847
5770-XW1	Language Group 2 Processor based	5848
5770-XW1	Language Group 3 Processor based	5849
5770-XW1	Language Group 1 User Based	5747
5770-XW1	Language Group 2 User Based	5748

Program number	Feature description	Supply feature number
5770-XW1	Language Group 3 User Based	5749

Db2 Mirror for i (5770-DBM)

Program number	Feature description	Supply feature number
5770-DBM	Language Group 1	5847
5770-DBM	Language Group 2	5848
5770-DBM	Language Group 3	5849

IBM National Languages for i (5770-NLV)

Program number	Feature description	Supply feature number
5770-NLV	i 7.4 Lang Grp 1 Supply	5841
5770-NLV	i 7.4 Lang Grp 2 Supply	5842
5770-NLV	i 7.4 Lang Grp 3 Supply	5843
5770-NLV	i 7.4 Licensed Machine Code	5874
5770-NLV	English U/L SBCS Secondary	5924
5770-NLV	Estonian Secondary Language	5902
5770-NLV	Lithuanian Secondary Language	5903
5770-NLV	Latvian Secondary Language	5904
5770-NLV	Vietnamese Secondary Language	5905
5770-NLV	Lao Secondary Language	5906
5770-NLV	Belgian English Secondary	5909
5770-NLV	Slovenian Secondary Language	5911
5770-NLV	Croatian Secondary Language	5912
5770-NLV	Macedonian Secondary Language	5913
5770-NLV	Serbian Secondary Language	5914
5770-NLV	Portuguese Secondary Language	5922
5770-NLV	Dutch Secondary Language	5923
5770-NLV	Finnish Secondary Language	5925
5770-NLV	Danish Secondary Language	5926
5770-NLV	French Secondary Language	5928
5770-NLV	German Secondary Language	5929
5770-NLV	Japanese Universal Secondary	5930
5770-NLV	Spanish Secondary Language	5931
5770-NLV	Italian Secondary Language	5932
5770-NLV	Norwegian Secondary Language	5933
5770-NLV	Swedish Secondary Language	5937
5770-NLV	English U/C DBCS Secondary	5938

Program number	Feature description	Supply feature number
5770-NLV	German MNCS Secondary Language	5939
5770-NLV	French MNCS Secondary Language	5940
5770-NLV	Italian MNCS Secondary Language	5942
5770-NLV	Arabic Secondary Language	5954
5770-NLV	Turkish Secondary Language	5956
5770-NLV	Greek Secondary Language	5957
5770-NLV	Icelandic Secondary Language	5958
5770-NLV	Hebrew Secondary Language	5961
5770-NLV	Japanese DBCS Secondary	5962
5770-NLV	Belgian Dutch Secondary Lang	5963
5770-NLV	Belgian French Secondary Lang	5966
5770-NLV	Thai DBCS Secondary Language	5972
5770-NLV	Bulgarian Secondary Language	5974
5770-NLV	Czech Secondary Language	5975
5770-NLV	Hungarian Secondary Language	5976
5770-NLV	Polish Secondary Language	5978
5770-NLV	Russian Secondary Language	5979
5770-NLV	Braz Portuguese Secondary Lang	5980
5770-NLV	Canadian French Secondary Lang	5981
5770-NLV	English U/L DBCS Secondary	5984
5770-NLV	Korean DBCS Secondary Language	5986
5770-NLV	Trad Chinese DBCS Secondary	5987
5770-NLV	Simp Chinese DBCS Secondary	5989
5770-NLV	Romanian Secondary Language	5992
5770-NLV	Slovakian Secondary Language	5994
5770-NLV	Albanian Secondary Language	5995
5770-NLV	Portuguese MNCS Secondary	5996
5770-NLV	Farsi Secondary Language	5998

Remove Keys/ePOEs for Transferred Software (5733-NKY)

Program number	Feature description	Supply feature number
5733-NKY	5770-DBM Db2 Mirror for i	2867
5733-NKY	5770-SS1 Opt48 Db2 Data Mirror	2868

Web Enablement for i5/OS (5722-WE2)

Program number	Feature description	Supply feature number
5722-WE2	WebSphere Express V8.5.5.15	5913

Web Enablement for i (5733-WE3)

Program number	Feature description	Supply feature number
5733-WE3	Web Enablement for i V9.0.0.11	5820

There is no new ordering information in this release.

Charge metric

The charge metrics for these licensed products can be found in the following License Information documents:

Program identifier	License Information document title	License Information document number
5770-SS1	IBM i 7.4	L-LHIH-AZ2U4S

Select your language of choice and scroll down to the Charge Metrics section. Follow-on releases, if any, may have updated terms. See the [License Information documents](#) website for more information.

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License Information number

The following License Information documents applies to the offering in this announcement:

Program identifier	License Information document title	License Information document number
5770-SS1	IBM i 7.4	L-LHIH-AZ2U4S

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Yes

Limited warranty

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Volume orders (IVO)

Yes. Contact your IBM representative.

Passport Advantage applies

No

Usage restrictions

Yes

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IBM Operational Support Services - SoftwareXcel

No

System i Software Maintenance applies

Yes

Variable charges apply

No

Educational allowance available

Yes. A 15% education allowance applies to qualified education institution clients.

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Corrections

(Corrected on May 16, 2019)

Revised the Description section.