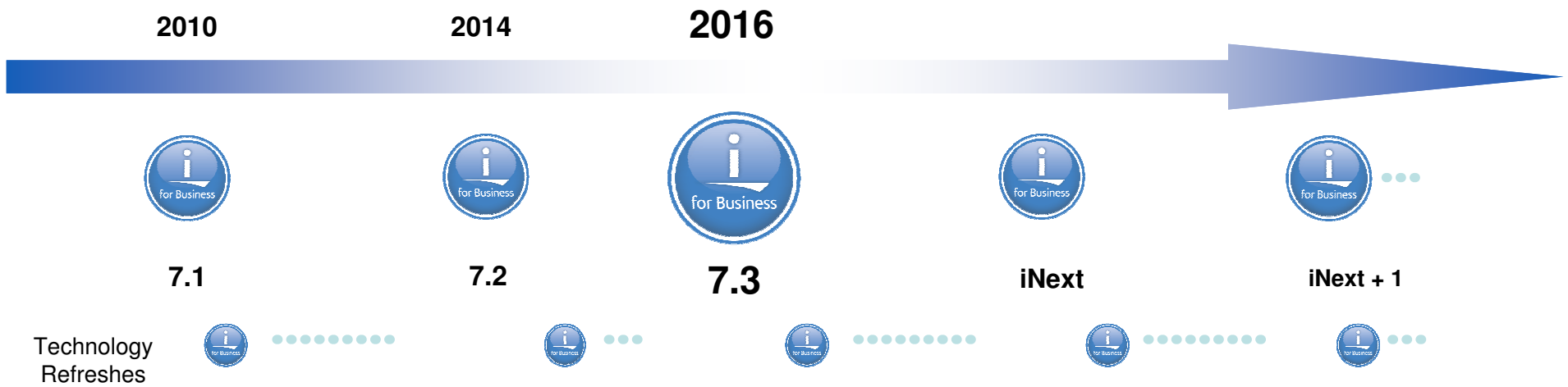


IBM i Recent Enhancements 7.3 Focus

Steve Will - IBM i Chief Architect

IBM i Releases



Technology Refreshes

IBM i System Support

Systems	IBM i 7.2	IBM i 7.3
POWER8 S814, S822 (VIOS only), S824, E870, E880	✓	✓
POWER7/7+ Servers Power 710, 720, 730, 740, 750, 760, 770, 780, 795	✓	✓
POWER7/7+ Blades and Compute Nodes PS700/701/702/730/704, PureFlex p260/460	✓	
POWER6+ 520, 550, 560, JS23/43 POWER6 520, 550, 570, 595, JS12/22	✓ 1	

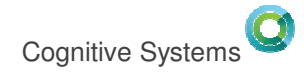
Note 1 – no IOP or HSL support

<http://www-01.ibm.com/support/docview.wss?uid=ssm1platformibmi>

7.2 Major Enhancements

- Db2
 - Row & Column Access Control – “Need to Know” built into Db2
 - “In-Memory” highlight & new functions
- Managing the System
 - Any device: Mobile, Web or PC/Mac/Linux
 - Fully Cloud Capable OS, with PowerVM & PowerVC
- Solution Development
 - Free-Form RPG for rapid learning and lower maintenance costs
 - PHP, Perl, Ruby, node.js etc. options in Application Development





IBM i 7.3 Overview

Steve Will - IBM i Chief Architect



IBM i 7.3 now lets you:



**Deepen your
data insight.**



**Forecast
trends with more
advanced analytics.**



**Enhance Security
Management.**



i4HiFashion



i4HiFashion – The World’s Source for Fashion – and More!



New Business Requirements

- Learn from history
- Ask new kinds of questions
- Ensure intelligent security
- Know who did what and when

i4HiFashion – The World’s Source for Fashion – and More!



New Business Requirements

- ★ Learn from history
- Ask new kinds of questions
- Ensure intelligent security
- Know who did what and when

Learning from History

What Did My Business Look Like Last Month?

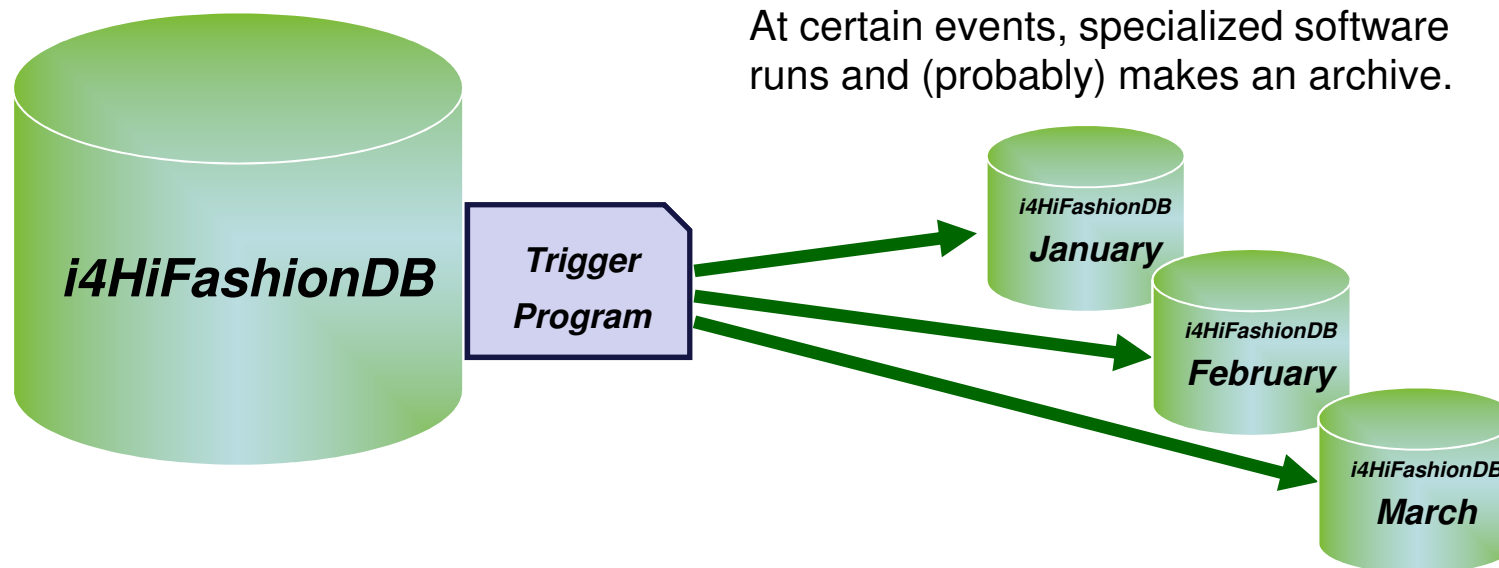


Before 7.3 Db2 Temporal Support

- Save/Restore? Maybe once ...
 - Cumbersome, slow, costly
- Journal Examination? Rarely.
 - Too much data & data reconstruction
- Snapshots?
 - Labor Intensive
- Trigger programs?
 - Best option before Temporal
 - ... but let's look at what happens

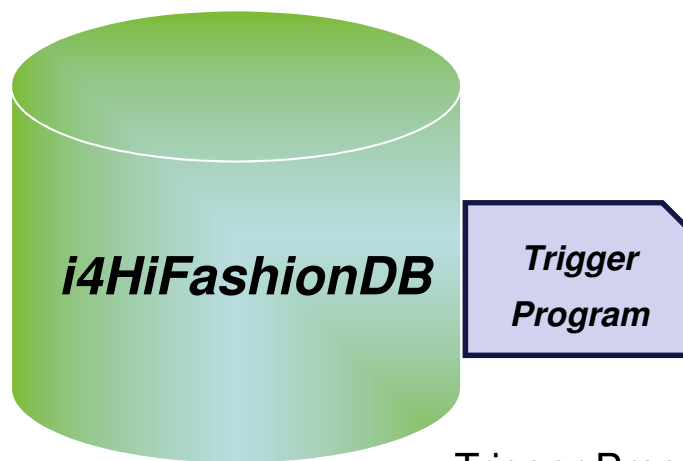
What Did My Business Look Like Last Month?

Trigger Program approach



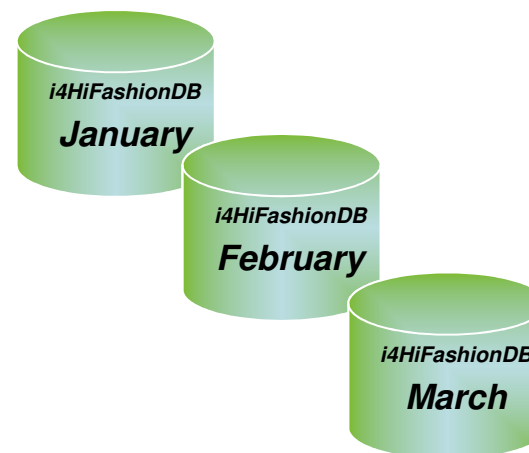
What Did My Business Look Like Last Month?

Trigger Program approach?



Trigger programs

- Data exists in multiple places
- Archives take space
- Management required

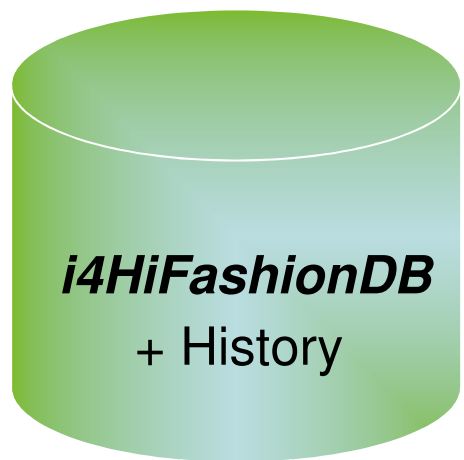


Trigger Programs must be

- Written
- Maintained
- Updated as requirements change
 - Will “monthly” always be the requirement?

What Did My Business Look Like Last Month?

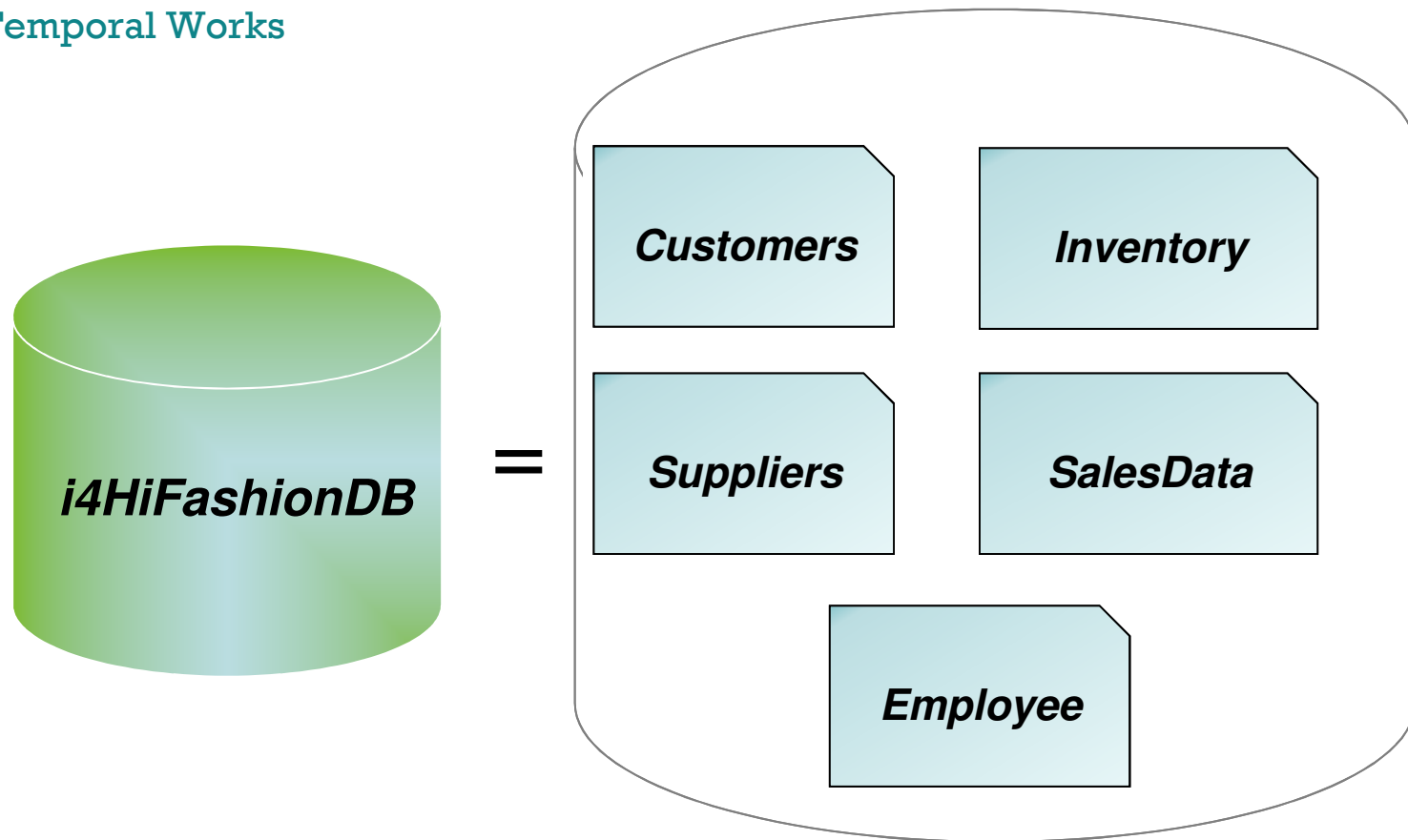
Db2 Temporal Tables



With 7.3 Temporal Table Support

- Simple SQL Query
- Historical Data Stored in Business Data
- Data-centric
- Flexible
- History Table associated, so no need for
 - Copies
 - Archives
 - Special programs

How Temporal Works



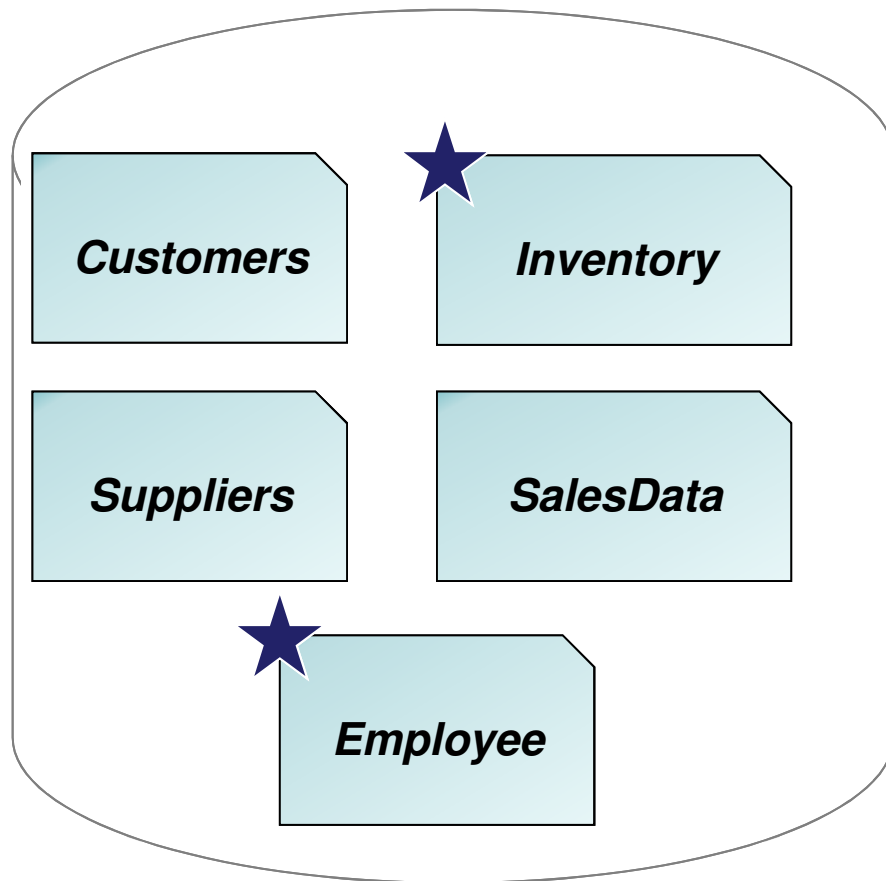
How Temporal Works



Choose the tables which will have stored history.

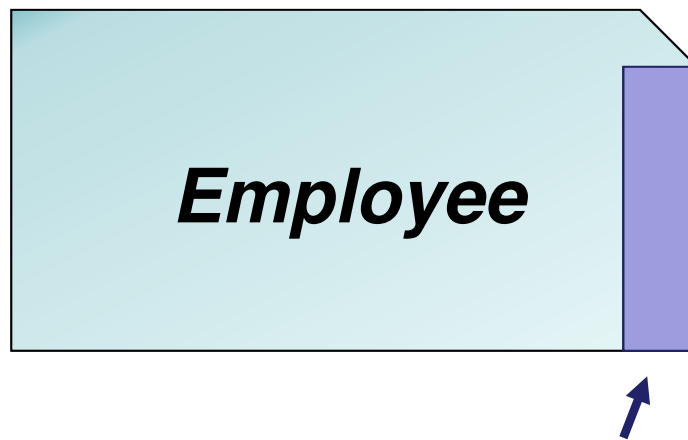


=



Adding History to a Table

Production Table



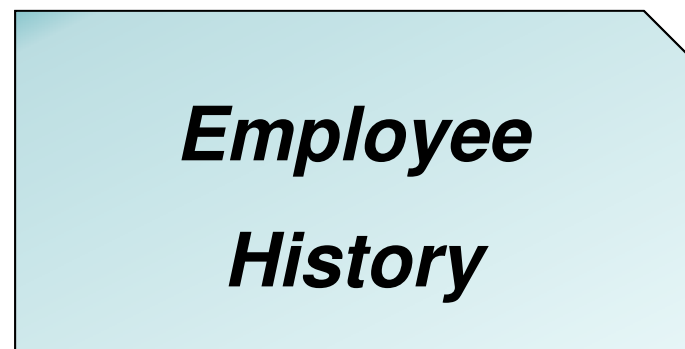
Add enabling columns to table.

Adding History to a Table

Production Table

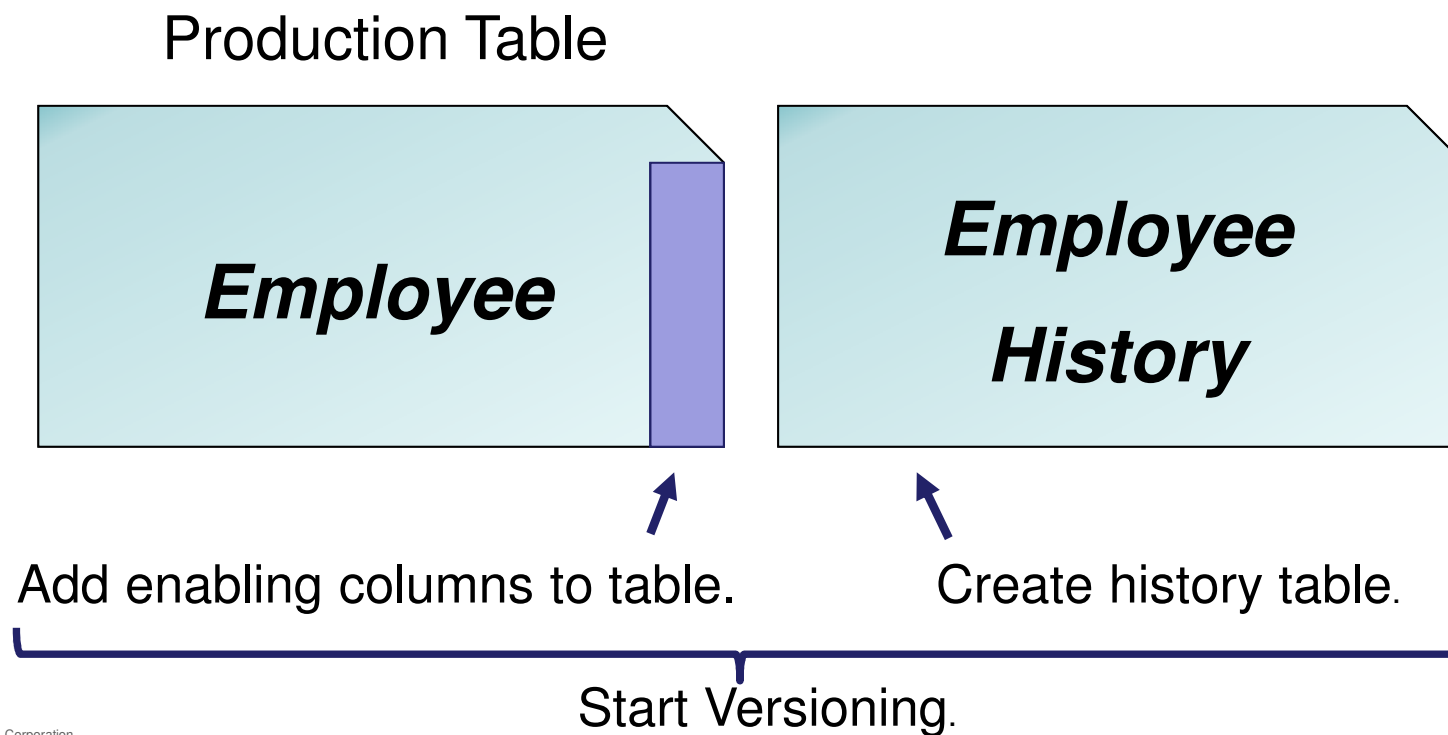


↑
Add enabling columns to table.



↑
Create history table.

Adding History to a Table



Temporal construction for data-centric history

```
ALTER TABLE employee  
  ADD COLUMN instance_begin  
    TIMESTAMP(12) NOT NULL GENERATED ALWAYS AS ROW BEGIN  
  ADD COLUMN instance_end  
    TIMESTAMP(12) NOT NULL GENERATED ALWAYS AS ROW END  
  ADD COLUMN transaction_id  
    TIMESTAMP(12) GENERATED ALWAYS AS TRANSACTION START ID  
  ADD PERIOD SYSTEM_TIME (instance_begin, instance_end)
```

Establish birth/death of a row

```
CREATE TABLE employee_history LIKE employee
```

Create history table

```
ALTER TABLE employee ADD VERSIONING USE HISTORY TABLE  
employee_history
```

Enable Temporal tracking

Temporal Queries – How to ask historical questions

```
SELECT * FROM employees AS OF TIMESTAMP '2014-12-24:00:00.000000'
```

```
SELECT * FROM employees FOR SYSTEM_TIME FROM '2014-06-01' AND '2014-12-31'
```

```
SELECT * FROM employees FOR SYSTEM_TIME BETWEEN '2014-06-01' AND '2014-12-31'
```

OR

```
SET CURRENT TEMPORAL_SYSTEM_TIME = '2014-12-24:00:00.000000'
```

```
SELECT * FROM employees
```



i4HiFashion – The World’s Source for Fashion – and More!



New Business Requirements

- Learn from history
- ★ Ask new kinds of questions
- Ensure intelligent security
- Know who did what and when

Ask New Kinds of Questions



Business questions:

- Do we make more sales when we spend more on marketing?
- If so -- Can we predict sales based on the amount spent on marketing?

Ask New Kinds of Questions



Before 7.3 & Db2 OLAP

- This type of analysis simply did not happen.
OR
- Extract the data off IBM i and run the analysis on copied data. (ETL approach) Copied data is “stale” data.
OR
- BI tools like Db2 Web Query or Cognos Analytics

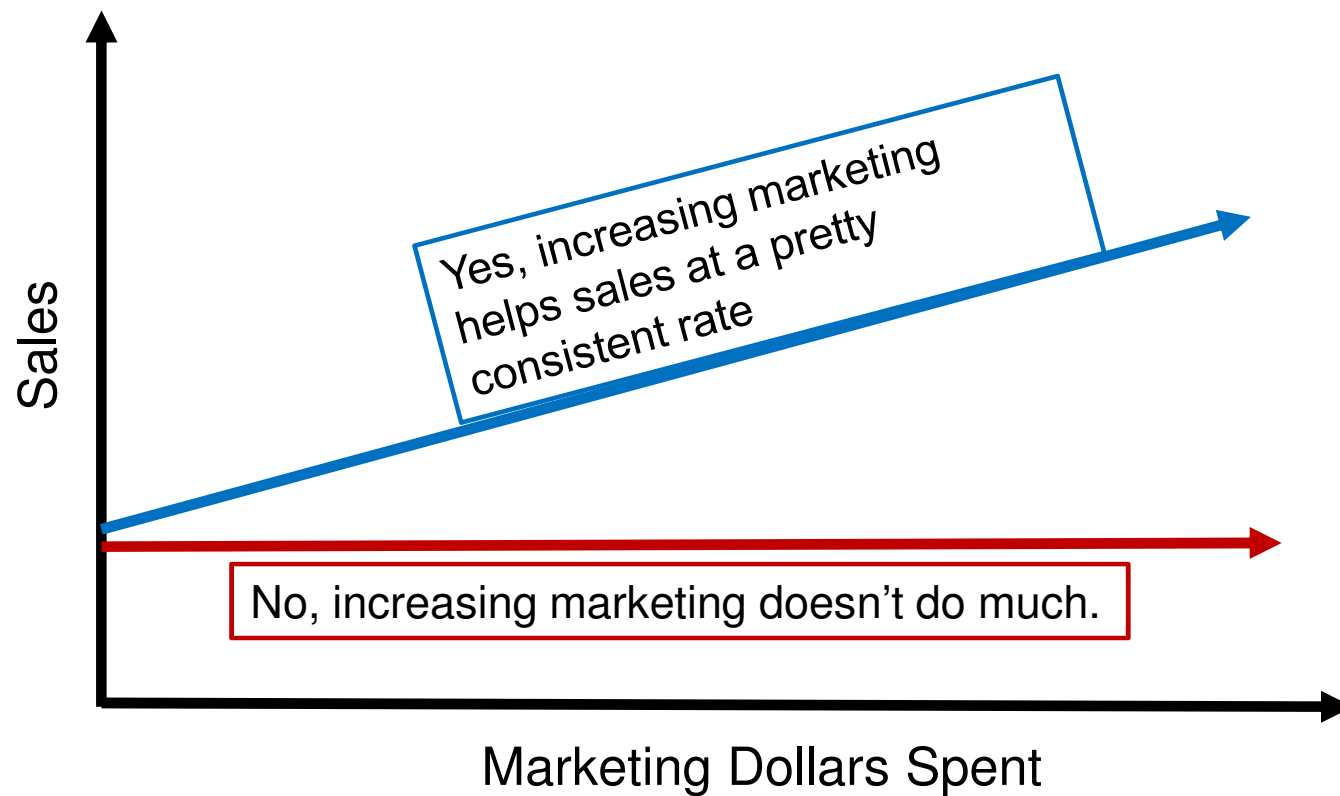
Ask New Kinds of Questions – with Db2 OLAP



With 7.3 & Db2 OLAP

- Integrated analytics functions
- Data remains on IBM i - not a copy
- BI tools like Db2 Web Query and Cognos Analytics get benefits!

Do we make more sales when we spend more on marketing?

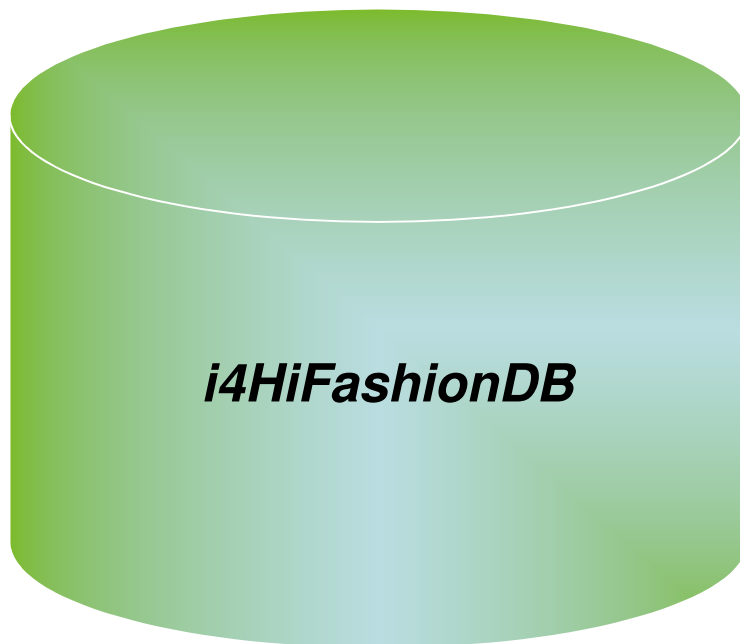


SQL Query Engine and OLAP Specification Extensions

Business questions – Math versions:

- Is there a correlation between the amount spent on marketing and sales for a product?
- Is the correlation weak or strong?
- Can we predict sales based on the amount spent on marketing?

SQL Query Engine and OLAP Specification Extensions



Business questions – Math versions:

- Is there a correlation between the amount spent on marketing and sales for a product?
- Is the correlation weak or strong?
- Can we predict sales based on the amount spent on marketing?

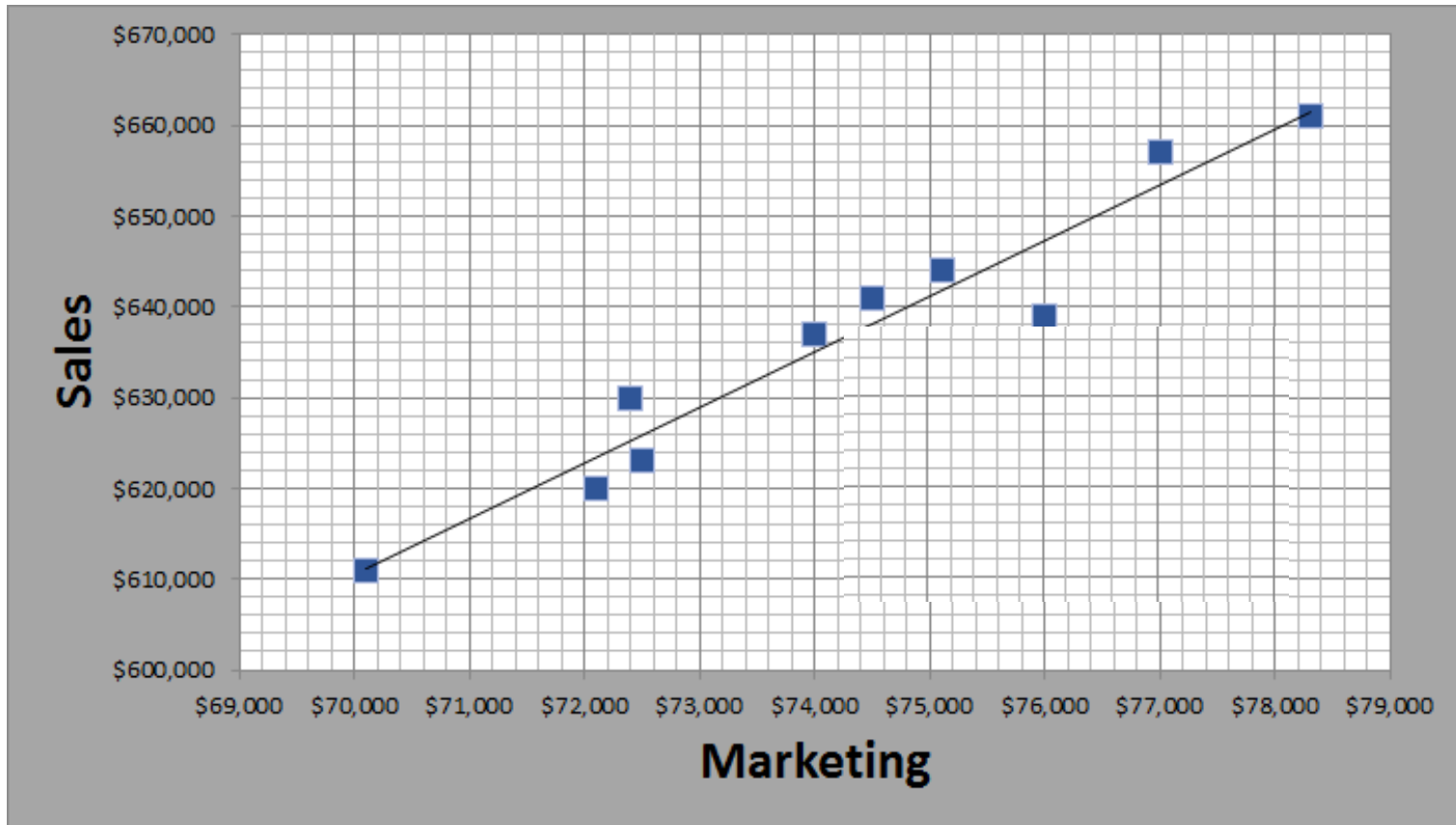
SQL Query Engine and OLAP Specification Extensions

Year/Quarter	Marketing	Sales
2014 Q1	\$70,100	\$611,000
2014 Q2	\$77,000	\$657,000
2014 Q3	\$72,100	\$620,000
2014 Q4	\$72,500	\$623,000
2015 Q1	\$78,300	\$661,000
2015 Q2	\$74,500	\$641,000
2015 Q3	\$74,000	\$637,000
2015 Q4	\$72,400	\$630,000
2016 Q1	\$75,100	\$644,000
2016 Q2	\$76,000	\$639,000

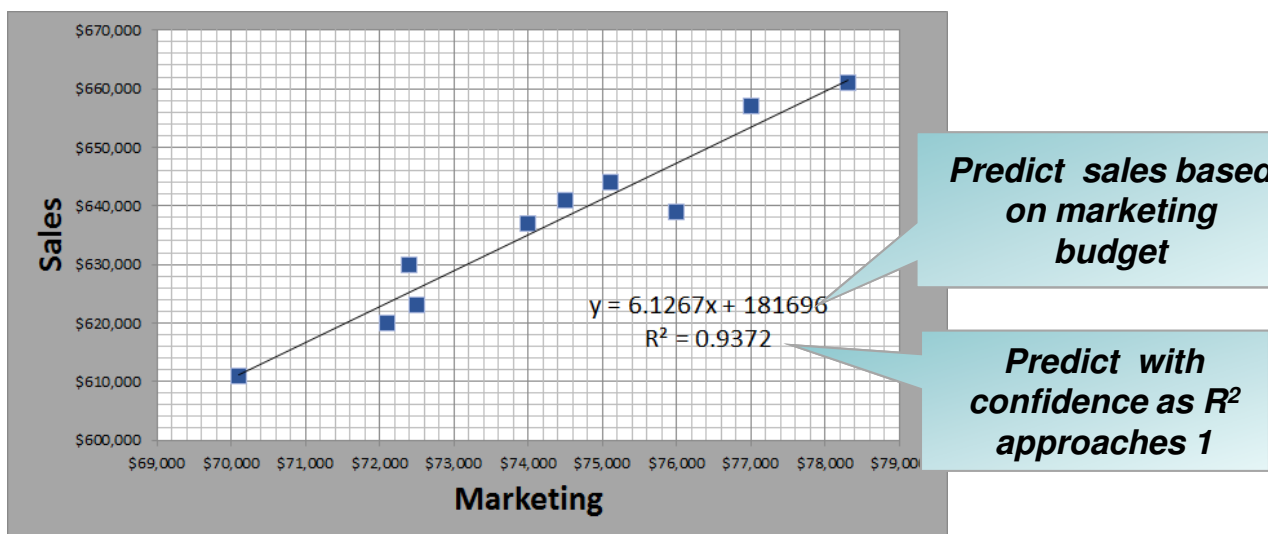
Business questions – Math versions:

- Is there a correlation between the amount spent on marketing and sales for a product?
- Is the correlation weak or strong?
- Can we predict sales based on the amount spent on marketing?

We have the data; how do we answer the question?



SQL Query Engine and OLAP Specification Extensions



Business results:

- `SELECT REGR_SLOPE (sales, mktg), REGR_INTERCEPT (sales, mktg)
FROM salesdata ;`
- `SELECT POWER (CORRELATION (sales, mktg), 2)
FROM salesdata ;`

SQL Query Engine and OLAP Specification Extensions – part 1

Option	Description
CORRELATION	Returns the coefficient of correlation of a set of number pairs
COVARIANCE	Returns the (population) covariance of a set of number pairs..
COVARIANCE_SAMP	Returns function returns the unbiased sample covariance (n-1) of a set of number pairs.
PERCENTILE_CONT	Is an inverse distribution function that assumes a continuous distribution model. It takes a percentile value and a sort specification, and returns an interpolated value that would fall into that percentile value with respect to the sort specification.
PERCENTILE_DISC	Is an inverse distribution function that assumes a discrete distribution model. It takes a percentile value and a sort specification and returns an element from the set.
MEDIAN	Takes a numeric or datetime value and returns the middle value or an interpolated value that would be the middle value once the values are sorted. Median is a form of PERCENTFILE_CONT.

i4HiFashion – The World’s Source for Fashion – and More!



New Business Requirements

- Learn from history
- Ask new kinds of questions
- ★ Ensure intelligent security
- Know who did what and when

Ensure Intelligent Security



Business reality:

- Good security policy dictates what authorities ***should be***.
- Excess authority can negate security intent.
- Yet excess authority is often granted.
- Determining the authority currently being used can be difficult or impossible.

Ensure Intelligent Security



Business questions:

- Do my employees have more authority than they need?
- What authority do they currently have?
- What authority do they really need to do their jobs?

Solution: Authority Collection

A utility that captures pertinent data associated with an authority check

- Covers all native IBM i file systems
- Capture unique instances of the authority check



The collection will include one key piece of information...

“What authority does the OS require for this authority check?”

Authority Collection Usage Overview

- Turn on the authority collection for a given user
 - or set of users
- Collect authority info for the user
- Examine the results via SQL or Navigator



How to Use Authority Collection

Four Basic commands

- Focus the search to limit data
 - Users, Libraries, Objects, Object Types, File System Objects, ...
 - Exclude OS Programs, internal objects, ...

- Discover
 - Authority being used
 - Source of that authority
 - Minimum authority required to get the job done

- Authority Collection
 - Start Authority Collection
 - End Authority Collection
 - Display Authority Collection
 - Delete Authority Collection

Start Authority Collection

Start Authority Collection

User:	<input style="width: 150px;" type="text" value="TLK"/>
Libraries to search:	<input style="width: 150px;" type="text" value="None"/>
Objects to search:	<input style="width: 150px;" type="text" value="All"/>
Object types:	<input style="width: 150px;" type="text" value="All"/>

Authority Collection – Interrogate the collected data

Leverage Navigator to do **basic** data investigation

Welcome x Users x Display Authority Collection - Tlk x

Display Authority Collection - Ut28p09.rch.stglabs.ibm.com

Authorization Name	Check Timestamp	System Object Name	System Object Library	System Object Type	Required Authority	Current Authority	Auth
No filter applied							
Tlk	2015-08-17 11:41:48	Qmsf	QSYS	*USRPRF	*ALL	*ALL	U
Tlk	2015-08-17 11:41:48	Qmsf	QSYS	*USRPRF		*ALL	U
Tlk	2015-08-17 11:42:03	Syslimtbl	QSYS2	*FILE		*ALL	U

Use SQL to get more details

```

16
17 SELECT SYSTEM_OBJECT_NAME, DETAILED_REQUIRED_AUTHORITY, DETAILED_CURRENT_AUTHORITY FROM QSYS2.AUTHORITY_COLLECTION A
18 WHERE AUTHORIZATION_NAME = 'SCOTT' AND SYSTEM_OBJECT_SCHEMA = 'TOYSTORE'
19 GROUP BY SYSTEM_OBJECT_NAME, DETAILED_REQUIRED_AUTHORITY, DETAILED_CURRENT_AUTHORITY
20 ORDER BY 1,2,3;
21

```

PLUS Vendor Tools are being created.

IT / Application Questions Related to Authority

- Does User 'Joe' really need to have *ALLOBJ to run an application?
- All my objects have PUBLIC *ALL authority! Is it needed?
- What is the minimum authority required on the objects it uses for the application to work correctly?
- We have little detailed knowledge of the applications... where is the data?
 - Yes, the data is in Db2 and/or IFS ... **but where?**




i4HiFashion – The World’s Source for Fashion – and More!



New Business Requirements

- Learn from history
- Ask new kinds of questions
- Ensure intelligent security

 Know who did what and when

Know Who Did What and When – Db2 Generated Columns



Business questions:

- When was this row last updated?
- Who did it?
- From which IP address?

Enhanced data-centric auditing – with generated columns

- **Generated columns direct Db2 to capture detail in each row**
 - When was this row last updated? (existing *row-change-timestamp-clause*)
 - Generated expressions (**New in IBM i 7.3**)
- **Generated expressions include:**
 - DATA CHANGE OPERATION (I/U/D)
 - Special register
 - Built-in Global Variable

Enhanced data-centric auditing – with generated columns

ALTER TABLE FACT_table

★ ADD COLUMN audit_type_change CHAR (1)
GENERATED ALWAYS AS (**DATA CHANGE OPERATION**)

★ ADD COLUMN audit_user VARCHAR(128)
GENERATED ALWAYS AS (**SESSION_USER**)

★ ADD COLUMN audit_client_IP VARCHAR(128)
GENERATED ALWAYS AS (**SYSIBM.CLIENT_IPADDR**)

ADD COLUMN audit_job_name VARCHAR(28)
GENERATED ALWAYS AS (**QSYS2.JOB_NAME**)

```
special-register
|---+CURRENT CLIENT ACCTNG-----+
  +CURRENT CLIENT APPLNAME-----+
  +CURRENT CLIENT PROGRAMID-----+
  +CURRENT CLIENT USERID-----+
  +CURRENT CLIENT WRKSTNNAME-----+
  +CURRENT SERVER-----+
  '+-+SESSION USER+-----+'
    '-USER-----'
```

```
built-in-global-variable
|---+QSYS2.JOB_NAME-----+
  +QSYS2.SERVER_MODE_JOB_NAME-----+
  +SYSIBM.CLIENT_HOST-----+
  +SYSIBM.CLIENT_IPADDR-----+
  +SYSIBM.CLIENT_PORT-----+
  +SYSIBM.PACKAGE_NAME-----+
  +SYSIBM.PACKAGE_SCHEMA-----+
  +SYSIBM.PACKAGE_VERSION-----+
  +SYSIBM.ROUTINE_SCHEMA-----+
  +SYSIBM.ROUTINE_SPECIFIC_NAME-----+
  '-SYSIBM.ROUTINE_TYPE-----'
```

IBM i 7.3 Networking Security Enhancement

Network Auditing Enhancements (New QAUDLVL values)



- *NETTELSVR
 - Generate audit records for Telnet Server TCP connections.
- *NETUDP
 - Generate audit records for inbound and outbound UDP packets.
- *NETSECURE
 - Generate audit records for successful and failed System SSL handshakes.
 - Generate audit records for successful VPN negotiations.
 - Generate audit records for IPsec.

i4HiFashion – Infrastructure Requirements



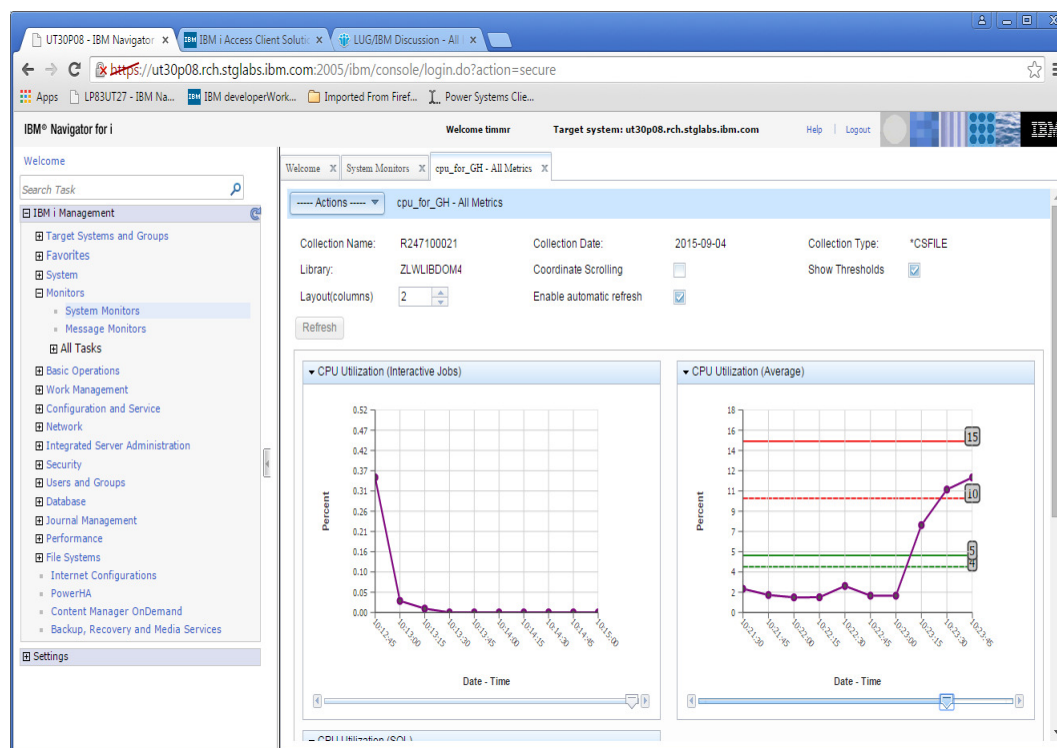
Operating an infrastructure means

- Monitoring performance easily
- Learning from (performance) history
- Identifying top resource consumers
- Access from anywhere

Visualize Performance Metrics in Navigator

Navigator

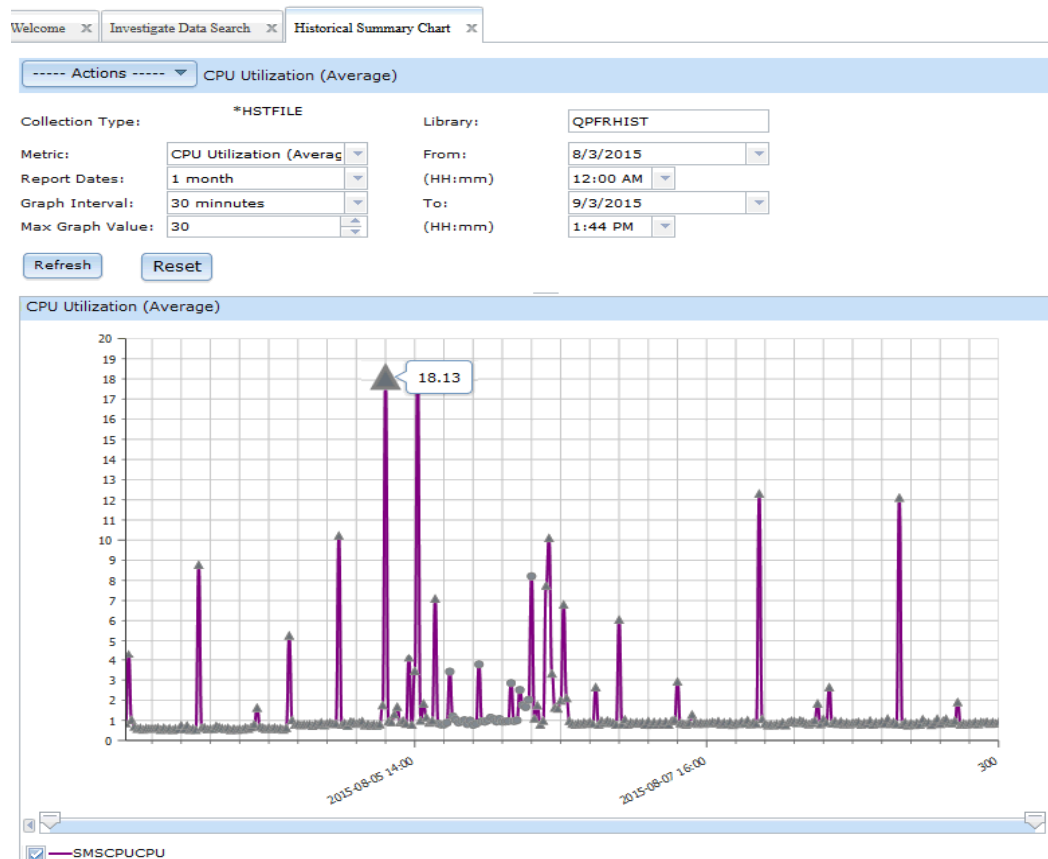
- Monitor Performance Metrics
- Set Thresholds to take actions
- Visualize the collected results
- View Many Metrics at Once



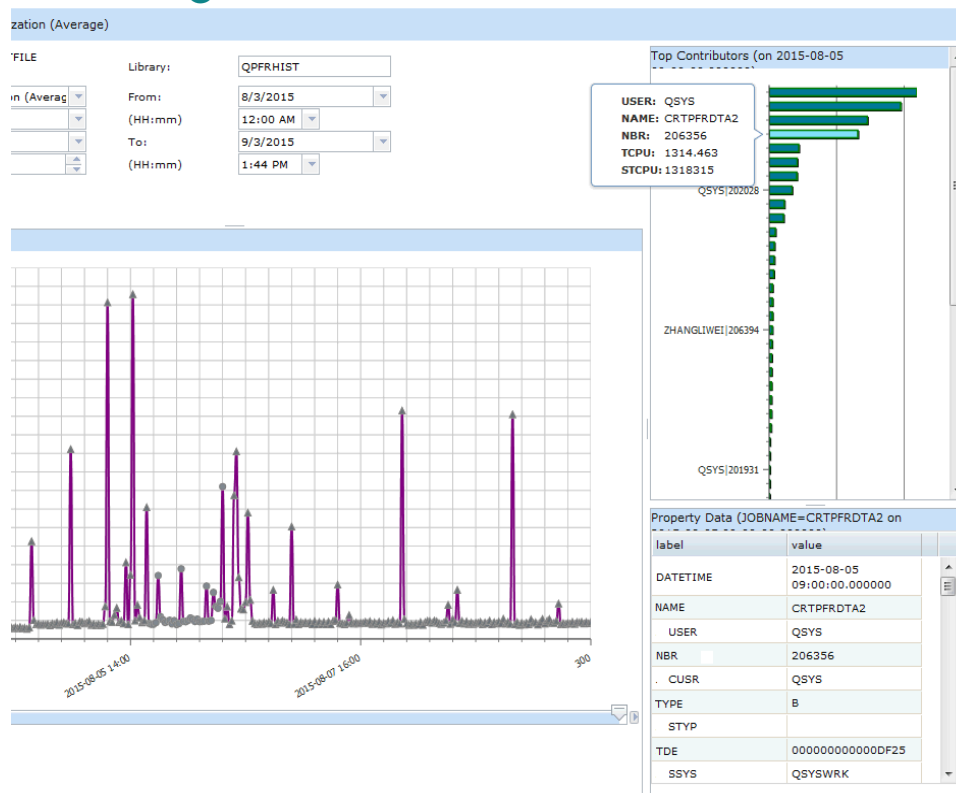
Understand the Past – View Historical Performance Data

Navigator

- View key performance metrics consolidated over long time intervals
- Weeks, Months, Years
- CPU, Disk Utilization



Monitor Your System– Visualize Performance Metrics in Navigator



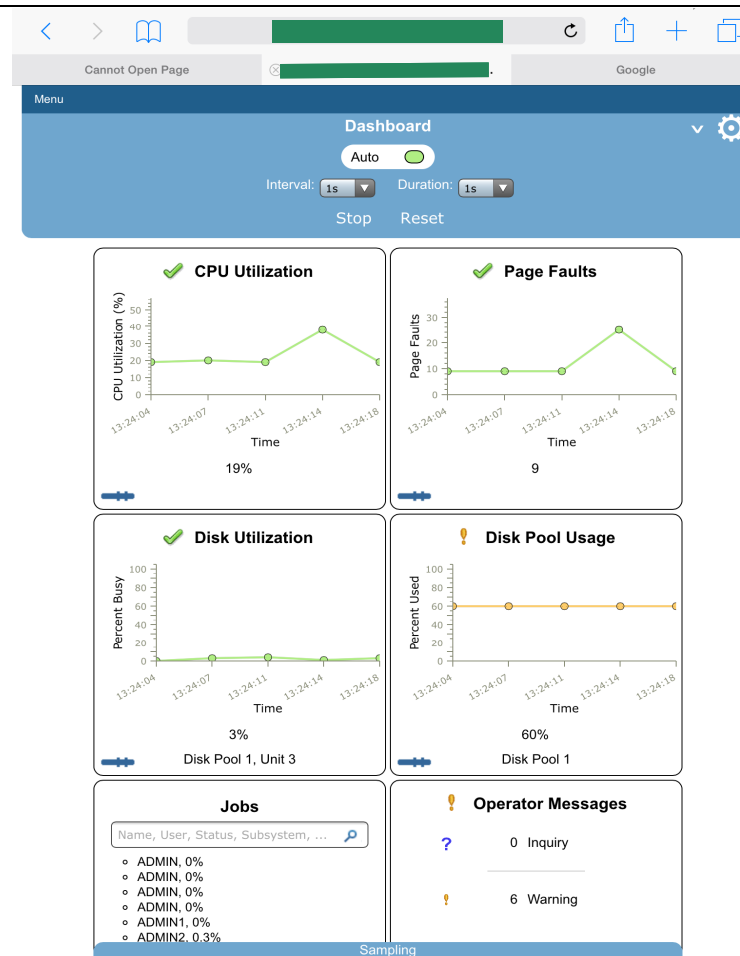
Navigator – Historical View

- Click to see the top resource consumers.
- Detailed information about all top consumers.
- Advanced information about the selected top consumer.

Mobile Dashboard

iAccess Mobile

- Watch several Key Metrics with 'Live' data
- Set thresholds to quickly visualize issues on your system
- Watch from your favorite Mobile Device
 - Phone
 - Tablet
- Visual notification when a threshold is exceeded



i4HiFashion – Productivity Requirements



Productivity means

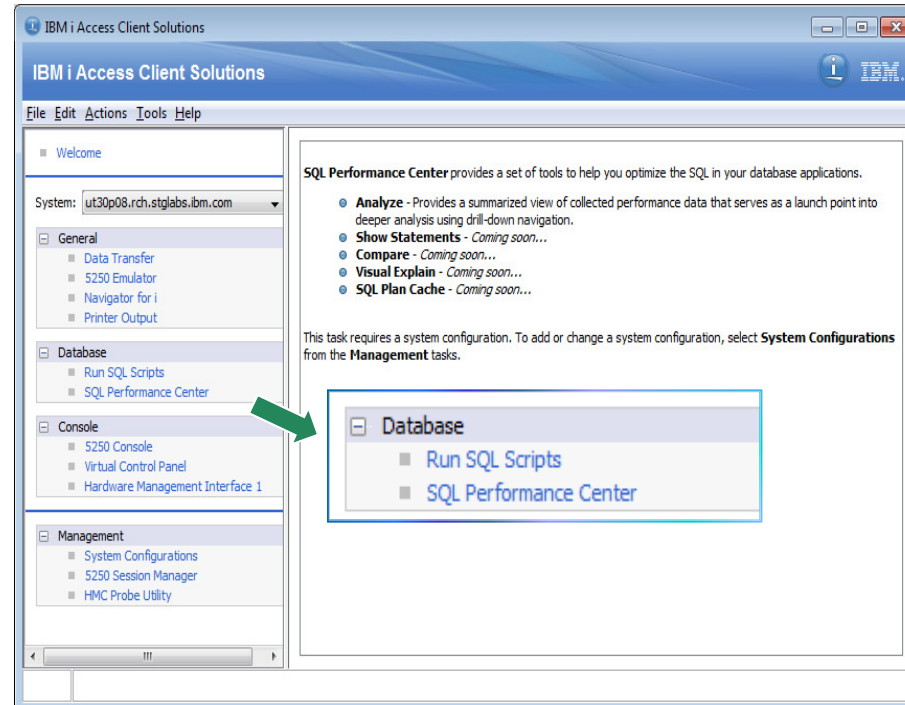
- Mobile, Web, Windows & Linux devices
- Quick answers with SQL Scripts
- Managing Availability – BRMS & PowerHA
- Live Data Dashboards – Db2 WebQuery

Manage and Access your System



Access Client Solution – 5733XJ1

- Run SQL Scripts
- SQL Performance Center
- Direct Connect to Navigator
- Improved 5250 Emulator
- Full Windows 10 Support
 - Plus Mac & Linux



Access Client Solutions Product Page

<http://www-03.ibm.com/systems/power/software/i/access/solutions.html>

IBM Systems > Power Systems > Software > IBM i >

IBM i Access

Overview | Client Solutions | Windows | Linux | Web | Mobile

Overview | Support | Resources

IBM i Access Client Solutions is the newest member of the IBM i Access family. It provides a Java based, platform-independent interface that runs on most operating systems that support Java, including Linux, Mac, and Windows™.

IBM i Access Client Solutions consolidates the most commonly used tasks for managing your IBM i into one simplified location. The latest version of IBM i Access Client Solutions is available to customers with an IBM i software maintenance contract.

[→ Download IBM i Access Client Solutions base package](#)

[→ QuickStartGuide](#)


[→ GettingStarted](#)

[↓ Updates](#)

Access videos

- [Introduction to IBM i Access Client Solutions \(00:01:17\)](#)
- [All IBM i Access videos](#)

Contact IBM

 **Call IBM Support Line:**
1-800-IBM-SERV (1-800-426-7378)
Inside the US

[→ IBM Software Support Guide](#)
Outside the US

[→ IBM Support Service Requests](#)
Manage incidents electronically with IBM support

Browse Power Systems

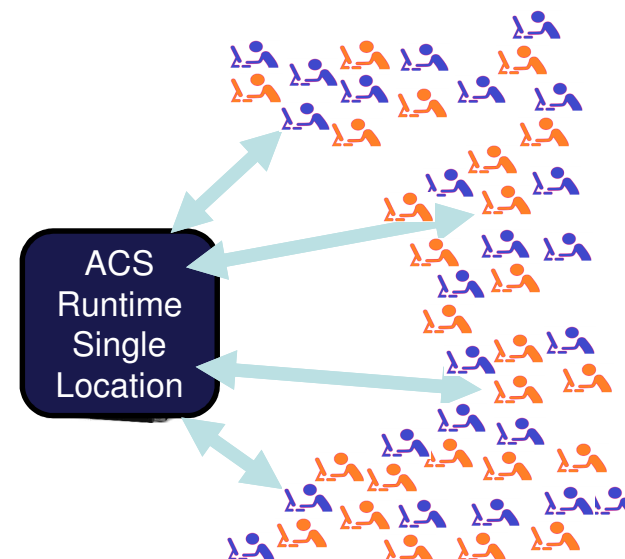
- Hardware
- Operating systems
- System software
- Solutions
- Migrate to Power
- Advantages

No ESS!!! Download direct from the Web site!!!

Central System Deployment

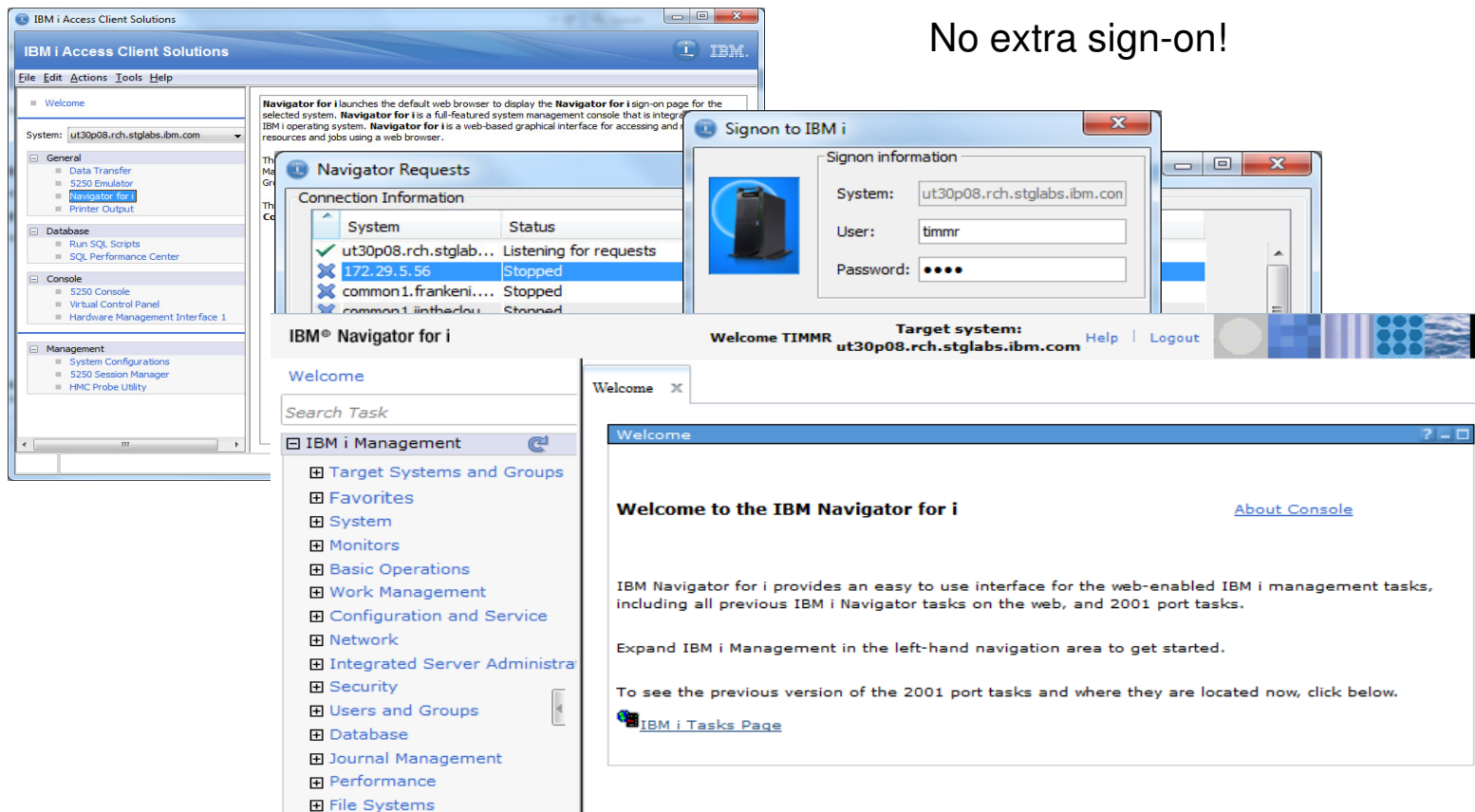
New Deployment Wizard to Simplify and Improve ACS Deploy

- Administrator Options for Multi User Deployment
- Create Desktop Shortcut to Runtime location
 - Local or Network location
- Create File Associations
 - Old .ws files
 - New .hod files
 - Data Transfer
- Customization of Available Function
 - Control what functions display



ACS & Navigator

No extra sign-on!



The screenshot displays the IBM i Access Client Solutions (ACS) interface. On the left, the 'Welcome' page shows the system 'ut30p08.rch.stglabs.ibm.com' and a navigation tree with categories like General, Database, Console, and Management. A 'Navigator Requests' window is open, showing a table of connection information:

System	Status
ut30p08.rch.stglab...	Listening for requests
172.29.5.56	Stopped
common1.frankeni...	Stopped
common1.iintheadou...	Stopped

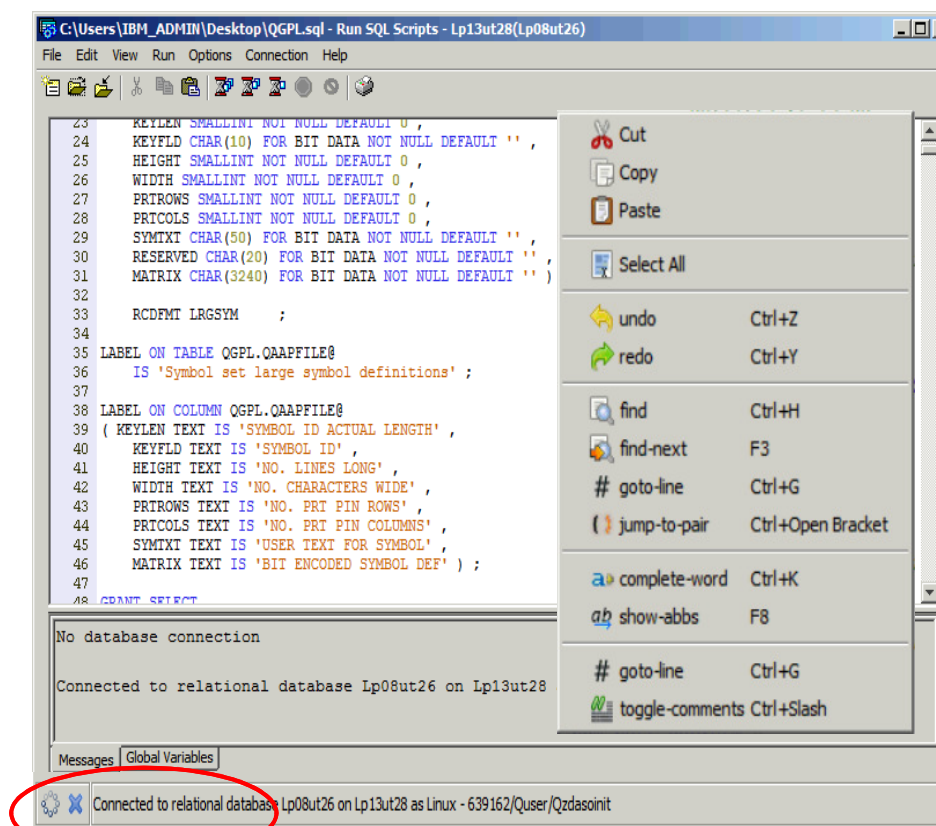
A 'Signon to IBM i' dialog box is overlaid, showing the 'Signon information' for the selected system: 'ut30p08.rch.stglabs.ibm.com', user 'timmr', and a masked password. Below this, the 'IBM® Navigator for i' interface is shown, featuring a 'Welcome TIMMR' message and a 'Target system: ut30p08.rch.stglabs.ibm.com' header. The main content area displays a 'Welcome to the IBM Navigator for i' message with an 'About Console' link and instructions on how to use the interface.

Work with Your Data

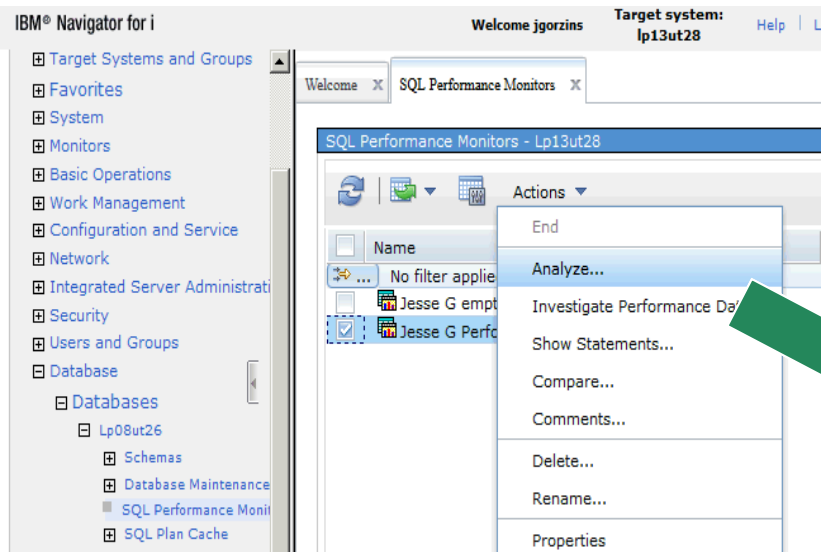
Works on Windows, Mac & Linux!!!

Run SQL Scripts

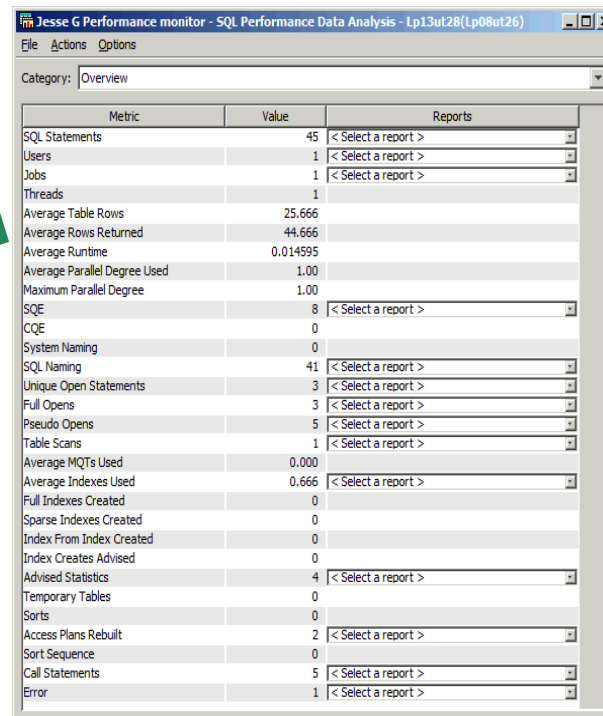
- Faster Startup Time
- Line Numbers
- Highlighting
- Color Coding
- Improved Usability
- Status Bar
- Stop Runaway Queries
- Find (supports Regex)
- Lots of Editor features
- Save Results .xlsx



Work with Your Data – SQL Performance Center



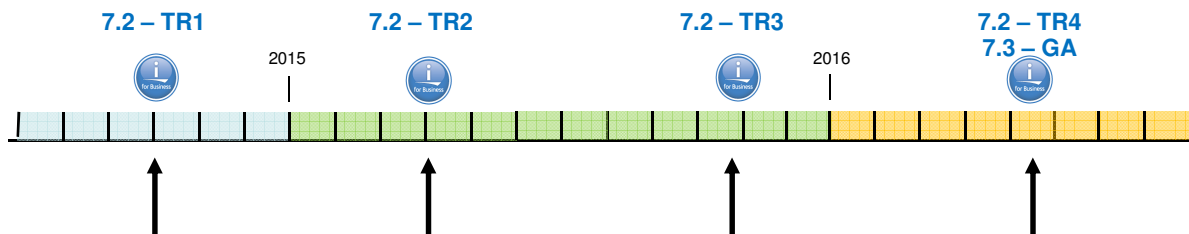
Navigator and ACS Working together



Metric	Value	Reports
SQL Statements	45	< Select a report >
Users	1	< Select a report >
Jobs	1	< Select a report >
Threads	1	
Average Table Rows	25.666	
Average Rows Returned	44.666	
Average Runtime	0.014595	
Average Parallel Degree Used	1.00	
Maximum Parallel Degree	1.00	
SQE	8	< Select a report >
CQE	0	
System Naming	0	
SQL Naming	41	< Select a report >
Unique Open Statements	3	< Select a report >
Full Opens	3	< Select a report >
Pseudo Opens	5	< Select a report >
Table Scans	1	< Select a report >
Average MQTs Used	0.000	
Average Indexes Used	0.666	< Select a report >
Full Indexes Created	0	
Sparse Indexes Created	0	
Index From Index Created	0	
Index Creates Advised	0	
Advised Statistics	4	< Select a report >
Temporary Tables	0	
Sorts	0	
Access Plans Rebuilt	2	< Select a report >
Sort Sequence	0	
Call Statements	5	< Select a report >
Error	1	< Select a report >

SQL Performance Center
Understand how your SQL is running
Tune your SQL to run better

IBM i Services for SQL users



Services in 2014:

- JOURNAL_INFO
- LIBRARY_LIST_INFO
- REPLY_LIST_INFO
- JOBLIST_INFO()
- SYSTMPSTG (7.2)
- Db2 for i built-in Global Variables (7.2)
- JOB_NAME (7.2)
- SERVER_MODE_JOB_NAME (7.2)
- SYSTOOLS.GROUP_PTF_CURRENT

Services in 2Q/2015:

- ACTIVE_JOB_INFO()
- SCHEDULED_JOB_INFO
- SERVER_SBS_ROUTING
- SET_SERVER_SBS_ROUTING()
- DRDA_AUTHENTICATION_ENTRY_INF
- JVM_INFO
- SET_JVM()

Services in 4Q/2015:

- MEMORY_POOL_INFO
- SYSTEM_STATUS_INFO
- LICENSE_INFO
- OBJECT_LOCK_INFO
- RECORD_LOCK_INFO
- OUTPUT_QUEUE_ENTRIES
- MEDIA_LIBRARY_INFO
- NETSTAT_INFO
- NETSTAT_JOB_INFO
- NETSTAT_INTERFACE_INFO
- NETSTAT_ROUTE_INFO
- SYSTOOLS.GROUP_PTF_DETAILS

Services in 2Q/2016:

- **OUTPUT_QUEUE_INFO**
- **ENVIRONMENT_VARIABLE_INFO**
- **SERVICES_INFO**
- **Services & SQL dependency management**
- **Enhanced NETSTAT services**
- **Enhanced SET_SERVER_SBS_ROUTING()**
- **Enhanced System Limits**
- **Enhanced DISPLAY_JOURNAL()**
- **Enhanced OBJECT_STATISTICS (7.3 only)**

<http://ibm.biz/Db2foriServices>

BRMS 7.3 Enhancements

- BRMS Web Client
 - Multi-task navigational tree added to the main panel

- BRMS Server
 - Modernization of Storage Tiering using BRMS Migration
 - IFS lists supported
 - Movement back and forth between SSD & HDD tiers
 - I-ASP support
 - Including help text



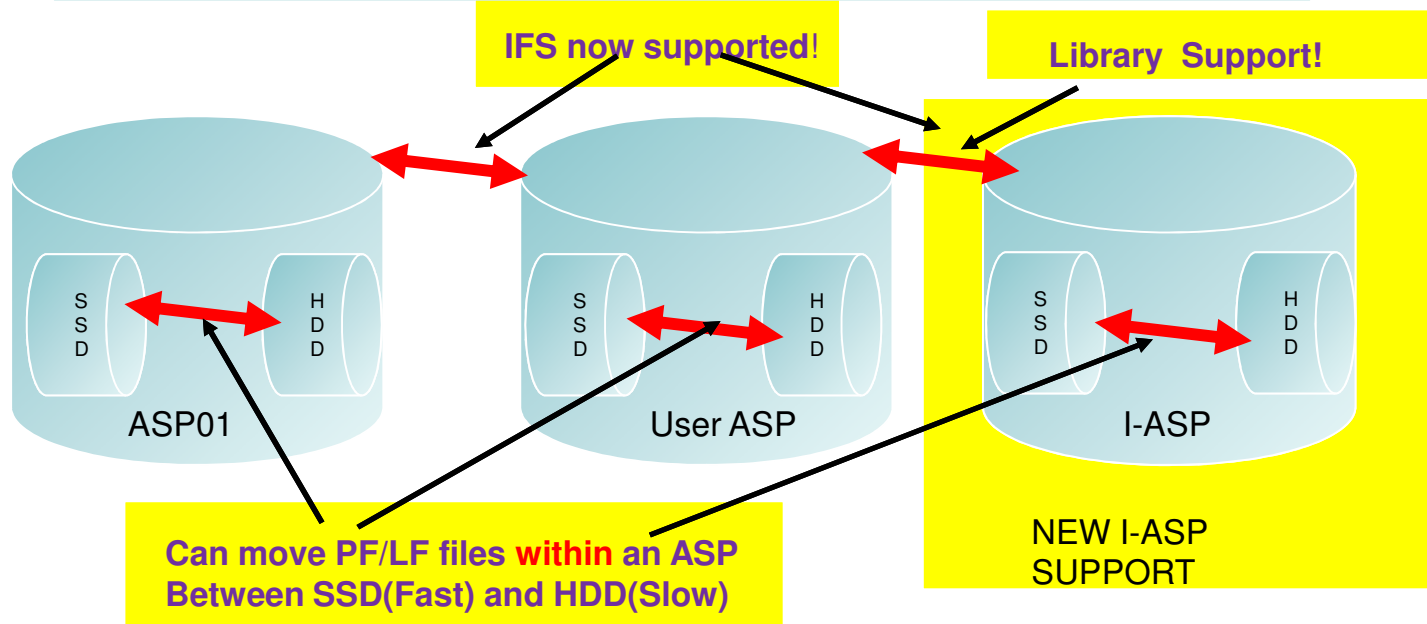
Example of the multi-task navigation in 7.3

7.3

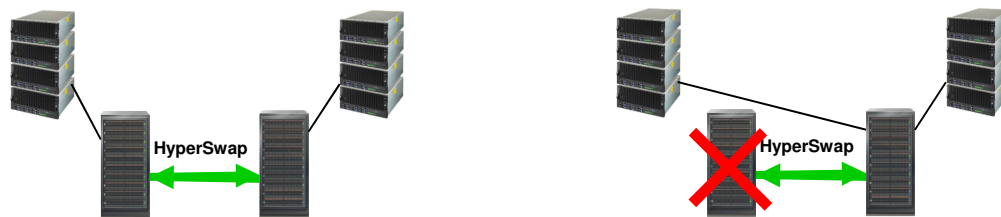
- Internet Configurations
- PowerHA
- ☐ Backup, Recovery and Media Services
 - Enterprise Services
 - Archive Control Groups
 - Backup Control Groups
 - Media Policies
 - Move Policies
 - Volumes
 - Media Pools
 - Tasks

More efficient access to a specific BRMS function.

Leveraging SSDs and IASPs with BRMS Migration



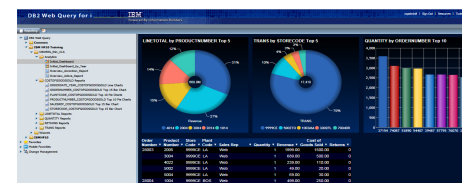
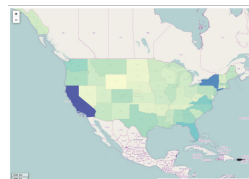
PowerHA for i – HyperSwap for DS8000 IASPs



- IASP replication plus HyperSwap
- HyperSwap for 'near-zero' downtime storage planned and unplanned outages
- PowerHA vary off/on of IASP for OS planned/unplanned outage, disaster recovery
- Available via 7.2 PTF --- PowerHA skip-shipping 7.3

Db2 Web Query for i Family

- Take Reports and Dashboards Mobile
- Geographical Mapping Capabilities
- Jump Start Reports and Dashboards with *Wizard Analytics*
- DataMigrator ETL Automates Data Replication/Transformation
- Version 2.2 Adds Additional Data Sources (Oracle, MySQL, etc.) and much more!



"Db2 Web Query is putting a modern face on our data and our analysts love it. It is the best way to provide BI on a budget."



Les Turner / Warehouse Architect & Developer
 David Parsons / I.T. Director
 Manhattan Insurance Group Houston, Texas

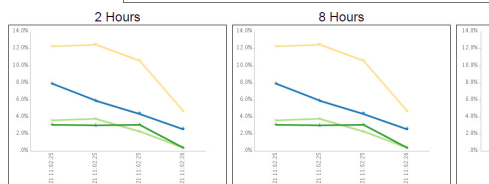
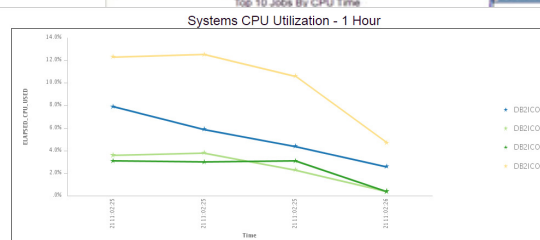
Db2 Web Query Update: Version 2.2
 Announce 4/12/16; GA 4/15/16
 Required version for IBM i 7.3

Db2 Web Query for the System Administrator

- A dozen or so sample Db2 Web Query reports and dashboards shipped with EZ-Install
- Built over IBM i SQL Services
 - Best to be at 7.2 or up
- Utilization and/or Top xx in nature
- Can use out of the box or edit/add using the as samples
- System Utilization across multiple LPARs
 - Auto Refresh
- Top Jobs by CPU or I/O or Temp Storage
- PTF Currency Report

System(s) Status

Host Name	Total Jobs in System	Active Jobs in System	Interactive Jobs in System	Active Threads in System	Elapsed Time	Current CPU Used	Current CPU Capacity	Average CPU Utilization	Minimum CPU Utilization	Maximum CPU Utilization	System Storage	Total Auxiliary Storage	System ASP Used	Current Temporary Storage	Maximum Temporary Storage
DB2COE1	585	190	.00	632	1	.10	2.00	.07	.00	11.00	1488922	1488922	76.59	4706	47
DB2COE2	4988	244	.00	1082	1	.30	2.00	.16	.00	11.00	954437	954437	44.66	8568	87
DB2COE3	5321	296	.00	1176	1	.10	4.00	.23	.00	.32	8242936	8242936	20.14	8358	95
DB2COE4	2184	241	.00	888	1	3.70	2.00	.58	.00	.32	8242936	8242936	9.00	6811	68



PTF Currency Report

Status	PTF Group ID	PTF Name	Installed Level	Level Available	Date of Last IBM Update
UPDATE AVAILABLE	SF90364	710 WebSphere App Server V8.1	9	9	09/09/2013
UPDATE AVAILABLE	SF90480	720 WebSphere App Server V8.0	6	6	02/01/2016
UPDATE AVAILABLE	SF98637	710 DB2 Web Query for IBM i V1.1.2	9	9	12/12/2013
UPDATE AVAILABLE	SF99747	720 DB2 Web Query for iV2.1.0	14	14	03/30/2016
UPDATE AVAILABLE	SF99766	720 Print PTFs	3	3	01/07/2015
UPDATE AVAILABLE	SF99145	710 Performance Tools	9	11	05/17/2016
UPDATE AVAILABLE	SF99363	710 WebSphere App Server V7.0	16	19	04/11/2016
UPDATE AVAILABLE	SF99366	710 Print PTFs	8	12	01/07/2015
UPDATE AVAILABLE	SF99369	710 IBM HTTP Server for i	37	42	07/01/2016
UPDATE AVAILABLE	SF99366	710 IBM i Integration with BladeCenter and System x	13	16	12/16/2014
UPDATE AVAILABLE	SF99380	710 WebSphere App Server V8.0	11	15	02/01/2016
UPDATE AVAILABLE	SF99381	710 WebSphere App Server V8.5	10	16	08/14/2016
UPDATE AVAILABLE	SF94481	720 WebSphere App Server V8.5	8	9	06/14/2016
UPDATE AVAILABLE	SF96647	710 DB2 Web Query for iV2.1.0	13	14	03/30/2016
UPDATE AVAILABLE	SF96658	720 DB2 Web Query for iV2.1.1	2	3	03/30/2016
UPDATE AVAILABLE	SF99701	710 DB2 for IBM i	38	40	04/30/2016
UPDATE AVAILABLE	SF99702	720 DB2 for IBM i	12	13	07/14/2016
UPDATE AVAILABLE	SF96710	Current Cumulative PTF Media Documentation	14288	16120	05/19/2016
UPDATE AVAILABLE	SF99715	720 IBM HTTP Server for i	15	16	07/01/2016
UPDATE AVAILABLE	SF99714	720 Performance Tools	2	4	05/17/2016
UPDATE AVAILABLE	SF99716	720 Java	9	10	06/21/2016
UPDATE AVAILABLE	SF99717	720 Technology Refresh	3	4	05/19/2016
UPDATE AVAILABLE	SF99718	720 Group Security	29	36	08/09/2016
UPDATE AVAILABLE	SF99719	720 Group Pipel	60	71	08/23/2016
UPDATE AVAILABLE	SF99720	Current Cumulative PTF Media Documentation	15311	16127	05/20/2016
UPDATE AVAILABLE	SF99787	720 T20 TCP/IP PTF	2	3	06/25/2016
UPDATE AVAILABLE	SF99775	720 Hardware and Related PTFs	14	17	04/25/2016
UPDATE AVAILABLE	SF99776	720 High Availability for IBM i	3	5	07/22/2016

28 August, 2016 at 15:29:31

Try It and Buy It

- Point customers to ibm.biz/db2wqezinstall-info for more information
- To request the package, send email to QU2@us.ibm.com
 - Include:
 - Name
 - Company Name
 - Serial Number of system where this will be installed



Db2 Web Query Update: Version 2.2



- **Db2 Web Query (5733-WQx) enhancements just keep on coming!**
 - New Version 2.2 : Announce 4/12, GA 4/15
 - No charge upgrade from previous versions (with SW Maintenance)
 - New orders will get V2.2. Upgrade from any previous Db2 Web Query version
 - **Required for IBM i 7.3!!**
 - Supports all IBM i 7.x releases
 - Previous versions of Web Query are not supported on IBM i 7.3
 - Note: Support for V1.1 ends in September 2016
- **Expands Heterogeneous database access**
 - Support for MySQL, Postgres, or generic JDBC Driver to get data from Oracle and others
 - Requires Db2 Web Query Standard Edition
- **New Developer Workbench Client**
 - No charge upgrade for licensed owners
 - Many new usability enhancements for working with meta data, dashboards or BI Applications
- **Responsive Dashboards**
 - Auto adjust dashboard views based on window size or perspective
 - Target specific browsers for testing to eliminate surprises
 - Design for MOBILE devices with new Mobile Layout canvas and enhancements
- **Learn More about Why upgrade to Version 2 at <https://ibm.biz/Bd4dbK>**

Utilizing Db2 Web Query has taken my company out of the green screen “stone ages”. We’re able to provide real-time data on different outputs to our clients. I am thrilled to use the Map feature and cannot wait to integrate this to our site.
 – Emerald Ganpath, USW Dealer Solutions

One of our biggest uses of WebQuery is for customer history reports. These can now be handled by our clerks right at our point-of-sale. No need for customers to contact our office and wait to be mailed a printout. This has saved many hours for our office staff!
 – Teri James, Stillwater Mill

Db2 Web Query Update: Data Migrator ETL Extension

▪ DataMigrator ETL (Extract, Transform, Load) Tool

- Db2 Web Query family product (5733-WQM)
- Replicate data, build data warehouses, data marts, or for analytics
- Data Replication supports both Journal Receivers and SQL processes
- Data transforms, data profiling, job scheduling built in

▪ NEW with V2.2



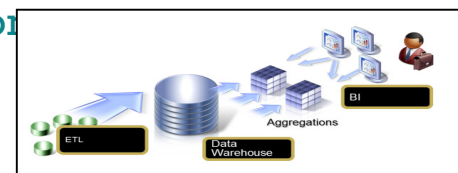
- Support for MySQL, Postgres, or generic JDBC for others (e.g., Oracle)
 - Requires Db2 Web Query Standard Edition

▪ Why?

- Consolidate data from multiple systems/databases
- Isolate and optimize analytics workloads from production systems
- Cleanse and transform data for accurate, speedy, self service analytics

▪ Considerations:

- Replace sunsetted Data Propagator with DataMigrator
- Complete Data Warehouse Solution for [as low as \\$15K \(U.S. List price\)](#)
- NOTE: NOT a replacement for HA tools



"One of the biggest obstacles we have faced to providing timely reporting was in trying to glean meaningful information using Query/400 and Crystal Reports over our production data. The combination of the Db2 database in a modern data warehouse and Db2 Web Query will allow us to have instantaneous access to our data to help us detect fraud, spot trends, adapt to changes, and provide the information needed to guide the business.

Db2 Web Query is putting a modern face on our data and our analysts love it. It is the best way to provide BI on a budget. "

- Les Turner / Warehouse Architect & Developer
 David Parsons / I.T. Director
 Manhattan Insurance Group

Introducing the Db2 Web Query EZ-Install Package – The EASY Button

- An EASILY acquired, EASILY installed package of **trial** code...and more
 - A single downloadable image that you can request that includes:
 - Db2 Web Query Version 2.2 (**LATEST Group PTF Already Installed**)
 - Express and Standard Editions (job scheduling. Non Db2 database access)
 - Optionally install **Data Migrator ETL** and/or Developer Workbench
 - Sample Reports for the System Administrator
 - Db2 Web Query Auditing/Monitoring Reports
 - Query/400 Discovery Tool
 - Everything set up ready to run 14 chapters of self guided report writing tutorials
 - (we also include all the completed tutorial reports)
 - Requirements
 - 7.1 and up (7.2 or 7.3 preferred for the System Administrator reports)
 - 70 Day Trial Period. Apply License Keys to get permanent usage



i4HiFashion – Application Development Requirements



Applications enable business transformation

- Existing applications need enhancement
- New solutions require new languages
- Talent pool has diverse skills
- Traditional and Open Source required
- Need efficient development tools

Modern RPG

- Full Free Format Language
- Removal of the 8-80 column restriction
- Major enhancement to Rational Developer for i

Open Source

- Latest Zend PHP engine
- Node.JS, Python, gcc
- And more!



RPG IV - A Modern Business Language

- Interoperability
 - Java
 - XML
 - SQL

- Readability
 - Free form
 - Blank lines
 - Comments

- Functionality
 - Procedures
 - Data areas
 - Data structures
 - More data types
 - Extended file support

- Modern Tools
 - RD i, RTC, ARCAD Power Pack

Free format C specs

```

read file;                // Get next record
dow not %eof(file);      // Keep looping with record
  if %error;
    dsply 'The read failed';
    leave;
  else;
    chain(n) name database data;
    time = hours * num_employees
           + overtime_saved;
    pos = %scan (',' : name);
    name = %xlate(upper : lower : name);
    exsr handle_record;
    read file;
  endif;
enddo;
begsr handle_record;
  eval(h) time = time + total_hours_array (empno);
  temp_hours = total_hours - excess_hours;
  record_transaction();
endsr;
    
```

Remove 8-80 Column Restriction

Without Free-Form column 1-8 are reserved (goes back to the punch card days)

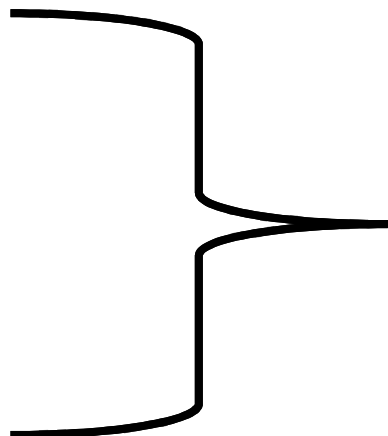
Max Column for content is 80 (again....punch card)

```
      dou wasFound;
      //Look up the custId in the file
      custName = %LOOKUP('custKey' : custArray
                        : 1
                        : %SIZE(custArray));
      custAddress = %SUBST(fullAddress :1 :50);
C     custAddress MOVEA          fullAddress
      CHAIN  custId  custFile;
      enddo;
```

- If column 1 of a source line contains '**FREE', the following lines contain free-form RPG code beginning in column 1
- If **FREE has not appeared in the source file, or if column 1 of a source line contains **END-FREE, the following lines have RPG code in columns 6 - 80. If columns 6 and 7 are blank, the code is free-form.

2016 options added to 5733OPS

- Option 1 – Node.JS 2.x
- Option 2 - Python 3.4
- Option 3 – GCC / chroot
- Option 4 – Python 2.7
- Option 5 – Node.JS 4.x
- Option 6 – Git
- Option 7 – Tools
- Option 8 – Orion
- Option 9 – cloud-init
- Option 10 – Node.JS 6.x



New

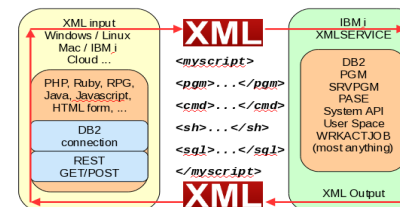


Open Source for IBM i - Runtime plus++

- FastCGI
 - Allows fast connection from HTTP server to backend PASE environment

- ILE Object Toolkit
 - Toolkit for each environment to easily allow connections to ILE objects and information – Built on XML Service

- SQL Connection for Db2 on i
 - Easy integrated (from the open source language) way to transfer data to and from Db2 for i leveraging SQL



Db2 for i

Python

Python is powerful... and fast;
plays well with others;
runs everywhere;
is friendly & easy to learn;
is Open.



- Why Python ?
 - Python is to the open source community as CL is to IBM i
 - It's the most popular scripting language in the industry
 - Taught and used by pretty much 'all' new developers
- Python V2.7 & V3

What are GCC & CHROOT?

GNU Compiler Collection

- Compilers for C & C++
- Collection of compilers, tools, build, deployment, shells, etc
- Industry standard vs the XLC currently on IBM i
- Allows the advanced user the ability to get any OS package running on IBM i without IBM intervention



CHROOT

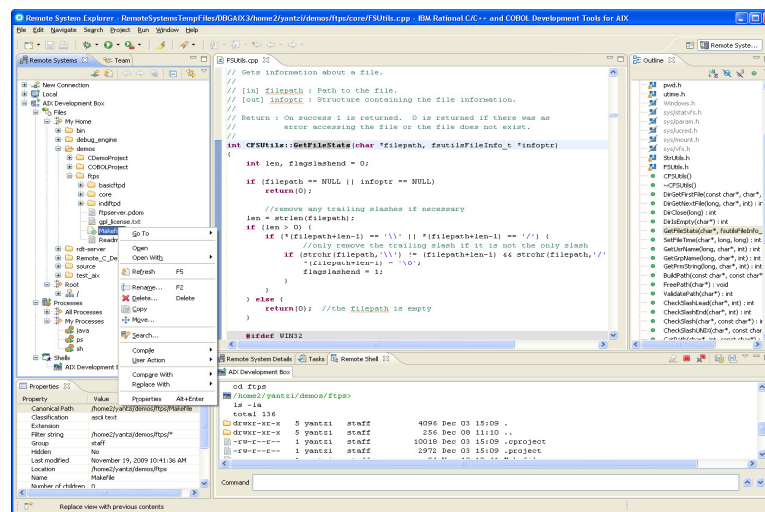
- Create a development 'sandbox'
- Ensure developers don't mess things up on the system
- Allow multiple environments to co-exist
- Provide a layer of protection

chRoot

Rational Developer for i V9.5

- Addition of a built-in 5250 emulator
- Removal of the 80 column restriction in RPG code editor
- Addition of Snippet Support in the Push-to-Client feature

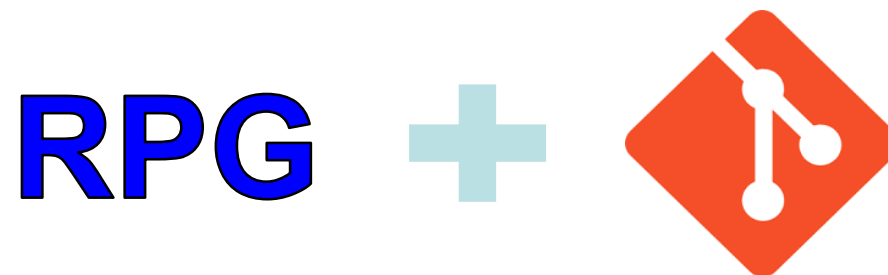
- Enhanced ability to rearrange Remote System Explorer (RSE) Filters
- Improvements to free-form RPG formatting (indentation support) in the RPG code editor
- Improved RPG Content Assist
- General improvements to code coverage analysis capabilities, significant performance improvements



Git – Source Control Management

Git

- Support RPG source stored in IFS
- Provides an alternative to other source control
- Would allow the same source control for both open source and RPG



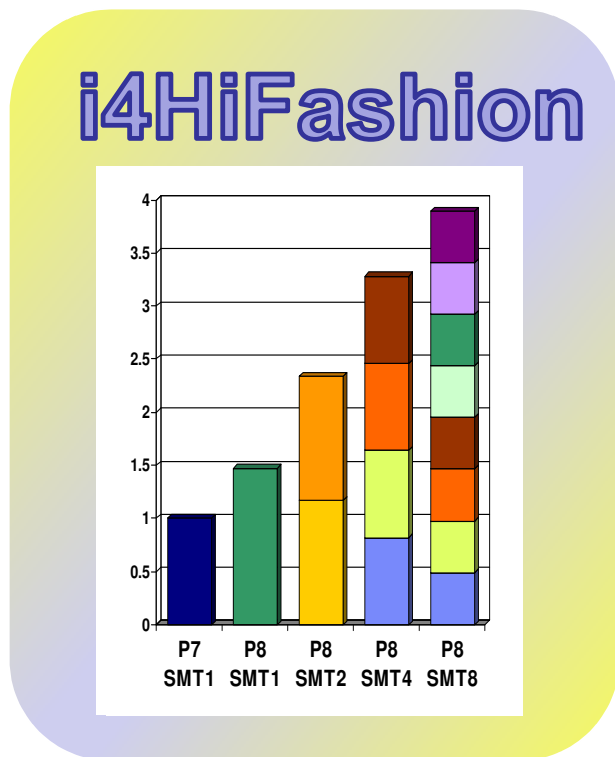
Orion - Web Based IDE

- Orion
 - Open Source Development Environment
 - Based on Eclipse
 - Browser based development environment
 - Free
 - Always there
 - Node, Python, others

- RPG ? YES!
 - Access RPG source from IFS Files



i4HiFashion – Additional Infrastructure Function from IBM i 7.3



Maximum use of system resources

- Large POWER8 capacity
- Latest Storage Options
- Latest I/O Virtualization capabilities
- Increase system limits

Raised architectural limits in IBM i 7.3

Maximum # of objects in a Library

360,000 → 1,000,000

Maximum # of parameters in a Db2 procedure

1,024 → 2,000

Maximum # of parameters in a Db2 function

1,024 → 2,000

Maximum # of return columns from a Db2 table function

1,025 → 8,000

Maximum # of members referenced in an SQL view

256 → 1,000



IBM i System Support

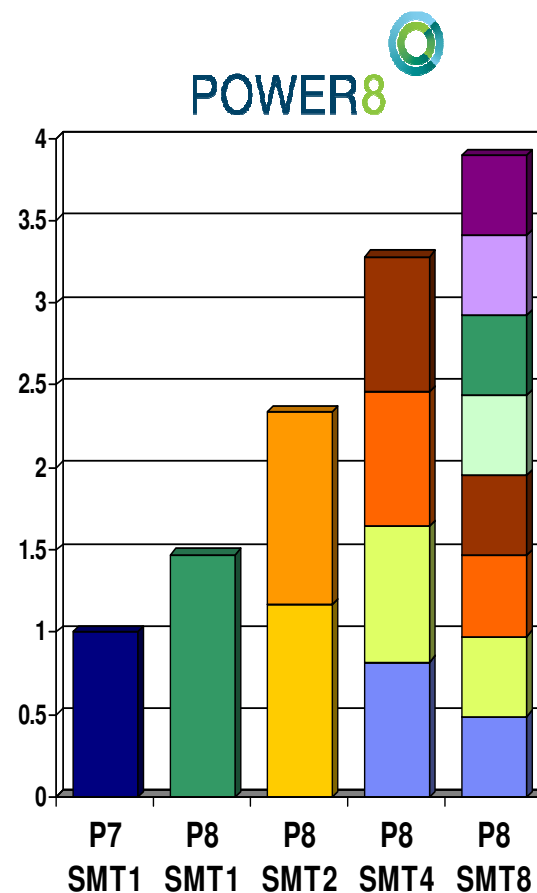
<http://www-01.ibm.com/support/docview.wss?uid=ssm1platformibmi>

Systems	IBM i 7.1	IBM i 7.2	IBM i 7.3
POWER8 S814, S822 (VIOS only), S824, E870, E880	✓	✓	✓
POWER7/7+ Servers Power 710, 720, 730, 740, 750, 760, 770, 780, 795	✓	✓	✓
POWER7/7+ Blades and Compute Nodes PS700/701/702/730/704, PureFlex p260/460	✓	✓	
POWER6+ 520, 550, 560, JS23/43 POWER6 520, 550, 570, 595, JS12/22	✓	✓ ¹	
POWER5/5+ 515, 520, 525, 550, 570, 595	✓		

Note 1 – no IOP or HSL support

POWER8 Multi-threading Options

- **SMT1:** Largest unit of execution work
- **SMT2:** Smaller unit of work, but provides greater amount of execution work per cycle
- **SMT4:** Smaller unit of work, but provides greater amount of execution work per cycle
- **SMT8:** Smallest unit of work, but provides the maximum amount of execution work per cycle
- Can dynamically shift between modes as required: SMT1 / SMT2 / SMT4 / SMT8
- Mixed SMT modes supported within same LPAR
 - Requires use of “Resource Groups”



Storage Configurations – New since IBM i 7.2

FlashSystem Attach



Native and VIOS NPIV attachment of FlashSystem

Support for SVC HyperSwap



Support for SVC configs, including Storwize products

IBM i 16 Gb FC direct attach



Native attachment for 16 Gb FC direct attach configs

Hardware and Virtualization Configuration Support – New since IBM i 7.2

Systems with POWER8 Technology

- PCIe Gen3 I/O Expansion Drawer
- Native, Native SR-IOV, and VIOS Support for 4-port 10 Gb Ethernet NIC

Virtualization

- vNIC Configurations allow SR-IOV to be used with Live Partition Mobility
- IBM i Virtualization Configurations with Little Endian Linux
- Large Send Offload for Virtual Ethernet

SAS Disk Configurations

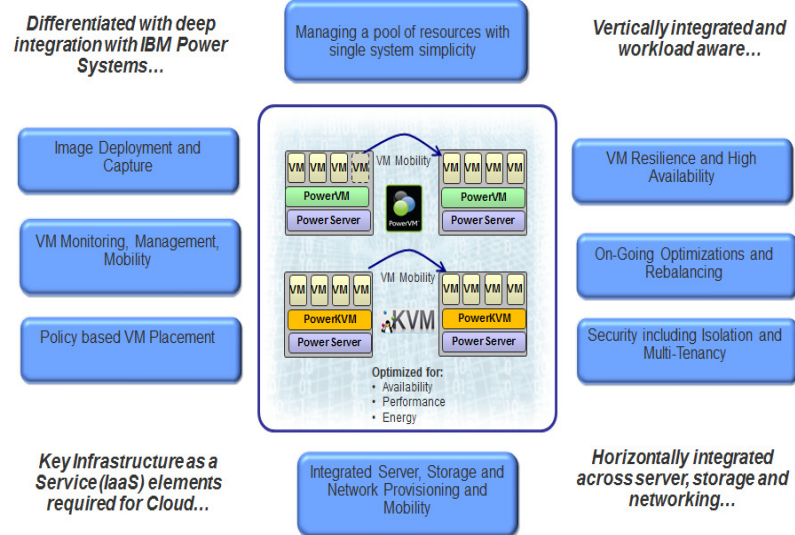
- SAS Adapter Availability Improvement
- RAID Array Start Time Reduction
- Larger SSD and HDD Disks with 4K Block Sizes

Tape Device Support

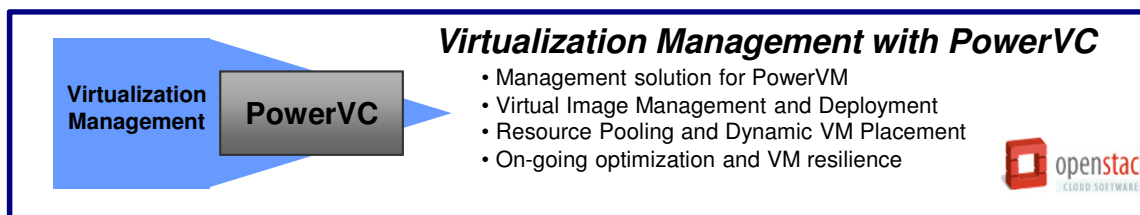
- TS1150 Enterprise Tape Drives
- Tape with LTO7 Technology
- Multipath Support for SAN Tape Configurations

PowerVC for i – What can you do for IBM i virtualization?

- Virtualization management for Power Systems – PowerVM
- Key Capabilities
 - Advanced virtualization management for Power Systems
 - IBM i virtual machine capture and deployment
 - IBM i virtual machine relocation
 - Policy based VM placement
 - One-click system evacuation
 - Optimization and rebalancing
 - Quick setup and Time to Value
- Based on OpenStack
 - Leverage open community
- Capabilities beyond OpenStack
 - Simplified user interface
 - Platform EGO scheduler
 - Reliability and serviceability



PowerVC for i Latest Enhancements



- **Advanced Policy-based Management**
 - New placement policies for system affinity, CPU utilization, CPU and Memory capacity, Host grouping with policies by group
- **High Availability Improvements**
 - Support for redundant HMCs, VM Restart, SVC local mirroring configurations
- **Storage Capabilities**
 - Support for DS8000, EMC Powerpath, XIV, Shared Storage Pool, IBM SDDPCM Multi-path managers, SVC local mirroring, Multi-disk VM capture / deploy
- **Cloud-Init Beta Support** – Newly deployed IBM i partition could be initialized with Cloud-Init.
- **Novalink support**
 - Provides much better capabilities and scalabilities of managing a virtualized environment. Support LPM between HMC and Novalink managed hosts.



All Cloud initiatives require a well orchestrated and *managed virtualized environment*

i4HiFashion – Additional Integrated Enhancements in IBM i 7.3



i4HiFashion



Key Integrated Technologies enhanced

- IFS
- NetServer
- Networking – Security Auditing
- Save/Restore and Related

Integrated File System

Display Attributes (DSPATR)

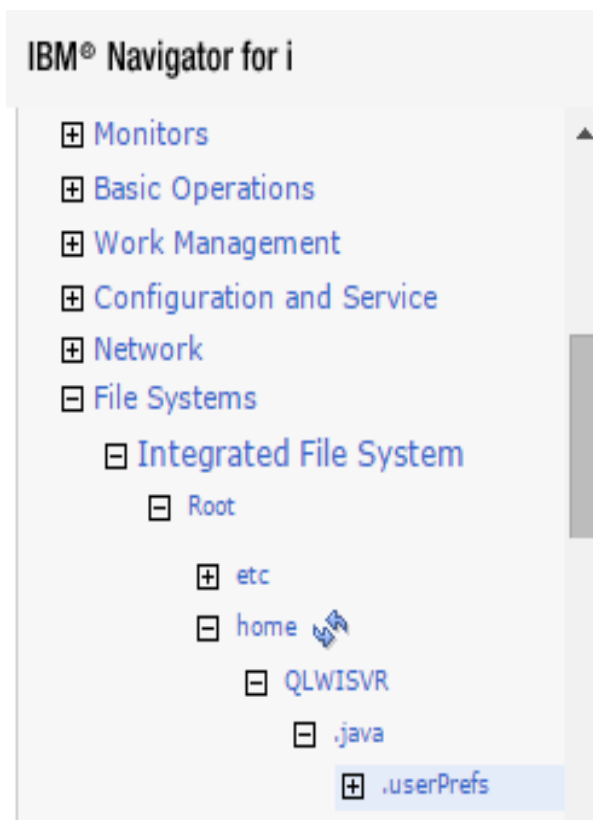
- Detailed object attributes
- Leverage Wild Cards
- Process entire Sub-tree

Improved Save-While-Active

- Set *ALWCKPWRT for directories.
- Save-while-active will no longer lock those directories
- Or interfere with link, rename, or unlink

CHGATR command - *TEXT attribute

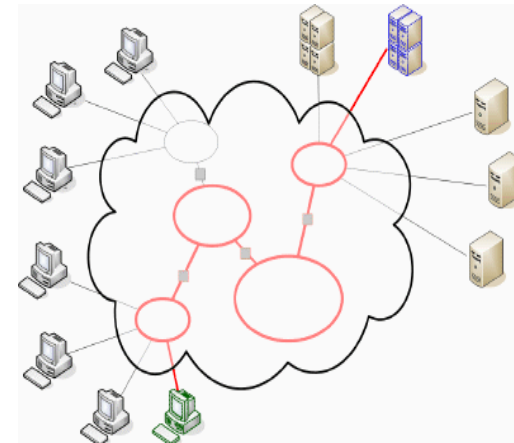
- Display a short (50-character) text description for any object in a file system that supports extended attributes



Connectivity - NetServer

NetServer improvements

- SMB2
 - Transparent negotiation of the new protocol between clients and servers
 - Latest Industry Standard
 - Allows read and write sizes up to 64kb to better move large blocks of data
 - Improved performance for large data blocks
- Route based on User Profile

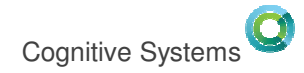


IBM i 7.3 Networking Enhancements

Security

- Network Auditing Enhancements (New QAUDLVL values)
 - *NETTELSVR
 - Generate audit records for Telnet Server TCP connections.
 - *NETUDP
 - Generate audit records for inbound and outbound UDP packets.
 - *NETSECURE
 - Generate audit records for successful and failed System SSL handshakes.
 - Generate audit records for successful VPN negotiations.
 - Generate audit records for IPsec.
- Simple Network Management Protocol (SNMP) support for AES encryption, and enhancements to simplify application and firewall configuration
- LIC Service Tools Server TLS configuration via application definition in DCM
- Intrusion Detection System (IDS) SSL Handshake failure policy
- System SSL - System Values updated to disable older algorithms by default





Technology Refresh Summaries

7.3 TR1 Summary

- Optical Containers – Adding value for USB
- Rational Developer for i: Mac OS X support and more
- IBM i ACS: Smart Card support and more
- Open Source offerings: perl, node.js v6 and more
- Db2: JSON_Table and more
- IBM Cloud Storage Solutions for i: BRMS Backup to Softlayer

Leveraging USB Device Technology

IBM i 7.3 TR 1

IBM i 7.2 TR 5



USB Flash Drives



Looking for more uses?



USB RDX Drives



Want to make better use of large capacity media?

As DVD technology ages, IBM is looking toward USB devices as a replacement

- DVD drive becomes more optional
- Saves cost on systems

Optical Containers Make USB Flash Look Like a Stack of DVDs

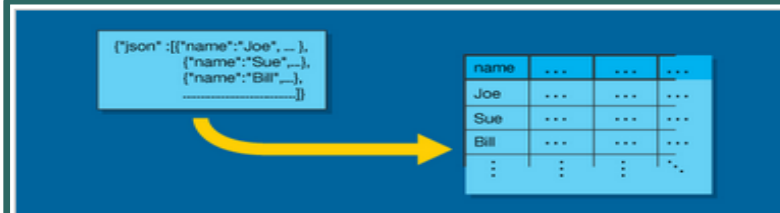
IBM i 7.3 TR 1

IBM i 7.2 TR 5

Scenario	Prior handling	New option	Benefit
Creating Optical Image Catalogs	Create only on disk (IFS)	Store Image catalog into QOPT file system on USB device	Makes data on USB media look like stack of DVDs
Use USB Flash drive to download PTFs	Not possible – instead stored image on disk in IBM i LPAR and added it to image catalog or burned it to DVD	Download ISO image of PTFs onto PC at office, move it to USB Flash drive, apply PTFs directly from Flash drive	Easy portability of PTFs
Storing image catalogs	Had to use expensive DASD and virtual media	Store image on USB Flash Drive. BP or ISV could take a USB Flash Drive to a customer site	USB is less expensive and more portable
Back-ups with RDX media	Incremental saves in separate directories, followed by deletes for re-use, resulted in file fragmentation & performance degradation	Partition RDX media into multiple virtual disks to allow multiple incremental saves	Allows RDX media to be leveraged for nightly back-ups, weekly back-ups, etc. ** Although these virtual disk images cannot be used for D-mode IPL, they are very useful for restoring data after IPL.

JSON_TABLE

- Allows queries to process JSON as relational data
- Leverage HTTP functions to tap external JSON data sources
- Conceptually similar to XML_TABLE



The diagram illustrates the conversion of JSON data into a table. On the left, a JSON array is shown:

```
[{"name": "Joe", ...}, {"name": "Sue", ...}, {"name": "Bill", ...}]
```

. A yellow arrow points from this JSON to a table on the right. The table has a header row with 'name' and three columns of ellipses. The data rows are 'Joe', 'Sue', and 'Bill', each followed by three columns of ellipses. Below the diagram is a screenshot of an IBM i article titled 'The powerful JSON_TABLE function' by John Eberhard. The article text reads: 'This article explains the four types of database columns that can be defined using JSON table and provides examples'.

“The powerful JSON_TABLE function”

<http://www.ibm.com/developerworks/ibmi/library/i-json-table-trs/index.html>

IBM i 7.3 TR2 Overview

- S812
- Db2
 - More JSON
 - SQL Services
- Access Client Solutions Version 1.1.7.0
 - Schemas
- Open Source
 - rsync, wget, curl, SQLite
 - git enhancement
 - GOLICPGM list
- Db2 WebQuery
 - “Easy Button” install
 - Sample Admin Graphical Reports
 - New Redbook

Power S812



8284-21A

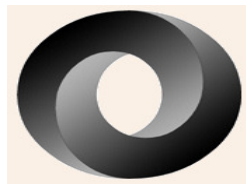
Entry price server

- 1-core server for IBM i
- 4-core server for AIX



- Single partition
- no virtualization
 - Not for Processor, memory or I/O
 - No VIOS, No PowerVC
- no Linux
- Simpler memory & I/O options

JSON support in Db2 for i



Db2 JSON Store

JSON_TABLE()

JSON Query support:

Predicates:

- IS JSON
- JSON_EXISTS

June 2015

November
2016

March
2017

IBM i 7.1, 7.2, &
7.3

IBM i 7.2 & 7.3

IBM i 7.2 & 7.3


New IBM i Services

- **QSYS2.AUTHORIZATION_LIST_INFO** – Similar to the Display Authorization List Objects (DSPAUTLOBJ) CL command
- **QSYS2.AUTHORIZATION_LIST_USER_INFO** – Similar to the Display Authorization List (DSPAUTL) CL command
- **QSYS2.OBJECT_PRIVILEGES** – Similar to the Display Object Authority (DSPOBJAUT) CL command
- **QSYS2.USER_INFO** – Add Supplement Group detail
- **And more...**

 Search

Search Filters: [IBM i 7.3](#)  [Auto-select](#) | [Clear All](#) | [Add Products...](#)

http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/rzahg/welcome.htm

 **Table of Contents**

[↑ Back to all products](#)

[↑ IBM i](#)

IBM i 7.3

Welcome

- [▶ About IBM i information](#)
- [▶ Availability](#)
- [▶ Basic system operations](#)
- [▶ Blade and System x](#)
- [▶ Connecting to your system](#)

 My Collections

 Search Results

IBM i 7.3 documentation

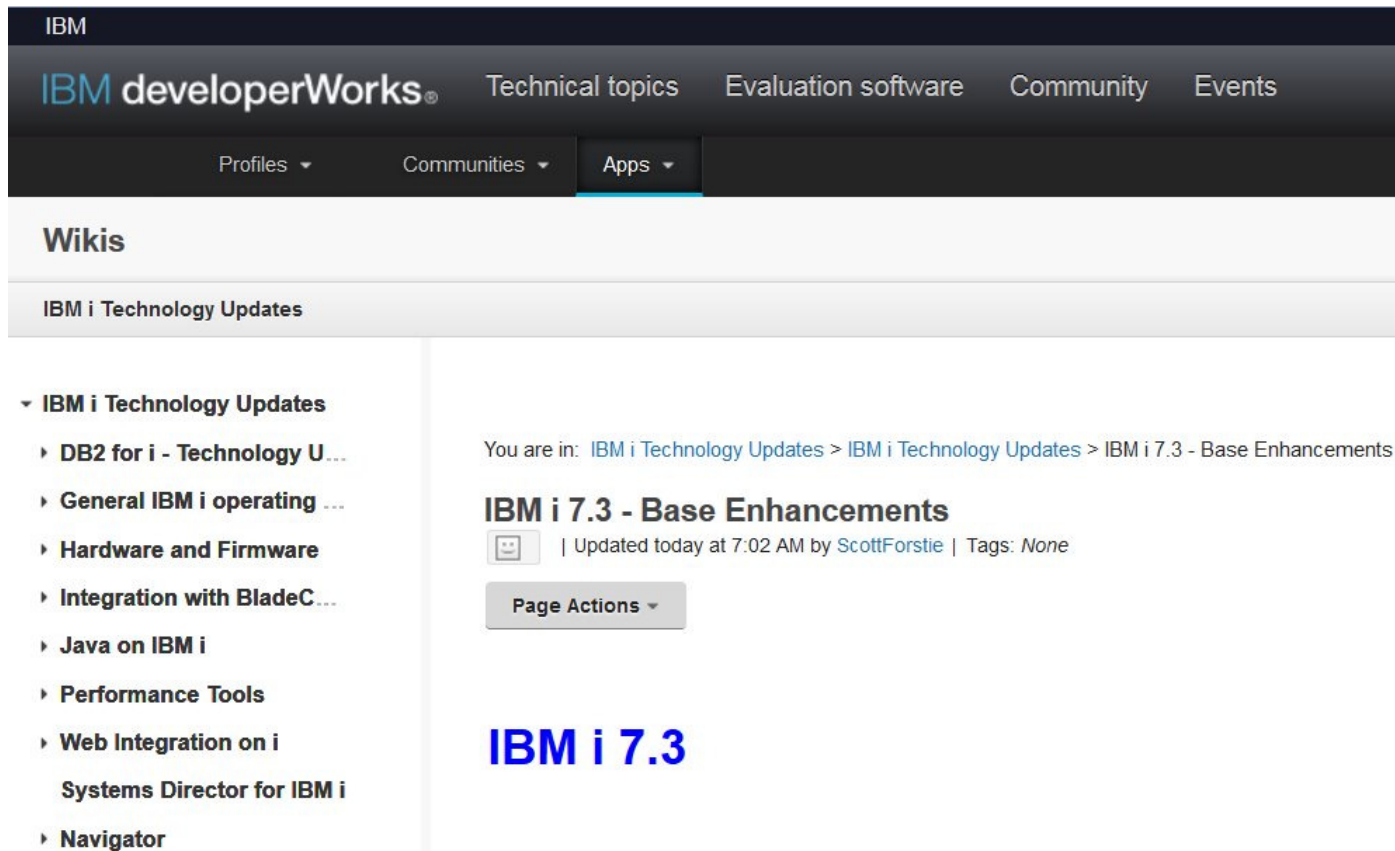
Welcome to the IBM® i 7.3 documentation, where you can find in

Getting started

- [IBM i overview and what's new](#)
- [Basic system operations](#)
- [Memo to users](#)
- [Frequently asked questions](#)

Common tasks

- [APIS](#)
- [CL commands](#)
- [DB2 for i SQL reference](#)
- [ILE RPG reference](#)



IBM

IBM developerWorks® Technical topics Evaluation software Community Events

Profiles ▾ Communities ▾ Apps ▾


Wikis

IBM i Technology Updates

- ▾ **IBM i Technology Updates**
 - DB2 for i - Technology U...
 - General IBM i operating ...
 - Hardware and Firmware
 - Integration with BladeC...
 - Java on IBM i
 - Performance Tools
 - Web Integration on i Systems Director for IBM i
 - Navigator

You are in: [IBM i Technology Updates](#) > [IBM i Technology Updates](#) > [IBM i 7.3 - Base Enhancements](#)

IBM i 7.3 - Base Enhancements

 | Updated today at 7:02 AM by [ScottForstie](#) | Tags: *None*

Page Actions ▾

IBM i 7.3

You and i *IBM i Trends and Strategies*

[Previous Post](#) | [See All Posts](#)



By Steve Will



IBM i 7.3 Announcement

April 12, 2016

Today's the day! As I hinted a couple of months ago, we have big news. Today, we are announcing the IBM i 7.3 release, which will be generally available on April 15, 2016.



Recent Posts

[IBM i 7.3 Announcement](#)
04/12/2016

[Signs and Portents for IBM i Announcements](#)

Our themes for 7.3 apply to many of the new features:

- Simplifying Insight
- Intelligent Security
- The Power of Integration

<http://www.ibmssystemsmag.com/Blogs/You-and-i/>



ithankyou

www.ibm.com/developerworks/ibmi/techupdates

Power Systems Social Media

IBM Power Systems Official Channels:



<https://facebook.com/IBMPowerSystems>



<https://twitter.com/IBMPowerSystems>



<https://www.linkedin.com/company/ibm-power-systems>



<http://www.youtube.com/c/ibmpowersystems>



<https://www.ibm.com/blogs/systems/topics/servers/power-systems/>

More to Follow:



Blogs to Follow	More to Follow	Hashtags To Use
<ul style="list-style-type: none"> • IBM Systems Magazine You and I (Steve Will) • IBM Systems Magazine i-Can (Dawn May) • IBM Systems Magazine: iDevelop (Jon Paris and Susan Gantner) • IBM Systems Magazine: iTalk with Tuohy • Aaron Bartell Blog • Steve Pitcher Blog • Trevor Perry Blog • IBM Db2 for i (Mike Cain) • IBM Db2 Web Query for i (Doug Mack) • Modern-i-zation (Tim Rowe) 	<ul style="list-style-type: none"> • @IBMSystems • @COMMONug • @IBMChampions • @IBMSystemsISVs • @LinuxIBMMag • @OpenPOWERorg • @AIXMag • @IBMiMag • @ITJungleNews • @SAPonIBMi • @SiDforIBMi • @IBMAIXeSupp • @IBMAIXdoc 	<ul style="list-style-type: none"> • #PowerSystems • #IBMi • #IBMAIX • #POWER8 • #LinuxonPower • #OpenPOWER • #HANAonPower • #ITinfrastructure • #OpenSource • #HybridCloud • #BigData

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.

Revised September 26, 2006

Special notices (cont.)

IBM, the IBM logo, ibm.com AIX, AIX (logo), AIX 5L, 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, Active Memory, Balanced Warehouse, CacheFlow, Cool Blue, IBM Systems Director VMControl, pureScale, TurboCore, Chiphopper, Cloudscape, Db2 Universal Database, DS4000, DS6000, DS8000, EnergyScale, Enterprise Workload Manager, General Parallel 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+, POWER7, System i, System p, System p5, System Storage, System z, 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 full list of U.S. trademarks owned by IBM may be found at: <http://www.ibm.com/legal/copytrade.shtml>.

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.

AltiVec is a trademark of Freescale Semiconductor, Inc.

AMD Opteron is a trademark of Advanced Micro Devices, Inc.

InfiniBand, InfiniBand Trade Association and the InfiniBand design marks are trademarks and/or service marks of the InfiniBand Trade Association.

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency which is now part of the Office of Government Commerce.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

Linear Tape-Open, LTO, the LTO Logo, Ultrium, and the Ultrium logo are trademarks of HP, IBM Corp. and Quantum in the U.S. and other countries.

Linux is a registered trademark of Linus Torvalds in the United States, other countries or both.

Microsoft, Windows and the Windows logo are registered trademarks of Microsoft Corporation in the United States, other countries or both.

NetBench is a registered trademark of Ziff Davis Media in the United States, other countries or both.

SPECint, SPECfp, SPECjbb, SPECweb, SPECjAppServer, SPEC OMP, SPECviewperf, SPECcapc, SPECchpc, SPECjvm, SPECmail, SPECimap and SPECsfs are trademarks of the Standard Performance Evaluation Corp (SPEC).

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.

TPC-C and TPC-H are trademarks of the Transaction Performance Processing Council (TPPC).

UNIX is a registered trademark of The Open Group in the United States, other countries or both.

Other company, product and service names may be trademarks or service marks of others.

Revised December 2, 2010