IBM i 7.3 Overview

OMNI - 20 Sept 2016

for Business

Steve Will
IBM i Chief Architect

IBM i 7.3 – Simplify Insights, Intelligent Security & the Power of Integration

- Historical data simplifies business insights for the future

- Intelligent Security matches actual authority with policy

- Integrated data analytics for new insights

- Extensive integrated application development options
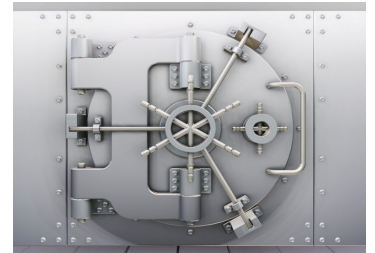
IBM i 7.3 – Simplify Insights, Intelligent Security & the Power of Integration

- 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!**

for Business

i4HiFashion

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

i4HiFashion

Business Characteristics

- Locations around the world

- Business growth through acquisition

- All key business data in IBM i DB2

- Mix of Solutions – Home-grown + ISV

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i4HiFashionDB

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!

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New Business Requirements

⭐ Learn from history

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Learning from History

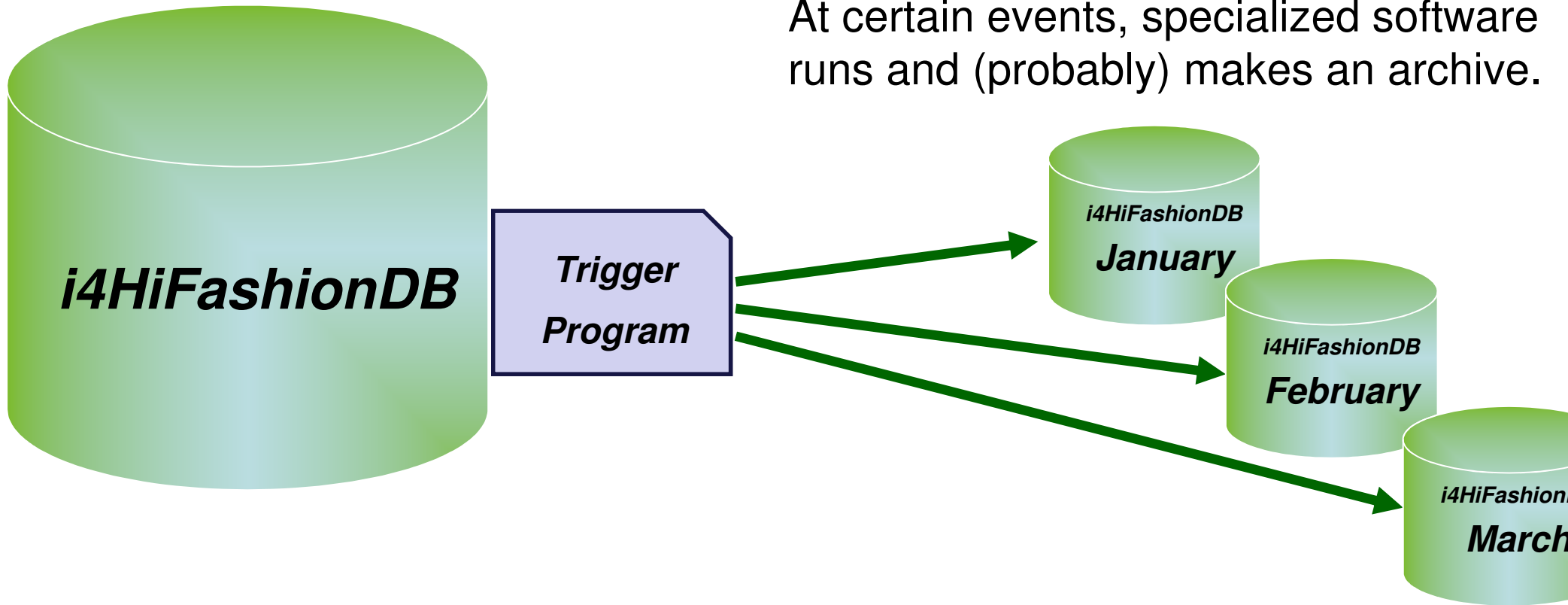## What Did My Business Look Like Last Month?

i4HiFashionDB

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
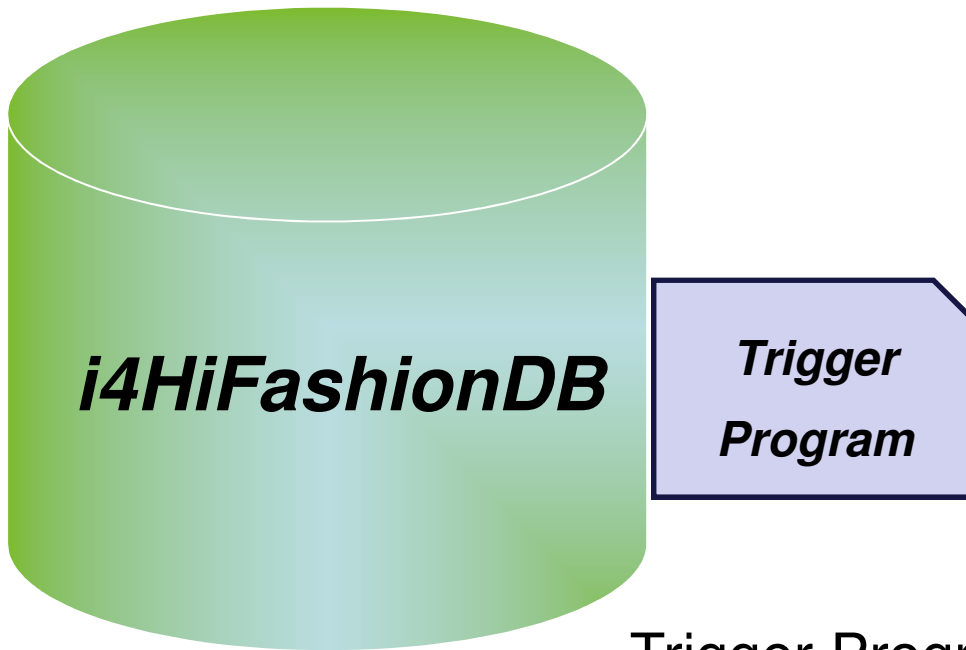
What Did My Business Look Like Last Month?

Trigger Program approach

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

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Trigger
Program

i4HiFashionDB
January

i4HiFashionDB
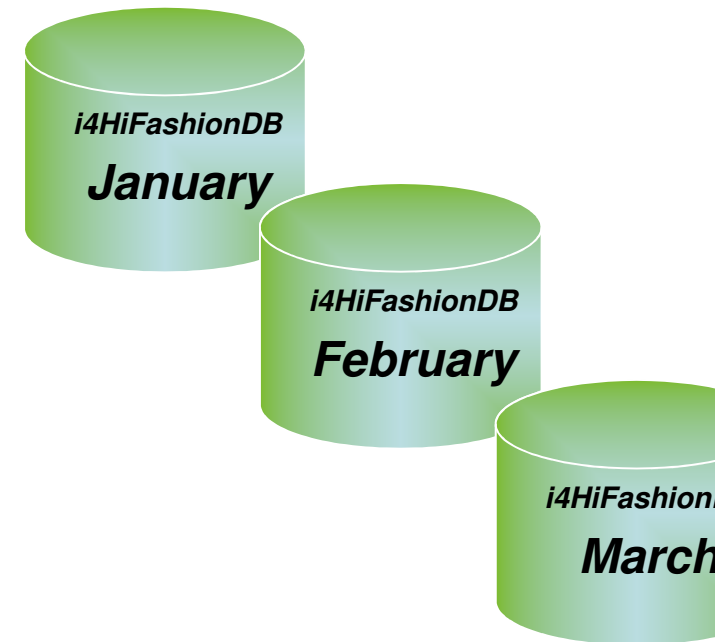**February**

i4HiFashion
March

What Did My Business Look Like Last Month?

Trigger Program approach?

Trigger programs

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

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Trigger Program

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January

i4HiFashionDB
February

i4HiFashion...
March

Trigger Programs must be
- Written
- Maintained
- Updated as requirements change
  - Will "monthly" always be the requirement?

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What Did My Business Look Like Last Month?

DB2 Temporal Tables

i4HiFashionDB
+ History

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
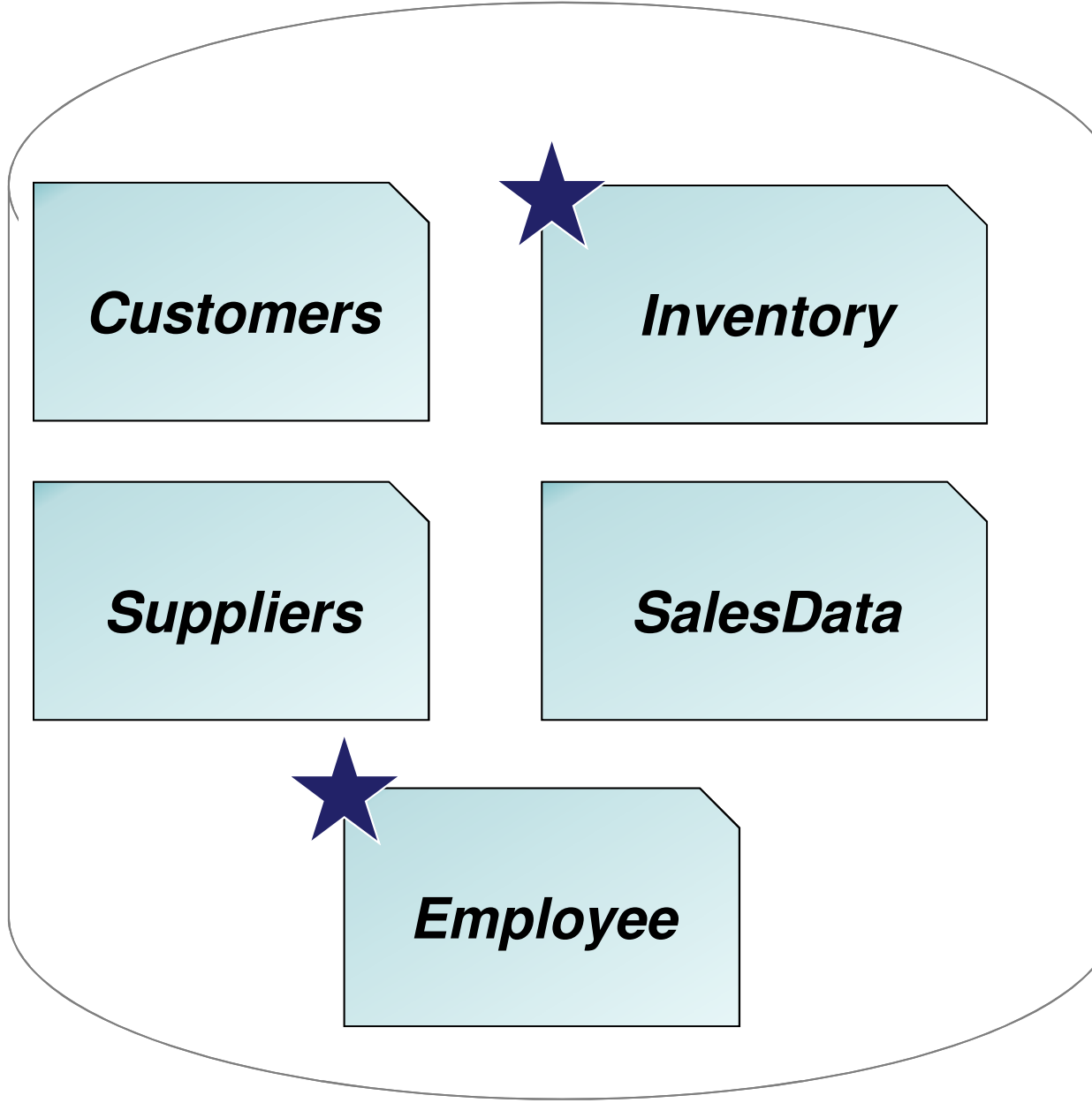   - Archives
    - Special programs

How Temporal Works

i4HiFashionDB =

Customers

Inventory

Suppliers

SalesData

Employee
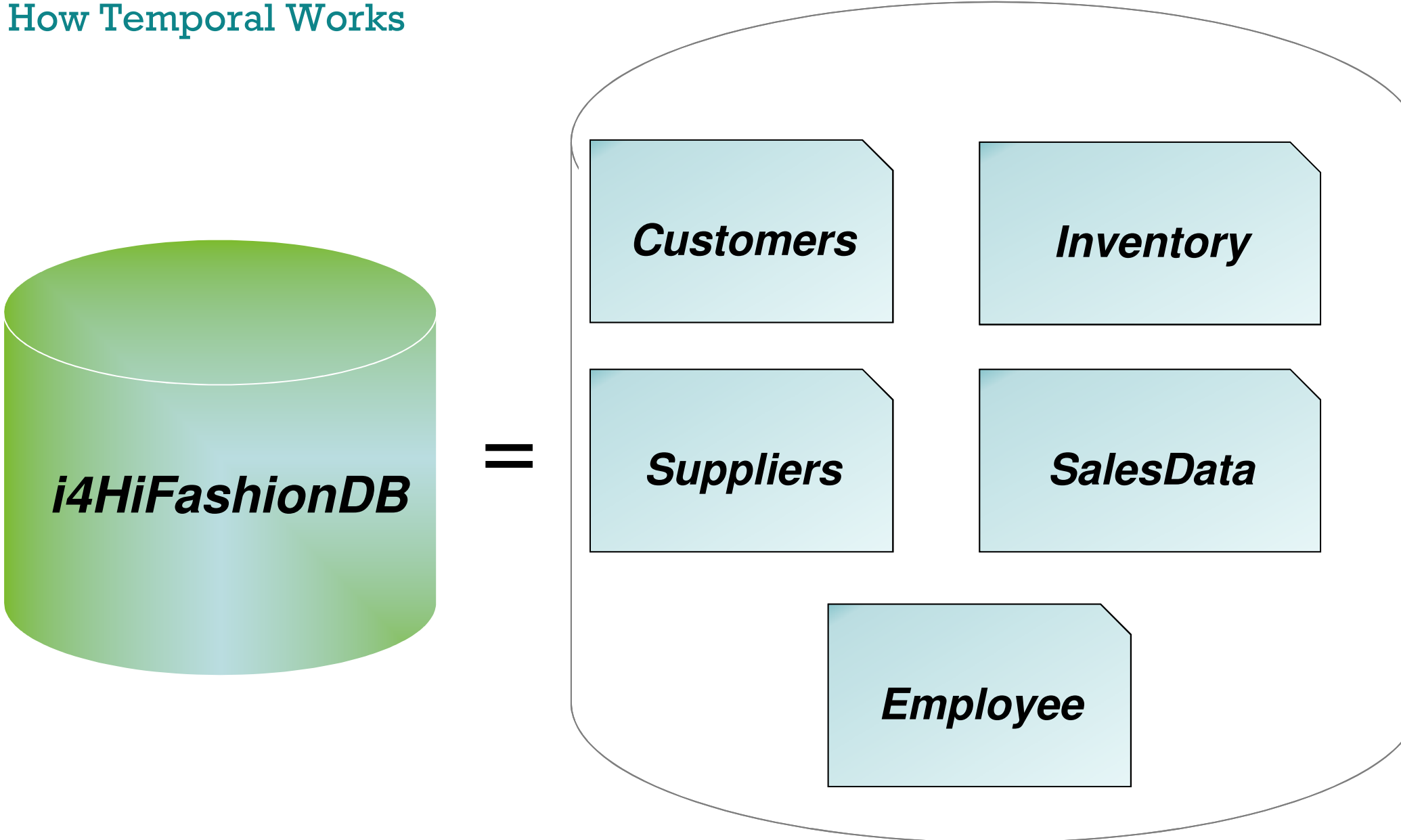
How Temporal Works

★ Choose the tables which will have stored history.

i4HiFashionDB =

Customers	★ **Inventory**
Suppliers	**SalesData**
★ **Employee**	

Adding History to a Table

Production Table

Employee

Add enabling columns to table.

Adding History to a Table

Production Table

Employee

Employee

History

Add enabling columns to table.
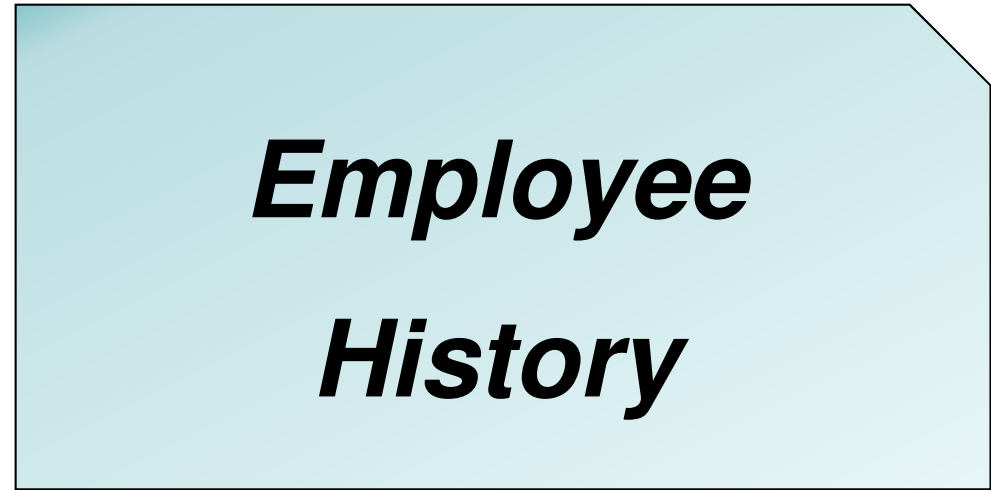
Create history table.

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

```
LTER 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

```
REATE TABLE employee_history LIKE employee
```

Create history table

```
LTER TABLE employee ADD VERSIONING USE HISTORY TABLE
mployee_history
```

Enable Temporal tracking

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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 Special Register
- CURRENT TEMPORAL SYSTEM_TIME

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

New Query *period-specification*
- FOR SYSTEM TIME AS OF <value>
- FOR SYSTEM TIME FROM <value> TO <value>
- FOR SYSTEM TIME BETWEEN <value> AND <value>
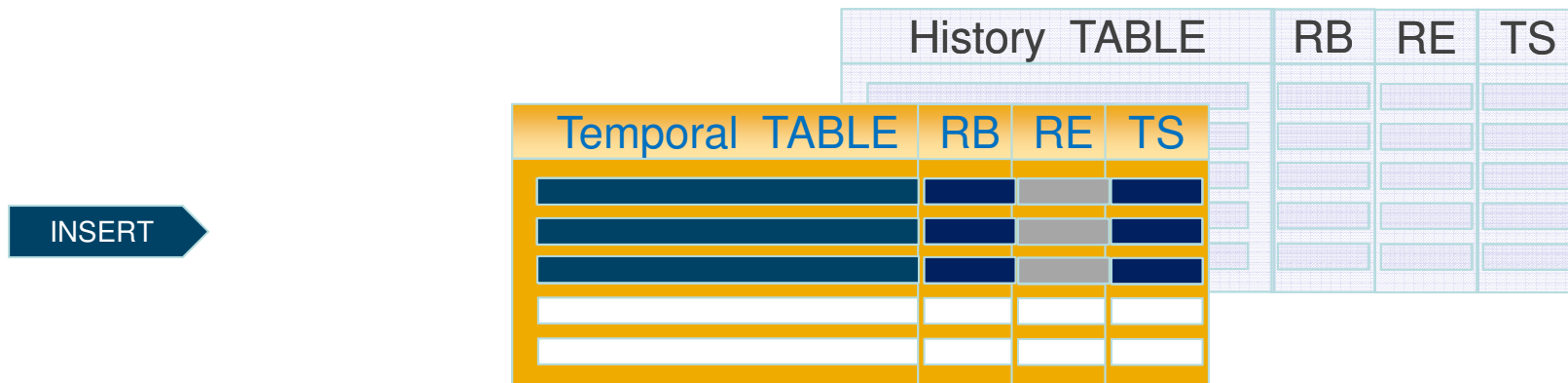
Data-centric history…

New Catalogs
- QSYS2/SYSPERIODS
- QSYS2/SYSHISTORYTABLES

Temporal in motion

**Inserting rows does not impact the history table**

○ ROW BEGIN (RB) Column – timestamp when the row was born
○ ROW END (RE) Column – set to "end of time"

History TABLE	RB	RE	TS

Temporal TABLE	RB	RE	TS

INSERT

Temporal in motion

Updating rows causes rows to be added to the history table
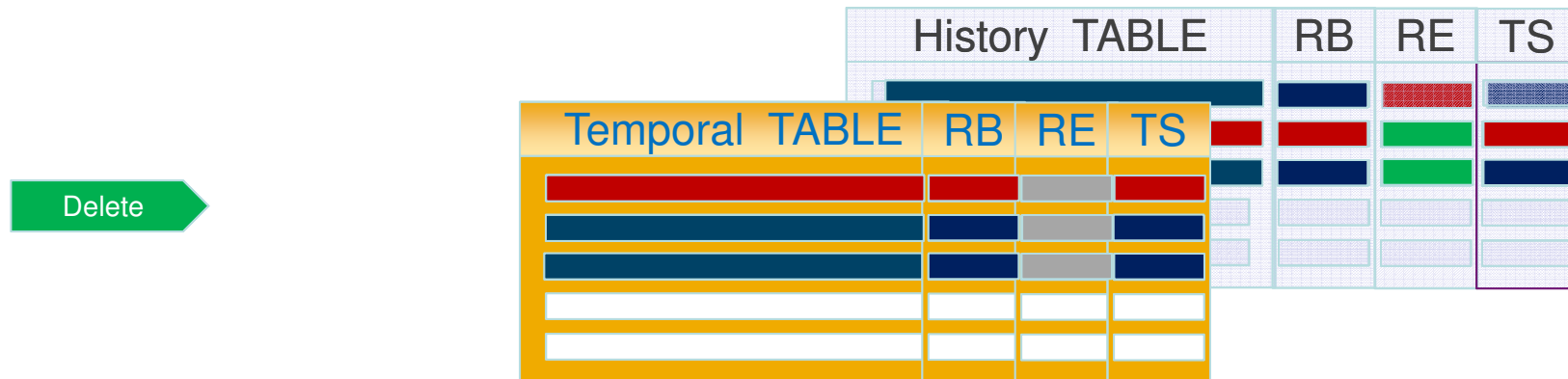
- ○ ROW BEGIN (RB) Column – timestamp when the row was born
- ○ ROW END (RE) Column – the death of the row results in the RE of the historical row matching the RB of the active row

History TABLE		RB	RE	TS

Update

Temporal TABLE	RB	RE	TS
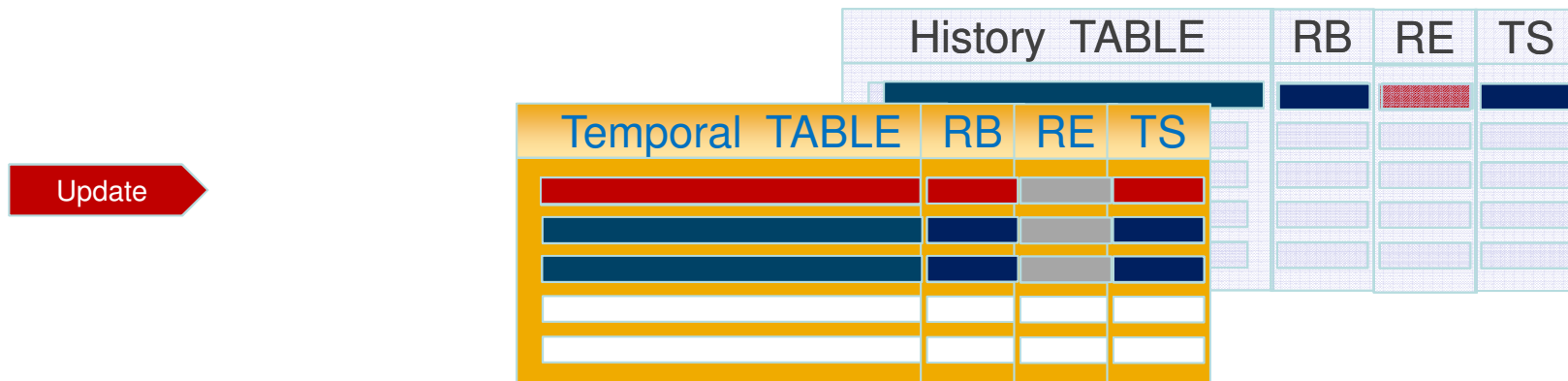
Temporal in motion

Deleting rows removes them from the temporal table and adds them to history table

o ROW END (RE) Column – set to the death time of the row

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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

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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

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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

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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

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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?

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?

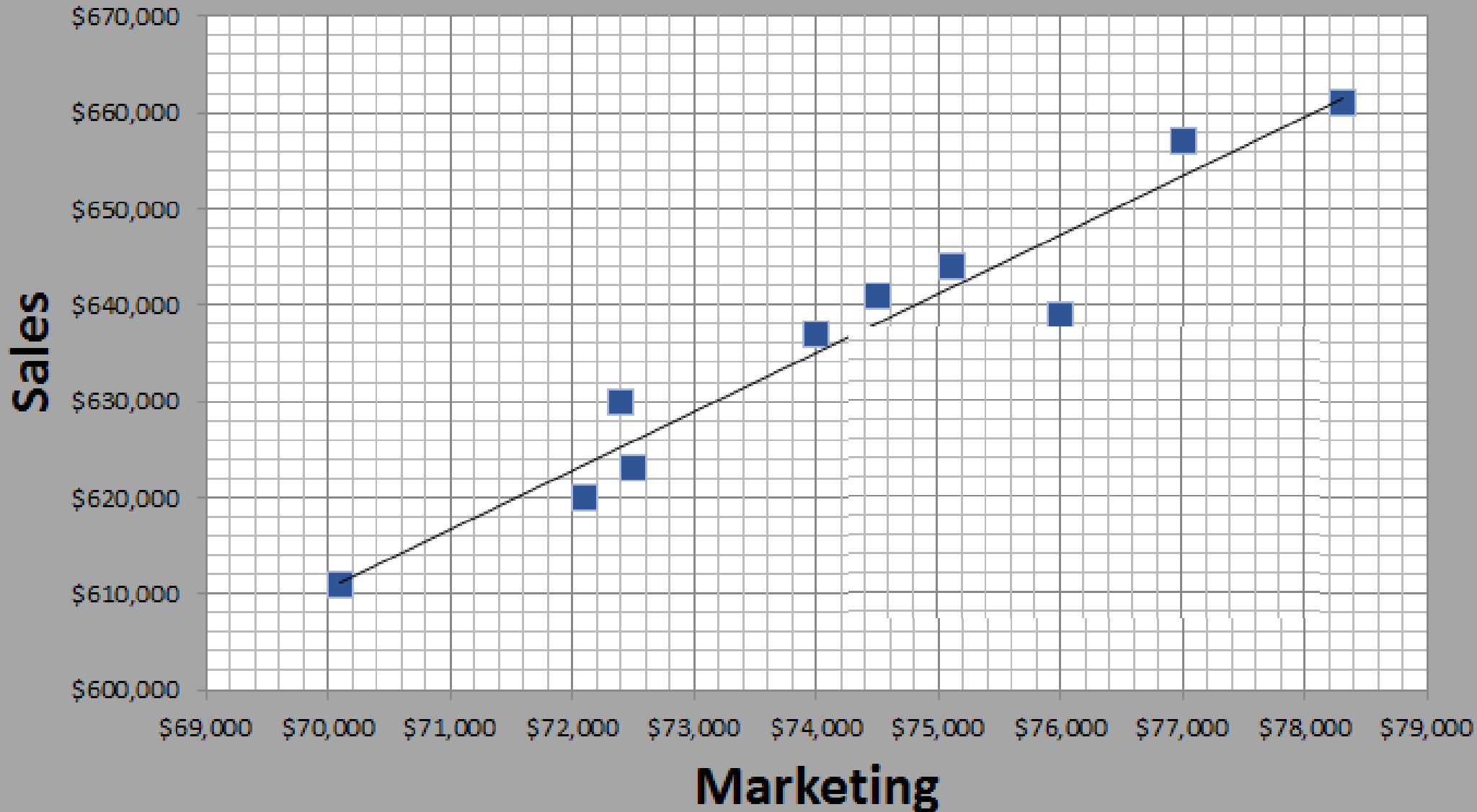- Can we predict sales based on the amount spent on marketing?

# SQL Query Engine and OLAP Specification Extensions

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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

Chart: Sales vs Marketing with trend line

$$y = 6.1267x + 181696$$
$$R^2 = 0.9372$$
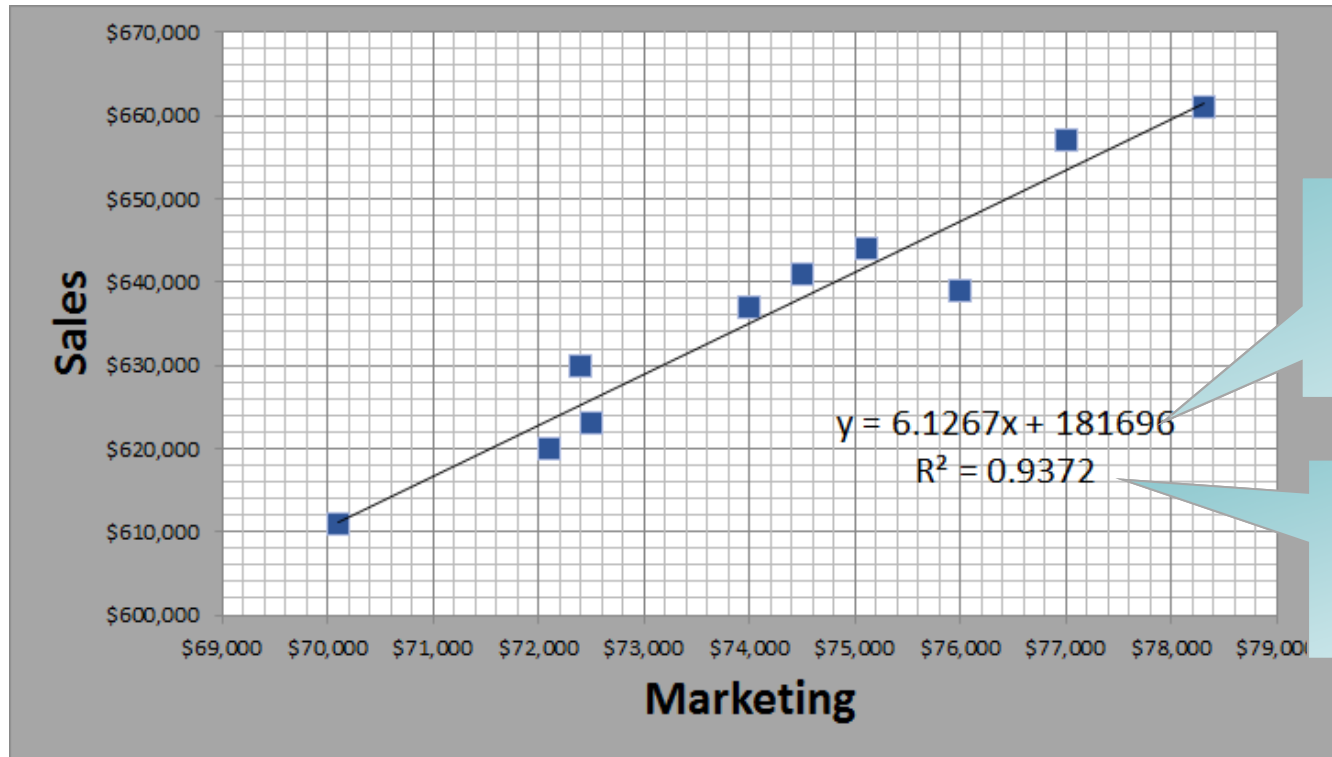
Predict sales base[d] on marketing budget

Predict with confidence as R^2 approaches 1

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.

SQL Query Engine and OLAP Specification Extensions

Option	Description
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 slope of the line.
REGR_AVGX, REGR_AVGY, REGR_SXX, REGR_SXY, REGR_SYY	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.

https://en.wikipedia.org/wiki/Regression_analysis

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

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:

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

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

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

Stores	Sales	Behind_1st	Behind_2nd	Compared_to_Last
Caining	770,000.00	0.00	270,000.00	670,000.00
Mills	500,000.00	-270,000.00	0.00	400,000.00
..	…	…	…	…
Bobs	100,000.00	-670,000.00	-400,000.00	0.00

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New Business Requirements

- Learn from history

- Ask new kinds of questions

Ensure intelligent security

- Know who did what and when

Power Systems

Ensure Intelligent Security

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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

i4HiFashionDB

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?

IT / Application Questions Related to Authority

– 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?

Power Systems

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

1

- Collect authority info for the user

2

- Examine the results via SQL or Navigator

3

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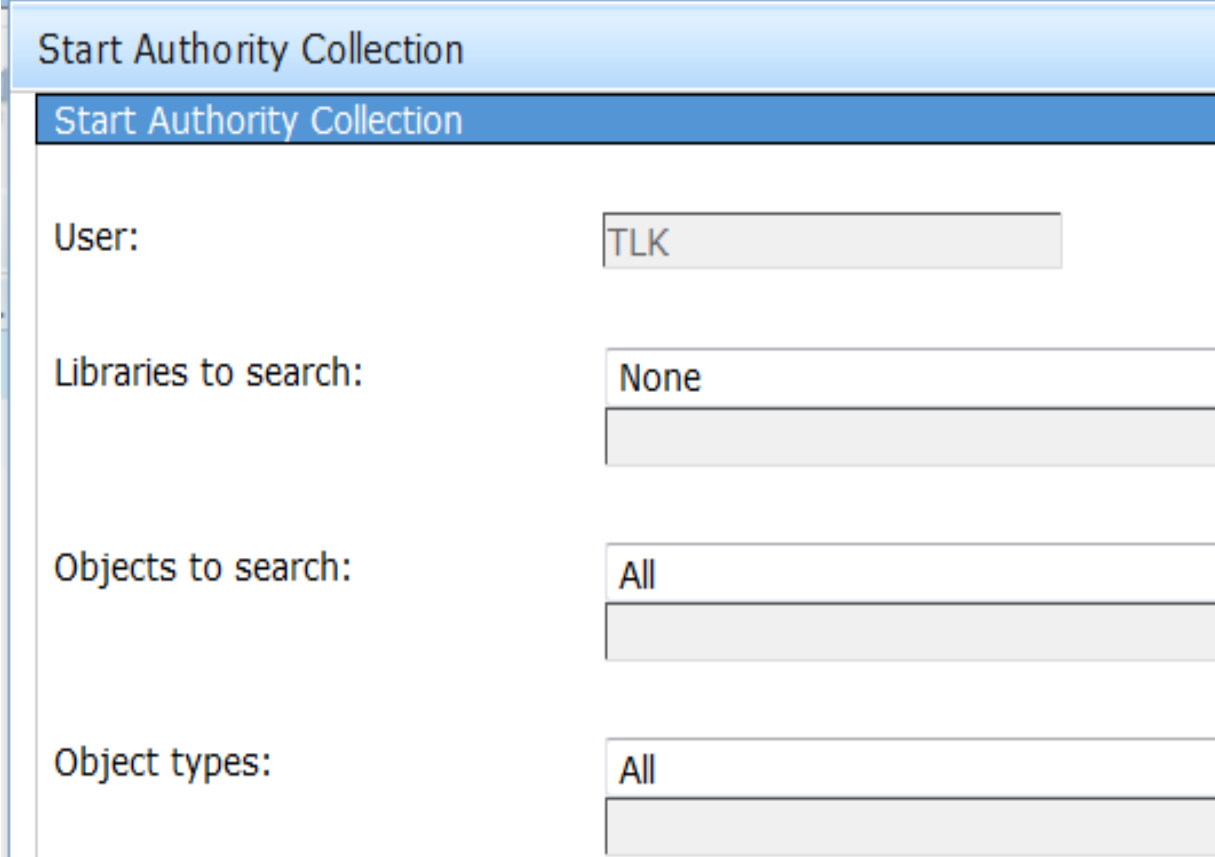
How to Use Authority Collection

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
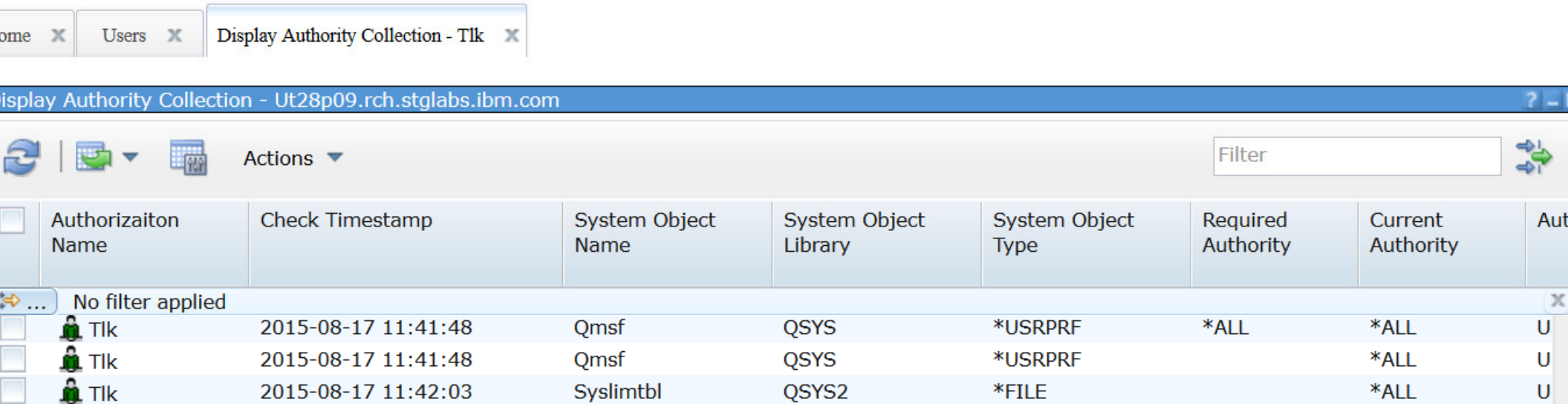
Start Authority Collection

Start Authority Collection	
User:	TLK
Libraries to search:	None
Objects to search:	All
Object types:	All

Authority Collection – Interrogate the collected data

Leverage Navigator to do **basic** data investigation

| | Users | Display Authority Collection - Tlk |

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

Actions ▼   Filter

	Authorizaiton Name	Check Timestamp	System Object Name	System Object Library	System Object Type	Required Authority	Current Authority	Aut
	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	*ALL	U
	Tlk	2015-08-17 11:42:03	Syslimtbl	QSYS2	*FILE	*ALL	*ALL	U

Use SQL to get more details

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

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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
    - o 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)

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i4HiFashionDB

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

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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

- **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

```
special-register

|--+-CURRENT CLIENT_ACCTNG-----+-
  +-CURRENT CLIENT_APPLNAME---+
  +-CURRENT CLIENT_PROGRAMID--+
  +-CURRENT CLIENT_USERID-----+
  +-CURRENT CLIENT_WRKSTNNAME-+
  +-CURRENT SERVER------------+
  '-+-SESSION_USER-+----------'
    '-USER-------'
```

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**)

```
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---------
```

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_NAM
   '-SYSIBM.ROUTINE_TYPE-------
```

Data Change Operation and Row-level Auditing detail

History table stores previous versions of a system-period temporal table's rows

- ○ ROW BEGIN (RB) Column – timestamp when the rows were born
- ○ ROW END (RE) Column – set to "end of time"
- ○ Data Change Operation (CHG) – 'I' for INSERT
- ○ Session User (USR) – identity of inserter

History TABLE				RB	RE	TS	CHG	USR

Temporal TABLE	RB	RE	TS	CHG	USR
				I	Tom
				I	Tom
				I	Tom

Insert

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Data Change Operation and Row-level Auditing detail

History table stores previous versions of a system-period temporal table's rows

- ○ ROW BEGIN (RB) Column – Birth
- ○ ROW END (RE) Column – Death
- ○ Data Change Operation (CHG) – 'U' for UPDATE
- ○ Session User (USR) – identity of updater

History TABLE	RB	RE	TS	CHG	USR
				I	Tom

Temporal TABLE	RB	RE	TS	CHG	USR
				U	Nick
				I	Tom
				I	Tom

Update

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ON DELETE ADD EXTRA ROW – in motion

History table stores previous versions of a system-period temporal table's rows

- o ROW BEGIN (RB) Column – Birth
- o ROW END (RE) Column – Death
- o Data Change Operation (CHG) – 'D' for DELETE
- o Session User (USR) – identity of deleter

History TABLE	RB	RE	TS	CHG	USR
				I	Tom
				U	Nick
				D	Jim
				I	Tom
				D	Jim

Delete →

Temporal TABLE	RB	RE	TS	CHG	USR
				U	Nick
				I	Tom
				I	Tom

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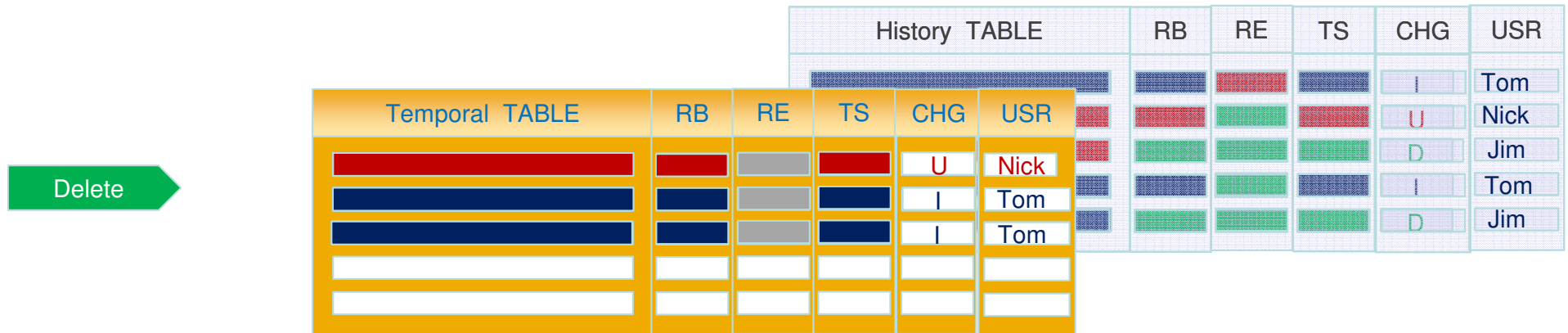
IBM i 7.3 Networking Security Enhancement

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.

The Power of Integration

Details

i4HiFashion – Application Development Requirements

i4HiFashion

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

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IBM i Application Languages Strategy

RPG

- RPG is the most commonly used language on IBM i so

  - Enable RPG as a powerful, modern procedural language
  - Partner for tools which transform older RPG to modern RPG
  - Work with partners & schools to teach RPG to non-RPG developers quickly

- Extensive skills and catalogs of solutions exist for business in other languages

  - Support key industry languages and programming models on IBM i
  - Ensure those new approaches can integrate with existing IBM i solutions
  - Enable tools for development, debug, lifecycle – from IBM and from partners

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!

Transformation

Modern RPG – Constant Transformation
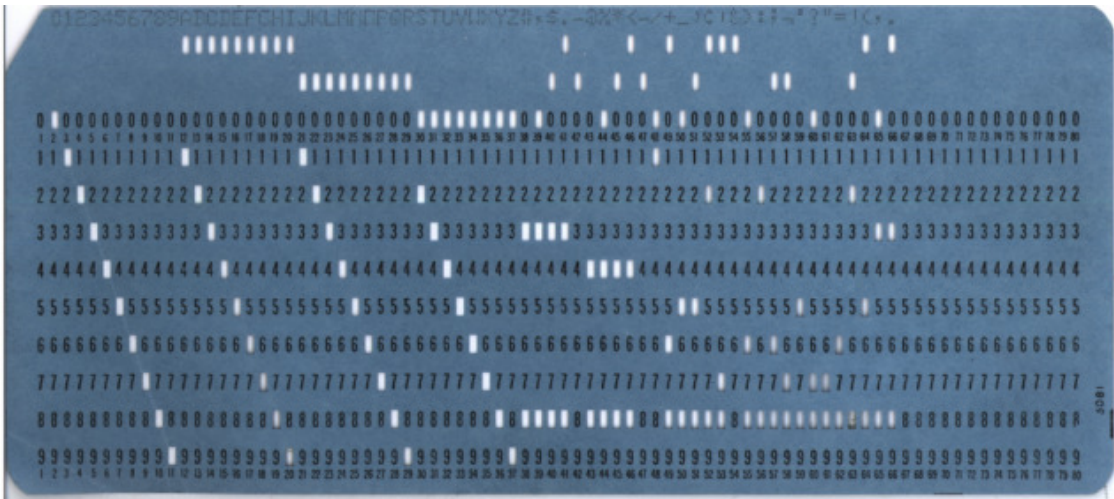
RPG IV - A Modern Business Language

– 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;
```

Modern RPG

- No Column restrictions

- 'Normal' syntax

- Easy readability

- Modular & Re-usable

- Leverage Other Languages

  - XML

  - SQL

  - JSON

```
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;
```

Full Free Form RPG

```
l-opt bnddir('ACCRCV');

l-f custfile usage(*update);
l-ds custDs;
l-f report printer;


ad custfile custDs;
w not %eof;
  if dueDate > %date(); // overdue?
     sendOverdueNotice ();
     write reportFmt;
     exec sql insert :name, :duedate into
             mylib/myfile;
  endif;
  read custfile custDs;
ddo;
lr = '1';

l-proc sendOverdueNotice;
   /copy invoices
 sendInvoice (custDs : IS_OVERDUE);
nd-proc;
```

Compiler Options

File Definitions

Data Definitions

Procedure Definitions

Calc Specs

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.

How is this changing the game?

Hear how Modern RPG and Tools allows a 23 year old developer to be success today!

http://bit.ly/1WhM7uT

What is IBM i doing?

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

5733-OPS: a bit unconventional?

- 5733-OPS has 15 options available NOW!

- The options themselves are placeholders

- Function will be delivered via PTF

- We now have a PTF group for each IBM i release!!

  SF99123 (7.1)
  SF99223 (7.2)
  SF99225 (7.3)
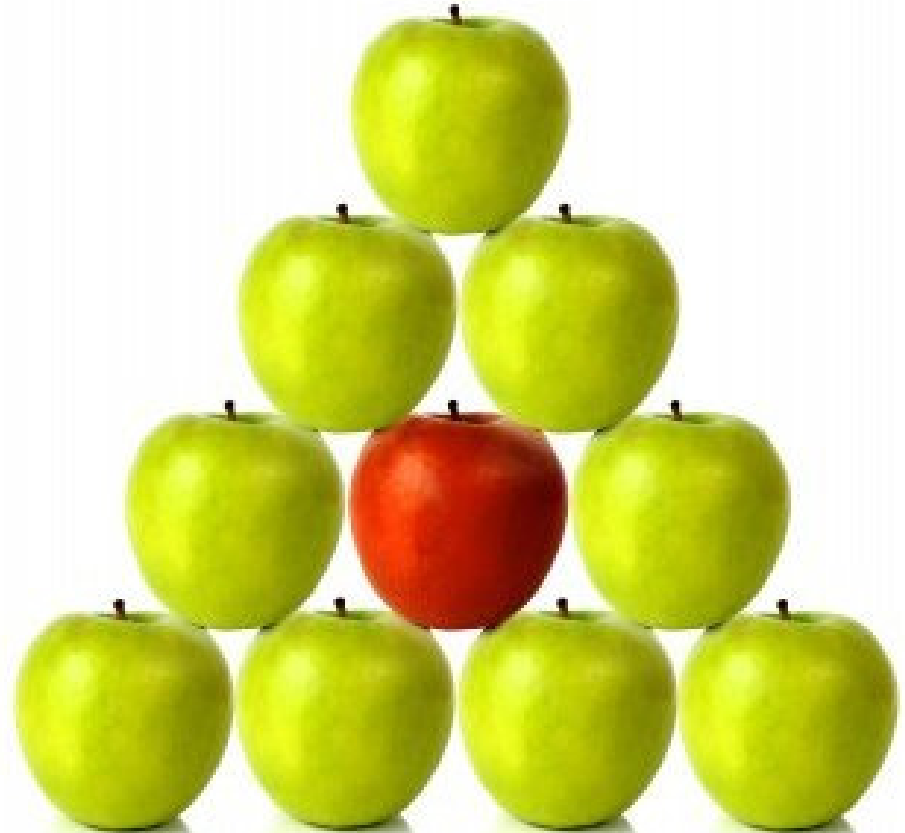
5733 OPS – Lots delivered in June 2016!

- 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

New

74

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
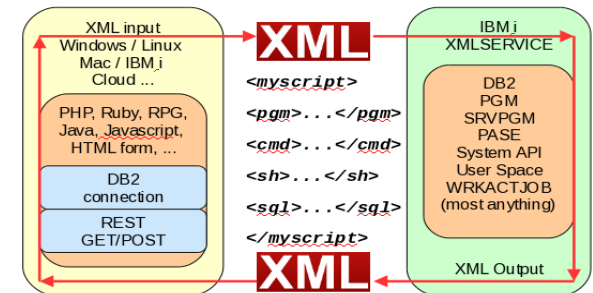
DB2 for i

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
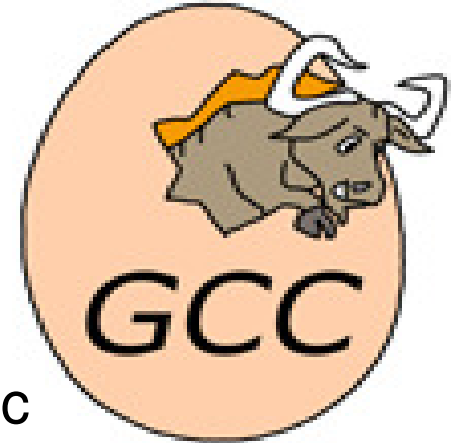
CHROOT

- 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

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.rte
- wget
- bash
- binutils
- bison
- bzip2
- curl
- expat-m
- gcc-c++
- gcc-cpp

- gcc-gfortranm
- gcc-'
- gdb'
- gmp'
- grep'
- gzip'
- info-'
- libgcc
- libgomp
- libiconv
- libidn
- libmpc
- libsigsegv

- libssh2
- libstdc++
- libtool
- m4
- make
- mpfr
- nedit
- openldap
- openssl
- p7zip
- pcre
- perl
- python-libs
- python-2.6.8-1

- readline
- sed
- tar
- unzip
- wget
- xz
- xz-libs
- xz-lzma
- zip-3.0
- zlib-1.2.4
- bash-4.3

IBM i chroot (change '/' location), 5733OPS Option 3

Ranger

chroot /QOpenSys/ranger /usr/bin/bsh

'/' is …
/QOpenSys/ranger/(*)

Bobby

chroot /QOpenSys/bobby /usr/bin/bsh

'/' is …
/QOpenSys/bobby/(*)

Lefty

chroot /QOpenSys/lefty /usr/bin/bsh

'/' is …
/QOpenSys/lefty/(*)

Wild Bill

chroot /QOpenSys/wildbill /usr/bin/bsh

'/' is ...
/QOpenSys/wildbill/(*)

admin
No problem, but you are not going to mess
up my system, so chroot you.

No chroot, '/' is … /(*)

(http://yips.idevcloud.com/wiki/index.php/PASE/OpenSourceBeta)

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
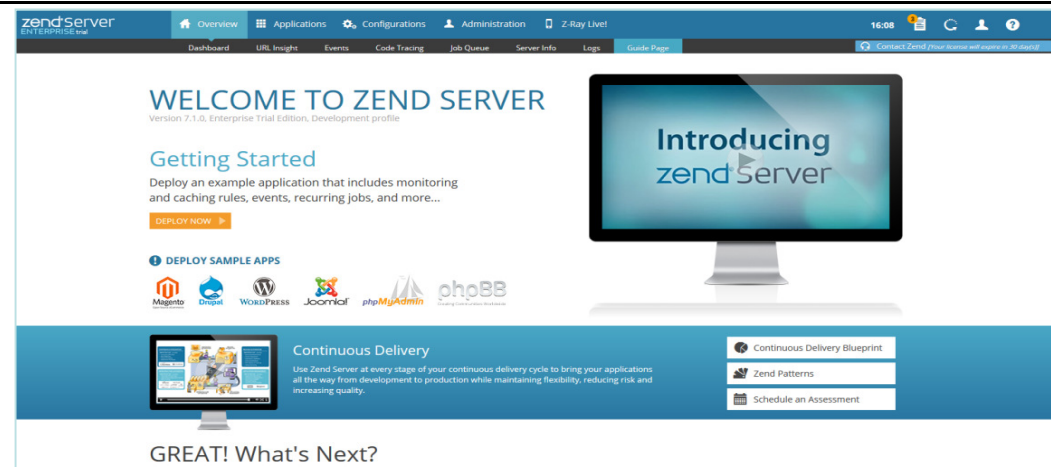
Rational Developer for i V9.5

- 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
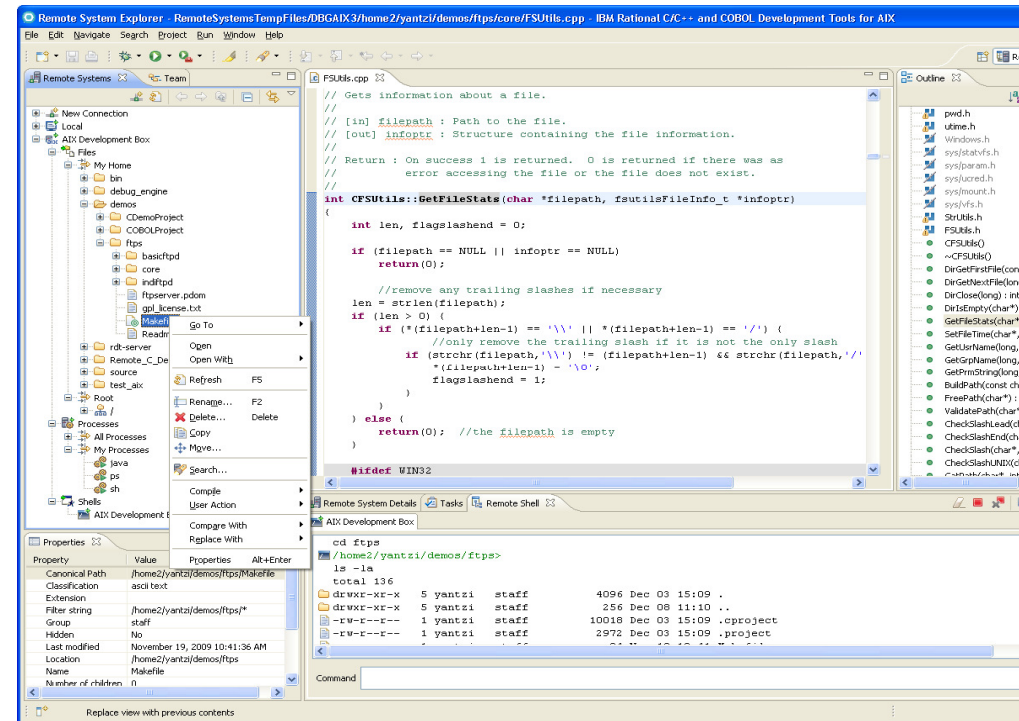
RDi Latest and Greatest 9.5.1

SSO

Run SQL Scripts

SQL

Kerbrose

Format SQL

Visual Explain

Synchronize IFS Projects

RPGILE Outline

Comments

O-Spec   I-Spec

Indicators

Unreferenced

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

RPG +

Orion

Orion

- Web Based Development Environment

- Great for many Open Source Languages

- Includes Syntax Color highlighting for 'Modern RPG'

- Integration with GIT

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 – Infrastructure Requirements
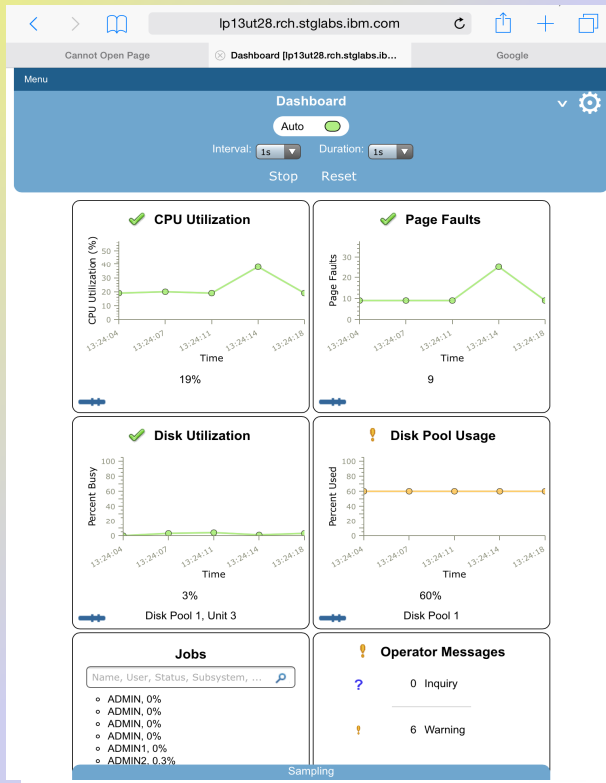
i4HiFashion

Operating an infrastructure means

- Monitoring performance easily

- Learning from (performance) history

- Identifying top resource consumers

- Access from anywhere

i4HiFashion – Productivity Requirements
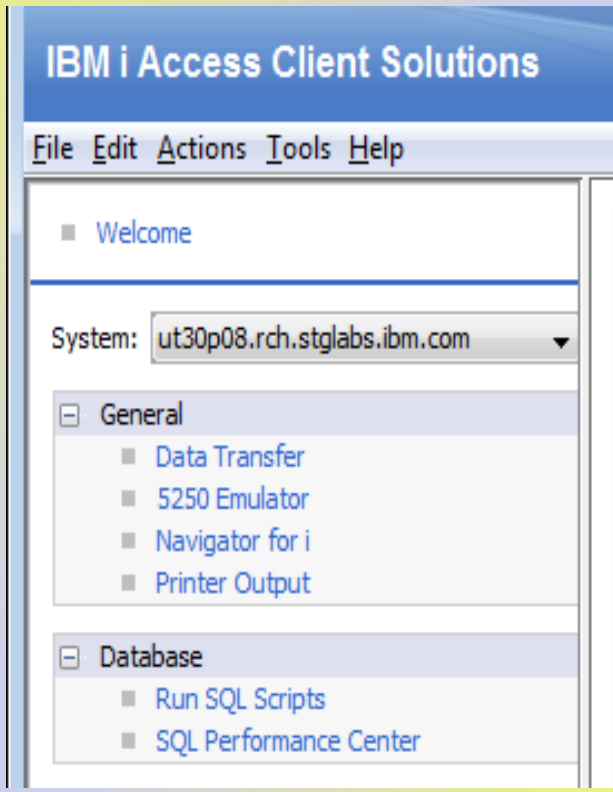
i4HiFashion

IBM i Access Client Solutions

File Edit Actions Tools Help

■ Welcome

System: ut30p08.rch.stglabs.ibm.com ▼

⊟ General
  ■ Data Transfer
  ■ 5250 Emulator
  ■ Navigator for i
  ■ Printer Output

⊟ Database
  ■ Run SQL Scripts
  ■ SQL Performance Center

Productivity means

- Mobile, Web, Windows & Linux devices

- Quick answers with SQL Scripts

- Managing Availability – BRMS & PowerH

- Live Data Dashboards – DB2 WebQuer

i4HiFashion – Additional Infrastructure Function from IBM i 7.3
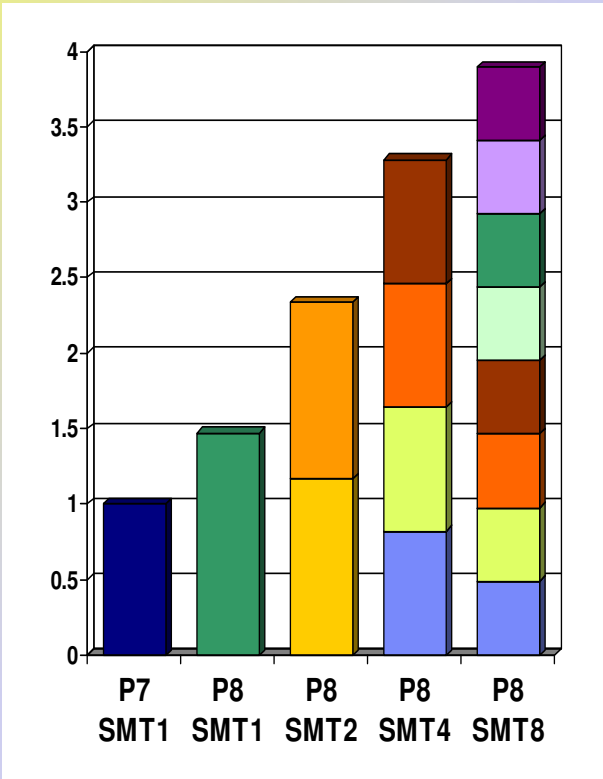
i4HiFashion

Maximum use of system resources

- Large POWER8 capacity

- Latest Storage Options

- Latest I/O Virtualization capabilities

- Increase system limits

i4HiFashion – Additional Integrated Enhancements in IBM i 7.3

i4HiFashion

Key Integrated Technologies enhanced

- IFS

- NetServer

- Networking – Security Auditing

- Save/Restore and Related

http://developerworks/ibmi/techupdates/i73

You and i *IBM i Trends and Strategies*

Previous Post | See All Posts

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.

By Steve Will

Tweet

SHARE

RSS

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.ibmsystemsmag.com/Blogs/You-and-i/

IBM i in the modern IT world.

Get your IBM i Strategy Whitepaper and roadmap for Power Systems.

Power Systems

IBM

IBM i plays a critical role in our Power Systems software portfolio. We continuously provide new solutions and are actively engaged in expanding into new technology areas to support the new business requirements of our clients.
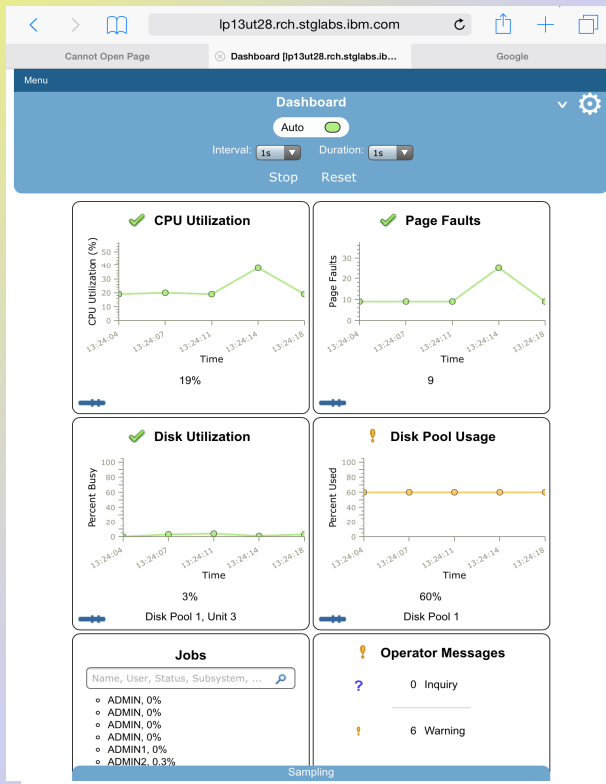
bit.ly/IBM_i_2016_Roadmap

Doug Balog
General Manager, Power Systems

i4HiFashion – Infrastructure Requirements

i4HiFashion

Operating an infrastructure means

- Monitoring performance easily

- Learning from (performance) history

- Identifying top resource consumers

- Access from anywhere

Visualize Performance Metrics in Navigator

avigator

Monitor Performance
Metrics

Set Thresholds to take
actions
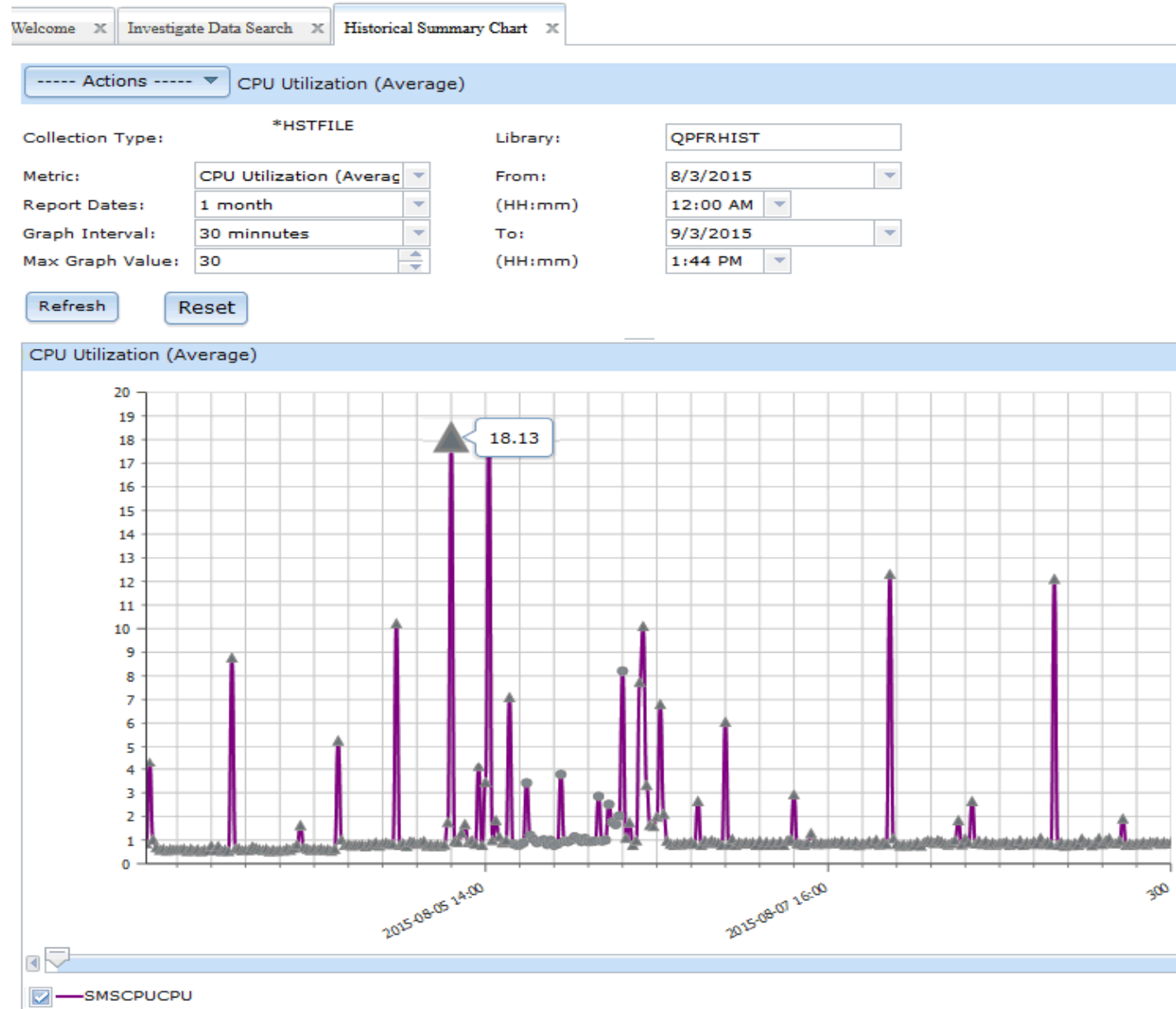
Visualize the collected
results

View Many Metrics at
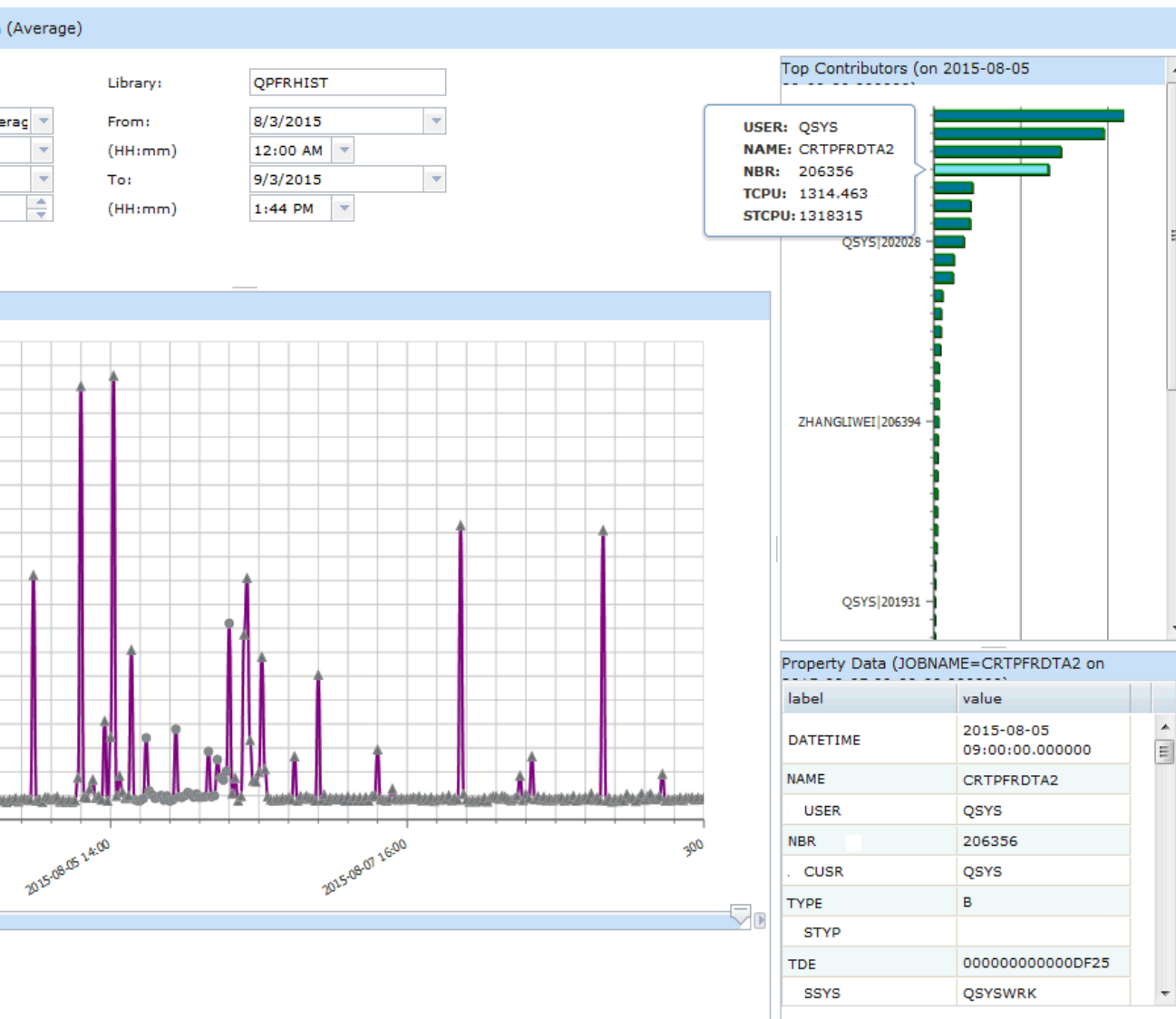Once

96
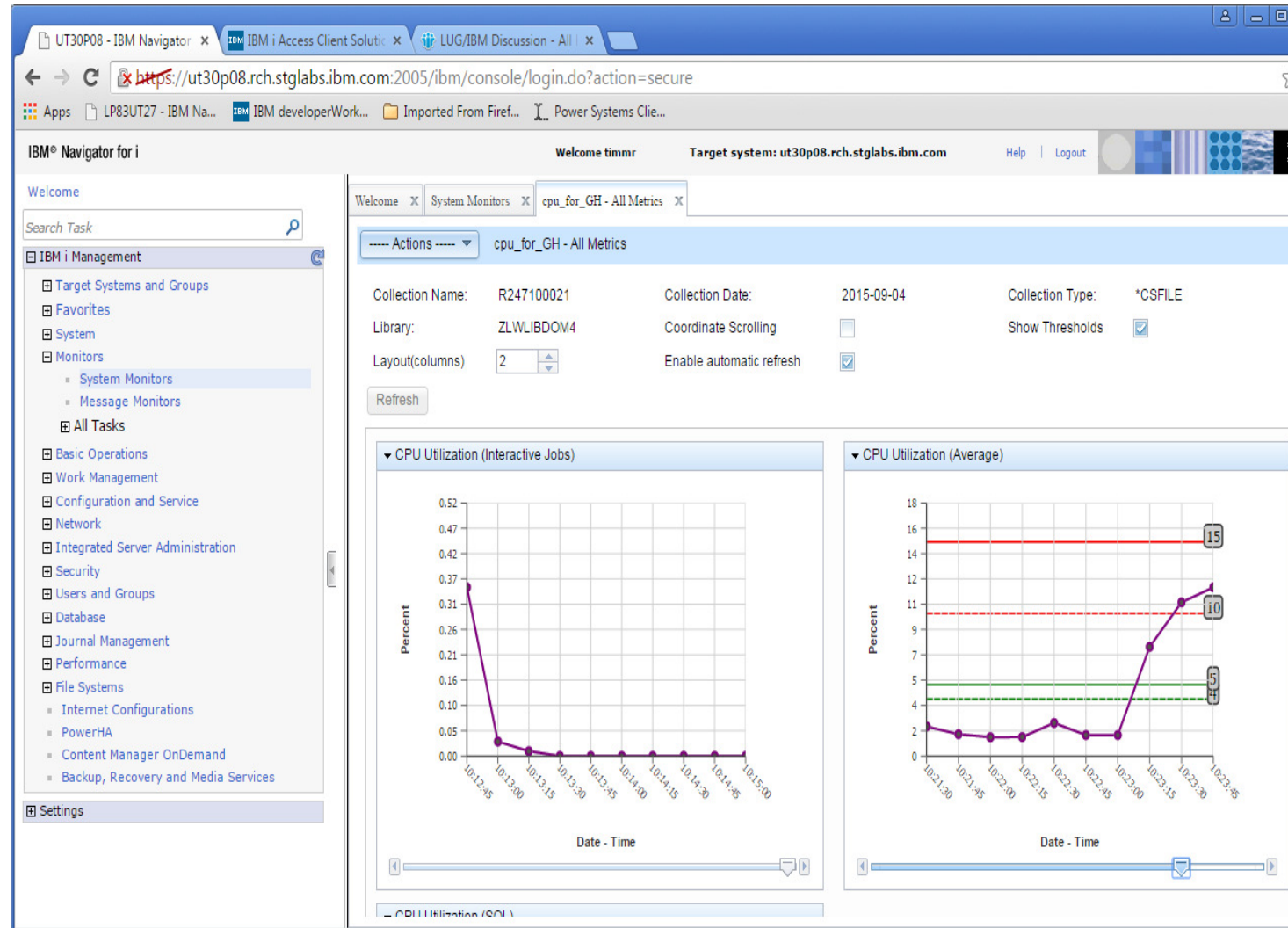
Understand the Past – View Historical Performance Data

avigator

View key performance
metrics consolidated
over long time intervals

Weeks, Months, Years
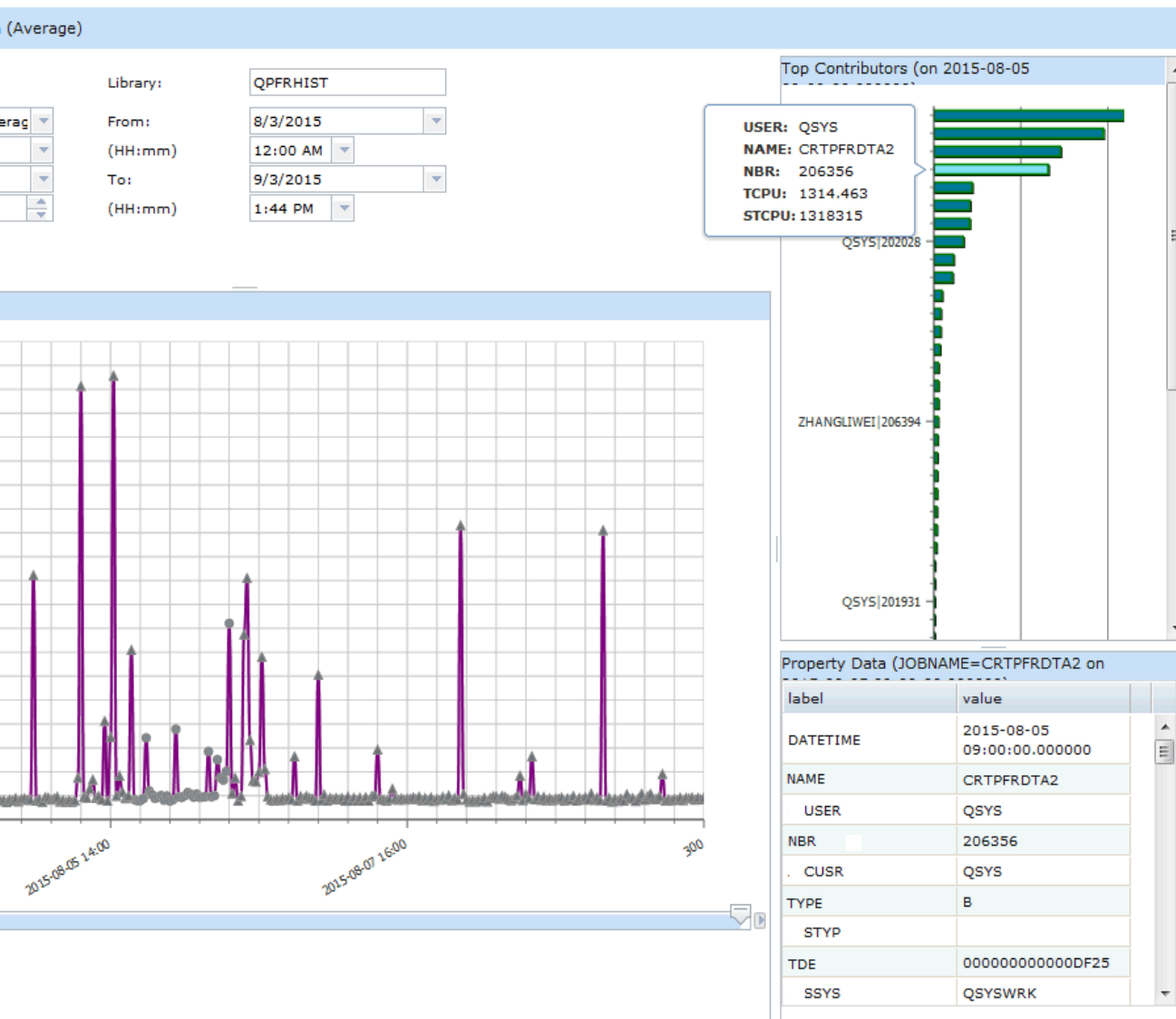
CPU, Disk Utilization

Monitor Your System– Visualize Performance Metrics in Navigator

Navigator – Historical View

- Click to see the top resourc[e] consumers.

- Detailed information about [a] top consumers.

- Advanced information abou[t] the selected top consumer.

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

Access Mobile

Watch several Key Metrics with 'Live' data

Set thresholds to quickly visualize issues on your system

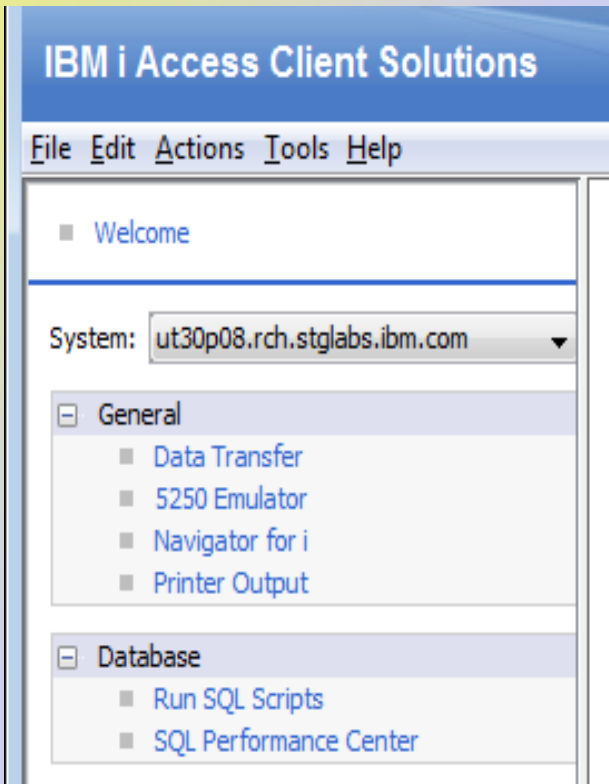Watch from your favorite Mobile Device
- Phone
- Tablet

Visual notification when a threshold is exceeded

i4HiFashion – Productivity Requirements

i4HiFashion

IBM i Access Client Solutions

File Edit Actions Tools Help

- Welcome

System: ut30p08.rch.stglabs.ibm.com ▼

☐ General
  - Data Transfer
  - 5250 Emulator
  - Navigator for i
  - Printer Output

☐ Database
  - Run SQL Scripts
  - SQL Performance Center

Productivity means

- Mobile, Web, Windows & Linux devices

- Quick answers with SQL Scripts

- Managing Availability – BRMS & PowerH

- Live Data Dashboards – DB2 WebQuery

iAccess for Windows

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

↓ ↓ ↓ ↓ ↓

Navigator

iAccess Mobile

- Supports Todays Devices
- Simple Install & Mgmt
- Improved Function

Access Client Solutions

Application Runtime Expert

DB2 SQL
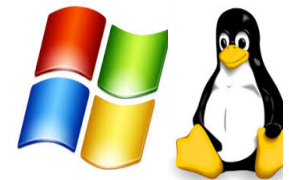
Manage and Access your System

Windows 10

Access Client Solution – 5733XJ1

Run SQL Scripts

SQL Performance Center

Direct Connect to Navigator

Improved 5250 Emulator

Full Windows 10 Support
• Plus Mac & Linux

IBM
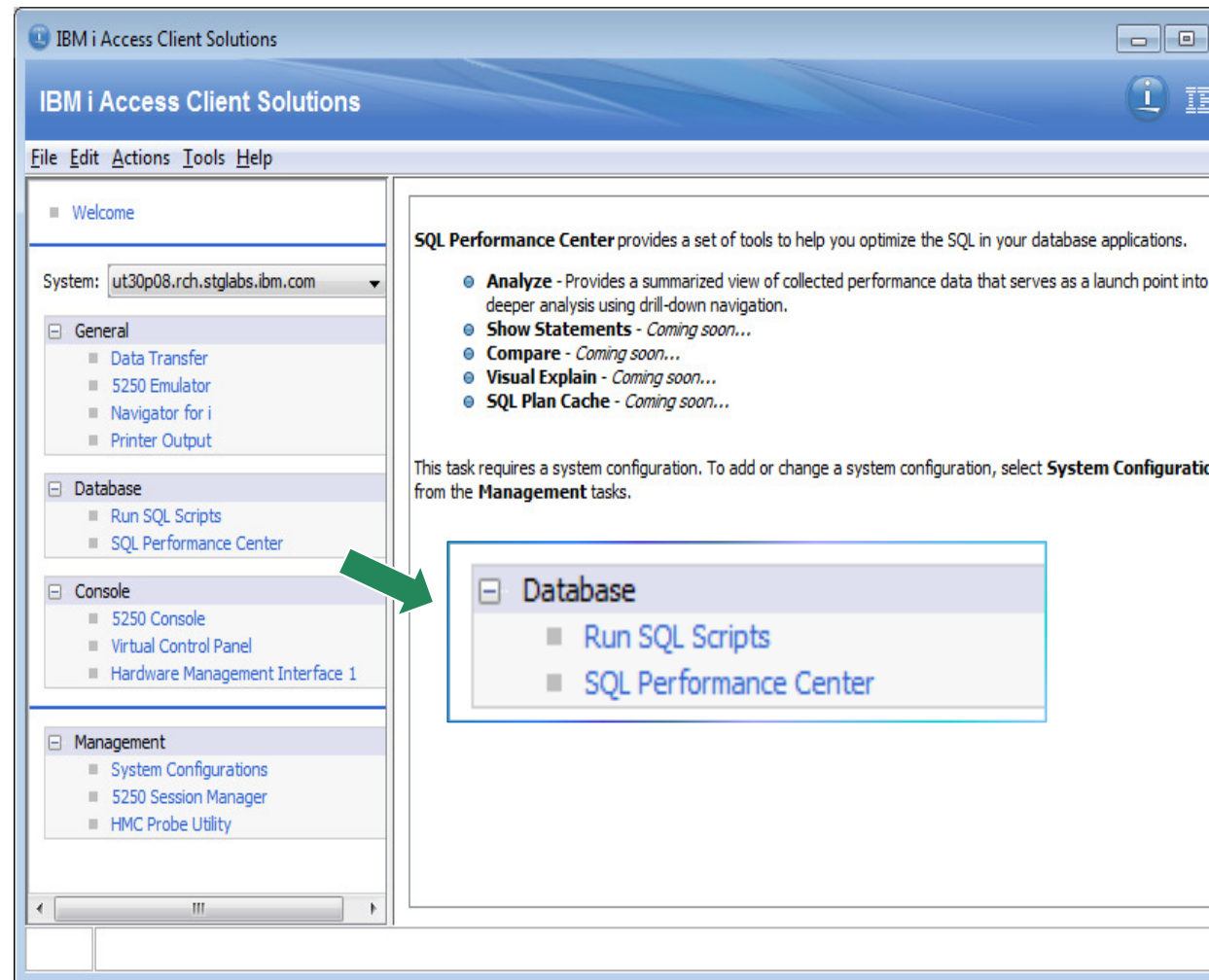
Access Client Solutions Product Page

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

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

Access videos

■ Introduction to IBM i Access Client Solutions (00:01:17)
▶ All IBM i Access videos

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■ Operating systems
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■ Solutions
■ Migrate to Power
■ Advantages

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Central System Deployment

New Deployment Wizard to Simplify and Improve ACS Deploy

Administrator Options for Multi User Deployment
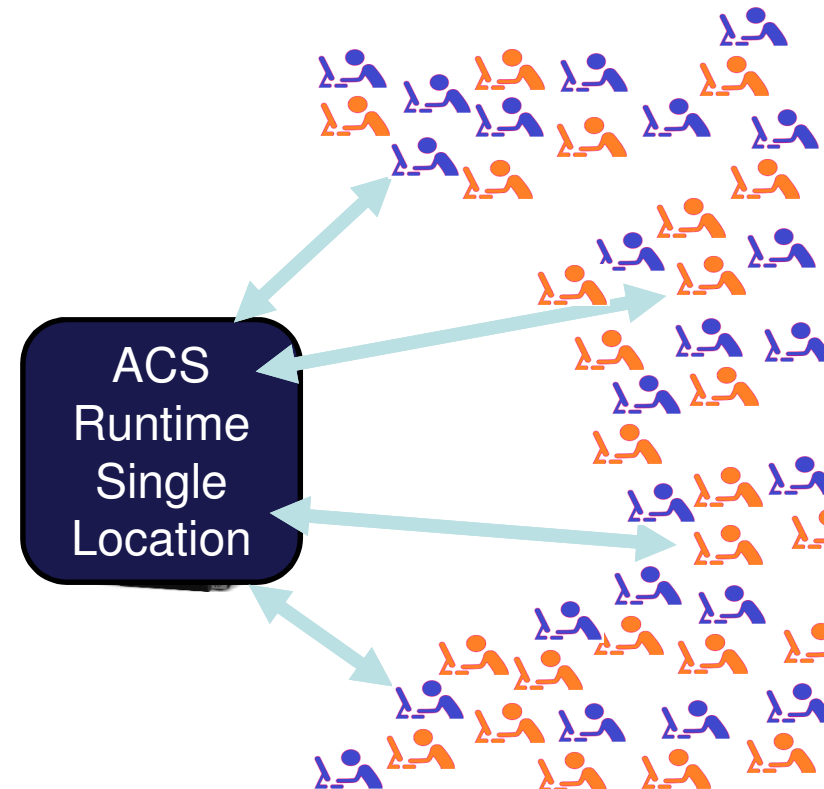
Create Desktop Shortcut to Runtime location
- Local or Network location

Create File Associations
- Old .ws files
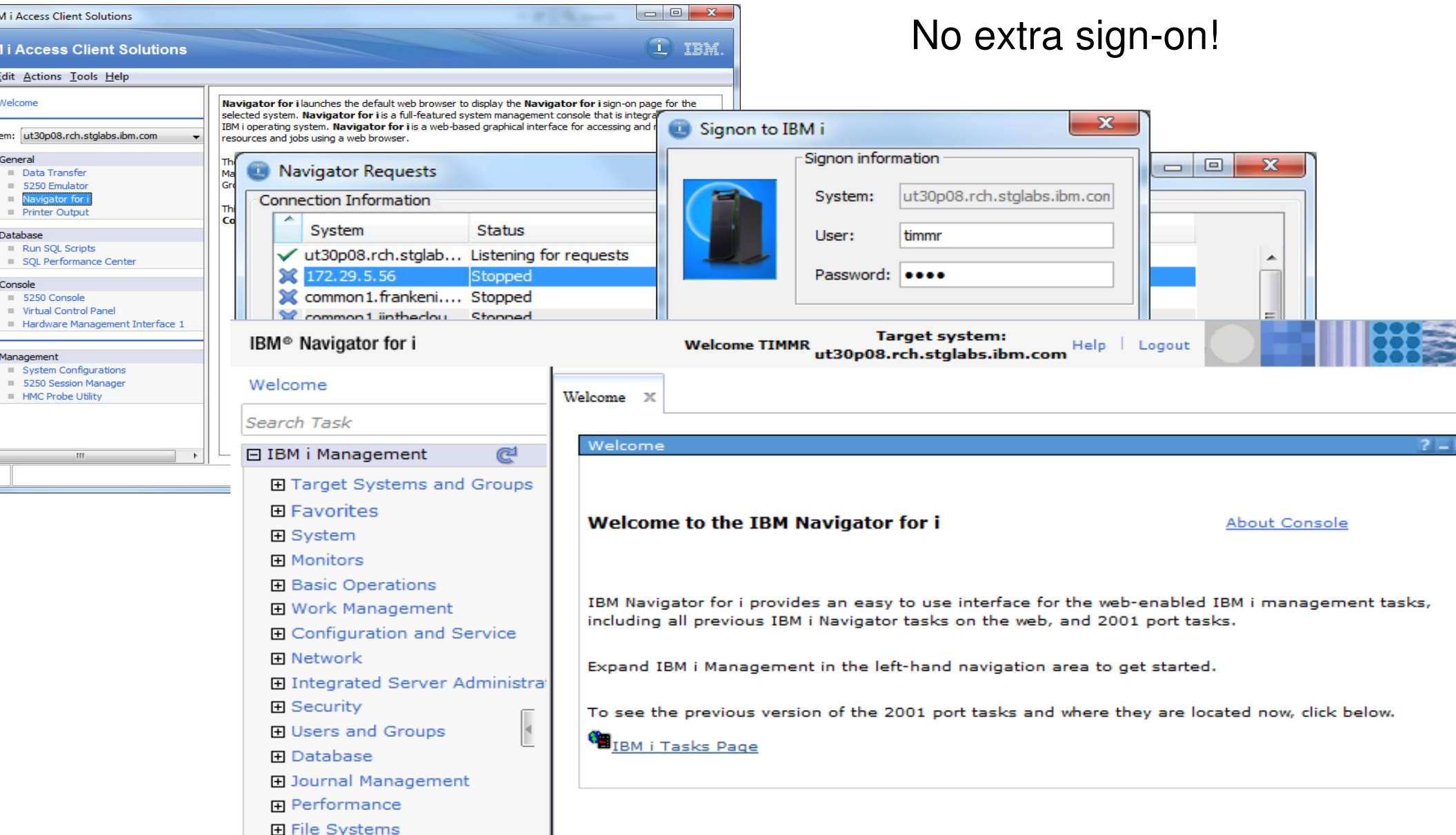- New .hod files
- Data Transfer

ACS
Runtime
Single
Location

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
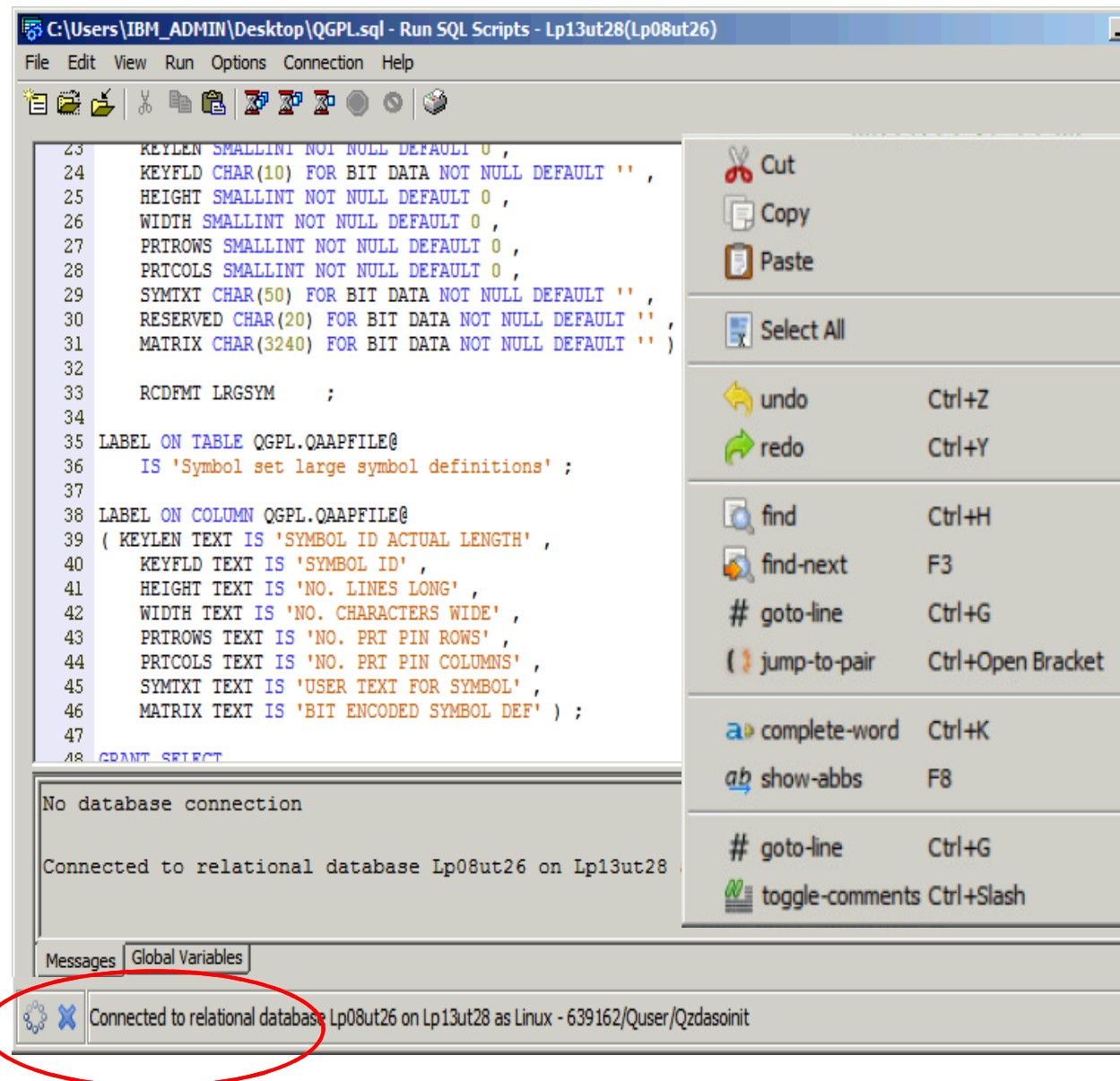
Work with Your Data – SQL Performance Center

Navigator and ACS Working togethe

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

Work with Your Data – SQL Performance Center

Work with LARGE amounts of data with amazing speed
Dig into the details of your SQL Performance

Jesse G Performance monitor - SQL Statements - Lp13ut28(Lp08ut26)

e View Actions

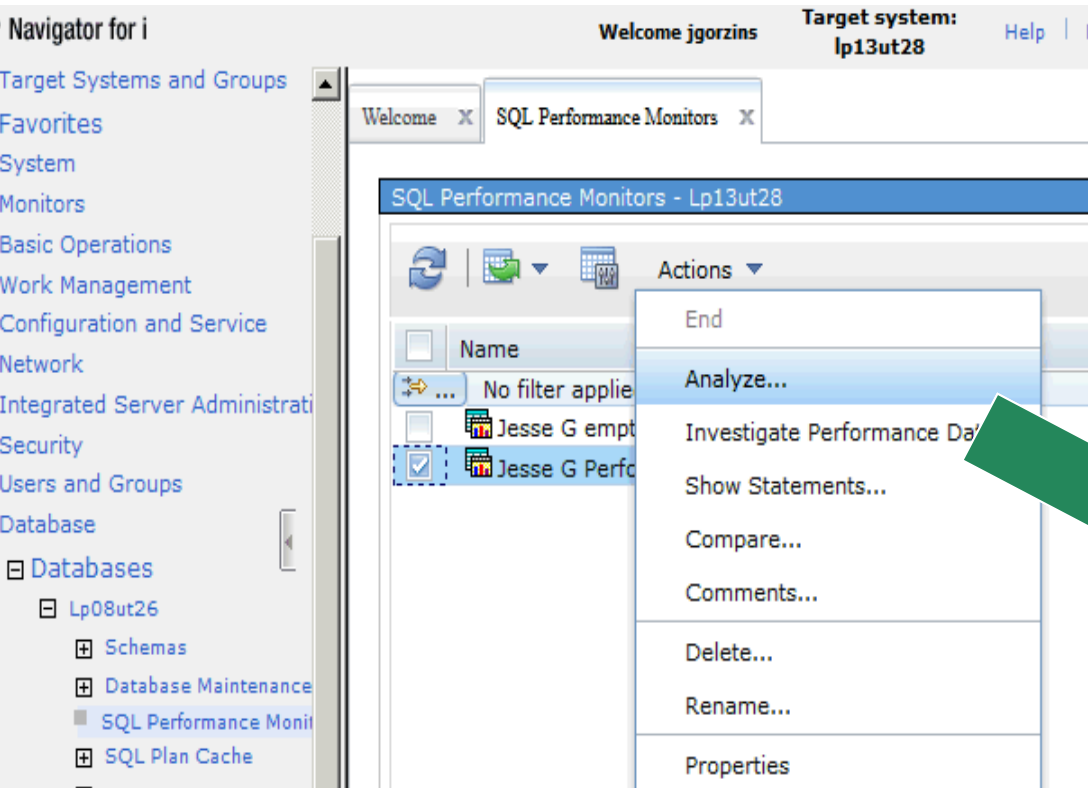| Start Time	End Time	Runtime	Statement Outcome	SQLSTATE	SQLCODE	Operation	Statement Te
14-08-19 15:27:03.312397	2014-08-19 15:27:03.680841	0.368448	Successful	00000	0	CREATE PROC...	CREATE PROCEDURE QIWS.QZDGDSPF (
14-08-19 15:27:03.704386	2014-08-19 15:27:03.803718	0.099328	Successful	0100C	466	CALL	CALL QIWS.QZDGDSPF(?,?)
14-08-19 15:27:03.134144	2014-08-19 15:27:03.190371	0.056056	Successful	00000	0	FETCH	
14-08-19 15:27:03.134144	2014-08-19 15:27:03.190027	0.055880	Successful	00000	0	OPEN	SELECT NAME_00001, STATU00001, JOB
14-08-19 15:26:26.425839	2014-08-19 15:26:26.461764	0.032960	Successful	00000	0	FETCH	
14-08-19 15:26:26.425839	2014-08-19 15:26:26.458622	0.032784	Successful	00000	0	OPEN	SELECT NAME_00001, STATU00001, JOB
14-08-19 15:27:03.900606	2014-08-19 15:27:03.920415	0.019808	Successful	00000	0	OPEN	SELECT QQ1000L, QQC102, QQC103 FR(
14-08-19 15:26:29.857867	2014-08-19 15:26:29.877668	0.019800	Successful	00000	0	CLOSE	CLOSE CRSR0030
14-08-19 15:27:03.268125	2014-08-19 15:27:03.285062	0.016936	Successful	0100C	466	CALL	CALL QIWS.QZDGDBLL(?,?,?,?)
14-08-19 15:27:03.882833	2014-08-19 15:27:03.897698	0.014864	Successful	00000	0	PREPARE...DE...	SELECT QQ1000L, QQC102, QQC103 FR(
14-08-19 15:26:28.556050	2014-08-19 15:26:28.567622	0.011264	Successful	00000	0	FETCH	
14-08-19 15:26:28.556050	2014-08-19 15:26:28.567180	0.011128	Successful	00000	0	OPEN	select * from qiws.qcustcdt
14-08-19 15:27:03.949538	2014-08-19 15:27:03.958738	0.009200	Successful	00000	0	CLOSE	CLOSE CRSR0032
14-08-19 15:26:28.935660	2014-08-19 15:26:28.944802	0.009144	Successful	00000	0	CLOSE	CLOSE CRSR0025
14-08-19 15:26:29.161710	2014-08-19 15:26:29.169269	0.007472	Successful	00000	0	FETCH	

DB2 for i – Enhancements delivered via DB2 PTF Groups

7.2 – TR2

7.2 – TR3

7.2 – TR4
7.3 – GA

2015

2016

SF99702
Level 5

SF99702
Level 9

SF99702
Level 11
SF99703
Level 1
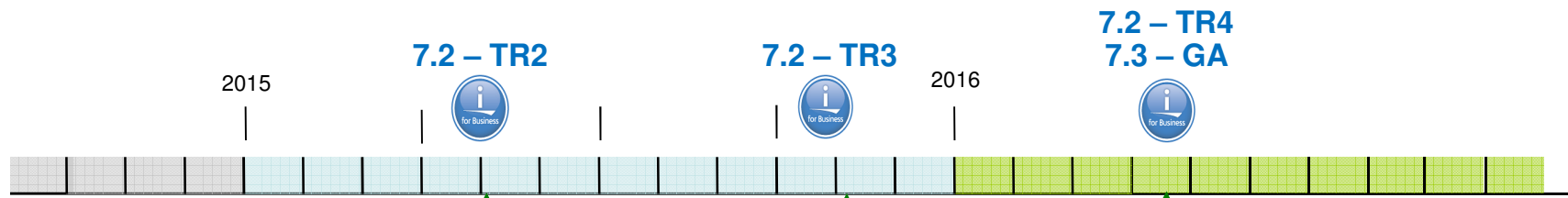
TR2-timed Enhancements
- Create OR REPLACE table
- JSON – DB2 Store Technology Preview
- SQE Performance improvements
- And more…

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

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**

Enhancements in 7.3:
- **Temporal Tables**
- **Generated columns for auditing**
- **New OLAP built-ins**
- **Raised architecture limits**
- **New support for partitioned tables**
- **More IBM i Services**
- **All TR-timed enhancements**

www.ibm.com/developerworks/ibmi/techupdates/db2

IBM i Services for SQL users

7.2 – TR1

2015

7.2 – TR2

7.2 – TR3

2016

7.2 – TR4
7.3 – GA
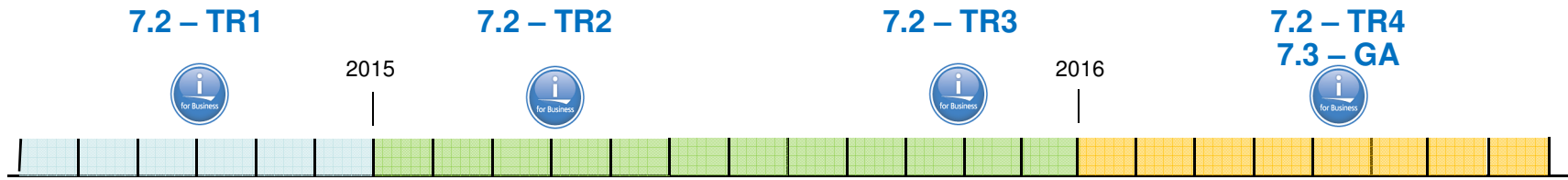
Services in 2014:
- JOURNAL_INFO
- LIBRARY_LIST_INFO
- REPLY_LIST_INFO
- JOBLOG_INFO()
- SYSTMPSTG (7.2)
- DB2 for i built-in Global Variables (7.2)
- JOB_NAME (7.2)
- SERVER_MODE_JOB_NAME (7.2)
- SYSTOOLS.GROUP_PTF_CURRENCY

Services in 2Q/2015:
- ACTIVE_JOB_INFO()
- SCHEDULED_JOB_INFO
- SERVER_SBS_ROUTING
- SET_SERVER_SBS_ROUTING()
- DRDA_AUTHENTICATION_ENTRY_INFO
- 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
    - o IFS lists supported
    - o Movement back and forth between SSD & HDD tiers
    - o I-ASP support
    - o 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

IFS now supported!

Library Support!

S S D • H D D — ASP01

S S D • H D D — User ASP

S S D • H D D — I-ASP

NEW I-ASP SUPPORT

Can move PF/LF files within an ASP Between SSD(Fast) and HDD(Slow)
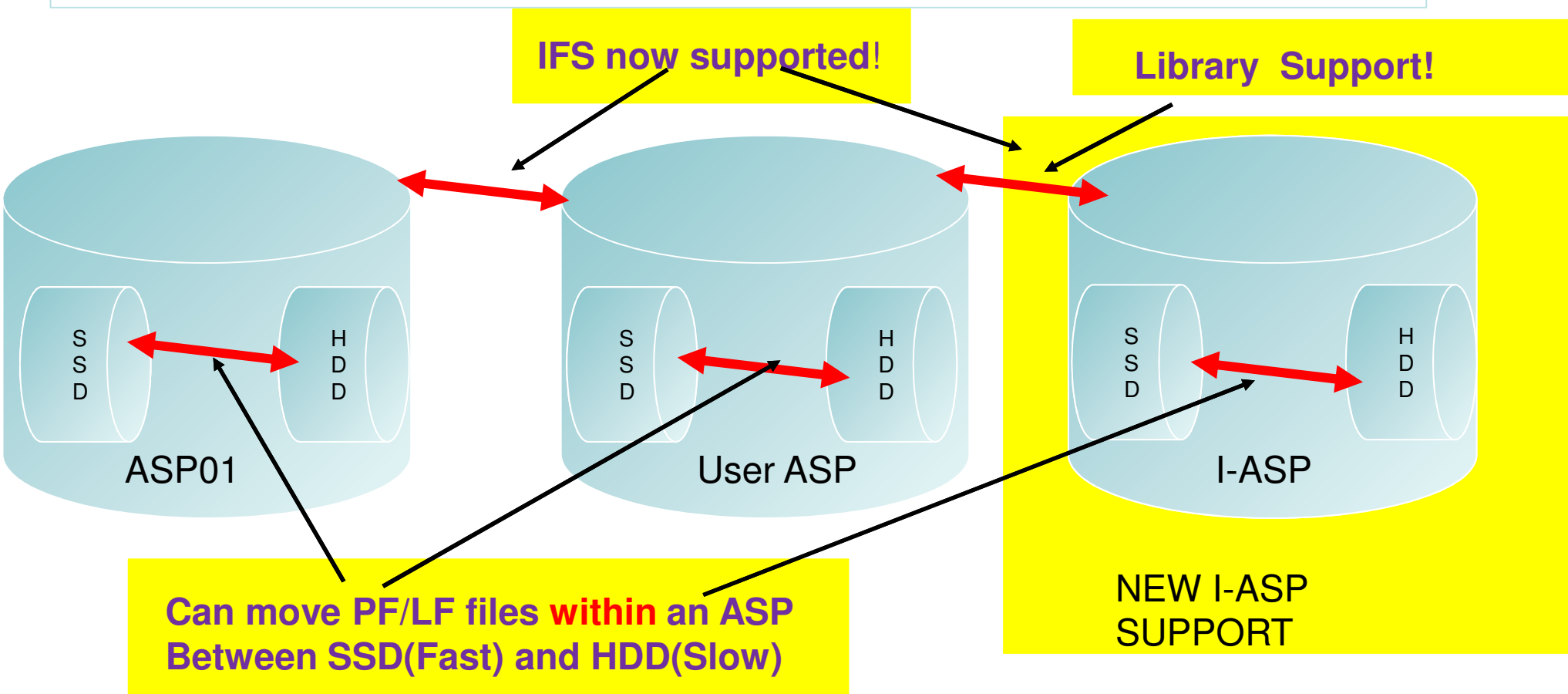
BRMS 7.3 Enhancements

- BRMS Web Client
  - 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 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.
  - SAVBRM 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
    - o 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 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!
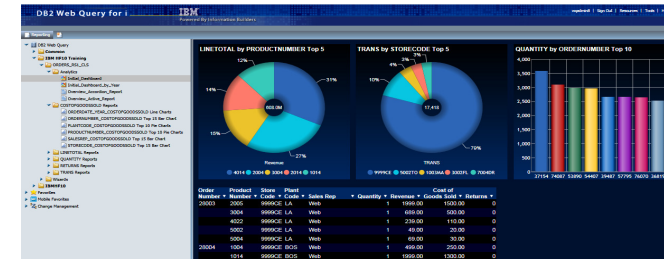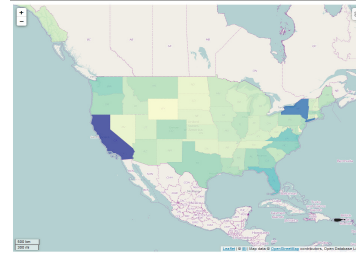
"DB2 Web Query is putting a modern face on our data and our analysts love it. It is the best way to provide BI on a budget."

NEW !!

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 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
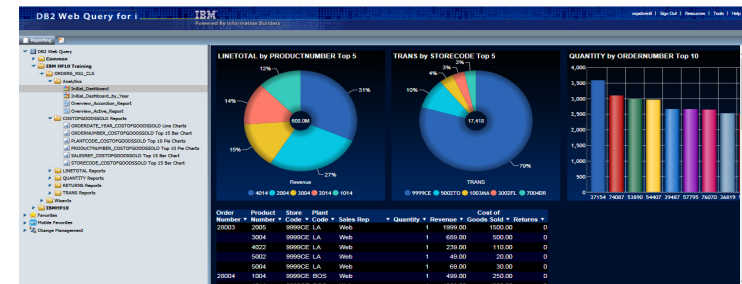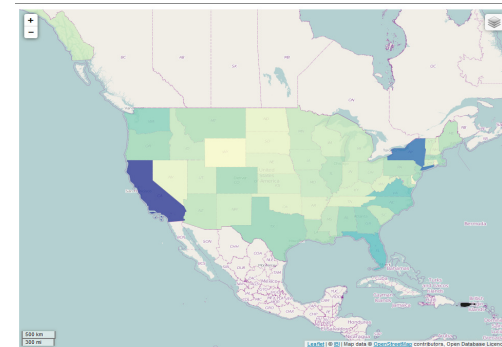
ake Reports and Dashboards Mobile with DB2 Web Query

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
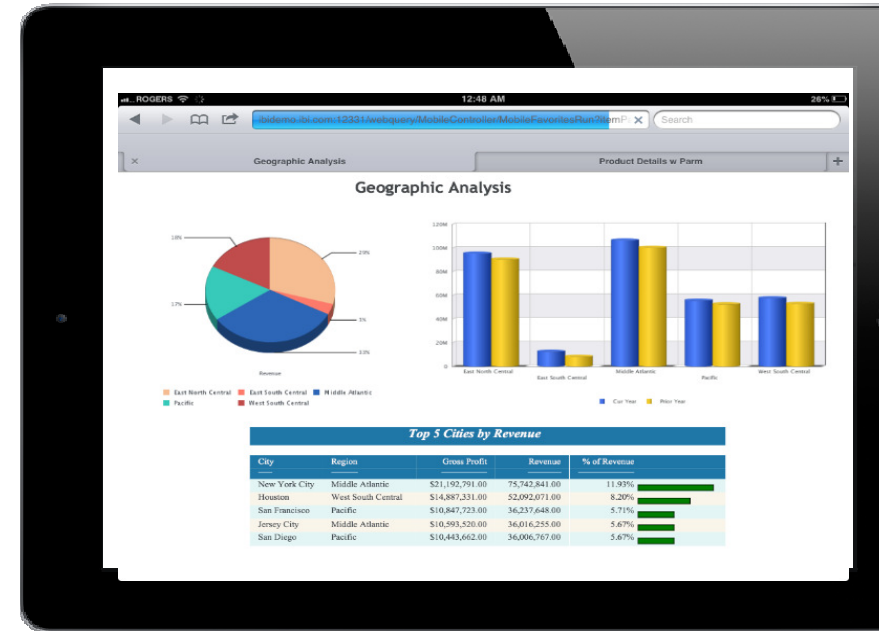
DB2 Web Query Update: Version 2.2   NEW !!

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
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 Ma
feature and cannot wait to integrate t
to our site.
– Emerald Ganpath, USW Dealer
Solutions

One of our biggest uses of WebQuer
is for customer history reports. These
can now be handled by our clerks rig
at our point-of-sale. No need for
customers to contact our office and w
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 !!**

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
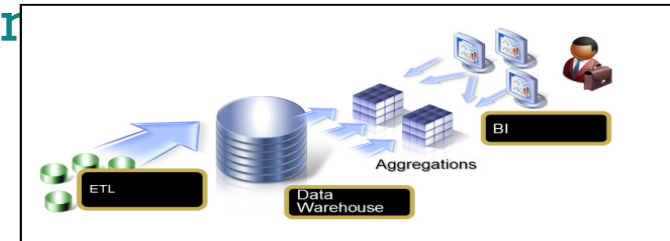
"One of the biggest obstacles we have faced to providing timely reporting was in trying to glean meaningful information using Query/400 and Crystal Reports over our production data. The combination of the DB2 database in a modern warehouse and DB2 Web Query will allow us to have instantaneous access 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/db2webqueryi

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 Demonstrations
- Wizards: https://ibm.biz/DB2WQWizards
- End User: https://ibm.biz/db2wqreportingdemos
- Getting Started: https://ibm.biz/db2wqgettingstarteddemos

Or reach out to the DB2 Web Query team at QU2@us.ibm.com

DB2 Web Query Update: Version 2.2

NEW !! For 7.3
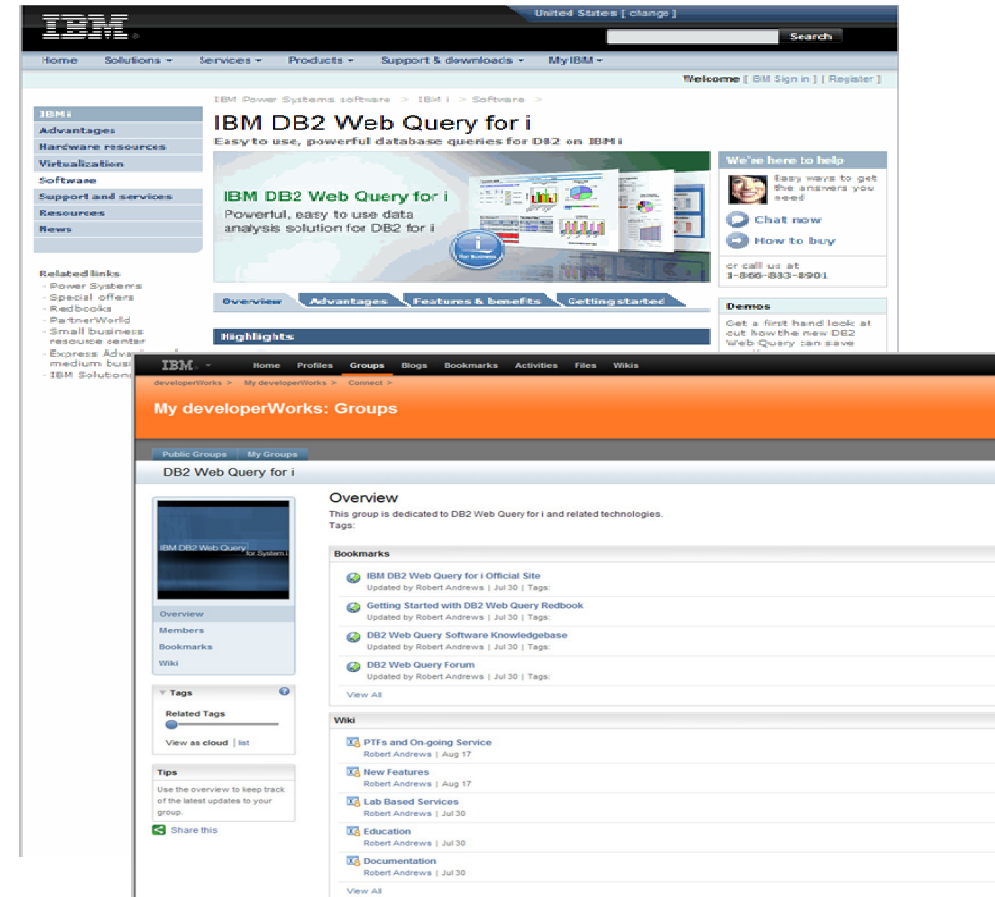
DB2 Web Query (5733-WQx) enhancements!
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- Target specific browsers for testing to eliminate surprises
- Design for MOBILE - new Mobile Layout canvas and enhancements

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

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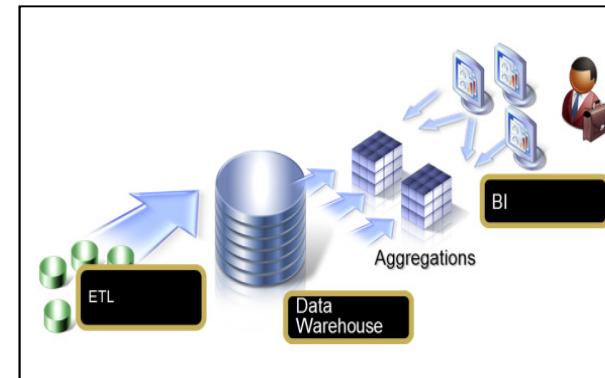
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- Les Turner / Warehouse Architect & Developer
David Parsons / I.T. Director
Manhattan Insurance Group

i4HiFashion – Additional Infrastructure Function from IBM i 7.3
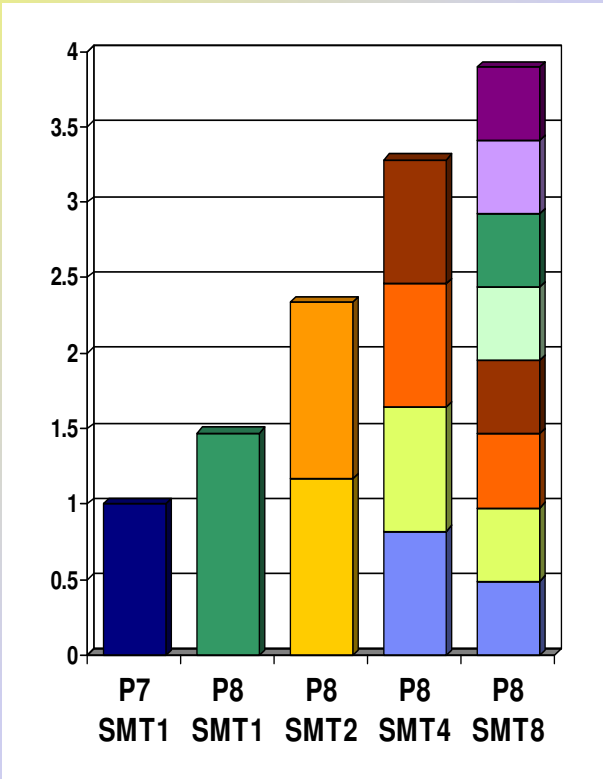
i4HiFashion

Maximum use of system resources

- Large POWER8 capacity

- Latest Storage Options

- Latest I/O Virtualization capabilities

- Increase system limits

IBM i System Support

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

POWER8

- **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"

P7	**P8**	**P8**	**P8**	**P8**
SMT1	**SMT1**	**SMT2**	**SMT4**	**SMT8**
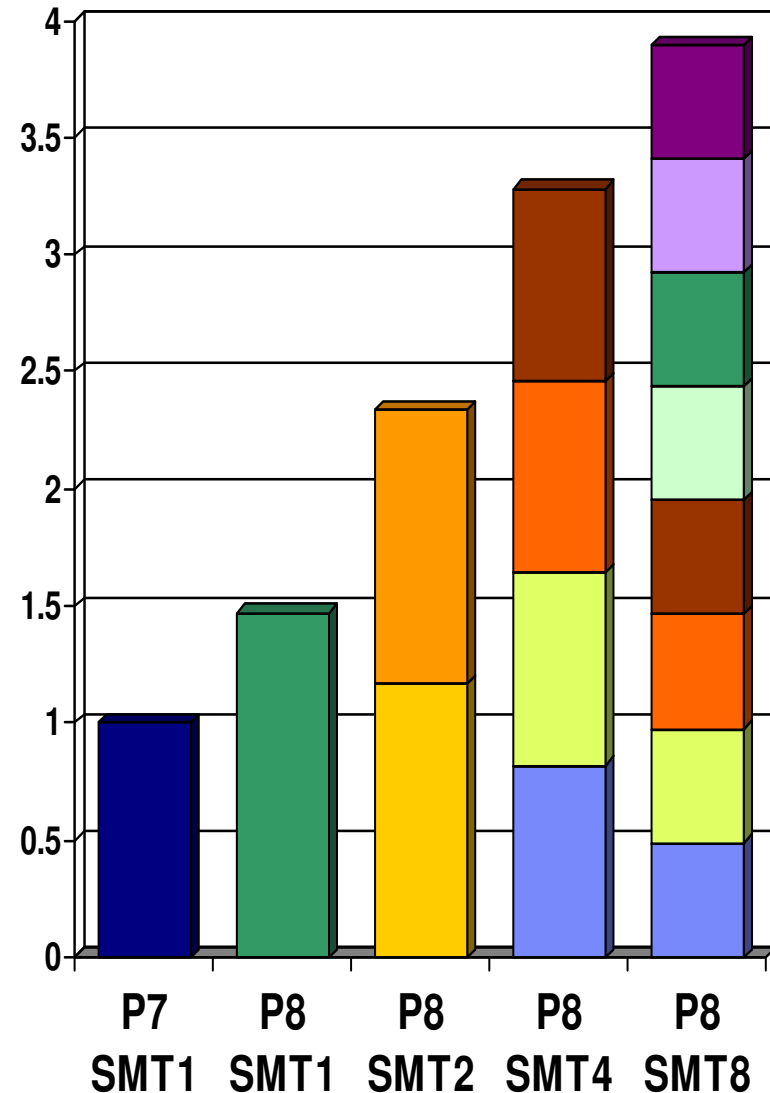
PowerVC for i – What can you do for IBM i virtualization?

- 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
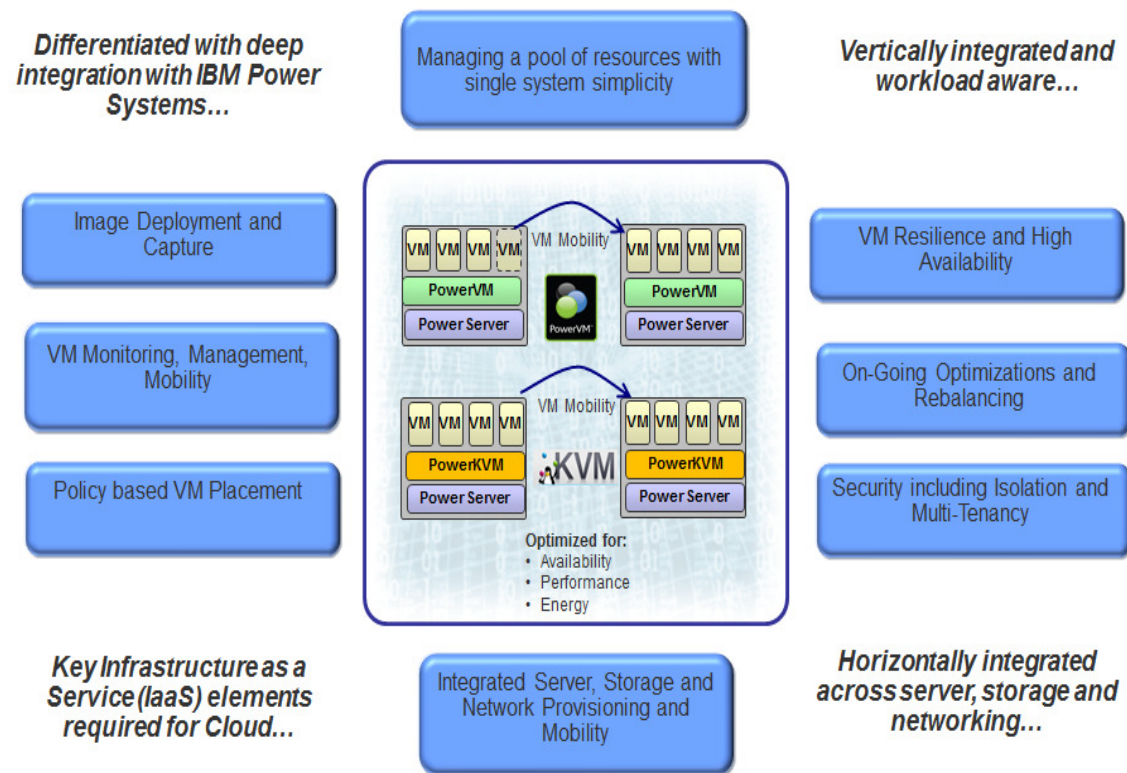
PowerVC for i Latest Enhancements

Virtualization Management → **PowerVC** →

Virtualization Management with PowerVC
- Management solution for PowerVM
- Virtual Image Management and Deployment
- Resource Pooling and Dynamic VM Placement
- On-going optimization and VM resilience

openstack CLOUD SOFTWARE

- **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 v orchestrated and **managed** virtualized environment*

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

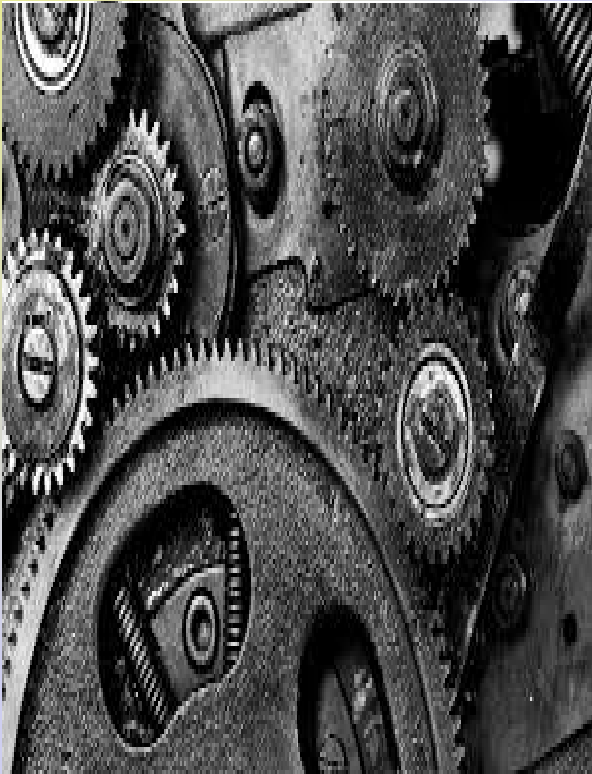**Maximum # of members referenced in an SQL view**
256 → 1,000

i4HiFashion – Additional Integrated Enhancements in IBM i 7.3

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

IBM® Navigator for i

⊞ Monitors
⊞ Basic Operations
⊞ Work Management
⊞ Configuration and Service
⊞ Network
⊟ File Systems
   ⊟ Integrated File System
     ⊟ Root
       ⊞ etc
       ⊟ home
         ⊟ QLWISVR
           ⊟ .java
             ⊞ .userPrefs

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
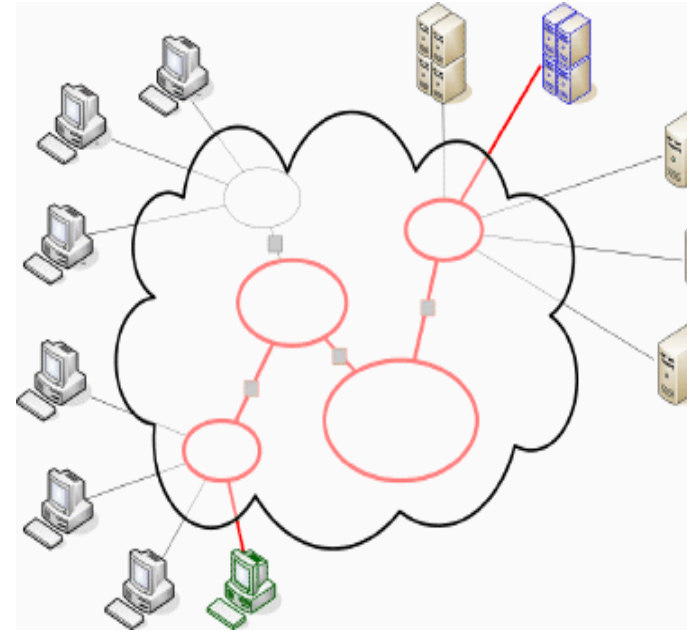
IBM i 7.3 Networking Enhancements

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

IBM i 7.3 Networking Enhancements

urrency

- – 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

sability, Stability and Performance

- – Host Table merge enhancements (CPYTCPHT/MRGTCPHT)
- – Sorting enhancements for WRKSMTPEMM
- – 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

Collaboration(Lotus) Software for IBM i 7.3

- IBM Domino 9.0.1
  - Enterprise messaging & collaboration
  - Requires Fixpack 6 and Java 1.8 for i 7.3

- IBM Traveler 9.0.1
  - Mobile access to your mail & calendar
  - Requires Fixpack 10(9.0.1.10) and Java 1.8 for i 7.3

- IBM Sametime 9.0.1
  - Real-time unified communication
  - Community server requires Java 1.7 for i 7.3
  - WAS based servers require WAS 8.5.5.9 for i 7.3

Everything Social, Mobile Everywhere!
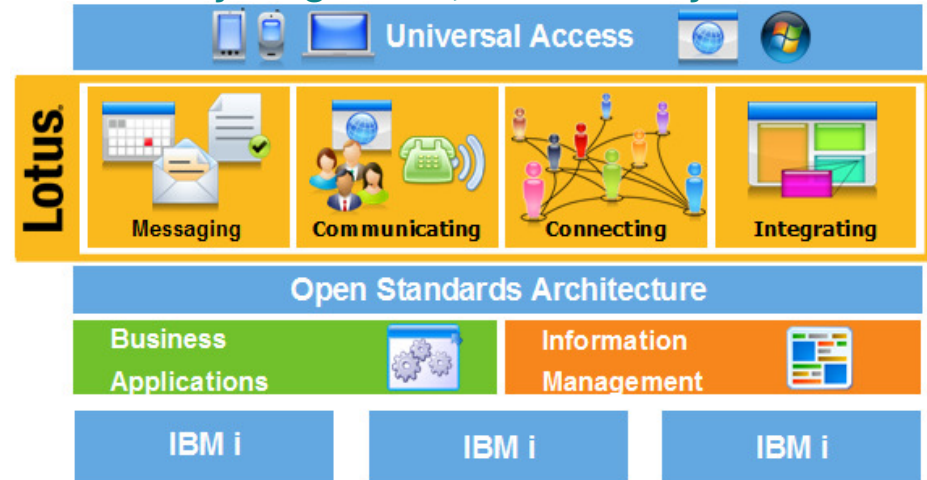
IBM i Supports Consolidation of x86 Workloads!

For the latest information, see:
https://www.ibm.com/developerworks/ibmi/social
http://www.ibm.com/systems/resources/releasesupport.pdf

www.ibm.com/developerworks/ibmi/techupdates