

IBM i 7.2 TR7 offers enhanced analytics, new security capabilities, and other new functions in IBM i and associated licensed programs

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At a glance

IBM^(R) i 7.2 TR7 includes the following new features:

- IBM Db2^(R) for i adds new and enhanced SQL capabilities for database application developers, system administrators, and security auditors. With these enhancements, Db2 for i can be used to become more productive and effective at solving important business requirements.
- Installation of IBM i can now be done with a simple download, copy to USB flash drive, and D-mode IPL on managed systems.
- The IBM i Save System (SAVSYS) operation now includes the LAN console configuration data, eliminating a couple of complex steps that were previously needed to re-install an IBM i partition from a backup onto a new load source.
- IBM i will now support the 4767 Cryptographic Co-processor. The 4767 is the follow-on to the 4765 Cryptographic Co-processor.
- IBM i can support up to 127 devices on both virtual and physical Fibre Channel ports.
- IBM i Integrated Web Services adds advanced features to help administrators and programmers leverage APIs in a safe, secure manner.
- IBM continues to expand the suite of functions available in the open source licensed program offering with benefits for many application scenarios. This includes new integration with the operating system, familiar IBM i Access tools, and IBM Bluemix^(R).
- Access Client Solutions continues to be enhanced to meet the needs of the IBM i user community.
- The RPG ILE Compiler in Rational^(R) Development Studio has been updated with new modernization capabilities.
- Rational Developer for i, V9.6 delivers an updated version of the Eclipse workbench, in addition to features designed to enhance programmer productivity.
- IBM Cloud Storage Solutions for i, V1.2 includes new encryption techniques, adding to the security of data movement.
- Db2 Web Query for i has a new release, version 2.2.1, with many new advanced visualization, usability, and security features.
- Db2 Web Query DataMigrator now includes simplified functions, regular expression support, and improved scheduling.

Overview

Following the tradition of delivering new functions and business value to the IBM i operating system and related products through Technology Refreshes, IBM is announcing IBM i 7.2 TR7. This Technology Refresh provides usability enhancements, new security capabilities, and significant new functions in many of the operating system components and licensed programs. A few of the business benefits that can be realized are described here.

With IBM i 7.2 TR7, Db2 for i continues to focus on new and advanced SQL capabilities and the ability to use SQL to access IBM i operating system details. Further, Db2 for i delivers new features for the creation of data-centric JSON solutions. Finally, Db2 for i delivers new capabilities to allow IBM i history logs and security audit details to be consumable by a security information and event management (SIEM) solution.

IBM i is introducing a new installation method that uses USB Removable Mass Storage technology, making the IBM i installation easier and more convenient. While there are many potential uses, the one that most clients will explore is the ability to download IBM i images from the Entitled Systems Support (ESS) website, copy them to a USB flash drive, do a D-mode IPL on a managed system, and then install LIC, XPF, and any LPP images that fit onto the media.

IBM i integrated web services, both the server and client, have been enhanced to give programmers and administrators more flexibility when leveraging web services on IBM i in a safe and secure manner. The server has been updated to support a multitier solution, and the client code now supports SSL when connecting to a web service.

Open source enhancements have been delivered in several areas, including open source projects, the IBM i open source solutions program offering, the operating system, and system access tools. These new open source functions enhance functionality for application developers, system administrators, and users. It is easier to deploy secure web solutions, use open source languages, port applications, and much more.

Rational Development Studio has updates for the application developer to improve the RPG language as well as invoke code coverage directly from the command line.

Access Client Solutions, the strategic interface for users, system managers, and database engineers looking to access IBM i, continues to be improved to address additional functions as well as updates requested by the ACS user community.

IBM i has been enhanced to work better with IBM PowerVC for cloud capabilities. For IBM i PowerVC clients who are using CloudInit, it will be enabled automatically on deployment.

For clients who do not have an HMC, the actions to install an IBM i partition from a backup onto a new load source have been simplified. In particular, the LAN console configuration is now saved as part of a SAVSYS operation and is later accessed during the D-mode IPL, eliminating the time-consuming steps of pulling together the information and configuring the LAN console separately using operator panel functions during the installation process.

Db2 Web Query for i has a new release, version 2.2.1, with numerous new features. Report authoring and advanced data analysis just got easier with additional visualizations that provide more powerful analytics. Report and dashboard navigation is made simpler for users with the introduction of report auto-link, auto-drill down, and dynamic parameterization. Service providers can also leverage the new capability to set the number of user licenses by logical partition.

Db2 Web Query DataMigrator is also refreshed in version 2.2.1. New features include simplified functions for building straightforward but powerful transformations, data flow comments on the developer palette, regular expression support for filtering, and improved scheduling.

The IBM i Technology Updates wiki in developerWorks^(R) contains details of i operating system enhancements. To view technical details for the topics found in this announcement letter, see the [IBM i 7.2 TR7 enhancements](#) website.

Key prerequisites

IBM i 7.2 TR7 is supported on selected IBM Power SystemsTM servers:

- Power Systems servers with IBM POWER8^(R) technology-based processors
- Power Systems servers and blades and IBM Flex systems with IBM POWER7^(R) or IBM POWER7 + processors
- Power Systems servers and blades with IBM POWER6^(R) or IBM POWER6 + processors
- IBM System i^(R) servers with POWER6 processors

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

Planned availability date

- October 27, 2017, for IBM i 7.2 TR7 (5770-SS1) and IBM i 7.2 (5770-SS1) USB Licensed Machine Code, feature 5972
- December 8, 2017, for Db2 Web Query for i, V2.2.1 (5733-WQX), features 5808, 5818, and 5828

Description

Included in this Technology Refresh are new functions and features for a variety of components in the base operating system, Db2 for i, licensed programs, and associated other products. This Technology Refresh provides usability enhancements, new security capabilities, and significant new functions in many of the operating system components and licensed programs.

IBM i 7.2 TR7 and associated IBM i licensed programs will be generally available (GA) on October 27, 2017, unless otherwise noted.

Db2 for i enhancements

With IBM i 7.2 TR7, Db2 for i continues to focus on new and advanced SQL capabilities and the ability to use SQL to access IBM i operating system details. Further, Db2 for i delivers new features for the creation of data-centric JSON solutions. Finally, Db2 for i delivers new capabilities to allow IBM i history logs and security audit details to be consumable by a security information and event management (SIEM) solution.

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

- JSON publishing functions can be used by the database application developer to build JSON objects from Db2 for i relational data. This standards-based technology enables a database application developer to leverage the query engine to efficiently construct JSON.
- JSON scalar functions enable the SQL programmer to efficiently process JSON objects. These functions join the existing JSON_TABLE function as techniques to programmatically shred JSON.
- Stateless pagination in the database becomes easier and more powerful by extending the LIMIT and OFFSET support.

These and other SQL enhancements are described in developerWorks.

Security auditors have a new source of Syslog security details to consume. With a consumable tap of standards-based security details, IBM i clients can take a noteworthy step forward in governance of security.

- The HISTORY_LOG_INFO table function is extended to include the option of returning IBM i history log details in Syslog format.
- The DISPLAY_JOURNAL table function is extended to include the option of returning a subset of IBM i audit journal entry types in Syslog format.

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

- The ASP_INFO view returns information about auxiliary storage pools (ASPs). Administrators will be able to advance their management of ASP existence, configuration, and storage with this service.
- The ASP_VARY_INFO view returns one row for each step associated with a vary on or vary off operation for all independent ASP devices. By having this service, administrators can use the SQL Query Engine to compare and contrast vary on performance over time.
- The JOB_QUEUE_INFO view returns one row for each job message queue. This service adds to the set of work management topics that can be managed by the use of SQL.

These and other IBM i services are described in developerWorks.

These and other enhancements are delivered through Db2 PTF Group SF99702, which will be released on October 27, 2017. See the [IBM i Technology Updates](#) wiki on developerWorks to learn more about these and other Db2 for IBM i enhancements.

To see the Db2 for i PTF Group details, go to the [Db2 for IBM i 2017 Group PTF Schedule](#) wiki.

Base operating system

New installation process

IBM i is introducing a new way to perform software installations using virtual media that has been copied to a UBS 3.0 removable mass storage media (for example, USB 3.0 flash drive) that is attached to an available USB 3.0 adapter. The [ESS](#) website offers a Licensed Internal Code (LIC) media image specially formatted for use with USB 3.0 flash drives. Note that this is in addition to, not in place of, the DVD media image currently available.

See the [General Operating System Technology Updates](#) wiki for more details.

Automation for CloudInit

Previously, CloudInit, which is primarily used by PowerVC clients, needed to be enabled before capturing a logical partition. Now a deployed partition on a POWER8 system can automatically enable the IBM i CloudInit component on the deployment of a partition.

IBM i integrated web services server

Integrated web services now supports a deployment topology where the integrated web service server is on one IBM i system and the web service implementation code (ILE programs or service programs) resides on a different IBM i system. This is a key enhancement for companies that want to leverage a multitier network, providing the ability to have multiple layers of security. To get the updates, it will be necessary to load the latest HTTP Group PTF.

Details can be found in the *Integrated Web Services Server Administration and Programming Guide* and on the Technology Updates web page, which may be found on the [Integrated Web Services Product](#) page.

IBM i integrated web services client for ILE

The client transport support of the integrated web services client has been enhanced to support SSL when connecting to a proxy server. The new support includes:

- The ability to use a secure channel (SSL) when connecting to a proxy server.
- The ability to perform SSL tunneling when connecting to a proxy server over an unsecure channel. In SSL tunneling, encrypted data is passed through the proxy server unaltered. This will happen automatically if the web service endpoint uses the https protocol.

In addition, the client transport has been enhanced to allow the toleration of validation failures due to expired certificate or certificate not in key store, which are referred to as *soft validation failures*. These updates are included in the latest HTTP Group PTF. Details can be found in the *Web Services Client for ILE Programming Guide* and on the Technology Updates web page, which may be found on the [Integrated Web Services Product](#) page.

IBM i support of the 4767 Cryptographic Co-processor

IBM i now supports the 4767 Cryptographic Co-processor. The 4767, announced earlier this year, is the follow-on adapter to the 4765 Cryptographic Co-processor and includes considerable performance improvements over the predecessor 4765, while maintaining the level of security to which customers are accustomed. The 4767 adapter provides access to updated Common Cryptographic Architecture (CCA) APIs, automatic CPU off-loading of SSL/TLS handshakes, and the most secure physical adapter available for secure cryptographic master key storage.

The CCA libraries have been updated to CCA 5.3 and have added API enhancements, which are also available for use with the previous 4765 adapter. Highlights of these changes for the 4767 adapter include new PIN processing APIs, financial services support for DK and Visa Data Secure Platform with point-to-point encryption, improved security, access, and logon control, among other features. For a complete list of these features and changes, review the *CCA Basic Services Reference Manual*.

The 4767 Cryptographic Co-processor is available via features EJ32 (without blind-swap cassette) or EJ33 (with blind-swap cassette).

In order to enable the new 4767 adapter or enable CCA 4.4 APIs for the 4765 adapter, clients will need to install IBM i 7.2, PTF SI63187. Additionally, clients will require a minimum release of 7.2 TR5 (MF99105).

Open source

Nginx

Nginx, a popular open source web server, is being delivered as Option 11 of the IBM i open source solutions product. For more general information, see the [A Tale of Two Web Servers](#) article and the public wikis from the [IBM developerWorks](#) community.

Eclipse Orion

Eclipse Orion is a cloud-based IDE with rich integration with git and IBM Bluemix. It is shipped in option 8 of IBM i Open Source Solutions (5733-OPS) and with this Technology Refresh, is updated to version 13, which brings interface and stability improvements. It also supports more languages, including:

- Node.js
- Python
- HTML
- CSS
- Bash
- CoffeeScript

- JSON
- Less
- Properties
- SQL
- COBOL
- CL
- DDS
- UIM
- Free-form RPG
- Fixed-form RPG

For more information, see the [Orion](#) wiki page.

Application portability enhancements

Many enhancements have been added to enable more applications to be ported to PASE on IBM i. IBM i Open Source Solutions (5733-OPS) delivers a shared library called libutil, adding support for openpty, forkpty, and getopt_long() APIs. This is based on an open source project that can be found at the [portlibfori](#) website.

The following industry standard libraries are now available in 5733-OPS option 7:

- libjpeg
- libxml2
- libxslt
- libpng
- libfreetype
- libpcre

For more information, see the [Open Source Technology Tools](#) wiki page.

Ability to customize user's SSH shell

The shell used for SSH connections can now be configured on a per-user basis. This functionality is exposed through the SET_PASE_SHELL_INFO procedure. While the shell can be set differently for different users, a system global default can also be set. Many SSH users may prefer the Bash shell /QOpenSys/QIBM/ProdData/OPS/tools/bin/bash, which is delivered in 5733-OPS option 7.

The USER_INFO catalog has also been enhanced with the new column PASE_SHELL_PATH, which enables you to query or display the SSH shell configuration for a user.

For more information, see the [Procedure](#) and [Catalog](#) web pages.

SSH terminal integration with IBM i Access Client Solutions (ACS)

SSH has become an important tool for accessing IBM i. If an SSH client is already installed on the device, ACS will detect it. With a single click, it will open an SSH terminal emulator to the system.

Open source PASE database driver

IBM has created a new database driver that is designed to enable easier Db2 integration in an asynchronous model. Over time, this new enhanced driver should be used to replace the previous XML Service technology and provide another avenue for integrating with ILE programs, service programs, CL commands, and more. It provides seamless replacement of the previous CLI APIs, while adding superior debug capability, UTF-16 support, and more. The project is expected to be in a

stable state before the end of 2017. For the latest status and information (or to contribute), see the [project](#) page.

Other open source contributions

IBM has contributed to other open source projects that will benefit IBM i open source users. Some examples include:

- [Mama](#): Apache FastCGI module to manage stand-alone web server applications like Node.js.
- [Borgi](#): A chroot safe 'system' utility with user-expandable helper scripts for ILE Makefiles (crtrpgmod, crtpgm, and so on).
- [Db2util](#): A command line utility similar to STRSQL.
- [Nodejs](#): Best practice node examples for Db2 pooling, toolkit calls using REST, and more.
- [Python-for-IBM-i-examples](#): Small, containable examples of integrating Python with IBM i. There is a simple active jobs dashboard, a tool to convert SQL or Db2 tables to Excel format, and a utility that provides netstat-like functions, making it possible to see the status of active connections on the system.

IBM i licensed programs

IBM i Access Client Solutions

IBM i Access Client Solutions (ACS) continues its path as the IBM i tool of choice for administrators, programmers, or database engineers. In this TR, ACS has addressed the needs and concerns of the IBM i user community, providing many requested updates and enhancements.

General updates:

- Option to disable users from accepting "trusted" signers.
- Option to enable SSL by default.
- Ability to enable "Check for updates" from the command line.
- New SSH client emulator. If an SSH client is already installed on the PC device, ACS will launch the installed client, providing ready access to the open source work on IBM i.

5250 emulator:

- Screen History has been enhanced to allow an unlimited number of screens to be collected, and those screens can now be archived. This support enables a user to track each screen that is displayed and save it for a number of purposes, such as audit, problem re-creation, capture screens for documentation, and more.
- The emulator window has been enhanced to now include button short cuts for all the major features within ACS.

Printer output:

- Date and time have been combined into a single column to allow for more accurate sort and filter capability.

Database-specific enhancements in ACS:

- The Schemas dialog is extended to include the Database Health Center, the ability to view Data and Audit Journals, and much more.
- Run SQL Scripts is enhanced to include direct launch buttons into built-in examples, the SQL formatter, and much more.
- Run SQL Scripts now supports the ability to easily identify to which system a connection has been made by leveraging the user-customizable identification border.
- The SQL Performance Center is enhanced to avoid having to cross-launch into Navigator for i, and much more.

These and other ACS enhancements are described in [developerWorks](#).

ACS can easily be obtained from the [IBM i Access family product](#) web page.

Rational Development Studio for i

Rational Development Studio for i is providing enhancements to the key languages, extending developer capabilities and increasing productivity.

RPG: The RPG IV language continues to be enhanced with significant new functions:

- Ability to code nested data structures directly in free-format RPG
- New built-in functions %MAX and %MIN to return the maximum or minimum of the operands
- ALIGN(*FULL) to define the length of a data structure as a multiple of its alignment

Available with PTFs delivered later in 2017:

- New built-in function %PROC to return the name of the current procedure
- Ability to use fully qualified names in more places, such as %ELEM and the DEALLOC opcode

For more information about the features, see the [RPG Cafe](#) wiki page.

Code coverage: Initially delivered only in the Rational Developer for i desktop tools, the code coverage engine is now being delivered as part of the Rational Development Studio, callable only from the command line. This new support allows code coverage to be a part of the build process in order to get solid measurement of the effectiveness of tests being executed.

Details on leveraging code coverage from the command line can be found on the [developerWorks](#) Modernization page.

Rational Developer for i

Rational Developer for i, V9.6 has been updated to continue to provide enhancements to help IBM i application developers better react to the needs of their business, while writing higher-quality code the first time. Code quality has been a recent theme of additions to RDi, and this release is no exception. The following key features are part of this new release:

- Rational Developer for i, V9.6 is now compatible with Eclipse 4.6. This brings new base functionality and additionally allows better integration with other modern application development tools.
- Error reporting has been enhanced to use annotations that will highlight the columns within the line that have caused compile errors. This location information will be maintained even as lines are added and deleted from the source. As the cursor hovers over an error, the message will appear along with a link to second-level help.
- Hovering over variables will now show the containing data structure or external file and record as well as any other contributors to the definition of this field and allows a hyperlink to them.
- The hovers have also been enhanced to show the associated documentation for the given RPG declaration, encouraging better comments as they are even more useful with greater visibility.
- Any unused declarations can now optionally be flagged within the source.
- Pressing the Enter key within free-form RPG will now intelligently split the line and position the cursor.
- Building of i projects can now be invoked with a shortcut and conveniently allows the setting of IBM i connections and libraries for all the selected i projects in one action.

- RDi also ships with the current version of Access Client Solutions (version 1.1.7.1) and the Java™ Toolbox (version 9.3).
- RDi has been updated to support the syntax for the very latest updates to the RPG language.
- Code coverage has been updated to now support headless code coverage. Quality assurance has received a big boost with the ability to analyze exactly which lines or procedures have been executed. This has been available through Rational Developer for i (RDi), but now the analysis can be done on the IBM i from any command-line invocation, and RDi is required only to view the results. This will allow code coverage to be a part of the build process in order to get solid measurement of the effectiveness of tests being executed.

For additional updates, see the [IBM Fix list for Rational Developer for i](#) website.

Rational Developer for i, V9.6 will be generally available (GA) on November 21, 2017.

Db2 Web Query for i, V2.2.1

Db2 Web Query for i, Version 2.2.1 adds a significant number of new features to address user requests and bring new industry features for reporting and analytics to IBM i clients.

Letting users navigate from one report to other related reports just got simpler with the new auto-link, auto-drill down, and dynamic parameter features. Users can now navigate across multiple reports, drill down on specific data elements or detail reports, or even decide which filtering is important in the report. All of this is possible without the author of the report defining and adding it ahead of time.

Data visualization is a hot topic in today's industry and Db2 Web Query, V2.2.1 delivers new, powerful data visualization for the data scientist. This technology helps users to visualize patterns in the data and follow through on discoveries for further insights.

Geographical maps, introduced in a previous version, are used to plot data points on a map in a dashboard or stand-alone view. This geographical data analysis has been further enhanced with additional Esri enrichment to bring additional information to maps quickly and easily. Several additional layers are built into Db2 Web Query, and other layers are available through Esri (for an additional charge). This support allows the viewing of demographic data or the adding of layers such as bus or train routes for further geo analysis. Tooltips are also now supported for maps.

One of the key benefits of the Db2 Web Query product set is its ability to leverage an industry best practice of providing a metadata layer. With version 2.2.1, working with metadata is even easier with enhancements to the browser-based "synonym editor." It is possible to quickly define joins, hierarchical data relationships, and virtual fields to simplify and standardize data for report authors and users.

From a product management perspective, Web Query administrators gain additional capabilities to manage resources via a full console interface. User licensing can now be controlled down to the partition level.

EZ-Install, IBM's simplified installation and sample reports package, is enhanced to support version 2.2.1. It also includes additional sample reports. The EZ-Install package can also be used to upgrade existing installations of Db2 Web Query. Email qu@us.ibm.com to learn more about EZ-Install.

Db2 Web Query, V2.2.1 will be generally available (GA) on December 8, 2017.

Db2 Web Query DataMigrator, V2.2.1

Db2 Web Query DataMigrator, Version 2.2.1, adds several new functions, along with the simplification of existing functions, to make building transformations easier than ever. Additionally, DataMigrator now supports regular expressions for filtering, providing capability well beyond simple wildcard searches.

The DataMigrator developer palette for creating flows has enhanced navigation assistance that allows the adding of comments to each step in the flow. This makes it easier to understand flows and share them with others.

Scheduling of flows just got easier as DataMigrator detects potential overlaps of flows and minimizes collisions when multiple schedules are active at the same time.

IBM Cloud Storage Solutions for i, V1.2

IT organizations are increasingly using public and private cloud services to share files, back up data, and archive data. The first release of Cloud Storage Solutions for i, V1.1, provided an API that integrated with IBM Backup, Recovery and Media Services (BRMS). Version 1.2 introduces a new optional feature that provides compression and encryption. For details and ordering information, see Software Announcement [217-495](#), dated October 3, 2017.

IBM Cloud Storage Solutions for i will be generally available (GA) on October 27, 2017.

IBM Power^(R) software

IBM Power Virtualization Center for IBM i

IBM Power Virtualization Center (PowerVC) is the advanced virtualization management offering built on OpenStack that delivers simplified virtualization management for Power Systems. The IBM i operating system has been officially supported as a managed client since PowerVC, V1.2.2. Users will see significant benefits from PowerVC in the following areas:

- Simplified virtualization management
- Easy-to-replicate virtual machines for consistency and fast deployment
- Automated configuration of I/O resources, enabling mobility and highly available configurations
- Virtual image management, including virtual machine capture, deployment, and catalog

Additional details can be found on the [developerWorks](#) wiki.

IBM software

IBM Domino^(R), V9.0.1 Feature Pack 9

Beginning with the Domino, V9.0.1 Feature Pack 9, IBM Domino for IBM i uses JVM 8 32-bit by default for all supported OS releases. Note that Domino has renamed *Fix Packs* to *Feature Packs* in recent versions. In addition, many new enhancements and fixes have also been delivered. For more details, see the [Technote #2003617](#) page.

IBM Traveler, V9.0.1.10

Beginning with the Traveler, V9.0.1.10 release, IBM Traveler for IBM i uses JVM 8 32-bit by default for all supported OS releases. A number of fixes and updates have also been included. For more details on installation, see the [IBM Traveler on IBM i](#) web page.

Nagios

Monitoring and understanding the state of the IT ecosystem, including IBM i, has changed. Nagios is an open source industry standard tool for understanding all the components in an IT network. IBM i is now a supported system within the Nagios infrastructure. IBM i has written a number of plug-ins to enable many key IBM i metrics to be monitored and graphed, and to provide notification based on thresholds.

Details on how to obtain these plug-ins, instructions for installing these into Nagios, and what metrics are supported can be found on the [IBM developerWorks](#) wiki.

IBM MQ

IBM MQ Fix Pack 8.0.0.7 and IBM Managed File Transfer (MTF) V8.0 for IBM i have been delivered. For more details, see the [IBM MQ and IBM MFT V8.0 for IBM i Fix Pack 8.0.0.7](#) web page.

Hardware

Increase in maximum number of LUNs per Fibre Channel IOA

Clients have been growing their configurations at a pace that has caused them to hit the limit on the number of LUNs they can create for each Fibre Channel port. The limit of 64 has now been increased to 127 for both NPIV and native-attached 16 Gb Fibre Channel configurations.

IBM i system backup saves LAN console configuration as part of the LIC data

IBM i 7.2 TR7 includes recently released PTFs that eliminate steps when installing IBM i onto a new load source from a SAVSYS. The LAN console configuration is now automatically saved to a new LIC LID during a SAVSYS operation. This enables the LAN console server to start during the D-mode IPL and be ready for the IBM i Access Client Solutions (ACS) connection. There is no longer a need to pull together the LAN console parameters and configure it separately if the same LAN console is being used for the new load source installation. No user actions are required to take advantage of this new support. The system will automatically attempt to use the previous configuration during a D-mode IPL that uses a backup created from a partition that had the IBM i 7.2 TR7, or later, code level.

Automatic sorting of volumes in optical container media

The volumes on an optical container media used for installation are now automatically sorted, so there is no longer a need to create a VOLUME_LIST file or to run VFYIMGCLG to first get the volumes sorted in proper order for installation. The operating system will also verify that there is only one bootable media in the catalog; any subsequent bootable volumes will be dropped from the loaded list and an LIC log will be generated.

Additional new hardware functions

IBM i 7.2 TR7 also includes this hardware-related support:

- Maximum disk size has increased to 4 TB for 4160 byte sector disks.
- USB flash drives with capacity greater than 32 TB are now allowed.
- Improved debug capabilities are provided for storage IOA failures.
- Some configurations that include IBM DS8000^(R) storage systems may get a performance benefit due to changes in the implementation of low-level I/O architecture.
- Support is provided for IBM TS1155 Tape Drive Model 55F.
- Support is provided for IBM TS4300 Tape Library.

In addition, the following recent announcements for the Hardware Management Console provide IBM i clients with additional options for managing their Power Systems, both virtually and as a closed appliance:

- IBM Power Systems Hardware Management Console virtual appliance for POWER^(R)-based systems offers increased deployment flexibility. For more information, see Software Announcement [217-200](#), dated August 8, 2017.
- IBM Power Systems offers a new IBM POWER technology-based Hardware Management Console. For more information, see Hardware Announcement [117-033](#), dated August 8, 2017.

Additional information

For more information on the hardware-related announcements, see the [Hardware and Firmware](#) section of the Technology Updates wiki.

Product positioning

IBM i 7.2 runs on a Power Systems server and offers a highly scalable and virus-resistant architecture with a proven reputation for exceptional business resiliency. Companies that run applications on i running on a Power server are able to focus on innovation and delivering new value to their business, not on managing their data center operations.

IBM i delivers a fully integrated and trusted combination of relational database, security, web services, networking, and storage management capabilities that are required to run business applications. For example, IBM installs and integrates the SQL standards-based Db2 database for i with advanced database management utilities, plus additional middleware components such as multiple file system options, directory capability, an HTTP web server that is powered by Apache, a web application server, and a web services environment.

IBM develops, fully tests, and preloads these core middleware components of i together. The preintegration and testing of i is a key factor in enabling companies to realize lower operations costs by deploying applications faster and maintaining them with less staff.

Virtualization and workload management are also built into the IBM i operating environment to enable businesses to consolidate and run multiple applications and components together on the same system, helping to drive up system usage and delivering a better return on IT investments. This broad and highly stable database and middleware foundation is ideal for efficiently deploying business processing applications.

Architecture for simplicity, stability, and security

Another important advantage for i is the underlying architecture of the operating system, which enables simplicity, stability, and security. These are not add-on features, but inherent aspects of the operating system. Here are a few examples:

Simplicity

The relational database in i is an integrated component that is built on a set of integrated storage management capabilities unique to i and its predecessors. This storage management is based on the single-level storage architecture that treats all of the storage managed by i as one long stream of memory that encompasses the system memory and the storage on disks. This architecture makes it critical for the operating system to decide where to store any given piece of data, which removes the user from having to manage data placement. This method makes management of storage and the database objects contained in that storage significantly simpler.

Stability

IBM i architecturally separates the address spaces of user applications and the operating system, so it is difficult for poorly written or malicious software to intrude upon the underlying operating system support. This is one of several attributes that can help keep i running for days, weeks, and months without unexpected restarting of the operating system.

Several architectural attributes of i have contributed to the stability of the system over the years. First, applications compiled on i are compiled to a set of intermediate code instructions defined as the Technology Independent Machine Interface (TIMI). This enables i to fundamentally change the implementation of underlying hardware, firmware, and virtualization features, without requiring rewriting, changing, or even recompiling the applications written by users. This sort of forward compatibility can

be a tremendous business advantage, and it enables the movement of software developed and compiled several years to even decades before to run on later generations of the i operating system.

Security

IBM i and its predecessors have an object-based architecture. Each entity on the system is an object, which has a set of prescribed operations that can be performed on it and connections from the object to those other objects that are allowed to perform various operations. An object that does not have a legal edit operation cannot be edited. It cannot be renamed to another kind of object. If the object does have an edit operation, known as *change* for most objects, it only has a defined set of attributes that can be edited, and then only by users who have authority to do that editing.

Objects can easily be hidden from other users by use of the library list objects, and security enhanced by the object-based security associated with all objects. And users who all have a similar role on the system can be grouped for role-based security, again as part of the base architecture of the system. While the i operating system supports Java, PHP, web services, and other open source programming methods, the underlying architecture offers a level of integration, stability, simplicity, and security that makes it significantly different from comparable operating systems. These aspects can deliver excellent business value to its users.

Reference information

- For more information on IBM Cloud Storage Solutions for i, see Software Announcement [217-495](#), dated October 3, 2017.
- For more information on Rational Developer for i, see Software Announcement [217-501](#), dated October 3, 2017.
- For more information on TS1155 Tape Drive models, see Hardware Announcement [117-038](#), dated May 9, 2017.
- For more information on IBM TS4300 Tape Library, see Hardware Announcement [117-043](#), dated July 25, 2017.

Program number

Program number	VRM	Program name
5770-SS1	7.2	IBM i 7.2 TR7
5733-WQX	2.2.1	IBM Db2 Web Query

Product identification number

Program number	Maintenance 1-year PID number	Maintenance 3-year PID number
5770-SS1	N/A	N/A
Program number	Maintenance 1-year PID number	Maintenance 3-year PID number
5733-WQX	N/A	N/A

Offering Information

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

Business Partner information

If you are a Direct Reseller - System Reseller acquiring products from IBM, you may link directly to Business Partner information for this announcement. A PartnerWorld^(R) ID and password are required (use IBMid).

Publications

None

Services

Software Services

IBM Software Services has the breadth, depth, and reach to manage your services needs. You can leverage the deep technical skills of our lab-based, software services team and the business consulting, project management, and infrastructure expertise of our IBM Global Services team. Also, we extend our IBM Software Services reach through IBM Business Partners to provide an extensive portfolio of capabilities. Together, we provide the global reach, intellectual capital, industry insight, and technology leadership to support a wide range of critical business needs.

To learn more about IBM Software Services, contact your Lab Services Sales or Delivery Leader.

Technical information

Specified operating environment

Hardware requirements

A supported Power, Flex, or System i server or blade with a POWER8, POWER7 +, POWER7, POWER6 +, or POWER6 processor is required to run IBM i 7.2 TR7.

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

Software requirements

To find the supporting technical details for the topics found in this announcement letter for IBM i 7.2, go to the [TR7 enhancements](#) website.

User Group requirements

A strong and passionate worldwide user community focuses on all aspects of i running on Power servers. The community includes online groups and face-to-face community gatherings. The COMMON organization has branches around the world, including COMMON North America, iSUC in Japan, and COMMON Europe. In addition, there are many smaller local user groups located in various regions in North America and other areas of the world.

IBM continues to recognize key community leaders through the IBM Champions program. The current IBM i Champions have been recognized for their work in the betterment of user groups, social media, and the Academic Initiative. To learn about the IBM Champions program, see the [IBM Champions](#) website.

Planning information

Packaging

This offering is delivered through the internet and as physical media.

Security, auditability, and control

These programs use the security and auditability features of the host hardware or software.

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

Ordering information

Program number	Feature description	Supply feature number
5770-SS1	IBM i 7.2 USB Licensed Machine Code	5972

Program number	Feature description	Supply feature number
5733-WQX	Express ^(R)	5808
5733-WQX	Standard	5818
5733-WQX	DataMigrator ETL Extension	5828

This software license includes Software Maintenance, previously referred to as Software Subscription and Technical Support.

Charge metric

Not applicable.

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Yes

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IBM will maintain this information for at least one year after the original licensee acquires the program (warranty period).

Money-back guarantee

If for any reason you are dissatisfied with the program and you are the original licensee, you may obtain a refund of the amount you paid for it, if within 30 days of your invoice date you return the program and its PoE to the party from whom you obtained it. If you downloaded the program, you may contact the party from whom you acquired it for instructions on how to obtain the refund.

For clarification, note that for programs acquired under any of IBM's On/Off Capacity on Demand (On/Off CoD) software offerings, this term does not apply since these offerings apply to programs already acquired and in use by you.

Volume orders (IVO)

Yes. Contact your IBM representative.

Passport Advantage applies

No

Usage restrictions

Yes

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Software Subscription and Support does not include assistance for the design and development of applications, your use of programs in other than their specified operating environment, or failures caused by products for which IBM is not responsible under this agreement.

IBM Operational Support Services - SoftwareXcel

Yes

System i Software Maintenance applies

Yes

Variable charges apply

No

Educational allowance available

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

Statement of good security practices

IT system security involves protecting systems and information through intrusion prevention, detection, and response to improper access from within and outside your enterprise. Improper access can result in information being altered, destroyed, or misappropriated or can result in misuse of your systems to attack others. Without a comprehensive approach to security, no IT system or product should be considered completely secure and no single product or security measure can be completely effective in preventing improper access. IBM systems and products are designed to be part of a regulatory compliant, comprehensive security approach, which will necessarily involve additional operational procedures, and may require other systems, products, or services to be most effective.

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