IBM i 7.2 Overview

Nihal Perera
IBM Power Systems Technical Specialist
IBM Canada
nihalper@ca.ibm.com
• 7.1 Introduced Technology Refreshes (TR8 GA June 6\textsuperscript{th} 2014)
• 7.2 Incorporates 7.1 TRs and adds new capabilities
• TRs will transition to 7.2 over time
• New Releases for pervasive changes beyond scope of TRs

** All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.
IBM i – Priorities

- **Solutions for Today and the Future**
  - Focus on solutions integration with new technology
  - Invest in DB2 and language features for strategic solutions
  - Enable Mobile Device Support

- **Systems On-Site or In the Cloud**
  - Exploit future POWER system technology
  - Deliver advanced virtualization of system & storage
  - Provide resiliency, availability & flexibility

- **Simple & Integrated, Secure & Available**
  - Simplify management of systems and high availability
  - Broaden storage area network integration
  - Extend industry-leading integrated security
IBM i 7.2 Highlights

- Powerful new features of DB2® for i ensures security of the data in a modern environment of mobile, social and network access

- **IBM Navigator for i** extends system management capabilities to manage and monitor performance services

- **PowerHA SystemMirror for i Express Edition** introduces HyperSwap improves resiliency value proposition

- Additional flexibility in configuration for **I/O** with new virtualization: Ethernet through SRIOV and WAN over LAN

- **Backup and Recovery Management Systems** (BRMS) extends Hub function for easier management

- Support for new **POWER8** systems, and new features for POWER8 and POWER7/7+

- **Integrated Security** SSO application suite extended to include FTP and Telnet authentication with Kerberos

- Many enhancements to the portfolio of IBM i products from **IBM Software Group**

- More highlights extending and enhancing the value proposition of **IBM i integration**
DB2 for i

Scalable
Data Centric
Easy to use
Bet your business on us
Encoded Vector Indexes
Open for Business
Easy to maintain
Intelligent SSD
Proven
Secure
Reliable

© 2014 International Business Machines Corporation
DB2 for i
- Standard compliant
- Secure
- Scalable
- Functionally Advanced
- Excellent Performance
- Easier to use
- Easier to maintain

Continual Investment and Innovation

V5R1
- SQL triggers
- Java Functions
- DRDA DUW TCP/IP
- 2 GB LOBs
- 1 Terabyte Table
- Journal Minimal Data
- Two-phase over TCP/IP
- DDL Journaling
- Database Navigator
- Generate SQL

V5R2
- SQE Stage 1 IASPs
- Identity columns
- Savepoints
- UNION in views
- Scalar subselect
- UDTFs
- DECLARE GLOBAL TEMPORARY TABLE
- Catalog views
- JDBC V3.0
- DRDA Kerberos
- Journal Standby

V5R3
- Partitioned tables
- UFT-8 and UTF-16
- ICU sort sequence
- MQTs
- Sequences
- Implicit char/numeric
- BINARY/VARBINARY
- GET DIAGNOSTICS
- DRDA Alias
- DECIMAL(63)
- SQE Stage 3
- Ragged SWA
- QDBRPLAY
- Online Reorganize

V5R4
- WebQuery
- SSD Memory Preference
- On Demand Performance Center
- Health Center
- Completion of SQL Core
- Scalar fullselect
- Recursive CTE
- INSTEAD OF triggers
- Descriptor area
- XA over DRDA
- DDM 2-phase
- Scrollable cursor
- 2M SQL statement
- 1000 tables in a query
- SQE Stage 5 Implicit journaling enhancements

V5R5
- MySQL storage engine
- DECFLOAT
- Grouping sets/super groups
- INSERT in FROM VALUES in FROM
- Extended Indicator Variables
- Expression in Indexes
- ROW CHANGE TIMESTAMP
- Statistics catalog views
- CLIENT special registers
- SQE Logical file support
- SQE Adaptive Query Processing
- EVI enhancements
- Inline functions
- CREATE OR REPLACE

Deferred Restore of MQT and Logicals
Environmental limits

7.2
- Row and Column Access Control
- XMLTABLE
- CONNECT BY TRANSFER
- OWNERSHIP
- Named arguments and defaults for parameters
- Obfuscation of SQL routines & triggers
- Array support in UDFs
- Timestamp precision
- Multiple-action Triggers
- Built-in Global Variables
- Record movement between partitions on UPDATE
- 1.7 Terabyte Indexes
- Health Center – Non-database limits
- Navigator Graphing and Charting
- SQE I/O Costing model improvement
- TRUNCATE
IBM Power Systems

DB2 for i – Enhancements delivered via DB2 PTF Groups

IBM i 7.1

TR3 2012

SF99701 Level 11

TR4 timed Enhancements:
- Performance enhancements for large numbers of row locks
- Automatic management of SQL Plan Cache size
- Field Procedure Masking
- CPYTOIMPF order by
- Many Others…

TR5 2013

SF99701 Level 14

TR5 timed Enhancements:
- InfoSphere Guardium V9.0 – DB2 for i
- SQE enhancement for Encoded Vector Indexes defined with INCLUDE
- SQL metrics in Collection Services
- Many Others…

TR6

SF99701 Level 18

TR6 timed Enhancements:
- Database Reorganization (User specified starting point)
- Tracking System Limits (Phase 1)
- Index Advice for ORs
- Many Others…

TR7

SF99701 Level 23

TR7 timed Enhancements:
- 1.7 TB Indexes
- Tracking System Limits (Phase 2)
- RDB Alias support for 3 part names
- Deferred restore for journals
- Plan Cache properties and controls
- Many Others…

Enhancements delivered by PTF are documented here:
www.ibm.com/developerworks/ibmi/techupdates/db2
& in this article “A Hit Parade of DB2 for i Enhancements”
http://iprodeveloper.com/database/hit-parade-db2-i-enhancements

What's new in DB2 for i
What’s new in DB2 for i

Enhancements delivered via DB2 PTF Groups

IBM i 7.1 & 7.2

7.2 - GA
- First DB2 PTF Group for 7.2
- All IBM i 7.1 Enhancements thru TR8

7.1 - TR8 timed Enhancements:
- High priority enhancements based upon customer requests
- Enhanced ability to programmatically analyze performance
- New DB2 for i services
- And more...

7.2 - TR1
7.2 - TR2
7.2 - TR3

Enhancements delivered by PTF are documented here:
www.ibm.com/developerworks/ibmi/techupdaters/db2

Redpaper - IBM i 7.2 & RCAC

IBM i 7.2 – Landing page for all 7.2 enhancements:
www.ibm.com/developerworks/ibmi/techupdaters/i72
DB2 for i enhancements in IBM i 7.2

Security
- Protect business critical data using data-centric design with RCAC
- Secure remote journaling with SSL

Application development
- Improved ability to build, maintain and extend complex database application architectures

Database Engineering (DBE)
- Timestamp precision control (0 thru 12)
- Partitioned tables automatically reposition a row when updated

Performance
- SQL Query Engine (SQE) supports OPNQRYF & Query/400
- Other SQE enhancements
- Use SQL to see temporary storage consumption
DB2 for i - 7.2 Enhancements by role - Performance

Database Performance
- SQE enhancements:
  - Support for Native Queries
  - Improved I/O Costing Model
  - Enhanced implementation for IN list processing
- Navigator enhancements:
  - New PDI perspectives
  - Native Queries in the SQL Plan Cache
  - Enhanced SQL Plan Cache detail and tuning
- New system level resource… Temporary Storage consumption
- And other enhancements that were brought back to IBM i 7.1 alongside Technology Refreshes

Out of the Box… what’s **faster**?
- OPNQRYF & Query/400 complex queries
- I/O intensive queries
- Queries with long IN lists
** Disclaimer: Realized performance gains depends upon many factors

New Services
- QSYS2/SYSTMPSTG catalog
- QSYS2/DUMP_SNAP_SHOT_PROPERTIES() procedure
SQL Query Engine (SQE) – Progression

SQE Characteristics
- Object Oriented Design
- Enhanced Performance for complex queries
- Enhanced Optimization Engine
- Separate Statistics Management
- Maintained Temporary Indexes
- Encoded Vector Indexes Enhancements
- Single, System-wide Plan Cache
- and much more...

6.1 → SQE
- Translation support
- Lateral Correlation
- UDTF support
- Optimization time improvements
- Other miscellaneous performance
- Simple Logical File support

7.1 → SQE
- Logical File support
- Adaptive Query Processing (AQP)
- EVI Aggregate capability
- Global Statistics Cache
- Other miscellaneous performance

7.2 → SQE
- Native Opens including Open Query File (OPNQRYF) & Query/400 commands
- Improved I/O costing
- Other miscellaneous performance
DB2 for i - 7.2 Enhancements by role - Security

Security & DB2 for i

- Column Masks ➔ Deploy “need to know” logic
- Row Permissions ➔ Simpler, faster security
- Violation clause for CHECK constraints ➔ Protect data integrity
- Secure remote journal using SSL ➔ Achieve HA & DR objectives without exposure
- SQL alternative to CHGOBJOWN ➔ Embrace separation of duty, using SQL
- Use adopted authority identity within business logic ➔ “Who am I?” conditional code using SQL

Data-Centric Security
- Comprehensive
- Auditable
- Sustainable
- Scalable
- Manageable

Data is an asset… what’s your data worth?
DB2 for i - 7.2 Enhancements by role - Security

New SQL Statements for security
- CREATE PERMISSION
- ALTER PERMISSION
- CREATE MASK
- ALTER MASK
- ALTER TRIGGER
- TRANSFER OWNERSHIP

New Boss Option
- IBM Advanced Data Security for i
  (Boss option 47)
  No Charge

Some of the details…

New Catalogs
- QSYS2/SYSCONTROLS
- QSYS2/SYSCONTROLSDEP

New Built-in Function
- VERIFY_FOR_GROUP_USER()

New Journal Entry Types
For journal code D - Database file:
- M1, M2, M3 for create/drop/alter mask
- P1, P2, P3 for create/drop/alter permission

For journal code T - Audit trail:
- AX for Row and Column Access Control
- X2 for Query manager profile changes
What is RCAC?

- Additional layer of data security available with DB2
- Complementary to table level security
- Subsetting access to only the required data for a task
- Controls access to a table at the row, column, or both
- Two sets of rules
  - Permissions for rows
  - Masks for columns
- IBM Advanced Data Security for i
  - No-charge feature - Option 47
Row and Column Access Control (RCAC)

CREATE MASK SSN_MASK ON EMPLOYEE
   FOR COLUMN SSN RETURN
   CASE
       WHEN (VERIFY_GROUP_FOR_USER(SESSION_USER, 'PAYROLL') = 1)
           THEN SSN
       WHEN (VERIFY_GROUP_FOR_USER(SESSION_USER, 'MGR') = 1)
           THEN 'XXX-XX-' CONCAT SUBSTR(SSN, 8, 4)
       ELSE NULL
   END
ENABLE;
ALTER TABLE EMPLOYEE ACTIVATE COLUMN ACCESS CONTROL;

CREATE PERMISSION PATIENT_TABLE_HMO_PERMISSION
ON HOSPITAL.PATIENT_TABLE
FOR ROWS
WHERE ((VERIFY_GROUP_FOR_USER(SESSION_USER, 'PCP') = 1 AND
        HOSPITAL.PATIENT_TABLE.PCP_ID = SESSION_USER) OR
       VERIFY_GROUP_FOR_USER(SESSION_USER, 'ACCTGROUP') = 1 OR
       VERIFY_GROUP_FOR_USER(SESSION_USER, 'RESGROUP') = 1)
ENFORCED FOR ALL ACCESS
ENABLE;
ALTER TABLE HOSPITAL.PATIENT_TABLE ACTIVATE ROW ACCESS CONTROL;
IBM Advanced Data Security for i (Boss Option 47)

- Option must be installed to use:
  - CREATE PERMISSION and CREATE MASK (RCAC)
  - Open a file that has RCAC activated
- RCAC constructs exist within the table (*FILE) and get applied by SQE
- RCAC does not replace object authorization requirements
  - If you pass the object authorization check:
    • Row permissions reduce the set of rows returned
    • Column Masks limit full or partial access to sensitive column data
- RCAC is comprehensive and applies to any DB2i data access interface (Native DB, SQL, RPG, APIs, etc)
- Row Permissions are a replacement technology for Views / Logical Files
- Only users with QIBM_DB_SECADM authority can manage RCAC
DB2 for i - 7.2 Enhancements by role – App Dev

Database Application Development

- Increased timestamp precision
- Named and Default parameter support on UDF/UDTFs
- Use of ARRAYS within UDF/UDTFs
- Obfuscation of SQL triggers
- Built-in Global Variables
- Expressions on PREPARE & EXECUTE IMMEDIATE
- Autonomous procedures
- CURRENT USER special register
- Constants in LANGUAGE SQL routines
- Unified debugger support for SQL functions
- Datetime scalar function improvements
- And other enhancements that were brought back to IBM i 7.1 alongside Technology Refreshes

New SQL Statement

- TRUNCATE

New Built-in Functions

- LPAD()
- RPAD()

New capabilities for solving business problems with SQL and DB2 for i
Application Development
Application Development Strategy for IBM i

Common development and management tools across operating systems and languages

Embrace Open Source Solutions

Integrate web and development technologies into IBM i

Include vendor tools as necessary
Significant Enhancements to RPG Built into 7.2

- New Free Format RPG
  - New Syntax; new style
  - Modern behavior

- Conversion tool changes old RPG to RPG Free Format
  - Arcad Converter
  - Linoma Software

- Rational Developer for i provided support in December 2013.
Additional RPG Enhancements

- Enhancements that were already delivered by PTFs
  - Free-form H, F, D, and P statements (7.1)
  - New XML-INTO options (6.1 & 7.1)
  - Get warnings or exceptions for failed CCSID conversions (6.1 & 7.1)
  - Performance option for date and time operations (6.1 & 7.1)

- 7.2 enhancements
  - CCSID support for alphanumeric data
  - Option for externally-described data structure subfields to have the same CCSIDs as the external fields
  - Option to open database files without CCSID conversion
  - Implicit CCSID conversion for free-form concatenation
  - Control the length returned by %SUBDT
  - Timestamps can have from 0 to 12 fractional seconds
Recent Advancements in Mobile Access for IBM i

- RPG Open Access
- XML Services
- JTOpen Lite
- PHP – Zend Server for IBM i, Zend Studio
- IBM Connections
- IBM Notes Traveler
- IBM Mobile Database
- DB2 WebQuery
- Rational HATS
- And more …

+ PLUS – Tools from Industry Vendors
JTOpen Lite (JTLite) – Java Toolbox for the Mobile World

- Significantly smaller footprint Java toolbox for IBM i
- Supports mobile devices capable of a Java environment
- Targeted to the high use elements:
  - Database -- JDBC (SQL) and record-level access (DDM)
  - Integrated File System – open, read, write, delete
  - Program calls (RPG, COBOL, service programs, etc)
  - Commands
  - Job Information
  - Messages, Message Information (DSPMSG QSYSOPR)
  - Disk Status (WRKDSKSTST)
  - Object Information (WRKOBJ)
  - User and group Information
Zend Server for IBM i Version 6

- Zend Studio and Zend Server will create/run mobile apps
  - Visual, drag-and-drop mobile client app creation in Zend Studio
  - Visual, drag-and-drop creation of RESTful PHP web services which connect the mobile app to Zend Server
  - Zend Studio creates mobile apps ready for deployment to app marketplaces of iOS, Android, Windows Phone, & more platforms

- Zend Server has enterprise-grade features for managing PHP applications
  - Application deployment, performance insight, management, caching, and monitoring on an application-by-application basis
  - Security and user management functions include
    - different roles for administrators and developers
    - permissions by application based on the users in an LDAP directory
    - maintaining a user audit trail
Quickly & Easily Create Mobile Solutions for IBM i

Zend Studio 10

- Drag & Drop interface
- Tie mobile apps to native IBM i artifacts
- Single development location for creating
  - mobile applications
  - Integrating restful web service
  - Tie to IBM i native toolkit
  - PHP application to drive the interactions

Deploy mobile apps application market places!

iOS, Android, Windows Phone, & more

IBM i XML Service

Zend Server for IBM i Version 6
- RESTful Web Services
- "Mobil-ize" RPG & COBOL applications
- XML Service ties Mobile application to native i artifacts
- Mobile solutions for IBM i!

http://www.youtube.com/watch?v=t4nmRO9-qN4&feature=plcp
Integrated Middle Ware on IBM i

- IBM i HTTP Server now running Apache 2.4
  - Improved performance
  - SNI (Server Name Indication) support
  - OCSP (Online Certificate Status Protocol) support
  - Independent Subsystems

- IBM i Integrated Application Server – now powered by Liberty 8.5
  - Runs on Java 7 & 7.1
  - Updated to the latest web specs
    - JCA 1.6, JSR 236
  - Replace for Tomcat – runs on any platform
  - Upward compatible to full WebSphere
  - Supported by normal development tools!
  - Several IBM interfaces have been running on this since last year!
Integrated Middle Ware on IBM i

- Integrated Web Services Server – now powered by WAS Liberty & Jax-WS
  - Running on Liberty
    - Faster and better compliance
  - JAX-WS SOAP web service container
    - Latest industry standard support
IBM Middleware products

- IBM Social Collaboration
  - IBM Domino 9.0.1
  - IBM Traveler 9.0.1
  - IBM Sametime 9.0
  - IBM Connections Next

- IBM WebSphere
  - WebSphere Application Server V8.0
    • Liberty, Express, Base, ND
  - WebSphere Application Server V8.5 & 8.5.5
    • Liberty, Express, Base, ND
  - WebSphere MQ 7.1.0.5
Managing the System with IBM i 7.2
IBM Navigator for i – new functions

- Performance & Usability
  - New browsers
  - My Favorites
  - Quick Search

- PTF management
  - Installed PTF Navigation
  - Load/apply PTF on single or group systems

- Message Queue monitor
  - Based on the same CIM infrastructure
  - Filter messages based on rules
  - Trigger action to handle messages automatically

- System monitor
  - User defined IBM i OS metrics monitor
  - Graphical displays of performance trend
  - User defined event automation

- Database
  - Create new function and procedure
  - DB Performance Metrics
Collection Services & Performance Data Investigator – 7.2

- Significant enhancements to PDi
  - New Collection Services Metrics
  - Batch Model
  - System Monitoring
  - New PDI Perspectives
  - Enhanced Left Hand Navigation

Fast Search – Enter metric see all charts its on!!

Select package and perspective from left hand
Sizing - Batch Model

Measure a batch workload
- Adjust hardware, processor, storage (SSD), system settings

Model how these changes effect the workload performance
Managing Temporary Storage – Improved Accounting

- Define new accounting “buckets” to track temporary storage usage.
- Track temporary storage allocations which persist after a job ends.
- Track temporary storage scoped to a job, the temporary file system, LIC tasks, etc.
IBM Navigator for i - Sort Active Jobs by Storage Used

<table>
<thead>
<tr>
<th>Job Name</th>
<th>Detailed Status</th>
<th>Current User</th>
<th>Type</th>
<th>CPU %</th>
<th>Run Priority</th>
<th>Thread Count</th>
<th>Temporary Storage Used (MB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin2</td>
<td>Waiting for thread</td>
<td>Qlwlsvr</td>
<td>Batch Immediate - Server</td>
<td>0</td>
<td>25</td>
<td>82</td>
<td>337</td>
</tr>
<tr>
<td>Admin4</td>
<td>Waiting for thread</td>
<td>Qwebadmin</td>
<td>Batch Immediate - Server</td>
<td>0</td>
<td>25</td>
<td>41</td>
<td>162</td>
</tr>
<tr>
<td>Admin1</td>
<td>Waiting for thread</td>
<td>Qlwlsvr</td>
<td>Batch Immediate - Server</td>
<td>0</td>
<td>25</td>
<td>34</td>
<td>154</td>
</tr>
<tr>
<td>Admin3</td>
<td>Waiting for thread</td>
<td>Qlwlsvr</td>
<td>Batch Immediate - Server</td>
<td>0</td>
<td>25</td>
<td>34</td>
<td>145</td>
</tr>
<tr>
<td>Qygpsfrcol</td>
<td>Waiting for dequeue</td>
<td>Qsys</td>
<td>Batch</td>
<td>0</td>
<td>1</td>
<td>30</td>
<td>117</td>
</tr>
<tr>
<td>Qygpsjsvr</td>
<td>Waiting for signal</td>
<td>Qygpsjsvr</td>
<td>Batch - Server</td>
<td>0</td>
<td>10</td>
<td>37</td>
<td>86</td>
</tr>
<tr>
<td>Qsrvmon</td>
<td>Waiting for thread</td>
<td>Qsecfr</td>
<td>Batch Immediate</td>
<td>0</td>
<td>50</td>
<td>22</td>
<td>61</td>
</tr>
<tr>
<td>Qpadev0005</td>
<td>Waiting for workstation I/O</td>
<td>Angela</td>
<td>Interactive</td>
<td>0</td>
<td>20</td>
<td>1</td>
<td>41</td>
</tr>
<tr>
<td>Crtpfrdta</td>
<td>Waiting for dequeue</td>
<td>Qsys</td>
<td>Batch - Server</td>
<td>0</td>
<td>50</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td>Qzlsrserver</td>
<td>Waiting for event</td>
<td>Qpgmgr</td>
<td>Batch - Server</td>
<td>0</td>
<td>20</td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>Qsqsvr</td>
<td>Waiting for condition</td>
<td>Qsys</td>
<td>Prestart batch - Server</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Onadevnya0</td>
<td>Waiting for workstation I/O</td>
<td>Wdtnarara</td>
<td>Interactive</td>
<td>0</td>
<td>20</td>
<td>1</td>
<td>19</td>
</tr>
</tbody>
</table>

1 - 100 of 172 Items
Mobile IBM i Access

- iAccess for Web new Mobile interface – shipped with 5770-XH2

- Access your IBM i from ANY web enabled mobile device

- Basic System and Management function
  - Job Management
  - Messages
  - Printer output
    - Spool files to PDFs
  - 5250 emulator
  - Run SQL Scripts!
  - Much more

Tech Preview with 7.2 GA
Cloud and Virtualization
IBM i 7.2 – Built in Cloud Capability

- **Network Installation** of all IBM i software for more efficient operations
- **Suspend/Resume** IBM i partition to optimize resource use
- **VM Image Management** to define and deploy partitions
- **Live Partition Mobility** to keep workloads running while changing systems
IBM SmartCloud Entry 4.1 is an easy to deploy, simple to use software offering that features a self-service portal for workload provisioning, virtualized image management, and monitoring.

- Radically **improves time to value** for new workloads
- Provides **repeatable accuracy and consistency** via automation

IBM Systems Director VMControl 2.4.5 offers Express, Standard and Enterprise Edition support for IBM i 7.2. Enables the cloud capability for quick partition deployment, systems pool.

- Support appropriate **isolation** within a highly shared and multi-tenant environment
SRIOV (Single Root I/O Virtualization) for Ethernet

- Simple virtualization **with** or **without** VIOS
- With quality of service controls to specify minimum bandwidth per partition

- Introduced on POWER7+ 770/780 (“D” models)
- Single slot provides Ethernet to multiple partitions
“WAN over LAN”

- WAN applications have traditionally used WAN adapters

- In 7.2 WAN can run in an Ethernet to Ethernet Device Server with multiple RS232 serial ports
  - Provides true Virtual Serial ports for WAN applications
  - Clients running IBM Facsimile Support for i, 5798-FAX, can use this new support

- Expands advanced virtualization capabilities:
  - Reduces total cost by allowing
    - Fewer PCI slots for applications requiring a modem
    - One Ethernet adapter can provide both TCP/IP connectivity and WAN
  - Allows IBM i client partitions with virtual I/O to use FAX and other WAN applications
    - Support for Flex and Blades - previously had no WAN capability

- Minimal disruption for existing WAN applications
  - No application changes
  - Simple configuration change required for IBM i partition
Integrated Value
IBM i 7.2 Security Enhancements

- **Power 8 in-core Cryptographic Performance Acceleration**
  - Support within the processor itself, no additional products or HW required
  - “Automatic” performance acceleration for certain cryptographic algorithms
    - AES & SHA-2 message digest
  - Does not support “cryptographic key” storage
    - Certain customers will still need the 4765 Cryptographic Coprocessor
  - Performance gains will be realized in support such as:
    - SSL (Secure Socket Layer)
    - VPN (Virtual Private Network)
    - Software Tape Encryption
    - Customer applications that use the Crypto Services APIs

- **Enhance both FTP and TELNET to support authenticating with Kerberos (SSO)**
  - Kerberos authentication and Enterprise Identity Mapping integrated in FTP & TELNET
  - Integrates into the IBM i SSO application suite
  - FTP client and server support
  - Telnet client and server support

- More …
Infrastructure Currency

- Enhanced Data in Audit Records
  - Significant changes to record both the "old" and "new" values in many security audit records (prior release audit record data included only the "new" values)

- System SSL (Security updates)

- PASE Updates
  - AIX 7.1
  - OpenSSL

IBM i does not have the "Heartbleed" vulnerability. Never did. No fix needed.
Operations Enhancements

- Improved ease for installing Licensed Programs
  - New API (QLPINSLP) provides GO LICPGM option 1 and 11 support
- CRTIMGCLG support to automatically add all images within the catalog directory to the image catalog.
- D-mode IPL support from USB
- Tape and Tape Library devices can now be configured for "Online at IPL"
- PTF Enhancements
  - Auditing of PTF operations and associated objects
  - More "immediate apply" PTF options
  - GUI Support through Navigator
- New functions for backing up
  - Journaling enhancements for handling “wrong order” restores TCP/IP configuration automatically saved with QUSRsys
  - More object selection capability (SELECT parameter)
  - Spooled file backup enhancements
  - Better IFS backup performance using the ASYNCBRING parameter
IBM i 7.2 Networking Enhancements

- System SSL (Security updates)
  - TLSv1.2
  - Elliptical Curve (ECDHE and ECDSA)
  - Online Certificate Status Protocol (OCSP)
- VPN
  - IKEv2 NAT
  - Re-keying IKE SA
  - Advanced IKE & IpSec Cryptographic Algorithms, ECDSA authentication
- Virtual LAN support of IEEE 802.1Q (VLAN)
- IPv6 Neighbor Proxy Discovery for virtual Ethernet and PPP
- LAN Console IPv4 initial configuration enhancements
- SNMP enhancements including implementing SNMPv3 Manager APIs
- TCP/IP IPv6 XML configuration file enhancements – validation and diagnostic messages
- Retrieve/Update TCP/IP Information
- CL commands for loading/unloading VPN & IP Filtering configuration files
- VIPA proxy ARP support tied in with the existing dead gateway support
Printed Output Enhancements

- **CPYSPLF to IFS**
  - Option to convert to PDF (PTF’d back to 7.1)

- **Bar Codes**
  - Support for all bar codes currently defined by BCOCA
  - Rendered by Host Print Transform (ASCII printers) and Transform Services (PDF)
    - Databar
    - Intelligent Mail
  - DDS BARCODE Keyword enhanced
    - Support for QR Code special parameters
    - Trim indicator allows user to truncate trailing blanks from bar code data
      - Important for 2D bar codes that carry long text
      - Eliminates the need to define multiple records with different lengths

- **Color Image Support**
  - HPT can now print color images on PCL 5C capable printers
  - Popular image formats (JPEG, TIFF, GIF)
  - Stream files in IFS
  - Reference via the AFPRSC DDS keyword

- **Color Management Support added to PSF/I**
  - PSF/i enhanced to support AFP Color Management architecture (CMOCA)
  - Mechanism to print color consistently across different printer models and manufactures
  - Color profile of input and output devices used to adjust color “automatically” at high speed
  - Requires use of AFP Resource Installer tool to generate Resource Access Table (RAT)
IBM i Middleware Updates

- **Java**
  - Support for Java 6, Java 7 & Java 7.1
  - Support removed for Java 5 and Java 1.4.2

- **SAMBA**
  - Fast, modern, lightweight CIFS file server
    - Common Internet File System
  - Better protocol compatibility with current Windows clients
  - SMB 2.0 protocol support
Expanding the Limits
Extended IBM i 7.2 Limits – Page 1

- 32 virtual disks per VSCSI adapter in IBM i client partition
  - (was 16)

- Memory pools > 2 Terabytes
  - (New parameter on CHGSHRPOOL, CRT/CHGSBSD for units (*KB/*MB))

- Job table limit 970,000 (QMAXJOB system value)
  - From 485,000

- SMTP removed the SDD limitations

- Optical: Expanded large saves for IFS QOPT files
  - Max IFS QOPT file size now almost 10 TB from 4 GB
- PowerHA Administrative Domain monitored resource entry (MRE) limit now 45,000
  - From 25,000

- Maximum load source size will accommodate up to 2 TB, and load source drives must be at least 70 GB

Managing Limits Easier than Ever

- Navigator’s Health Center has DB2 and System Limits

- Hold a job that exceeds its defined limits (MAXTMPSTG and MAXCPU) and allow the operator to change the limit and let the job continue, or end the job
Product Enhancements

Power HA

BRMS

Power VP

Application Runtime Expert

Social

Messaging

Communicating

Connecting

Integrating
PowerHA SystemMirror for i Express Edition – Hyperswap

- Provides ability to ‘instantly’ switch access from production IBM i DS8000 instance to remote DS8000
- Switch can happen automatically in case of DS8000 failure
- Switch can be manually triggered for planned maintenance
- Affinity can be defined so an LPM switch triggers a DS8000 switch

- DS8000 storage servers only
- IASP based replication not yet supported
PowerVP - Virtualization Performance Intelligence

PowerVP provides performance intelligence to proactively address performance issues mapping virtual workloads to physical hardware.

Client Pain Points

- **Complexity and time** required to pinpoint performance bottlenecks
- **Lack of visibility** of placement of VMs within a server’s physical hardware
- Difficult to go **back in time** to diagnose detailed performance issues
- Lack of performance health metrics for virtualized workloads

PowerVP Solution

- **Simplifies management and performance measurement** of virtualized systems
- **Reduces cost of resolving performance issues**
- **Improves detection of performance bottlenecks before they cause a slowdown**
- **Provides a quick view of performance health**
- **Visually shows the physical resources a VM is consuming**
Power Virtualization Performance

System Topology View

HW DRILL DOWN

LPAR DRILL DOWN
BRMS Enhancements

- BRMS Enterprise
  - Dashboard of all BRMS systems
  - Central site monitoring
- Graphical Interface supports additional function
- Backup with improvements to IFS backups, include and exclude support in BRMS Object List and new ability to save by size of library
- Media Services allows concurrent duplications in batch via SBMOPT parm
- New features for Recovery supports restore list options and other new function
- Maintenance
  - Increase performance with *BATCH on RGZBRMDB
  - RMVMEDI at an object retention level for *OBJ, *LNK, *DLO, *SPL
- Faster install via new alter table support!
What is the Hub Center within the BRMS Enterprise support?

This is the main Enterprise panel - the BRMS Dashboard to find out information about all the nodes.

<table>
<thead>
<tr>
<th>Select</th>
<th>Node</th>
<th>Release</th>
<th>BRMS PTF</th>
<th>BRMS Status</th>
<th>Report Definitions</th>
<th>Failed Reports</th>
<th>Successful Reports</th>
<th>Reports not Ran</th>
<th>Pending Network Transactions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Apon Kikai</td>
<td>V6R1M0</td>
<td>SI48339</td>
<td>Connected</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Apon Lp8u27</td>
<td>V7R1M0</td>
<td>SI48540</td>
<td>Connected</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>Apon Lp8u27</td>
<td>V7R1M0</td>
<td>SI48540</td>
<td>Connected</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>283</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>Apon Marisi</td>
<td>*NONE</td>
<td>*NONE</td>
<td>Not connected</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>Apon Mounds</td>
<td>V8R4M0</td>
<td>SI48335</td>
<td>Connected</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1806</td>
<td>Test Node: Mounds</td>
</tr>
<tr>
<td></td>
<td>Apon Rchass</td>
<td>*NONE</td>
<td>*NONE</td>
<td>Not connected</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>Apon Rchasy</td>
<td>V6R1M0</td>
<td>SI48339</td>
<td>Connected</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>37</td>
<td>Test Node: RCHASYM</td>
</tr>
<tr>
<td></td>
<td>Apon Reese</td>
<td>V6R1M0</td>
<td>SI48339</td>
<td>Connected</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Apon Test</td>
<td>*NONE</td>
<td>*NONE</td>
<td>Not connected</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>Apon Troy</td>
<td>V8R4M0</td>
<td>SI48535</td>
<td>Connected</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>Apon X0716p2</td>
<td>V9R1M0</td>
<td>SI48339</td>
<td>Connected</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>Apon X0718p3</td>
<td>V7R1M0</td>
<td>SI48540</td>
<td>Connected</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NONE</td>
</tr>
</tbody>
</table>
Special notices

This document was developed for IBM offerings in the United States as of the date of publication. IBM may not make these offerings available in other countries, and the information is subject to change without notice. Consult your local IBM business contact for information on the IBM offerings available in your area.

Information in this document concerning non-IBM products was obtained from the suppliers of these products or other public sources. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

IBM may have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not give you any license to these patents. Send license inquiries, in writing, to IBM Director of Licensing, IBM Corporation, New Castle Drive, Armonk, NY 10504-1785 USA.

All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

The information contained in this document has not been submitted to any formal IBM test and is provided "AS IS" with no warranties or guarantees either expressed or implied.

All examples cited or described in this document are presented as illustrations of the manner in which some IBM products can be used and the results that may be achieved. Actual environmental costs and performance characteristics will vary depending on individual client configurations and conditions.

IBM Global Financing offerings are provided through IBM Credit Corporation in the United States and other IBM subsidiaries and divisions worldwide to qualified commercial and government clients. Rates are based on a client's credit rating, financing terms, offering type, equipment type and options, and may vary by country. Other restrictions may apply. Rates and offerings are subject to change, extension or withdrawal without notice.

IBM is not responsible for printing errors in this document that result in pricing or information inaccuracies.

All prices shown are IBM's United States suggested list prices and are subject to change without notice; reseller prices may vary.

IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply.

Any performance data contained in this document was determined in a controlled environment. Actual results may vary significantly and are dependent on many factors including system hardware configuration and software design and configuration. Some measurements quoted in this document may have been made on development-level systems. There is no guarantee these measurements will be the same on generally-available systems. Some measurements quoted in this document may have been estimated through extrapolation. Users of this document should verify the applicable data for their specific environment.
Special notices (cont.)

IBM, the IBM logo, ibm.com AIX, AIX (logo), AIX 6 (logo), AS/400, BladeCenter, Blue Gene, ClusterProven, DB2, ESCON, i5/OS, i5/OS (logo), IBM Business Partner (logo), IntelliStation, LoadLeveler, Lotus, Lotus Notes, Notes, Operating System/400, OS/400, PartnerLink, PartnerWorld, PowerPC, pSeries, Rational, RISC System/6000, RS/6000, THINK, Tivoli, Tivoli (logo), Tivoli Management Environment, WebSphere, xSeries, z/OS, zSeries, AIX 5L, Chipshopper, Chipkill, Cloudscape, DB2 Universal Database, DS4000, DS6000, DS8000, EnergyScale, Enterprise Workload Manager, General Purpose File System, GPFS, HACMP, HACMP/6000, HASM, IBM Systems Director Active Energy Manager, iSeries, Micro-Partitioning, POWER, PowerExecutive, PowerVM, PowerVM (logo), PowerHA, Power Architecture, Power Everywhere, Power Family, POWER Hypervisor, Power Systems, Power Systems (logo), Power Systems Software, Power Systems Software (logo), POWER2, POWER3, POWER4, POWER4+, POWER5, POWER5+, POWER6, POWER6+, System i, System p, System p5, System Storage, System z, Tivoli Enterprise, TME 10, Workload Partitions Manager and X-Architecture are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol (® or ™), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Web at “Copyright and trademark information” at www.ibm.com/legal/copytrade.shtml

The Power Architecture and Power.org wordmarks and the Power and Power.org logos and related marks are trademarks and service marks licensed by Power.org. UNIX is a registered trademark of The Open Group in the United States, other countries or both.
Linux is a registered trademark of Linus Torvalds in the United States, other countries or both.
Windows and the Windows logo are registered trademarks of Microsoft Corporation in the United States, other countries or both.
Intel, Pentium are registered trademarks and Xeon is a trademark of Intel Corporation or its subsidiaries in the United States, other countries or both.
AMD Opteron is a trademark of Advanced Micro Devices, Inc.
Java and all Java-based trademarks and logos are trademarks of Sun Microsystems, Inc. in the United States, other countries or both.
PFC-C and TPC-H are trademarks of the Transaction Performance Processing Council (TPPC).
SPECint, SPECfp, SPECjbb, SPECweb, SPECjAppServer, SPEC OMP, SPECviewperf, SPECpc, SPECmpc, SPECjvm, SPECmail, SPECimap and SPECsfs are trademarks of the Standard Performance Evaluation Corp (SPEC).
NetBench is a registered trademark of Ziff Davis Media in the United States, other countries or both.
Altivec is a trademark of Freescale Semiconductor, Inc.
Cell Broadband Engine is a trademark of Sony Computer Entertainment Inc.
InfiniBand, InfiniBand Trade Association and the InfiniBand design marks are trademarks and/or service marks of the InfiniBand Trade Association. Other company, product and service names may be trademarks or service marks of others.