Rev up your system with IBM i 7.3

Tonight’s Agenda

• IBM i Roadmap with IBM i 7.3

• Some inside stuff about messaging

• IBM i 7.3 Solving Business Problems using
  – Simplified Insight
  – Intelligent Security and
  – The Power of Integration

• Reference Material (Knowledge Center, dW, blogs)
### IBM i Releases

<table>
<thead>
<tr>
<th>Year</th>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>7.1</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>7.2</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>7.3</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>i next</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>i next+1</td>
<td></td>
</tr>
</tbody>
</table>

**Technology Refreshes**

- **IBM i 7.3**
  - Announce: April 12, 2016
  - GA: April 15, 2016
- **IBM i 7.2 TR4**
  - Announce: April 12, 2016
  - GA: May 20, 2016

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**Inside Stuff**

**Anonymous**
Rev up your system with IBM i 7.3

IBM i 7.3 Overview
Simplifying Insights, Intelligent Security and the Power of Integration

Steve Will
IBM i Chief Architect
You think you know IBM i?
You haven't met 7.3.
The platform you know and love.
The capabilities you've asked for.

IBM i 7.3 now lets you:
- Deepen your data insight.
- Forecast trends with more advanced analytics.
- Enhance Security Management.
IBM i 7.3 – Simplify Insights, Intelligent Security & the Power of Integration

- Historical data simplifies business insights for the future
  - DB2 Temporal support automatically maintains history
- Intelligent Security matches actual authority with policy
  - Authority Collection analysis ensures continuous operation
- Integrated data analytics for new insights
  - OLAP enhancements built into DB2 for i
- Extensive integrated application development options
  - Easy-to-learn RPG + Open Source development technology
- And much, much more!
Rev up your system with IBM i 7.3
i4HiFashion – The World’s Source for Fashion – and More!

Business Characteristics

- Locations around the world
- Business growth through acquisition
- All key business data in IBM i DB2
- Mix of Solutions – Home-grown + ISV
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
  - Too much data & data reconstruction
- Snapshots?
  - Labor Intensive
- Trigger programs?
  - Best option before Temporal
  - ... but let’s look at what happens

At certain events, specialized software runs and (probably) makes an archive.
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?

---

**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

i4HiFashionDB

=

Customers
Inventory
Suppliers
SalesData
Employee

How Temporal Works

i4HiFashionDB

Choose the tables which will have stored history.

=

Customers
Inventory
Suppliers
SalesData
Employee

© 2016 IBM Corporation
Adding History to a Table

Production Table

Employee

Add enabling columns to table.

Create history table.
Adding History to a Table

Production Table

Employee

Employee History

Add enabling columns to table.

Create history table.

Start Versioning.

Temporal construction for data-centric history

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

CREATE TABLE employee_history LIKE employee

ALTER TABLE employee ADD VERSIONING USE HISTORY TABLE employee_history

Establish birth/death of a row

Create history table

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

DB2 for i – Insight Enhancements in IBM i 7.3

New Generated Columns
- ROW BEGIN (birth)
- ROW END (death)
- TRANSACTION START ID
- DATA CHANGE OPERATION
- Special Register
- Built-in Global Variable

New Query period-specification
- FOR SYSTEM TIME AS OF <value>
- FOR SYSTEM TIME FROM <value> TO <value>
- FOR SYSTEM TIME BETWEEN <value> AND <value>

New Special Register
- CURRENT TEMPORAL SYSTEM_TIME

New SET OPTION
- SYSTIME (*YES | *NO)

New Catalogs
- QSYS2/SYSPERIODS
- QSYS2/SYSHISTORYTABLES
- ES
New Business Requirements

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

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

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!
SQL Query Engine and OLAP Specification Extensions

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?

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

Yes, increasing marketing helps sales at a pretty consistent rate.

No, increasing marketing doesn’t do much.
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?

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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?

We have the data; how do we answer the question?
Predict sales based on marketing budget

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

**Returns:**
- 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 PERCENTILE_CONT.
### SQL Query Engine and OLAP Specification Extensions

Regression analysis is a statistical process for estimating the relationships among variables.

**Option**

- **REGR_COUNT**: Returns the number of non-null number pairs used to fit the regression line.
- **REGR_INTERCEPT**: Returns the y-intercept of the regression line.
- **REGR_R2**: Returns the coefficient of determination for the regression.
- **REGR_SLOPE**: Returns the quantities that can be used to compute various diagnostic statistics needed for the evaluation of the quantity and statistical validity of the regression model.

### SQL Query Engine and OLAP Specification Extensions

On-Line Analytical Processing (OLAP) specifications provide the ability to return ranking and row numbering as a scalar value in a query result. Today we support RANK, DENSE_RANK, and ROW_NUMBER.

With IBM i 7.3, DB2 for i supports the following OLAP options:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregates</td>
<td>Returns the aggregate value (SUM, COUNT...) for the OLAP window.</td>
</tr>
<tr>
<td>LAG or LEAD</td>
<td>Returns the value computed using rows prior to or following the current row.</td>
</tr>
<tr>
<td>NTILE</td>
<td>Specifies the quantile rank of a row within the window in which it is computed.</td>
</tr>
<tr>
<td>NTH_VALUE</td>
<td>Returns the value for the nth row in an OLAP window.</td>
</tr>
<tr>
<td>FIRST_VALUE and LAST_VALUE</td>
<td>Returns the first or last value in an OLAP window.</td>
</tr>
<tr>
<td>RATIO_TO_REPORT</td>
<td>Returns the ratio of an argument to the sum of the arguments in an OLAP window.</td>
</tr>
<tr>
<td>CUME_DIST</td>
<td>Returns the relative position of a specified value in a group of values.</td>
</tr>
</tbody>
</table>
First_Value, Last_Value, Nth_Value Example

Show the difference in sales between the current store and the store with the best sales, the second best sales, and the worst sales

```sql
SELECT store, sales, sales - first_value(sales) over (order by sales desc range between unbounded preceding and unbounded following) Behind_1st, sales - nth_value(sales,2) over (order by sales desc range between unbounded preceding and unbounded following) Behind_2nd, sales - last_value(sales) over (order by sales desc range between unbounded preceding and unbounded following) Compared_to_Last
from stores order by sales desc;
```

<table>
<thead>
<tr>
<th>Stores</th>
<th>Sales</th>
<th>Behind_1st</th>
<th>Behind_2nd</th>
<th>Compared_to_Last</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caining</td>
<td>770,000.00</td>
<td>0.00</td>
<td>270,000.00</td>
<td>670,000.00</td>
</tr>
<tr>
<td>Mills</td>
<td>500,000.00</td>
<td>-270,000.00</td>
<td>0.00</td>
<td>400,000.00</td>
</tr>
<tr>
<td>Bobs</td>
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New Business Requirements

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

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?
IT / Application Questions Related to Authority

- Does User ‘Joe’ really need to have *ALLOBJ to run an application?

- What object authority should the HR department have for these 15 objects to get their job done?

- What is the minimum authority required on the objects it uses for the application to work correctly?

- All my objects have PUBLIC *ALL authority! Is it needed?

- We have little detailed knowledge of the applications… where is the data?
  - Yes, the data is in DB2 and/or IFS … but where?

- What is the “minimum” authority level that can be granted for the end user?
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

1. Turn on the authority collection for a given user
   – or set of users
2. Collect authority info for the user
3. 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 – Interrogate the collected data

Leverage Navigator to do basic data investigation

Use SQL to get more details

```sql
SELECT System_Object_Name, Detailed_Required_Authority, Detailed_Current_Authority FROM V010.Authority_Collection A
WHERE AUTHORIZATION_NAME = 'SCOTT' AND SYSTEM_OBJECT_SCHEMA = 'TEST123'
```
Solution: Authority Collection – Important Usage Points

• While the collection is active, run-time performance is affected. Start small and learn from experience.

• Be aware of storage being consumed, especially when doing a long running authority collection.

• “User” based, only.
  – “Object” would be a natural next step.
  – “Groups” would be a natural next step.
  – Seeking feedback on future possibilities.

Authority Collection Usage Overview

• Turn on the authority collection for a given user or set of users

• Collect authority info for the user
  – Access via the group authority is collected
    ◦ Group level collection not supported
  – Adopted authority information collected

• QSYS file system has object level selectivity but

• IFS (root, QOpenSys, UDFs do not have object level selectivity)
New Business Requirements

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

Business questions:

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

- 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:
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```
ALTER TABLE FACT_table
ADD COLUMN audit_job_name VARCHAR(28)

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 (SYSBM.CLIENT_IPADDR)

ADD COLUMN audit_job_name VARCHAR(28)  
  GENERATED ALWAYS AS (QSYS2.JOB_NAME)
```
Enhanced data-centric auditing – with generated columns

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```
The Power of Integration

Overview

i4HiFashion – Infrastructure Requirements

Operating an infrastructure means

- Monitoring performance easily
- Learning from (performance) history
- Identifying top resource consumers
- Access from anywhere
**i4HiFashion – Productivity Requirements**

Productivity means
- Mobile, Web, Windows & Linux devices
- Quick answers with SQL Scripts
- Managing Availability – BRMS & PowerHA
- Live Data Dashboards – DB2 WebQuery

**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
Maximum use of system resources

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

Key Integrated Technologies enhanced

- IFS
- NetServer
- Networking – Security Auditing
- Save/Restore and Related
The Power of Integration

Details

http://www.ibmsystemsmag.com/Blogs/You-and-i/
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 for a data point.
- View detailed information about each of the top consumers.
- Use property information details to get 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
Productivity means

- Mobile, Web, Windows & Linux devices
- Quick answers with SQL Scripts
- Managing Availability – BRMS & PowerHA
- Live Data Dashboards – DB2 WebQuery

- Only Windows
- Difficult to install
- Worse to Manage
- No Windows 10

- Supports Today’s Devices
- Simple Install & Mgmt
- Improved Function

iAccess for Windows
Navigator
iAccess Mobile
Access Client Solutions
Application Runtime Expert

DB2 SQL
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

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!
ACS & Navigator
No extra sign-on!

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

• 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

Works on Windows, Mac & Linux!!
Work with Your Data – SQL Performance Center

Navigator and ACS Working together

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

Work with LARGE amounts of data with amazing speed
Dig into the details of your SQL Performance
DB2 for i – Enhancements delivered via DB2 PTF Groups

TR4-timed Enhancements
- Inlined UDTFs
- Trigger (re)deployment
- More IBM i Services
- New DB2 built-in Global Variables
- Enhanced SQL Scalar functions
- Guardium on i enhancement
- Evaluation option for DB2 SMP & DB2 Multisystem

TR3-timed Enhancements
- LIMIT and OFFSET
- Guardium V10 and other database security monitoring enhancements
- SQE Performance improvements
- More IBM i Services
- New SQL built-in functions
- Enhancements for SAP on i clients
- Enhancements in 7.3:
  - Temporal Tables
  - Generated columns for auditing
  - New OLE/DB capabilities
  - Raised architecture limits
  - New support for partitioned tables
  - More IBM i Services
  - All TR-timed enhancements

TR2-timed Enhancements
- Create OR REPLACE table
- JSON – DB2 Store Technology Preview
- SQE Performance improvements
- And more…

Enhancements in 7.3:
- Temporal Tables
- Generated columns for auditing
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- Raised architecture limits
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- More IBM i Services
- All TR-timed enhancements

IBM i Services for SQL users

7.2 – TR1
- Services in 2014
  - JOURNAL_INFO
  - LIBRARY_LIST_INFO
  - LICENSE_INFO
  - LOCK_INFO
  - OUTPUT_QUEUE_INFO
  - REPLY_LIST_INFO
  - JOBLOG_INFO
  - SYSTMPSTG
  - DB2 for i built-in Global Variables
  - JOB_NAME
  - SERVER_MODE_JOB_NAME
  - SYSTOOLS.GROUP_PTF_CURRENCY

7.2 – TR2
- Services in 2Q/2015
  - DRDA_AUTHENTICATION_ENTRY_INFO
  - JVM_INFO
  - SET_JVM

7.2 – TR3
- Services in 2Q/2016
  - 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

7.2 – TR4
- Services in 4Q/2015
  - SYSTOOLS.GROUP_PTF_DETAILS

7.3 – GA
- Services in Q4/2016
  - ENVIRONMENT_VARIABLE_INFO
  - SERVICES_INFO
  - SERVICES & SQL dependency management
  - Enhance NETSTAT services
  - Enhanced SET SERVER, SB6_ROUTING
  - Enhanced System Limits
  - Enhanced DISPLAY_JOURNAL
  - Enhanced OBJECT_STATISTICS

Enhancements in 7.3:
- Temporal Tables
- Generated columns for auditing
- New OLE/DB capabilities
- Raised architecture limits
- New support for partitioned tables
- More IBM i Services
- All TR-timed enhancements
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

More efficient access to a specific BRMS function.
Leveraging SSDs and IASPs with BRMS Migration

- Multi-task navigational tree added to the main panel
- Key panels converted to Dojo
- Improved backup list editing (sorting)
- Improved Include panel selection on “ok”
- Newer infrastructure support (Liberty)

BRMS 7.3 Enhancements

- BRMS Web Client
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- BRMS Server
  - Modernization of Storage Tiering using BRMS Migration
    - IFS lists supported
      - SSD → HDD support
      - I-ASP support
      - Including help text
  - PRTRPTBRM FROMSYS support w/help text
  - INZBRM network checker options w/help text
  - CHGMEDBRM movement support of 1 volume with help text.
  - SAVEBRM now supports Pattern parameter
**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

**PowerHA for i – Reduced time for Vary On of IASP**

- Initially an IASP vary on performance enhancement effort
  - Reduce abnormal IASP vary on time and minimize variability
  - Most performance enhancements apply to abnormal IPL
  - Some enhancements also reduce normal IPL and vary on time
  - Focus on DB Access Path Recovery, Journal Synchronization, Journal Recovery steps
- Normal vs. abnormal IPL and IASP vary on
  - Abnormal IPL is an unexpected termination, should be rare
  - Abnormal IASP vary on is common, could be daily
    - FlashCopy or detach of a mirror copy in an active environment (Even if jobs are stopped, quiesced, or restricted state)
- All improvements are in 7.3 base IBM i
- 7.1 and 7.2 improvements in latest cum and DB PTF Group
- "Faster IASP vary on" document on developerWorks site
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 Web Query Version 2.1.1

- Geographical Mapping Capabilities
  - Associate data with points on the map
- Jump Start Reports and Dashboards with Wizard Analytics
  - Create meta data and 20-30 sample reports and dashboards in minutes
  - Use created reports as templates for others
  - Meta Data Wizard over DB2 data; Upload Wizard for spreadsheet/flatfiles
    - See Video Demos at https://ibm.biz/DB2WQWizards
- Many Additional Enhancements
  - Leverage DB2 SQL or User Defined Functions in virtual fields
  - Control library lists dynamically or build audit exit program with Run Time Environments
  - Create drill downs within personal dashboards
  - Send URL link to recently run reports via email

"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
Take Reports and Dashboards Mobile with DB2 Web Query

- Ease of Development
  - Build Reports once, deploy anywhere
  - Dynamic detection of the device
  - Converts to "mobile"
  - Renders appropriate content for the device
- Ease of Use
  - Gesturing & screen rotation
  - Embedded analysis and visualization
  - Offline interactivity
- Automate Report Distribution
  - Mobile Faves app for syncing reports with server and organizing mobile reports for Apple/Android Devices
  - Execute reports from job scheduler and route via email

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](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-WQ0)
- Replicate data, build data warehouses, data marts, or for analytics
- Data Replication supports both Journal Receivers and SQL processes
- Data transforms, data purging, 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 sunsetting 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

Links
- DB2 Web Query for i Marketing Website
  - ibm.biz/db2webquery
- DB2 Web Query for i Wiki
  - ibm.co/db2wqwiki
- DB2 Web Query Getting Started Enablement
  - https://ibm.biz/db2wqconsulting
- DataMigrator Info
  - https://ibm.biz/DB2WQDATAMIGRATOR
- Video Demos: "Wizards: https://ibm.biz/DB2WQWizards"
- End User: https://ibm.biz/DB2WQgetStarted
- Getting Started: https://ibm.biz/DB2WQgetStarted
- Or reach out to the DB2 Web-Query team at QUI2@us.ibm.com

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DB2 Web Query Update: Version 2.2

DB2 Web Query (5733-WQx) enhancements!
- New Version 2.2 : Required for IBM i 7.3!

Expands heterogeneous database access
- Support for MySQL, Postgres, or generic JDBC Driver

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 - new Mobile Layout canvas and enhancements

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 Garpath, USW Dealer Solutions

NEW for 7.3!

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
- Both JMS Receivers and SQL processes
- Data transforms, data enriching, job scheduling built in

NEW with V2.2
- Support for MySQL, Postgres, or generic JDBC for others (e.g., Oracle)

Why?
- Consolidate data from multiple systems/databases
- Isolate and optimize analytics workloads from production systems
- Cleanse and transform data for accurate, speaking 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

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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

```c
read file; // Get next record
do not test(file); // keep looping with record
if error;
  dsply 'The read failed'; leave;
else;
  chain(n) name database data;
time = hours * num_employees + overtime_served;
  pce = temps ('.' : name);
  name = translate(upper : lower : name);
  exsr handle_record;
  read file;
  endd;
```

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;
enddd;
```

- 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.
Open Source for IBM i

- Recently created LPO – Open Source for IBM i 5733-OPS

- What we have added
  - Option 1 – Node.js 1.x
  - Option 2 – Python 3.x
  - Option 3 – GCC & CHROOT
  - Option 4 – Python 2.7
  - Option 5 – Node.js 4.x
  - Option 6 – git
  - Option 7 – Tools (.zip, .unzip, bash)
  - Option 8 - Orion

- Continue to Partner for other key technologies
  - Zend latest PHP version and updates
  - PowerRuby latest Ruby on Rails support for i

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
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
Open Source – GCC & GNU Compiler Collection

- This is the environment that the ‘open source developer’ uses to do their job
- IBM i User community now has the tools and environment needed to create applications using open source technologies

- autoconf
- automake
- rpm.re
- wget
- bash
- binutils
- bison
- bzip2
- curl
- expat-m
- gcc-c++
- gcc-mp
- libgcc
- libgomp
- libiconv
- libidn
- libmpc
- libsigsegv
- libssh2
- libstdc++
- libtool
- m4
- make
- mpfr
- redist
- openssl
- openldap
- bzip2
- binutils
- bash-4.3
- libstdc++
- mpfr
- python-2.6.8-1
- readline
- sed
- tar
- unzip
- wget
- xz
- xz-lib
- xz-extma
- zip-3.0
- zlib-1.2.4
- bash-4.3

Zend Server

- New UI
  - Cleaner
  - More modern
- Z-Ray for IBM i
  - Z-Ray extensibility: create your own Z-Ray extensions
  - Z-Ray Live! - insight on non-browser based requests, such as mobile client requests and APIs/web services
- URL Insights: details on the slowest, poorest performing, and most popular URLs on your website
- Faster runtime engine
- Run parallel with older versions

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Development tools....

Tried and True, Yes but also SLOW, OLD, No new features

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
• Improved RPG Format (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
Power Systems Roadmap

- POWER7+ and POWER8 systems deliver compelling application performance, security and application optimization; lower operational management costs; and it will be easier to upgrade to take advantage of new technology.

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
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

Native and VIOS NPIV attachment of FlashSystem

Support for SVC HyperSwap

IBM i 16 Gb FC direct attach

Support for SVC configs, including Storwize products

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

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 SDQPCM 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.
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

i4HiFashion – Additional Integrated Enhancements in IBM i 7.3

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

IBM® Navigator for i
- Monitors
- Basic Operations
- Work Management
- Configuration and Service
- Network
- File Systems
  - Integrated File System
    - Root
      - etc
      - home
      - QMFSVR
      - java
      - logfiles

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

Currency
- Quality of Service (QoS) IPv6 support
- IPv6 Neighbor Discovery Ping to provide an IPv6 low-level reachability test. (NDPING)
- DNS BIND refreshes to version 9.10.2

Usability, Stability and Performance
- Host Table merge enhancements (CPYTCPHT/MRGTCPHT)
- Sorting enhancements for WRKSMTPM
- Many improvements of usability, stability and performance have been done for SMTP
- NTP improves the time synchronization accuracy
Operations Enhancements

- DUPOPT of IPL-capable media
  - Enables duplicating an existing IPL-capable DVD or distributed media image to RDX or flash media

- Save/Restore Enhancements
  - Recover authorization list links for objects in QSYS
  - Better performance restoring one object from a large back-up
  - GO SAVE menu enhancements
IBM i 7.3

http://developerworks/ibmi/techupdates/i73

http://www.ibmsystemsmag.com/Blogs/You-and-i/