



## IBM i 7.2 TR5 offers significant enhancements in the areas of database, availability, open source, and I/O support and currency with IBM software

### Table of contents

<a href="#">2 Overview</a>	<a href="#">12 Publications</a>
<a href="#">2 Key prerequisites</a>	<a href="#">13 Technical information</a>
<a href="#">3 Planned availability date</a>	<a href="#">14 Ordering information</a>
<a href="#">3 Description</a>	<a href="#">14 Terms and conditions</a>
<a href="#">10 Product positioning</a>	<a href="#">16 Prices</a>
<a href="#">12 Program number</a>	

### At a glance

As with every new Technology Refresh, IBM<sup>(R)</sup> i adds a variety of function across the entire operating system, Licensed Program Products, and updates to the IBM Power<sup>(R)</sup> hardware and firmware. The major highlights of IBM i 7.2 TR5 are:

- IBM DB2<sup>(R)</sup> for i offers new and advanced SQL capabilities, SQL Query Engine (SQE) performance, and the ability to use SQL to access details about the IBM i operating system.
- IBM i Open Source Solutions now includes Perl and the latest version of Node.js.
- IBM i Access Client Solutions has enhanced the end-user interaction to improve usability of many of the components.
- Rational<sup>(R)</sup> Developer for i, V9.5.1 includes support for the Mac OS X operating system support and improved usability for developers using Mac technology.
- IBM PowerHA<sup>(R)</sup> SystemMirror<sup>(R)</sup> for i now supports SVC/Storwize<sup>(R)</sup> HyperSwap<sup>(R)</sup> with Independent Auxiliary Storage Pools (IASPs), and the new HMC interfaces for Advanced Cluster Node Failure Detection.
- Delivery simplification of selected IBM i LPPs and IBM i feature OptiConnect.
- IBM i Entitlement Transfer to P05 now supports upgrade to three-year SWMA.
- Power hardware and system firmware enhancements provide significant advantages to IBM i clients.
- Additional enhancements can be found in the following areas:
  - Containers make USB Flash and RDX look like a stack of DVDs
  - IBM i Integrated Web Services
  - IBM i HTTP Server (Powered by Apache)(5770-DG1)
  - Rational Development Studio (5770-WDS)
  - WebSphere<sup>(R)</sup> Application Server V9
  - DB2 Web Query
  - Hardware and System Firmware enhancements
  - EXP24SX SAS Storage Enclosure for high performance disks or SSDs
  - PCIe3 Cryptographic Coprocessor card
  - PCIe3 100 Gb Ethernet adapters
  - RDX USB Top Mount Docking Station on Power Systems<sup>TM</sup> S814
  - VNIC fail-over
  - Shared Ethernet Adapter (SEA)

- NovaLink support for SR-IOV configurations
- Tape device TS4500 R3
- Power Systems firmware V8.6 enhancement for identifying a partition using a Universally Unique Identifier (UUID)

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## Overview

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As with every new Technology Refresh, IBM i adds a variety of function across the entire operating system. Enhancements and extensions have been made to many components of the operating system, Licensed Program Products, IBM Software products, and the firmware to support the latest hardware.

The **IBM i operating system** has added the use of containers to make USB Flash and RDX appear as a stack of DVDs.

IBM i Open Source Solutions now includes Perl and the latest version of Node.js.

With IBM i 7.2 TR5, **IBM DB2 for i** is focused on new and advanced SQL capabilities, SQL Query Engine (SQE) performance, and the ability to use SQL to access details about the IBM i operating system.

**IBM i Access Client Solutions**, the strategic solution for access and management of IBM i, has enhanced the end-user interaction to improve usability of many of the components. In addition, the Run SQL Scripts interface improves the productivity for using SQL with DB2 for i. Finally, IBM i Access Client Solutions deployment has significant improvements in the process for delivering i Access Client Solutions to end users.

The RPG compiler included in **IBM Rational Development Studio for i** is again enhanced with new function that encourages IBM i developers to make the transition to modern RPG techniques.

**Rational Developer for i, V9.5.1** includes new features and functions, including support for the Mac OS X operating system and improved usability for developers using Mac technology. Additionally, enhancements have been made to IFS projects, Kerberos authentication, and support for additional language enhancements.

**WebSphere Application Server V9** is supported on IBM i 7.2 TR5.

**IBM PowerHA SystemMirror for i** now supports SVC/Storwize HyperSwap with Independent Auxiliary Storage Pools (IASPs) and the new HMC interfaces for Advanced Cluster Node Failure Detection.

Many **Power hardware** and system firmware enhancements provide significant advantages to IBM i clients.

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## Key prerequisites

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IBM i 7.2 TR5 is supported on selected IBM Power Systems:

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

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

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## Planned availability date

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- October 11, 2016, for 3-Year Software Maintenance available on P05 transfer and new bonus programs with the operating system
- November 11, 2016, for IBM i 7.2 TR5

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## Description

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### DB2 for i enhancements

With IBM i 7.2 TR5, DB2 for i continues to focus on new and advanced SQL capabilities, SQL Query Engine (SQE) performance, and the ability to use SQL to access details about the IBM i operating system. In addition, DB2 for i delivers ease-of-use enhancements to help database engineers (DBE) accomplish the daily task of managing the data center.

Database application developers have new capabilities for constructing advanced SQL solutions:

- The `JSON_TABLE()` user-defined table function (UDTF) is added to DB2 for i. This function enables database application developers to use data-centric SQL capability to effectively decompose JSON data into relational data. By embracing set-at-a-time processing, database programmers can be more productive and produce robust and scalable solutions.
- DB2 for i innovates by enabling SQL programmers to identify critical, common code segments and reuse that code across multiple SQL routines or triggers. By having a single source that can be included in many SQL procedures, functions, or triggers, the application developer will more easily revise, extend, and reuse database application code.
- These and other SQL enhancements are described in [developerWorks<sup>\(R\)</sup>](#).

DBEs have improved capabilities to help them to effectively manage the data center:

- Impact analysis can be studied using SQL. A new database service makes it possible to deconstruct SQL statements into their base elemental form. By having easy access to parser level detail, the DBE can easily understand object and program relationships and dependencies.
- These and others DBE enhancements are described in [developerWorks](#).

Database performance and the SQL Query Engine (SQE) are improved:

- Following the recent enhancement to enable UDTFs to become inline-eligible, the same enhancement is now available for scalar user-defined functions (UDFs). By avoiding repeated calls to UDFs for every row processed in a query, the performance of some queries can be accelerated without changing the application.
- These and other DB2 for i performance improvements as described in [developerWorks](#).

As in previous Technology Refreshes, IBM i Services are added or enhanced, providing useful SQL-based alternatives to IBM i commands and APIs:

- Display Log (DSPLOG) access partition history detail. The IBM i Service makes it possible to achieve new systems management solutions using SQL.
- Existing and popular services such as `GET_JOB_INFO()`, `GROUP_PTF_CURRENCY`, and other existing services are extended to provide additional detail, making it possible to solve more business requirements using SQL.
- These and other IBM i services as described in [developerWorks](#).
- These and other enhancements are delivered through DB2 PTF Group SF99703.

- Several prebuilt report and dashboard templates are being provided with DB2 Web Query to provide system information through the SQL-based IBM i Services. Use web-based reports to check PTF currency, monitor system utilization across LPARs, or leverage "top 10" reports over various metrics.

See the [IBM i Technology Updates](#) web page on developerWorks to learn more about all of the enhancements being made to DB2 for i 7.2 TR5.

Go to the [DB2 for IBM i 2016 Group PTF Schedule](#) web page for more details.

## **IBM i operating system enhancements**

As with every new Technology Refresh, IBM i adds a variety of function across the entire operating system. The IBM i Technology Updates wiki in developerWorks contains details for IBM i operating system enhancements. To view technical detail for the topics found in this announcement letter, go to the [TR5 enhancements](#) website.

## **Containers make USB Flash and RDX look like a stack of DVDs**

Clients have been looking for more operations that can be done with USB flash drives and to make better use of the large-capacity RDX media. Today, clients can create optical image catalogs only on disk (IFS). With IBM i 7.2 TR 5, Container support has been added so that clients can now store an image catalog into the QOPT file system on a USB removable flash drive or RDX media, making the format of the data on the flash drive or RDX media look like a stack of DVDs. This new Container support can ease operational procedures in many ways:

- A system administrator can download an ISO image that contains PTFs onto a PC at the office, move that file to a USB removable flash drive, and apply the PTFs directly from the flash drive. Prior to this Technology Refresh, you simply could not use a flash drive to load PTFs. It was necessary to store the image on disk within an IBM i partition, and then either add it to an Image Catalog or burn it to DVD.
- A system administrator can now store an entire Image Catalog on a USB removable flash drive or RDX media. Previously, Image Catalogs were limited to configurations with DASD and virtual media, but this is more expensive than USB flash drives and RDX media. Putting images on a USB flash drive also makes it easy to move to another system, which makes it easy for a business partner or ISV to take with them to a customer site.
- With up to 2 TB of capacity, a system administrator can now consider partitioning an RDX media in a way that will enable multiple incremental saves, such as an incremental save for each day of the week for nightly backups, or each week of the month for weekly backups, and so on. Previously, if incremental saves were done to separate directories on an RDX media, and the contents of the directories were deleted to enable reuse, file fragmentation on the media could cause noticeable performance reductions. Now the media can be subdivided into multiple virtual disks to be used for saves. Then any time one of those virtual disks is reinitialized, there will be no fragmentation of the data. If the save operation creates a bootable disk image, it does not mean that this media can be used for a D-mode IPL, because the device is a virtual disk, and virtual disks in general cannot be used for a D-mode IPL. This image is intended to be used for restore operations after the partition is IPLed.

For more details on usage and restrictions, see the [Removable Media on IBM i](#) website.

## **IBM i Open Source Solutions**

IBM continues to expand and update the portfolio of open source products that are distributed with IBM i. The IBM i Open Source Solutions (5733 OPS) now includes the following new languages, features, tools, and environments:

- Option 7 (Tools) has been updated to include Perl. Perl is a general-purpose highly leveraged language, great for many things, including scripting and other general-purpose applications.

- Option 11 (Node.js V6). The very latest release of Node.js is now available, enabling developers to implement the latest enhancements to the Node.js product.

For details and availability, see the [IBM i open source](#) website on developerWorks.

Option 1 (Node.js) is no longer supported. As a replacement, use a more current version of Node.js with Option 5 (Node.js V4) or Option 11 (Node.js V6).

### **IBM i Integrated Web Services**

The IBM i Integrated Web Services support is updated to meet industry standards. When creating a REST-based web service, it is now possible to create a SWAGGER document, describing the web services request. This document can be used with tools like IBM Connect to understand all your web service artifacts and more easily find and consume these services.

For details and availability, see the [IBM i Integrated Web Services](#) website on developerWorks.

### **IBM i Licensed Program Products**

The following Licensed Program Products are available for IBM i:

#### **IBM i HTTP Server (Powered by Apache ) 5770-DG1**

The IBM i HTTP Server continues to be the backbone of web technology for IBM i clients. In IBM i 7.2 TR5, The HTTP server on IBM i is updated to the Apache 2.4.20 level. This includes all the latest security vulnerabilities and some minor enhancements to a number of directives. For details on all the updates and changes, go to the [IBM i HTTP Server product](#) website.

### **IBM i Access Client Solutions**

IBM i Access Clients Solutions is the strategic solution for access and management of IBM i, providing support for many end-user devices. As such, IBM continues to enhance and expand the features. The following enhancements have been added:

- End-user focused updates have been made with the Integrated File System interface. This new feature provides the ability to easily view the contents of the Integrated File System, and to copy and paste files, directories, and libraries to new locations on the same partition or to other IBM i partitions within your ecosystem. The file mover support includes the following features:
  - Copy/Paste between IBM i partitions.
  - Send multiple files to multiple IBM i partitions.
  - Download/Upload files to or from your PC.
  - Additional actions include Create New Folder, Delete, Rename, and Properties.
- 5250 Emulator Smart Card authentication support. The 5250 emulator has been enhanced to support the ability to leverage a smart card to establish a secure connection to your IBM i. The smart card support is only available for the Microsoft™ Windows™ operating system at this time.
- Many updates have been made to Data Transfer to improve the user experience:
  - Support for character and numeric truncation
  - Include column name/heading when downloaded to a text file type
  - The "Create IBM i Database File" wizard updates and improvements
  - Enablement for Active Spreadsheet support on a Mac OS X
  - Ability to override the default sheet name during the download of data to an Excel spreadsheet
- The Run SQL Scripts interface includes many enhancements that enhance the productivity for using SQL on DB2 for i. The following updates have been included:

- SQL Formatter: The formatter in Run SQL Scripts will now format poorly structured SQL statements according to selected customization preferences. Using the SQL Formatter increases productivity so that developers can spend less time worrying about syntax and more time focused on satisfying business requirements.
- Visual Explain: The widely used Visual Explain (VE) tool is now included within Run SQL Scripts. Launching VE is as simple as highlighting the SQL statement and choosing one of the VE options.
- JDBC Configuration Manager improves ease of use by enabling the SQL user to maintain and easily switch between discrete execution environments.
- Insert from Examples: The list of examples provided by IBM has been extended to showcase more IBM i Services capabilities and popular examples for DBEs.
- For the additional new functions, refer to developerWorks.
- SQL Performance Center Updates. Several new features have been added to the SQL Performance Center, providing more information to the DBE:
  - Show Statements enables direct interrogation of multiple sources of information: the live SQL Plan Cache, SQL Plan Cache Snapshots, SQL Plan Cache Event Monitors, and SQL Performance Monitors.
  - Compare Statements provides a tool to compare two SQL Plan Cache Snapshots or SQL Performance Monitors and quickly isolate changes in performance.
  - Visual Explain can be launched directly from any of the SQL Performance Center tooling, enabling the DBE to perform full analysis using a single tool.
- Access Client Solutions deployment. The following updates have been added to simplify the process of deploying Access Client Solutions to end users:
  - Support for silent mode deployment when used in combination with /AdminConfig.
  - New improvements to the multiuser deployment of ACS on Windows simplify the deployment process and help users to set required features.

Details can be found on the [IBM i Access Client Solutions](#) product page. This new support is delivered as a service pack and can be easily downloaded from the [FTP](#) site or from the [Entitled Systems Support \(ESS\)](#) website.

### **Rational Development Studio (5770-WDS)**

The RPG compiler included in Rational Development Studio for i is again enhanced to provide new function aimed at encouraging IBM i developers to make the transition to modern RPG techniques. The following update has been included in the RPG IV language: To improve the quality of code being written, a new ON-EXIT operations code is being added to force a section of code to run when the unexpected happens. You can now specify a section of code to be run every time the procedure ends, whether the procedure returns normally, or it ends due to an unhandled exception, or due to the job or subsystem ending. The ON-EXIT operation code specifies the beginning of this code.

For example, the following procedure creates a temporary file and allocates some storage. Later, it has a division by the value numOrders. If numOrders is not zero, the procedure will return normally. Otherwise, the procedure will end abnormally. In either case, because the procedure contains an ON-EXIT operation, the statements in the ON-EXIT section will be run. The temporary file will always be deleted and the storage will always be deallocated.

```
DCL-PROC myproc;
tempFile = createTempFile (); p = %alloc(1000);
averagePrice = totalPrice / numOrders;
ON-EXIT;
deleteTempFile (tempFile);
DEALLOC p;
```

END-PROC;

### **New command parameter TGTCCSID to support compiling from Unicode source files in IFS**

The ILE RPG compiler normally reads the source files for a compile in the CCSID of the primary source file. Because the compiler only supports reading the source in an EBCDIC CCSID, this means that the compile will fail when the primary source file has a Unicode CCSID such as UTF-8 or UTF-16.

The TGTCCSID parameter for the CRTBNDRPG and CRTRPGMOD enables the RPG programmer to specify the CCSID with which the compiler will read the source files for the compile. Specify TGTCCSID(\*JOB) or specify a specific EBCDIC CCSID such as TGTCCSID(37) or TGTCCSID(5035).

The default is TGTCCSID(\*SRC), which is the same as the current behavior.

When compiling Unicode source with CRTSQLRPGI, specify RPGPPOPT(\*LVL1) or RPGPPOPT(\*LVL2) and COMPILEOPT('TGTCCSID(\*JOB)'), or some other TGTCCSID parameter value.

Details can be found on the [RPG Cafe](#) website on developerWorks.

### **Rational Developer for i (5733-RDW)**

Rational Developer for i, V9.5.1 includes the following new features and functions:

- Mac OS X operating system support. Rational Developer for i is now supported on Mac OS X Version 10.11 (referred to as Mac OS X in this announcement) and later. This makes it faster and simpler for Mac OS X users to develop IBM i applications. **Note:** Some functions, such as program verifiers and syntax checkers, are not available on Mac OS X.
- IFS projects. Any non-iProject Eclipse project can now be synchronized with an IFS folder by using the remote reconciler view. This enables the full power of Eclipse tooling to be applied to any development project stored on the IFS. For example, a Java™ or web development project can easily synchronize with an IFS folder. This enables editing of the project with Eclipse tooling. The result is immediately available on the IBM i for testing and deployment.
- Kerberos authentication. Connections to IBM i can now be authenticated automatically by using Kerberos. An organization that has Kerberos installed will realize the benefit of single sign-on and enterprise identity mapping when working with Rational Developer for i.
- ILE RPG editing improvements. The ILE RPG editor tooling can now detect definitions and references within O-Specs. The dynamic ILE RPG outline view, hyperlinking, hover support, and content assist can find fields that are referenced in O-Specs. I-Specs tooling is enhanced to fully support qualified and indexed fields.
- ILE RPG outline view improvements. To reduce clutter in the RPG outline view, a toolbar button has been added to turn on/off the inclusion of any unreferenced definitions on the view. Removing the clutter has the added benefit of making declarations easier to find.
- Language-sensitive help for SQL (in ILE RPG) is improved. Now when developers press F1, they are taken to the SQL language reference page specific to the keyword identified by the cursor.
- ILE RPG content assist function enhanced. Automatically show proposals after entering a customizable set of specific characters. This provides helpful hints for completing code without requiring any intervention.
- ILE RPG program verifier can now be easily switched from generating messages for bound programs versus modules. Previously, the verifier defaulted to generating messages as CRTRPGMOD but now it supports bound programs as well. The default can be switched between programs and modules.
- CL and DDS editing improvements. The CL and DDS languages, such as ILE RPG, can easily comment and uncomment lines by using a shortcut key.

- Access Client Solutions (ACS) integration. With ACS, Rational Developer for i can analyze the performance of SQL using Visual Explain. The integration with the Run SQL Statement function in ACS is extended to both ILE COBOL and ILE RPG.

## IBM WebSphere Application Server V9

WebSphere Application Server V9.0, delivered with IBM Web Enablement for i, 1.1, with its traditional and Liberty run times, offers industry-leading, production-ready, standards-based Java EE 7 compliant architectures that support the API economy and underpin business transformation. Additional features and enhancements to WebSphere Application Server offer a right-fit infrastructure for enterprise IT, upon which businesses can deliver composable applications. This can enable security-enhanced, flexible, and efficient access to internal or external software components and services. Highlights include:

- Previously based on the Express<sup>(R)</sup> edition, IBM Web Enablement for i, V1.1 is now based on the standard WebSphere Application Server edition and is delivered as 5733-WE3.
- Java EE 7 Web Profile and Full Platform certification of WebSphere Application Server traditional brings the traditional run time to the same Java EE level as the Liberty run time. This certification supports deployment of any Java EE 7-based application that uses the latest industry standards for on-premises or in the cloud. It enables you to easily exploit HTML5 to help improve application responsiveness, increase developer productivity, and meet the most demanding enterprise requirements.
- WebSphere Application Server traditional and Liberty support for Java Platform, Standard Edition 8 (Java SE 8) can deliver enhanced developer productivity and significant application performance improvements.

For additional details about WebSphere Application Server V9.0, see Software Announcement [216-298](#), dated June 7, 2016.

## IBM PowerHA SystemMirror for i enhancements

Support for IBM SVC and IBM Storwize HyperSwap. HyperSwap provides near zero downtime for storage system outages. Previously, HyperSwap was supported with the IBM SAN Volume Controller and IBM Storwize family of products on IBM i at a Full System level. With IBM i 7.2 TR5, support has been extended to include the ability to use SVC HyperSwap with Independent ASP (IASP) technologies, including FlashCopy<sup>(R)</sup> and LUN Level Switching. For more details on usage and restrictions, see the [PowerHA SystemMirror for i Technology Updates](#) website.

New HMC interfaces for Advanced Cluster Node Failure Detection. The IBM i cluster technology has the ability to make use of user-registered cluster node monitors to determine whether a system has truly failed when communication to the system is lost. A user registers a cluster node monitor on a node, and the node registers a handler with the HMC. If the node that is monitored by the HMC suffers a failure or outage, the HMC notifies the monitoring nodes of the nature of the failure so that cluster resource services can take the appropriate action based on the type of failure, rather than resulting in a cluster partition failure condition that needs manual intervention.

- The HMC is being updated to replace the existing interface with a new representational state transfer (REST)-based interface. HMC version 850 (V8R8.5.0) is the last version of HMC to support the older interface and the first version to support the REST interface. When upgrading to HMC version 860, or later (V8R8.6.0), all IBM i partitions that were using the Advanced Cluster Node Failure Detection function must be updated to use the new REST-based interface. The new REST-based interface is provided for IBM i 7.3 TR 1, IBM i 7.2 TR 5, and IBM i 7.1 with the latest PowerHA PTF Groups. For more information on the PTFs required, as well as usage and steps for updating to use the new REST interfaces, see [PowerHA SystemMirror for i Technology Updates](#) website.

## DB2 Web Query



DB2 Web Query for i Version 2.2 is being enhanced to provide an easier way to get started with the product through "one-button" trial installation and several report and dashboard templates.

A simplified installation process is available to try out DB2 Web Query under a trial period. The new process provides a downloadable image that contains all the latest DB2 Web Query features and the templates noted below in one easy package. Metadata is prebuilt over the sample database so everything is ready so you can get to work and learn the product through tutorials. Details on obtaining the simplified installation image are at the [DB2 Web Query for i Wiki](#) web page.

New function to the existing Wizard Analytics enables you to create 20 - 30 reports in a matter of minutes over your DB2 for i data or uploaded spreadsheets. Sample reports are provided that can be run out of the box or tweaked to meet you specific requirements.

- IBM i Services Templates. This set of prebuilt reports and dashboards leverage the SQL-based System Services to provide systems administrators with web-based visualizations. Track system status across LPARS, see which jobs are using the most CPU, monitor which users are using the most storage or temp storage, or compare PTF levels with the latest released by IBM.
- Query/400 Discovery and Analysis. Understand existing Query/400 definitions by using the Discover and Analysis tools shipped with DB2 Web Query. Is it necessary to know which queries are obsolete or redundant so that they can be cleaned up for impact analysis? Is it important to see which ones make the most sense to be converted into DB2 Web Query native reports? These tools and reports provide an easy way to analyze and clean up or convert the massive Query/400 definitions that have accumulated over time.
- New DB2 Web Query Audit Functions. Out-of-the-box reports and dashboards help in understanding report usage information. Leverage the metadata and sample reports to extend to additional auditing information as required. The out-of-the-box dashboards and reports provide information such as:
  - How many reports are in each folder?
  - Who is running the longest running reports?
  - Which reports are people running the most?
  - What reports are been altered most often?
- This set of prebuilt reports and dashboards is delivered in DB2 Web Query Group PTF Level 2 for Version 2, Release 2.
  - Version 2 Release 2 supports IBM i 7.1, 7.2, and 7.3

### **Delivery simplification for selected programs**

IBM i is simplifying the delivery for a subset of Licensed Program Products (LPPs) for IBM i and the IBM i feature OptiConnect. For IBM i 7.2 and later, the selected LPPs and IBM i feature will no longer be ordered separately but instead will be automatically delivered with all operating system orders and upgrades. Existing IBM i 7.2 and 7.3 clients who are registered on the [ESS](#) website can download the selected LPPs and IBM i feature either under their existing 5770-SS1 entitlement, or under 5770-SS1 in the "IBM i evaluation and NLV download" selection. The following products and feature are included in this delivery simplification:

- IBM Administration Runtime Expert (formerly called *Application Runtime Expert*) 1.1 (5733-ARE)
- IBM Facsimile Support for i 5.8 (5798-FAX)
- IBM System Manager for i 7.2 and 7.3 (5770-SM1)
- IBM CICS<sup>®</sup> Transaction Server for i 7.2 and 7.3 (5770-DFH)
- IBM Managed System Services for i 7.2 and 7.3 (5770-MG1)
- IBM i Option 23, OptiConnect 7.2 and 7.3 (5770-SS1)

**Note:** For the selected products and feature, the IBM i 7.1 ordering and delivery remain the same and the physical media charges still apply; however, there will be no software license charge for the LPPs and IBM i feature.

### **IBM i Entitlement Transfer to P05 processor group machines allows upgrade to three-year Software Maintenance**

The IBM i Entitlement Transfer offering configuration for P05 processor group machines now provides the additional selection of the upgrade to three-year Software Maintenance (SWMA) coverage. Prior to this addition, the IBM i transfer to P05 machines provided selection of 90-day or one-year SWMA coverage.

### **Hardware and system firmware enhancements**

Recent Power hardware and system firmware enhancements provide these advantages to IBM i clients:

- New Power Systems models IBM Power E880C and E870C for cloud deployment.
- IBM Power S822 Model 22A with FW860 now supports IBM i partitions with up to four processor cores. Because IBM i support on Power S822 requires Virtual I/O Server (VIOS), this change may be of the most interest to service providers with external storage and knowledge of VIOS.
- Support for new EXP24SX SAS Storage Enclosure for high-performance disks or SSDs.
- Support for new PCIe3 Cryptographic Coprocessor cards (#EJ32/#EJ33) with improved performance and security services.
- Support for the NIC function in the new PCIe3 100 Gb Ethernet adapters (#EC3M, #EC3L) in configurations with Virtual I/O Server (VIOS).
- Support for new RDX USB Top Mount Docking Station (#EUA3) on Power Systems S814.
- Support for VNIC fail-over, which provides automated fail-over for SR-IOV network configurations.
- Shared Ethernet Adapter (SEA) large send performance improvements for configurations with VIOS.
- NovaLink support for SR-IOV configurations.
- Support for new tape device TS4500 R3, which has dual robotic accessors that help increase mount performance and overall system availability.

### **Power Systems firmware V8.6 enhancement for identifying a partition using a Universally Unique Identifier (UUID)**

Support for a UUID is available starting with Power Systems firmware V8.6, along with IBM i 7.2 TR5.

Firmware V8.6 and later will generate a UUID as an attribute for each partition. This UUID can then be materialized using the Materialize Machine Attributes (MATMATR) instruction. The UUID does not change when the partition moves to a new serial number; for example, during a Live Partition Mobility (LPM) operation. While the IBM i operating system, the Licensed Program Products for IBM i, and the IBM i license management function do not utilize the UUID, application providers may choose to utilize the UUID in order to facilitate movement and management of partitions between servers. For information regarding using the machine instructions related to UUID, see the [IBM i Machine Interface](#) website and search for "UUID."

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## **Product positioning**

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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 IBM 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 IBM 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 IBM i together. The preintegration and testing of IBM 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 IBM 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 IBM i is an integrated component that is built on a set of integrated storage management unique to IBM i and its predecessors. This storage management is based on the single-level storage architecture that treats all of the storage managed by IBM 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 IBM i running for days, weeks, and months without unexpected restarting of the operating system.

Several architectural attributes of IBM i have contributed to the stability of the system over the years. First, applications compiled on IBM i are compiled to a set of intermediate code instructions defined as the Technology Independent Machine Interface (TIMI). This enables IBM 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 IBM 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 IBM 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.

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## Reference information

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For additional information on announcements related to IBM i, refer to the following:

- Hardware Announcement [116-088](#), dated October 11, 2016(Multiple enhancements for IBM Power Systems I/O and servers)
- Software Announcement [216-384](#), dated October 11, 2016(IBM PowerVM<sup>®</sup> and IBM PowerVC enhancements)
- Hardware Announcement [116-091](#), dated September 19, 2016(IBM Power System E880C (9080-MHE))
- Hardware Announcement [116-092](#), dated September 19, 2016(IBM Power System E870C (9080-MME))
- Hardware Announcement [116-051](#), dated May 10, 2016(IBM TS4500 Tape Library)
- Software Announcement [216-452](#), dated October 11, 2016(IBM i 7.3 TR1)

For information on the new LPP for IBM i IBM Cloud Storage Solutions for i (5733-ICC), refer to Software Announcement [216-419](#), dated October 11, 2016.

This product enables IBM i clients to connect to a public or private cloud. It can be used for data backup and archiving and is targeted for less than one terabyte of data.

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## Program number

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Program number	VRM	Program name
5770-SS1	7.2	IBM i 7.2 TR5

### Product identification number

Program PID number	Maintenance 1-year PID number	Maintenance 3-year PID number
5770-SS1	Not applicable	Not applicable

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## Offering Information

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

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## Publications

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No publications are shipped with these programs.

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## Business Partner information

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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<sup>(R)</sup> ID and password are required (use IBMid).

[BP Attachment for Announcement Letter 216-400](#)

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## Services

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### Software Services

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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 or to contact a Software Services sales specialist, go to the [IBM Software Services](#) website.

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## Technical information

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### Specified operating environment

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#### *Hardware requirements*

A supported Power, Flex, or System i server or blade with POWER8, POWER7 +, POWER7, POWER6 +, or POWER6 processor is required to run IBM i 7.2 TR5.

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 detail for the topics found in this announcement letter for IBM i 7.2, go to the [TR5 enhancements](#) website.

The program's specifications and specified operating environment information may be found in documentation accompanying the program, if available, such as a readme file, or other information published by IBM, such as an announcement letter. Documentation and other program content may be supplied only in the English language.

### User Group requirements

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A strong and passionate worldwide user community focuses on all aspects of IBM 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, COMMON Europe, and Interaction in Australia/New Zealand.

IBM continues to recognize key community leaders through the IBM champion program. The 14 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.

### Security, auditability, and control

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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.

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## Ordering information

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### Charge metric

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Not applicable.

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## Terms and conditions

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The information provided in this announcement letter is for reference and convenience purposes only. The terms and conditions that govern any transaction with IBM are contained in the applicable contract documents such as the IBM International Program License Agreement, IBM International Passport Advantage<sup>(R)</sup> Agreement, and the IBM Agreement for Acquisition of Software Maintenance.

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### License Information number

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GC52-0885

See the [License Information documents](#) page on the IBM Software License Agreement website for more information.

### Limited warranty applies

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Yes

### Limited warranty

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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**

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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)**

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Yes. Contact your IBM representative.

### **Passport Advantage applies**

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No

### **Usage restriction**

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Yes

See the [License Information documents](#) page on the IBM Software License Agreement website for more information.

### **Software Subscription and Support applies**

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Yes. All distributed software licenses include Software Subscription and Support (also referred to as Software Maintenance) for a period of 12 months from the date of acquisition, providing a streamlined way to acquire IBM software and assure technical support coverage for all licenses. Extending coverage for a total of three years from date of acquisition may be elected.

While your Software Subscription and Support is in effect, IBM provides you assistance for your routine, short duration installation and usage (how-to) questions, and code-related questions. IBM provides assistance by telephone and, if available, electronic access, only to your information systems (IS) technical support personnel during the normal business hours (published prime shift hours) of your IBM support center. (This assistance is not available to your end users.) IBM provides Severity 1 assistance 24 hours a day, every day of the year. For additional details, go to the [IBM Support Handbooks](#) page.

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**

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Yes

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**System i Software Maintenance applies**

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Yes

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**Variable charges apply**

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No

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**Educational allowance available**

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

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**Statement of good security practices**

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IT system security involves protecting systems and information through 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 lawful, comprehensive security approach, which will necessarily involve additional operational procedures, and may require other systems, products, or services to be most effective.

**Important:** IBM does not warrant that any systems, products, or services are immune from, or will make your enterprise immune from, the malicious or illegal conduct of any party.

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**Prices**

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For additional information and current prices, contact your local IBM representative.

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