

# IBM i Latest Announcements

7.4 and so much more!

Tim Rowe



# IBM i Roadmap



2014

2016

2019



7.2



7.3



7.4



i Next



i Next+1

...

Technology  
Refreshes



.....

7.3 TR6



.....



.....



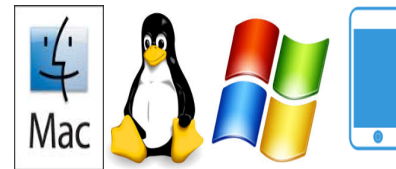
.....

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

\*\* Arrows indicate "ongoing status" and do not imply any specific dates.

# Strong Foundation for Continuing Innovation

- Db2 – Integrated Analytics, Security & Service Orientation
- Solution Development Innovation – Modern RPG plus Open options
- Intuitive Management & Access on any platform
- Reliable, Securable, Auditable, Scalable on site or in a cloud



# IBM i 7.4 & More Cornerstone Announcements





# IBM i 7.4 Suite – Addressing the Needs of the Community



## **Continuous Availability**

- IBM Db2 Mirror for i

## **Continuous Innovation**

- From Db2 to RPG and COBOL
- Open Source and REST

## **Continuous Security**

- Authority collection - object based control
- Latest industry standards

## **Continuous Access**

- Access Client Solutions (ACS)
- Services

## **Cloud options and More!**

# Continuous Availability Db2 Mirror for i



# Anytime, Anywhere



# Anytime, Anywhere



# What is your Availability Tolerance ?



Metrics	Platinum Continuous Availability <sup>1</sup>	Gold High Availability	Silver Moderate Availability	Bronze Standard Availability
Availability Objective (Uptime)	99.999%	99.99%	99.9%	99.5%
Planned Downtime	Near 0	Outage Required	Outage Required	Outage Required
Availability	Always On	Almost Always On	Usually On	
Solution	Db2 Mirror for i	Logical or Physical Replication	Disaster Recovery Reboot Required	

<sup>1</sup> Continuous Availability (CA) is HA around the clock (24x7) and does not mean 100% availability; DR may or may not be included.

# IBM Db2 Mirror for i



Operating System Synchronous Replication

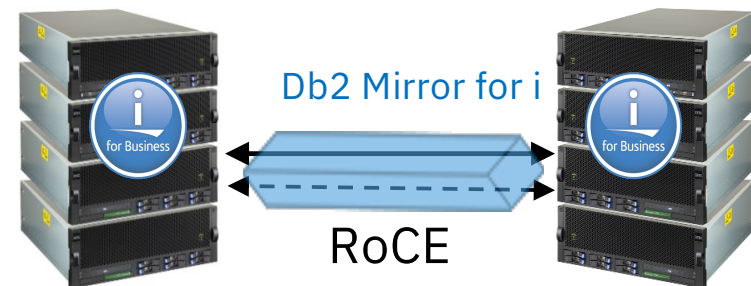
Continuous Availability

24 x 7 Up Time

Rolling Upgrades

RTO/RPO Near Zero

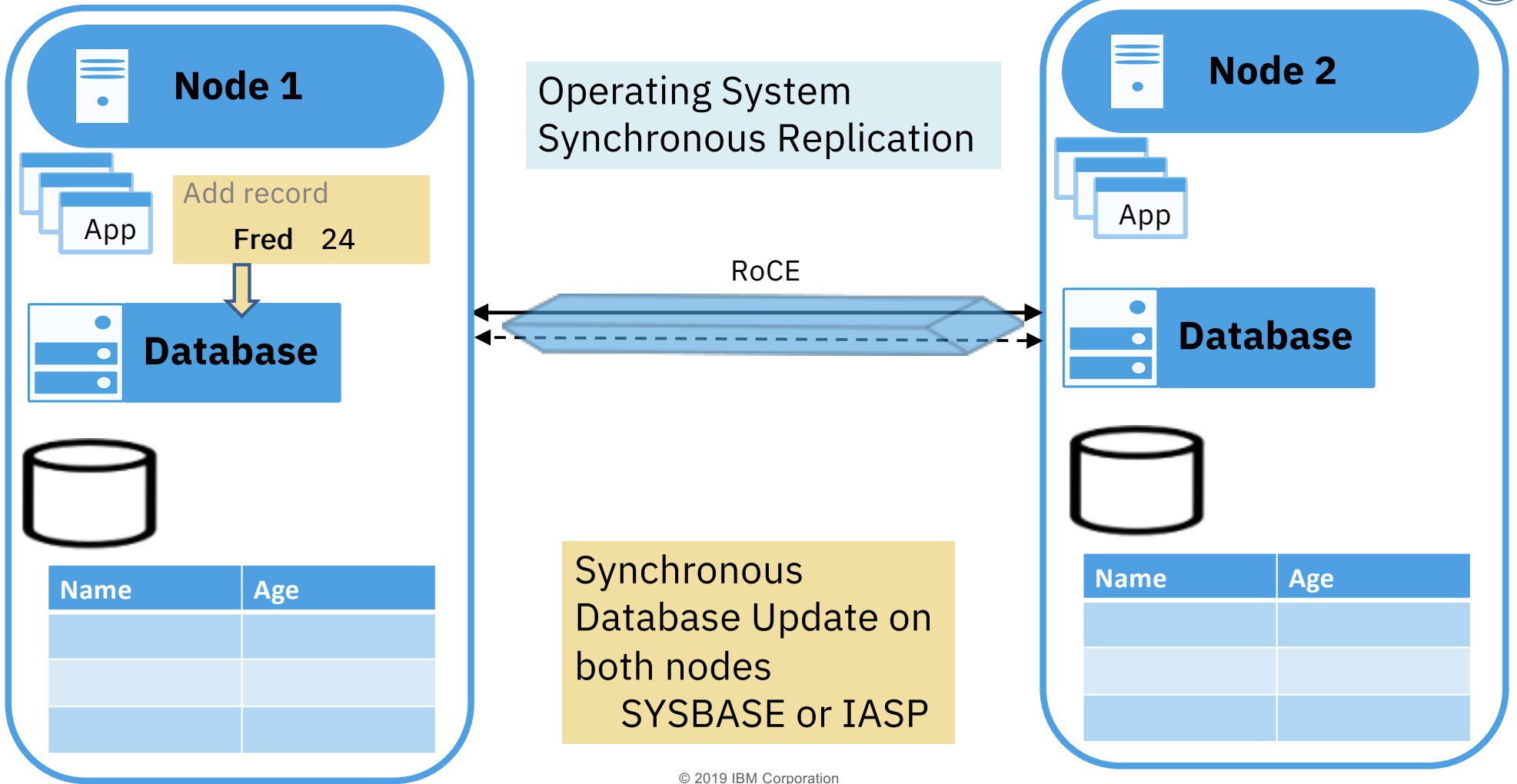
5770 DBM



POWER8 or later & IBM i 7.4



# Db2 Mirror – Active Active





# Db2 Mirror – Database Supported Objects

Database replication eligible objects

**Native:**

- Database Physical & Logical File

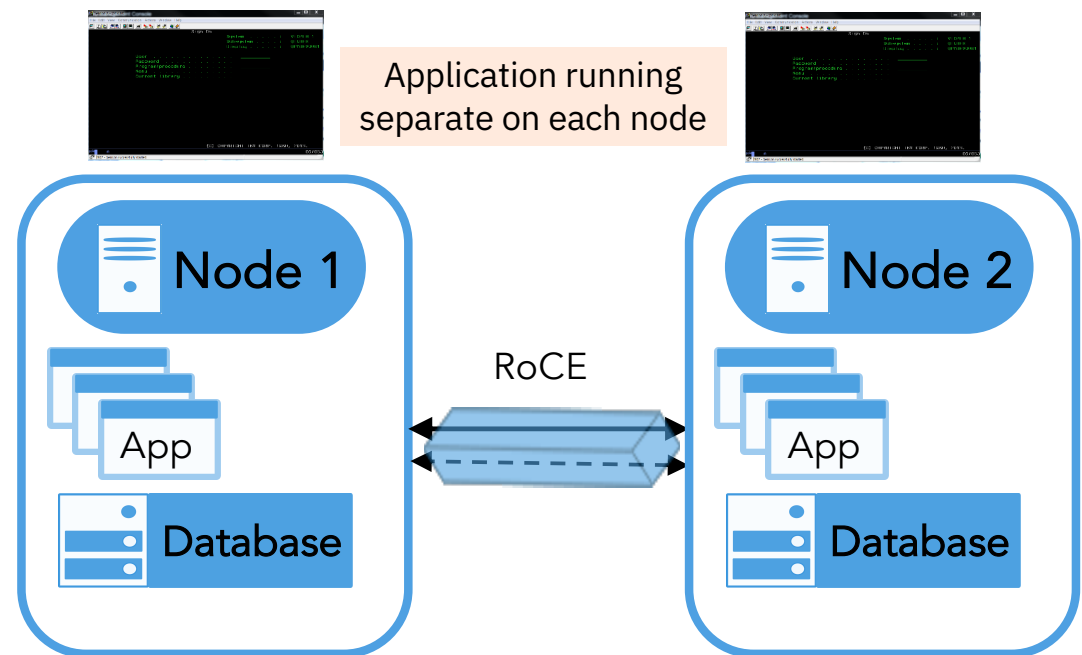
**SQL:**

- Alias
- Function
- Index
- Procedure
- Schema
- Sequence
- SQL Package
- Table
- Trigger
- User Defined Type
- Global Variable
- View
- XML Schema Repository

Included with File support:

- Row Permission
- Column Mask
- Temporal Table
- Constraint
- Etc...

- ✓ DDS / Record Level Access
- ✓ SQL / Set Based Access





# Db2 Mirror – Other Supported Objects

## Other Objects

- User profile
- Authority
- Ownership
- Security
- PGM/SRVPGM
- Data Area
- Data Queue (DDL Only)
- System Values
- Environment Variable LEVEL(\*SYS)
- Library
- Job Description
- Journal

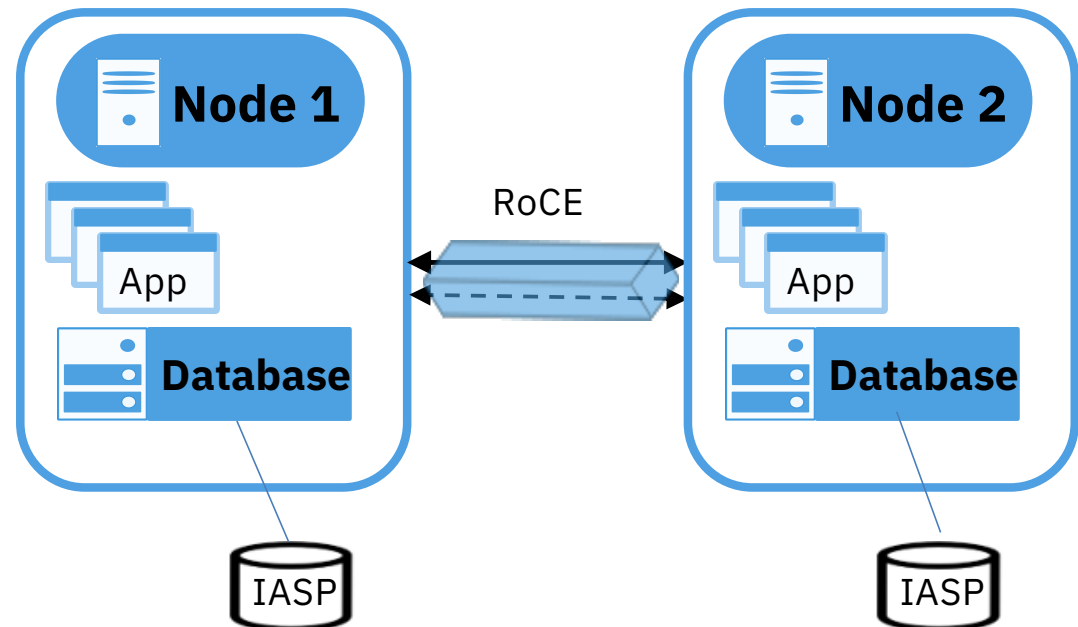
## Special Handling

- o Output Queue & Spool
- o Job Queue

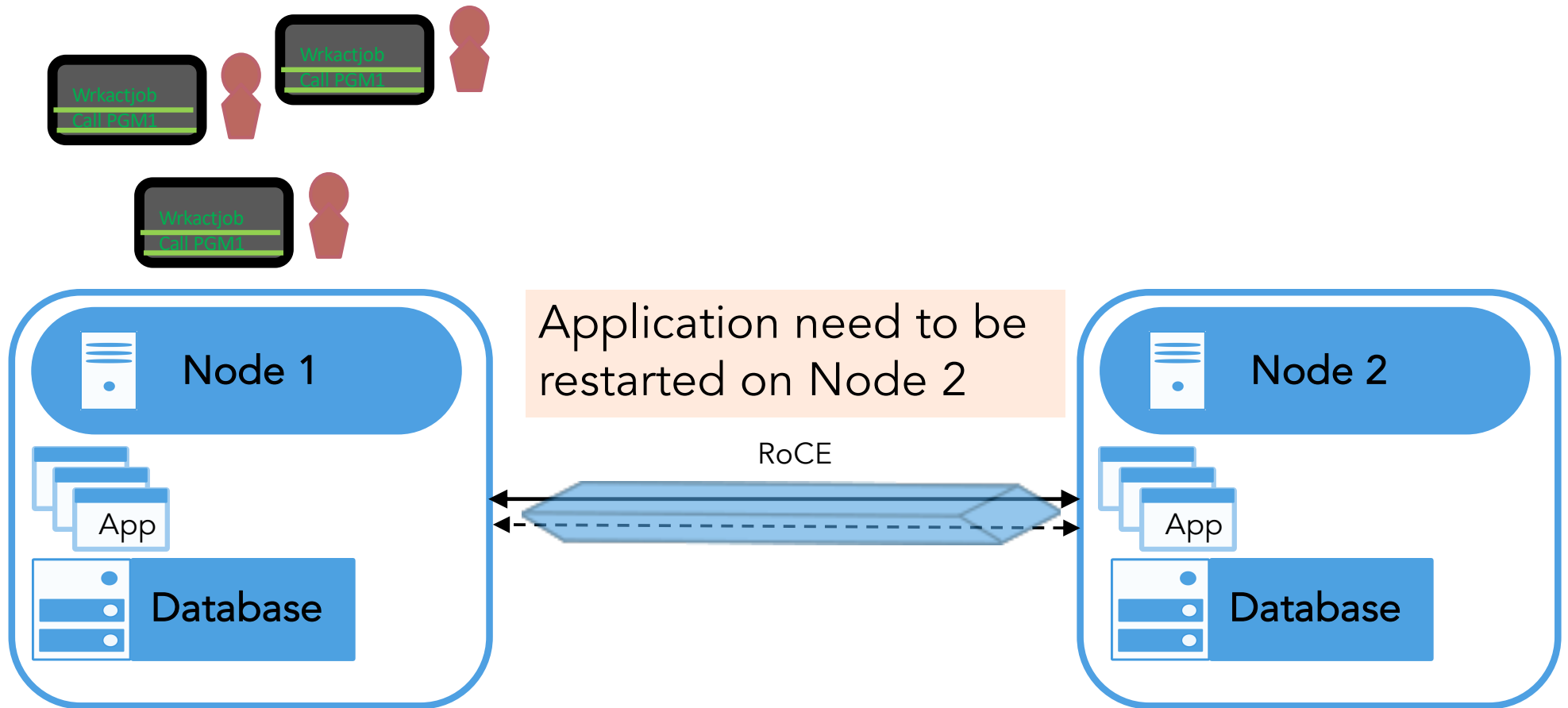
## Exceptions

- User Space
- User Index
- User Queue
- Journal Receiver

✓ SYSBAS  
✓ Database IASPs



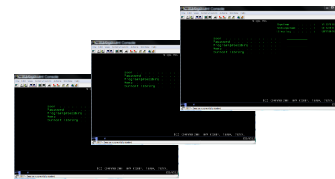
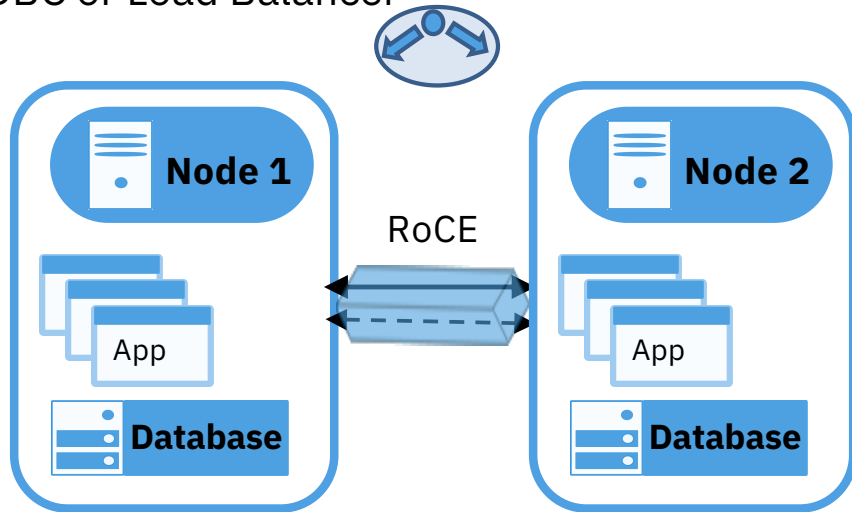
# Db2 Mirror – Active Active, Green Screen Application



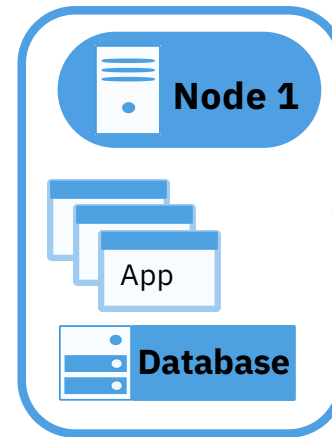
# Db2 Mirror – Active Active, Active Passive



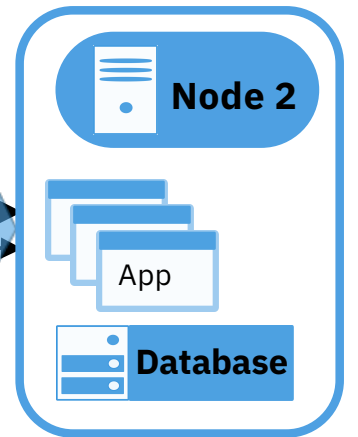
Application layer connects with either JDBC or Load Balancer



Run Production Workloads

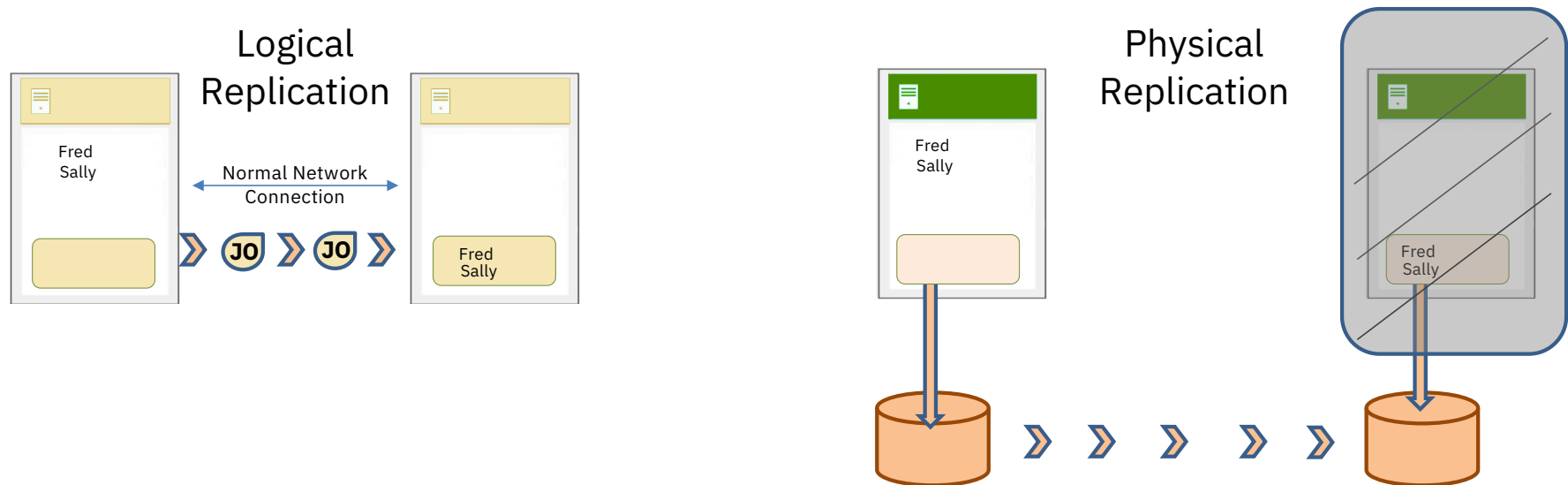


Run Queries and reports



# Db2 Mirror – What makes it different

- IBM i Operating System synchronization technology
- Does not leverage any previous Availability technology to provide continuous availability
  - But does work with existing technology





# Db2 Mirror – Where to get more information

**IBM** IBM Knowledge Center

Home > IBM i 7.4 > Availability >

## Db2 Mirror

☰ Table of Contents    Change version or product ▾

Start of Db2 Mirror documentation.

- **PDF file for Db2 Mirror**

Use this to view and print a PDF of this information.

- **Intro and architecture**

chapter 1 placeholder

- **Db2 Mirror concepts**

This section describes the basic concepts you need to understand when working with Db2 Mirror.

- **Application considerations**

chapter 3 placeholder

- **Planning and setup**

There are many decisions that need to be made as you prepare and step through the Db2 Mirror setup process. Db2 Mirror configuration should be understood before starting in order to make the right decisions for your business.

# Continuous Innovation

Application Development  
Topics

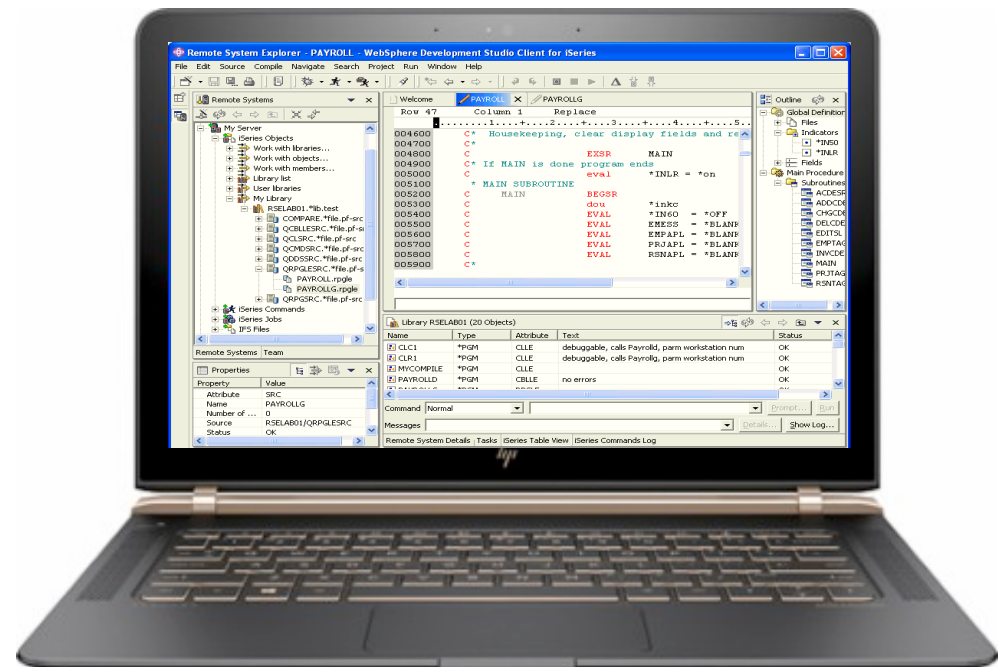


# Application Development Enhancements



## Traditional Language Updates

- RPG IV
  - Varying dimension arrays
  - Similar position subfields
- COBOL
  - COPY Enhance
  - Conditional Compilation
  - FREE and ALLOCATE statement
  - INITIALIZE statement
  - EXIT statement
  - Inline comments





# Node.js version 10

- Long-term-support (LTS) release
  - Performance improvements
  - New version of node package manager (NPM)
  - JavaScript language enhancements
- Buildable from community source
  - Anyone can use a tool like nvm to manage their own versions, including feature releases
- Expecting version 12 soon!
























# R: a new programming language on IBM i!

- Great for:
  - Data analysis
  - Statistical computing
  - Data mining
  - Big Data



- Ranked #7 by IEEE

<https://spectrum.ieee.org/at-work/innovation/the-2018-top-programming-languages>

Language Rank	Types	Spectrum Ranking
1. Python	  	100.0
2. C++	  	99.7
3. Java	  	97.5
4. C	  	96.7
5. C#	  	89.4
6. PHP		84.9
7. R		82.9
8. JavaScript	 	82.6

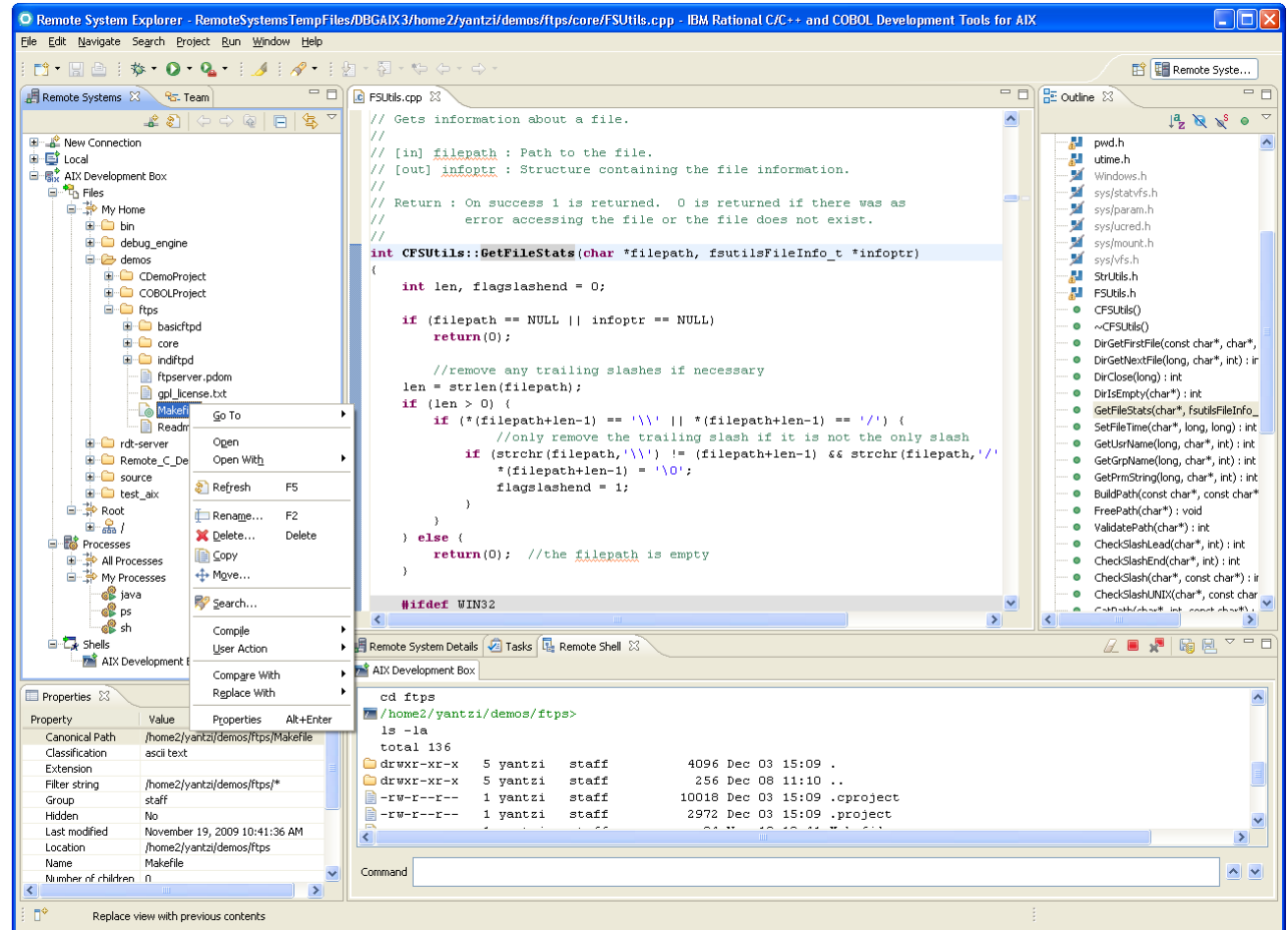
Tools



# Rational Developer for i - 9.6.06



- *Modern*
- Supports RPG, COBOL, CL, C, C++, SQL, DDM
- **What's New:**
- New PDM View
- Refactoring Updates – extract constants
- Improved SQL Formatting
- 7.4 RPG & COBOL updates
- ILE Parser finds anomalies
- Quick Zoom with command keys
- Code Coverage updates





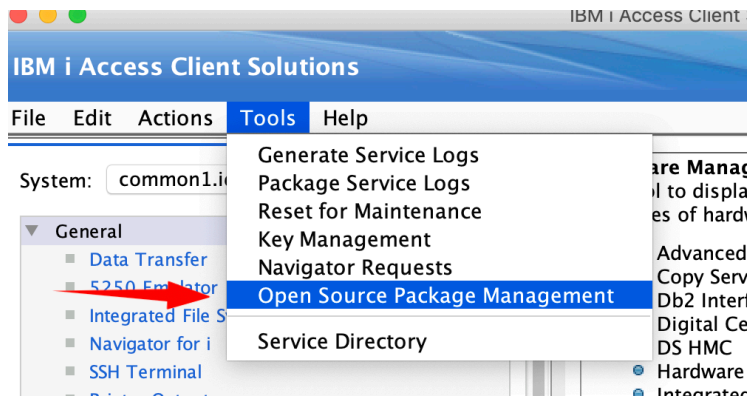
## Open Source RPMs

- 5733-OPS is sunset, and no longer needed!
- Now delivered with RPMs



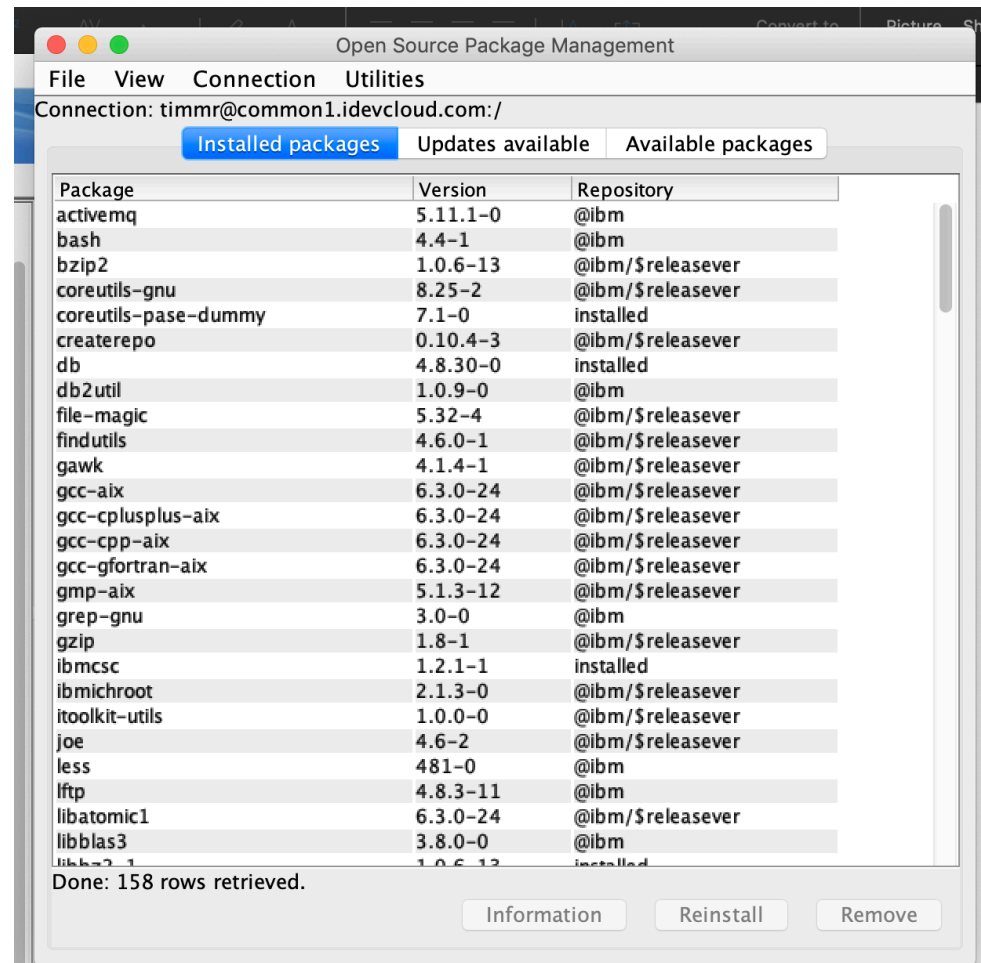
- To get started:
  - <http://ibm.biz/ibmi-rpms>

# ACS – Open Source Package Manager



View and Update packages easily

Easily update packages in a CHROOT





# ActiveMQ

- Open source message broker (Java-based)
- Supported protocols:
  - OpenWire
  - STOMP
  - MQTT
  - AMQP
  - REST
  - WebSockets





# Python Machine Learning and Data Science

- Either available via RPM or buildable with Python “pip3” command
  - NumPy, Pandas
    - data processing
  - Scipy, Scikit-Learn
    - Machine Learning (ML) and scientific analysis
  - ipython
    - interactive python language support
  - nltk,
    - natural language toolkit for ML
  - matplotlib, jupyter notebook
    - visual/interactive ML/data analysis



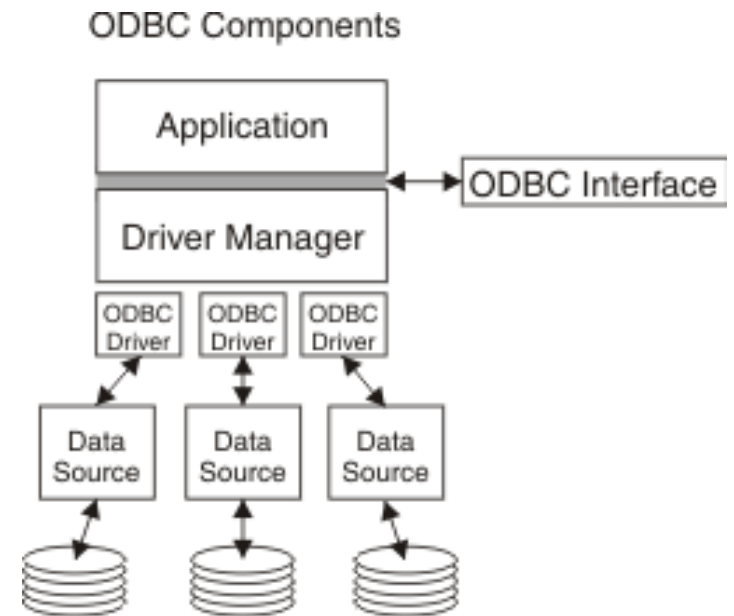


# ODBC Driver

- IBM i Access ODBC driver now supported on:
  - Windows
  - Linux
  - IBM i

- Why ODBC on IBM i?

1. Develop on Windows/Linux, deploy on IBM i
2. Use standard ODBC libraries from various languages (PHP, Python, Node.js, Ruby, R, etc)



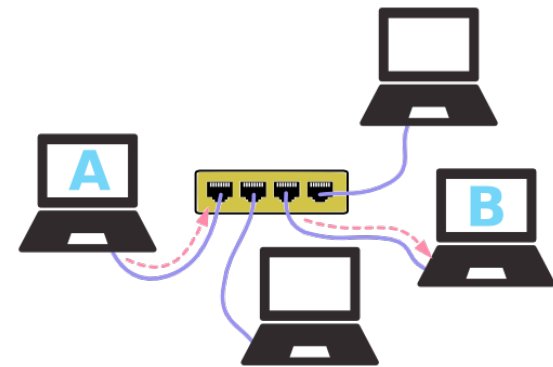
RV3W364-1



# IBM i Application Connectivity Improvements



- JTOpen JDBC
  - Previously - when connection lost, a new connection had to be re-established with the backup server
  - IBM i 7.4 – Connection is NOT lost in the application, the ‘backup’ server just takes over
  - Also can choose to delay and retry to the same IBM i





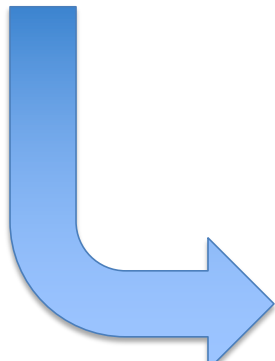
# Loopback support

- Easily create REST APIs with a popular Node.js framework

**book** Show/Hide | List Operations | Expand Operations

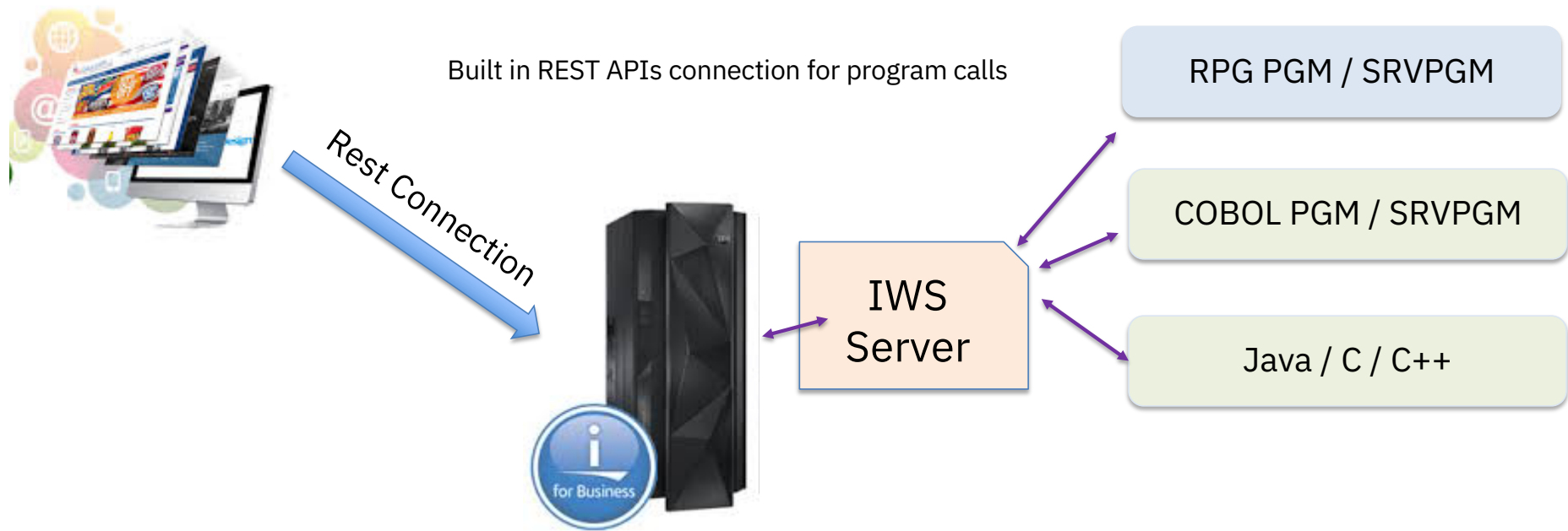
PATCH	/books	Patch an existing model instance or insert a new one into the data source.
GET	/books	Find all instances of the model matched by filter from the data source.

Table	Columns	Key Constraints	Foreign Key Constraints	Check Constraints	Materialized Query	Partitioning	
	Column Name	System Name	Data Type	Length	Nullable	Generated Value	Default Value
	"isbn"	ISBN_00001	INTEGER		Yes		No default
	"id"	ID___00001	INTEGER		No	Identity	
	"personId"	PERSO00001	INTEGER		Yes		No default
	"title"	TITLE00001	VARCHAR	128	Yes		No default

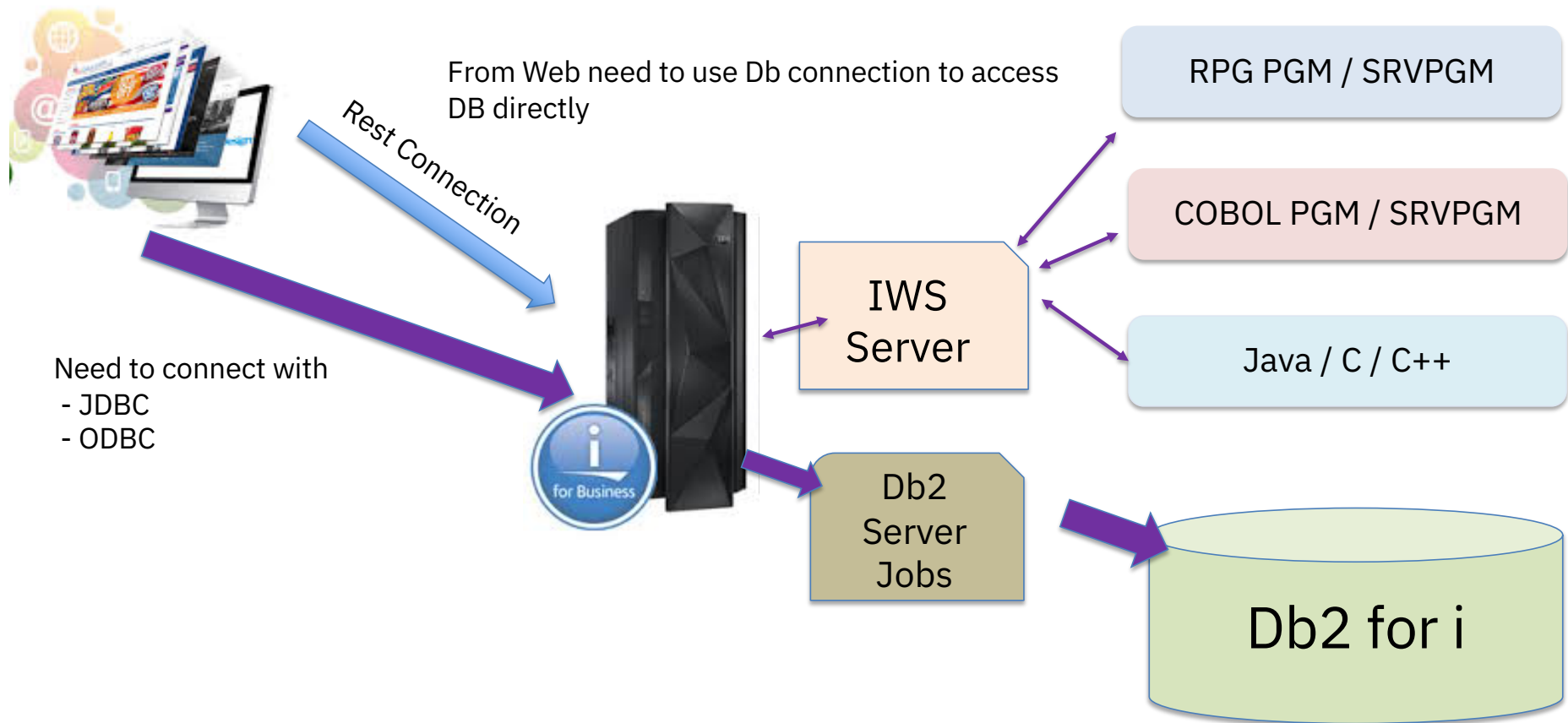


GET	/books/{id}/exists	Check whether a model instance exists in the data source.
GET	/books/{id}/person	Fetches belongsTo relation person.
POST	/books/{id}/replace	Replace attributes for a model instance and persist it into the data source.
GET	/books/change-stream	Create a change stream.
POST	/books/change-stream	Create a change stream.
GET	/books/count	Count instances of the model matched by where from the data source.
GET	/books/findOne	Find first instance of the model matched by filter from the data source.
POST	/books/replaceOrCreate	Replace an existing model instance or insert a new one into the data source.
POST	/books/update	Update instances of the model matched by {{(where)}} from the data source.
POST	/books/upsertWithWhere	Update an existing model instance or insert a new one into the data source based on the where criteria.

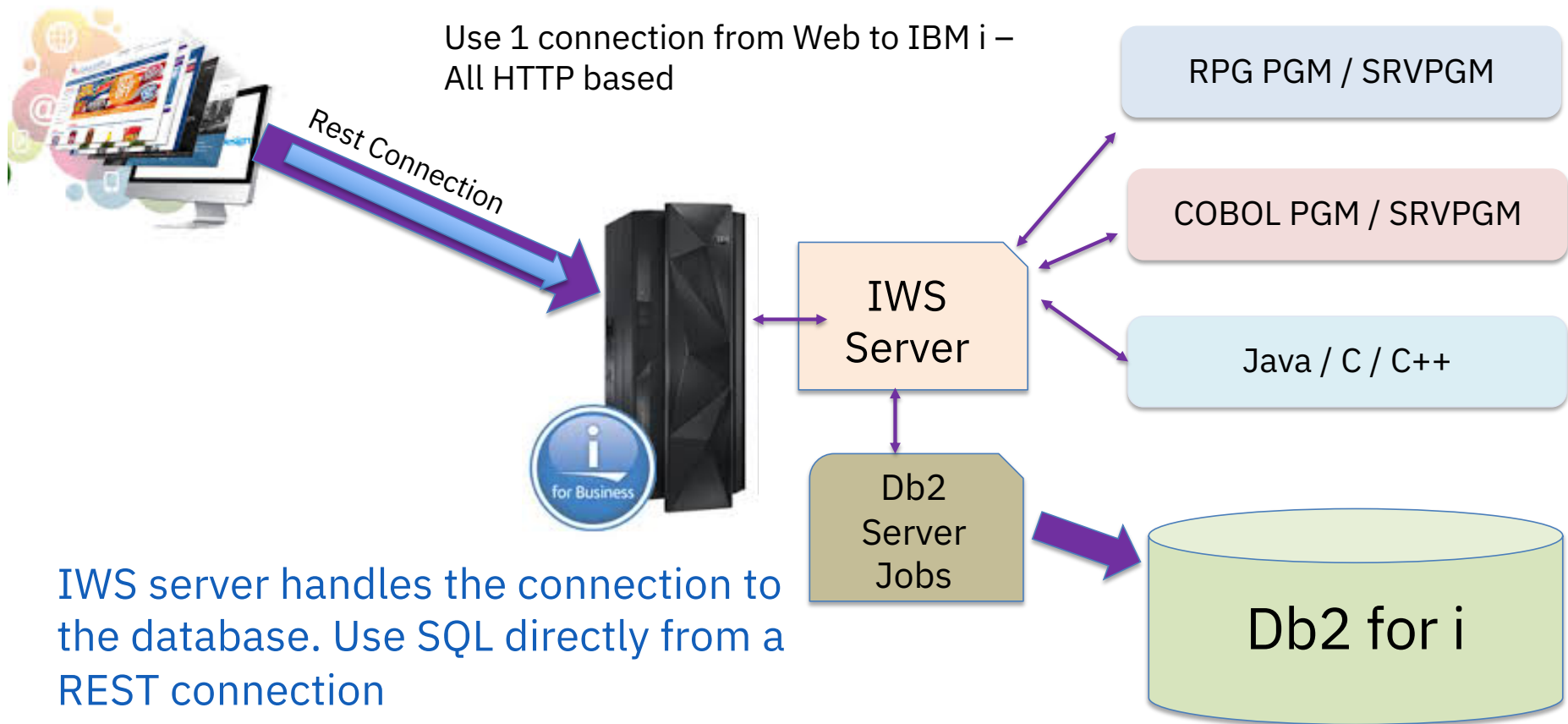
# IWS before 7.4



# IWS and Db2 before 7.4



# IWS & Db2 Connections – 7.4



IWS server handles the connection to the database. Use SQL directly from a REST connection

# IWS Wizard Updated



IBM Web Administration for i

Setup **Manage** Advanced | Related Links

All Servers | HTTP Servers **Application Servers** Installations

Running Server: SQLBaby - V2.6 (web services)

- Common Tasks and Wizards
  - Create Web Services Server
  - Create HTTP Server
  - Create Application Server
- Web Services Wizards
  - Deploy New Service
  - Configure SSL
  - Disable SSL
- Server Properties
  - Properties
  - Server Tracing
  - View HTTP Servers
- Services
  - Manage Deployed Services

SQLBaby > [Manage Deployed Services](#) > Deploy New Service

## Deploy New Service

*Specify Web service type - Step 1 of 8*

Welcome to the Deploy New Service wizard. This wizard helps you that are accessible over the Internet and exchange XML messages exchanged is defined by the resource itself.

Specify Web service type: REST

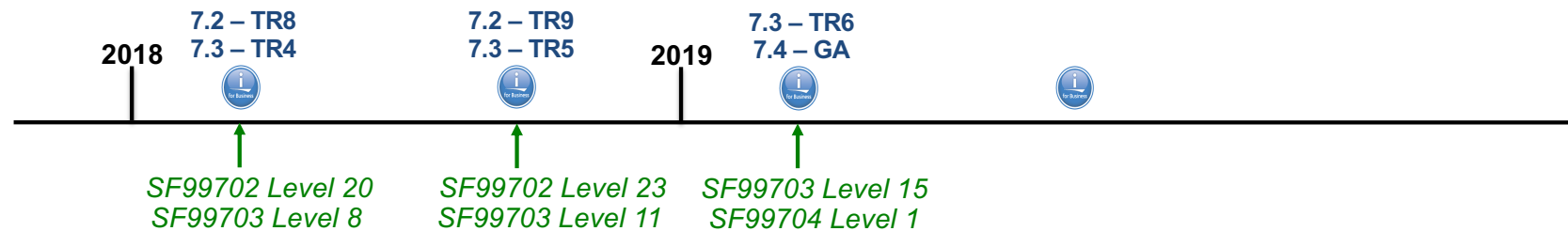
Specify Web service implementation: \*SQL

Database





# Enhancements delivered via Db2 PTF Groups



## Enhancements timed with TR5 & TR9

- RPG Embedded SQL Enhancements
- New and Enhanced SQL built-in functions
- New and Enhanced IBM i Services
- Additional Database features in ACS
- SQL Language Improvements
- OmniFind Text Search enhancement
- And more...

## Enhancements timed with IBM i 7.4 GA & TR6

- **IBM Db2 Mirror for i**
- **Authority Collection for objects**
- **RPG Embedded SQL Enhancements**
- **New and Enhanced IBM i Services**
- **Additional Database features in ACS**
- **SQL Language Improvements**
- **And more...**

[www.ibm.com/developerworks/ibmi/techupdates/db2/groupptf](http://www.ibm.com/developerworks/ibmi/techupdates/db2/groupptf)



# IBM i Services – A Brief History

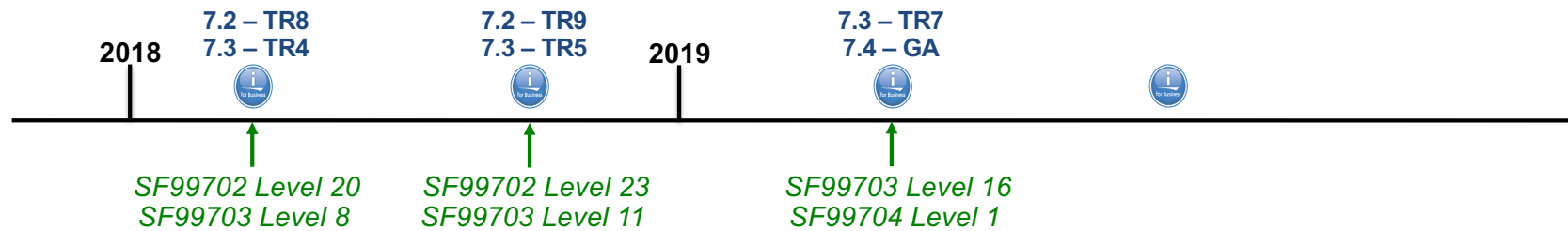


- **What:** Use SQL, SQL DDL and SQE to provide alternatives to IBM i APIs and CL Commands
- **Dawn of the 1<sup>st</sup> IBM i Service (2013) – QSYS2.PTF\_INFO**
  - Alternative to the DISPLAY PTF (DSPPTF) command
  - Proof of concept that SQL Views paired with SQL UDTFs provide significant value, for low cost
- **IBM i Services take root (2015)**
  - Enhancements delivered with every Technology Refresh
  - Examples shift from IBM presentations into ACS's Insert from Examples
- **IBM i Services begin to be used as a modernization technology (2017)**
- **IBM i Services consist of 13 topical categories (2019)**
  - Significant ISV adoption
  - RFEs too numerous to count





# IBM i Services – Timeline



## Services in 4Q/2017:

- Syslog detail returned from DISPLAY\_JOURNAL & HISTORY\_LOG\_INFO
- ASP\_INFO
- ASP\_VARY\_INFO
- JOB\_QUEUE\_INFO
- STACK\_INFO
- And more...

## Services in 3Q/2018:

- JOB\_DESCRIPTION\_INFO
- ACTIVE\_JOB\_INFO enhancements
- NETSTAT\_INFO & NETSTAT\_JOB\_INFO enhancements
- And more...

## Services in 2Q/2019:

- DATA\_AREA\_INFO
- ASP\_JOB\_INFO
- MESSAGE\_FILE\_DATA
- SYSTOOLS.FIRMWARE\_CURRENCY
- SYSTOOLS.SPLIT
- SYSTOOLS.SPOOLED\_FILE\_DATA
- IBM i 7.4 only services
- And many enhanced services

<http://ibm.biz/Db2foriServices>



# SYSTOOLS – A trifecta of enhancements

- **SYSTOOLS – Home of Db2 for i provided tools and examples**
  - **SPOOLED\_FILE\_DATA() – Query spooled files**
  - SPLIT() – LISTAGG() builds a list of values, SPLIT() deconstructs the list into single values
  - FIRMWARE\_CURRENCY – **Fix Level Recommendation Tool (FLRT)** consumable with SQL

```
select * from table(systools.spooled_file_data(
                    job_name => '083866/QSYS/SCPF',
                    spooled_file_name => 'QPJOBLOG',
                    spooled_file_number => '*LAST'));
```

ORDINAL_POSITION	SPOOLED_DATA
1	5770SS1 V7R4M0 190621 Job Log SYNC18 04
2	Job name . . . . . : SCPF User . . . . . : QSYS Number . .
3	Job description . . . . . : *SYS Library . . . . . :
4	MSGID TYPE SEV DATE TIME FROM PGM LIBRARY INST
5	CPF1124 Information 00 03/28/19 20:53:03.667160 QWCISCFR QSYS 238F
6	Message . . . . : Job 000000/QSYS/SCPF started on 03/28/1
7	subsystem *NONE in *NONE. Job entered system on 03/28/19
8	CPC2609 Completion 00 03/28/19 20:53:20.109928 QDCVRC QSYS 0984
9	Message . . . . : Varv on completed for controller OCTL.



# SYSTOOLS – A trifecta of enhancements

```
--  
-- Find QZDASOINIT joblogs related to a specific TCP/IP address  
--  
with my_spooled_files (job, file, file_number, user_data, create_timestamp) as (  
  select job_name, spooled_file_name, file_number, user_data, create_timestamp  
  from qsys2.output_queue_entries_basic  
  where user_data = 'QZDASOINIT' and spooled_file_name = 'QPJOBLOG' and  
        create_timestamp > current timestamp - 24 hours  
  order by create_timestamp desc),  
all_my_spooled_file_data (job, file, file_number, spool_data) as (  
  select job, file, file_number, spooled_data  
  from my_spooled_files, table (  
    systools.spooled_file_data(  
      job_name => job, spooled_file_name => file,  
      spooled_file_number => file_number)))  
select * from all_my_spooled_file_data  
  where upper(spool_data) like upper('%client 9.80.229.177 connected to server%') ;
```

JOB	FILE	FILE_NUMBER	SPOOL_DATA
088544/SCOTT/OPADEV0008	QPJOBLOG	1	Message . . . . : User SCOTT from client 9.80.229.177 connected...



# SYSTOOLS – A trifecta of enhancements

- **SYSTOOLS – Home of Db2 for i provided tools and examples**
  - SPOOLED\_FILE\_DATA() – Query spooled files
  - **SPLIT() – LISTAGG() builds a list of values, SPLIT() deconstructs the list into single values**
  - FIRMWARE\_CURRENCY – **Fix Level Recommendation Tool (FLRT)** consumable with SQL

```
SELECT ordinal_position, LTRIM(element) AS special_authority
FROM qsys2.user_info u,
     TABLE (systools.split(input_list => special_authorities,
                           delimiter => ' '))
WHERE u.authorization_name = 'SCOTT';
```

ORDINAL_POSITION	SPECIAL_AUTHORITY
1	*ALLOBJ
2	*SECADM
3	*JOBCTL
4	*SPLCTL



# SYSTOOLS – A trifecta of enhancements

- **SYSTOOLS – Home of Db2 for i provided tools and examples**
  - SPOOLED\_FILE\_DATA() – Query spooled files
  - SPLIT() – LISTAGG() builds a list of values, SPLIT() deconstructs the list into single values
  - **FIRMWARE\_CURRENCY – Fix Level Recommendation Tool (FLRT) consumable with SQL**

```
select * from systools.firmware_currency;
```

FW_CURRENCY	FW_CURRENTFIXPACK	FW_MACHINE_TYPE_MODEL	FW_RECOMMENDED_UPGRADE
UPGRADE AVAILABLE	AM760_089	9179-MHD	AM780_100





# DATA\_AREA\_INFO

- Alternative to the Retrieve Data Area (RTVDTAARA) command
- **Logical and Character types, Decimal types, QTEMP, and more...**

```
select * from qsys2.data_area_info
where data_area_library = 'GONZO333';
```

DATA_AREA_LIBRARY	DATA_AREA_NAME	DATA_AREA_TYPE	LENGTH	DECIMAL_POSITIONS	DATA_AREA_VALUE
GONZO333	MYBOOLEAN	*LGL	1	-1	
GONZO333	MYPLACE	*CHAR	100		-Place holder : 555



# MESSAGE\_FILE\_DATA

- Returns one row for each message in a message file
- SQL Alternative to the Display Message Description (DSPMSGD) CL command and the Retrieve Message (QMHRVMT) API

```
select * from qsys2.MESSAGE_FILE_DATA
  where message_file_library = 'QSYS' and
         message_file       = 'QSQLMSG' and
         message_id like 'SQ20%';
```

MESSAGE_ID	MESSAGE_TEXT	Message Second Level Text	MESSAGE_DATA_COUNT	Message Data
SQ20038	Clauses not valid in same definition.	Cause . . . . . : &1 and &2 cannot be spe...	2	&1 *CHAR *VARY 2
SQ20054	File &1 in &2 has DataLinks in link ...	Cause . . . . . : The accessed file &1 ha...	3	&1 *CHAR *VARY 2
SQ20055	Result column not compatible with co...	Cause . . . . . : The data type of a resu...	1	&1 *CHAR *VARY 2
SQ20058	Subselect for materialized query tab...	Cause . . . . . : &1 in &2 cannot be crea...	3	&1 *CHAR *VARY 2
SQ20073	Attribute not valid for function &1 ...	Cause . . . . . : Function &1 in &2 canno...	2	&1 *CHAR *VARY 2





# IBM® i Services

## Security Services

QSYS2.AUTHORITY\_COLLECTION – VIEW  
QSYS2.AUTHORITY\_COLLECTION\_DLO – VIEW  
QSYS2.AUTHORITY\_COLLECTION\_FSOBJ – VIEW  
QSYS2.AUTHORITY\_COLLECTION\_LIBRARIES – VIEW  
QSYS2.AUTHORITY\_COLLECTION\_OBJECT – VIEW  
QSYS2.AUTHORIZATION\_LIST\_INFO – VIEW  
QSYS2.AUTHORIZATION\_LIST\_USER\_INFO – VIEW  
QSYS2.DRDA\_AUTHENTICATION\_ENTRY\_INFO – VIEW  
QSYS2.FUNCTION\_INFO – VIEW  
QSYS2.FUNCTION\_USAGE – VIEW  
QSYS2.GROUP\_PROFILE\_ENTRIES – VIEW  
QSYS2.OBJECT\_PRIVILEGES – VIEW  
QSYS2.SQL\_CHECK\_AUTHORITY – UDF  
QSYS2.USER\_INFO – VIEW  
SYSPROC.SET\_COLUMN\_ATTRIBUTE – PROCEDURE

## Spool Services

QSYS2.OUTPUT\_QUEUE\_ENTRIES – VIEW  
QSYS2.OUTPUT\_QUEUE\_ENTRIES\_BASIC – VIEW  
QSYS2.OUTPUT\_QUEUE\_ENTRIES – UDTF  
QSYS2.OUTPUT\_QUEUE\_INFO – VIEW  
SYSTOOLS.SPOOLED\_FILE\_DATA – UDTF

## Storage Services

QSYS2.ASP\_INFO – VIEW  
QSYS2.ASP\_JOB\_INFO – VIEW  
QSYS2.ASP\_VARY\_INFO – VIEW  
QSYS2.MEDIA\_LIBRARY\_INFO – VIEW  
QSYS2.SYSDISKSTAT – VIEW  
QSYS2.SYSTMPSTG – VIEW  
QSYS2.USER\_STORAGE – VIEW

## Journal Services

QSYS2.DISPLAY\_JOURNAL – UDTF  
QSYS2.JOURNAL\_INFO – VIEW

## Java Services

QSYS2.JVM\_INFO – VIEW  
QSYS2.SET\_JVM – PROCEDURE

## Librarian Services

QSYS2.LIBRARY\_LIST\_INFO – VIEW  
QSYS2.OBJECT\_STATISTICS – UDTF

## System Health Services

QSYS2.SYSLIMITS – VIEW  
QSYS2.SYSLIMTBL – TABLE

■ — Added in IBM i 7.4

■ — Added or Enhanced @ IBM i 7.3 TR6

<http://ibm.biz/Db2foriServices>

<http://www.ibm.com/developerworks/ibmi/techupdates/db2/landscape>



# IBM® i Services

## Product Services

QSYS2.LICENSE\_INFO – VIEW  
SYSTOOLS.LICENSE\_EXPIRATION\_CHECK – PROCEDURE

## Application Services

*QSYS2.DATA\_AREA\_INFO – UDTF & VIEW*  
QSYS2.ENVIRONMENT\_VARIABLE\_INFO – VIEW  
QSYS2.QCMDXC – PROCEDURE  
QSYS2.SERVICES\_INFO – TABLE  
QSYS2.SET\_PASE\_SHELL\_INFO – PROCEDURE  
QSYS2.STACK\_INFO – UDTF  
*SYSTOOLS.SPLIT – UDTF*

## Communication Services

*QSYS2.ADD\_TIME\_SERVER – PROCEDURE*  
QSYS2.NETSTAT\_INFO – VIEW  
QSYS2.NETSTAT\_INTERFACE\_INFO – VIEW  
QSYS2.NETSTAT\_JOB\_INFO – VIEW  
QSYS2.NETSTAT\_ROUTE\_INFO – VIEW  
*QSYS2.REMOVE\_TIME\_SERVER – PROCEDURE*  
QSYS2.SERVER\_SBS\_ROUTING – VIEW  
QSYS2.SET\_SERVER\_SBS\_ROUTING – PROCEDURE  
QSYS2.TCPIP\_INFO – VIEW  
*QSYS2.TIME\_PROTOCOL\_INFO – VIEW*  
SYSIBMADM.ENV\_SYS\_INFO – VIEW

## Message Handling Services

QSYS2.HISTORY\_LOG\_INFO – UDTF  
QSYS2.JOBLOG\_INFO – UDTF  
*QSYS2.MESSAGE\_FILE\_DATA – VIEW*  
QSYS2.MESSAGE\_QUEUE\_INFO – VIEW  
QSYS2.REPLY\_LIST\_INFO – VIEW

## PTF Services

QSYS2.GROUP\_PTF\_INFO – VIEW  
QSYS2.PTF\_INFO – VIEW  
*SYSTOOLS.FIRMWARE\_CURRENCY – VIEW*  
SYSTOOLS.GROUP\_PTF\_CURRENCY – VIEW  
SYSTOOLS.GROUP\_PTF\_DETAILS – VIEW

## Work Management Services

QSYS2.ACTIVE\_JOB\_INFO – UDTF  
*QSYS2.GET\_JOB\_INFO – UDTF*  
QSYS2.JOB\_DESCRIPTION\_INFO – VIEW  
QSYS2.JOB\_INFO – UDTF  
QSYS2.JOB\_QUEUE\_INFO – VIEW  
QSYS2.MEMORY\_POOL – UDTF  
QSYS2.MEMORY\_POOL\_INFO – VIEW  
QSYS2.OBJECT\_LOCK\_INFO – VIEW  
QSYS2.RECORD\_LOCK\_INFO – VIEW  
QSYS2.SCHEDULED\_JOB\_INFO – VIEW  
QSYS2.SYSTEM\_STATUS – UDTF  
QSYS2.SYSTEM\_STATUS\_INFO – VIEW  
QSYS2.SYSTEM\_VALUE\_INFO – VIEW

■ — *Added in IBM i 7.4*

■ — *Added or Enhanced @ IBM i 7.3 TR6*

# Continuous Security with IBM i 7.4



# Continuous Security - Topics



- Authority Collection – Objects



- TLS



- SMB3



# Authority Collection by User Profile

- **Concept**
  - Capture detail related to authority checks for a specific **user**
- **Benefits**
  - ❖ **Safely reduce** excess authorization
  - ❖ **Review** authorization model prior to deploying new solutions
  - ❖ **Train** your IBM i security officers
  - ❖ **Diagnose** authorization failures
- **Acquisition Cost**
  - None - included in IBM i 7.3

IBM i 7.3



# Authority Collection by Object

- **Concept**
  - Capture detail related to authority checks for a specific **object**
- **Benefits**
  - ❖ **Safely reduce** excess authorization
  - ❖ **Review** authorization model prior to deploying new solutions
  - ❖ **Train** your IBM i security officers
  - ❖ **Diagnose** authorization failures
- **Acquisition Cost**
  - None - included in IBM i 7.4

IBM i 7.4





## Authority Collection by Object

- As of IBM i 7.4 authority collection support allows the collection of authority information for **specific objects** when accessed by **any user**
- The authority collection value for an object set with the new **Change Authority Collection (CHGAUTCOL) command**
- Object types:
  - QSYS file system
  - "root" (/)
  - QOpenSys
  - user-defined file system
  - document library objects



# Authority Collection - Usage

- **Start Authority Collection**
  - Point to a specific user profile
    - ➔ To monitor for multiple profiles at the same time, issue multiple commands
    - ➔ To monitor objects, this is the ON / OFF switch
- **End Authority Collection**
  - Point to a specific user profile or end all object collection
- **Change Authority Collection**
  - Point to a specific object to opt IN or OUT
  - Optionally include dependent objects
- **Explore the data**
  - SQL (ACS Insert from Examples) & Navigator
- **Delete Authority Collection**
  - Point to a specific user profile







# Authority Collection Updated Interfaces

- **Configure** Authority Collection:

- Start Authority Collection (STRAUTCOL)
- End Authority Collection (ENDAUTCOL)
- Delete Authority Collection (DLTAUTCOL)
- Navigator

☰ Authority Collection for Objects

Authorization Name	Detailed Current Authority	Detailed Required Authority	Current Authority	Required Authority	System Object
Scottf	*OWNER *OBJEXIST	*READ	*ALL		Employee
Scottf	*OWNER *OBJEXIST	*OBJOPR	*ALL		Employee
Scottf	*OWNER *OBJEXIST	*OBJOPR	*ALL		Employee
Frankdba	*OBJEXIST *OBJMGT	*DLT	*ALL		Employee

- Interfaces that show whether collection is **on-going**:

- Display Security Attributes (DSPSECA) command
- Retrieve Security Attributes (QSYRTVSA) API

```

Display Security Attributes
User ID number . . . . . : 286
Group ID number . . . . . : 209
Security level . . . . . : 50
Password level . . . . . : 2
Allow change of security related system
values . . . . . : *YES
Allow add of digital certificates . . . . . : *YES
Allow service tools user ID with default
and expired password to change its own
password . . . . . : *NO
Authority collection for objects active . . : *YES
  
```

- Interfaces that show whether a specific object is **included**:

- Display Object Description (DSPOBJD)
- Display Attributes (DSPATR)
- QSYS2.OBJECT\_STATISTICS()
  - ACS Insert from Examples

AUTHORITY_COLLECTION_VALUE	OBJNAME	OBJTYPE	SQL_OBJECT_TYPE	OBJATTRIBUT
*OBJINF	EMPLOYEE	*FILE	TABLE	PF
*OBJINF	VASTRDE1	*FILE	VIEW	LF
*OBJINF	VASTRDE2	*FILE	VIEW	LF
*OBJINF	VDEPMG1	*FILE	VIEW	LF
*OBJINF	VEMP	*FILE	VIEW	LF

☰ Authority Collection for Objects

# Authority Collection by Object – All activity



```
-- Show all activity over TOYSTORE/EMPLOYEE *FILE
with emp_activity ( username, cur_auth, req_auth
) as (
    select "CURRENT_USER", DTLCURAUTH, DTLREQAUTH
    from qsys2.authority_collection_object
    where system_object_schema = 'TOYSTORE' and
          system_object_name   = 'EMPLOYEE'
) select * from emp_activity;
```

USERNAME	CUR_AUTH	REQ_AUTH
SCOTT	*OWNER *OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECUTE	*READ
SCOTT	*OWNER *OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECUTE	*OBJOPR
SCOTT	*OWNER *OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECUTE	*OBJOPR
FRANK	*OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECUTE	*DLT
FRANK	*OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECUTE	*ADD
FRANK	*OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECUTE	*READ
FRANK	*OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECUTE	*OBJOPR
MARYSEC	*OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECUTE	*READ
MARYSEC	*OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECUTE	*OBJOPR

# Authority Collection by Object – All activity



Change your included columns

Authority Collection - Columns

Available Columns:

Title

Current Columns:

- Title
- Authorization Name
- Detailed Current Authority
- Detailed Required Authority
- Current Authority
- Required Authority

Add >

< Remove

Display Authority Collection - Localhost

Actions

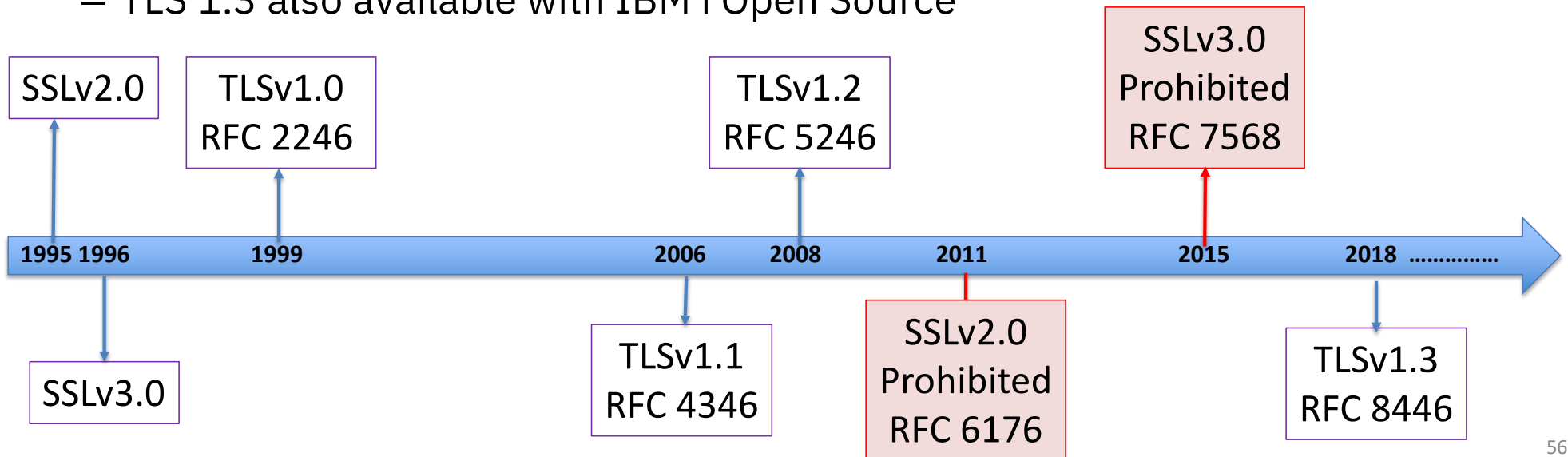
- Permissions
- Columns...
- Save as Favorite

No filter applied

Authorization Name	Detailed Current Authority	Detailed Required Authority
Scottf	*OWNER *OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECU	*READ
Scottf	*OWNER *OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECU	*OBJOPR
Scottf	*OWNER *OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECU	*OBJOPR
Frankdba	*OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECUTE	*DLT
Frankdba	*OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECUTE	*ADD
Frankdba	*OBJEXIST *OBJMGT *OBJALTER *OBJREF *OBJOPR *READ *ADD *DLT *UPD *EXECUTE	*READ

# TLS - Transport Layer Security v1.3

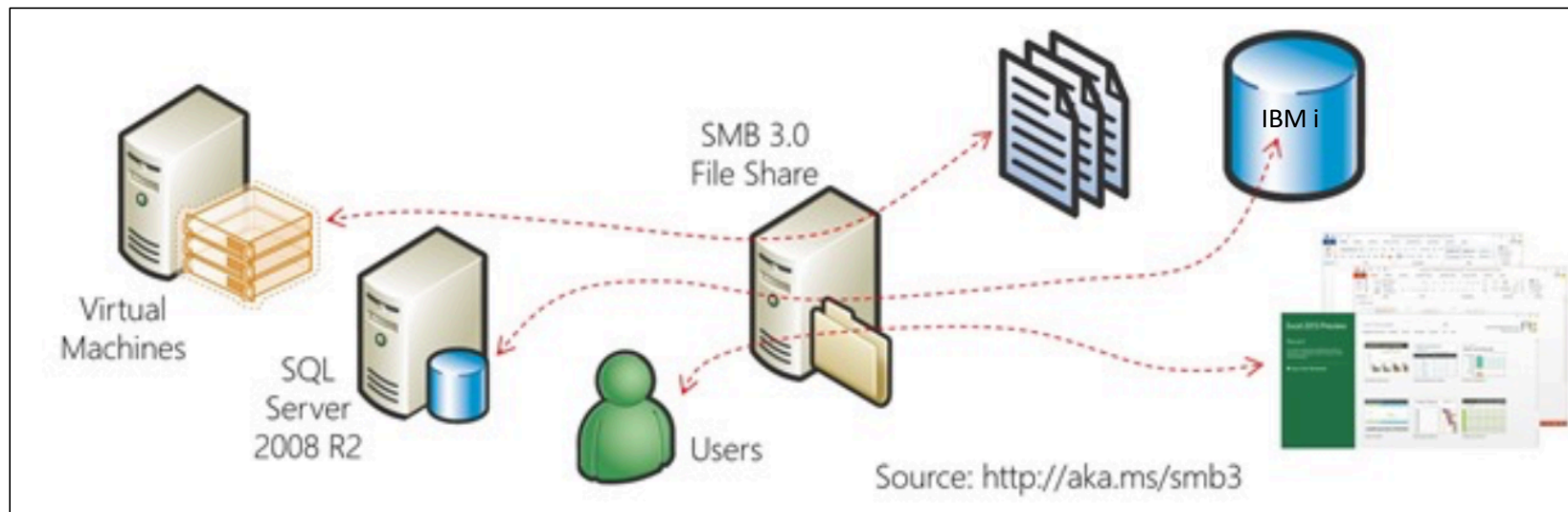
- Newest and most secure version of the TLS/SSL protocols replacing TLSv1.2
  - All key negotiation protected by elliptical curve algorithms
  - Majority of handshake messages are encrypted
  - Fixed or removed features susceptible to existing named vulnerabilities
- Support part of base IBM i environment now
  - TLS 1.3 also available with IBM i Open Source



# Server Message Block Version 3 - SMB 3



- **Supported by both NetServer and QNTC**
- Support for larger read and write sizes (512 Kb, in our case) to improve performance in high latency networks
- End to end data encryption for entire client/server conversations or just on access to specific shares



## Continuous Access



# Access Client Solutions – Strategic Interface



## WHO?

Users



System Management



Database Engineer



## WHERE?

[http://ibm.biz/IBMi\\_ACS](http://ibm.biz/IBMi_ACS)

## WHAT?



5250

IFS

Spool

Run SQL Scripts

Create Excel Spreadsheets

Schemas

Console

## Gone...

IBM i Access for Windows (5733XE1)

End of Life – April 2019



# Access Client Solutions – What's New



New Formatter!

- It works 😊

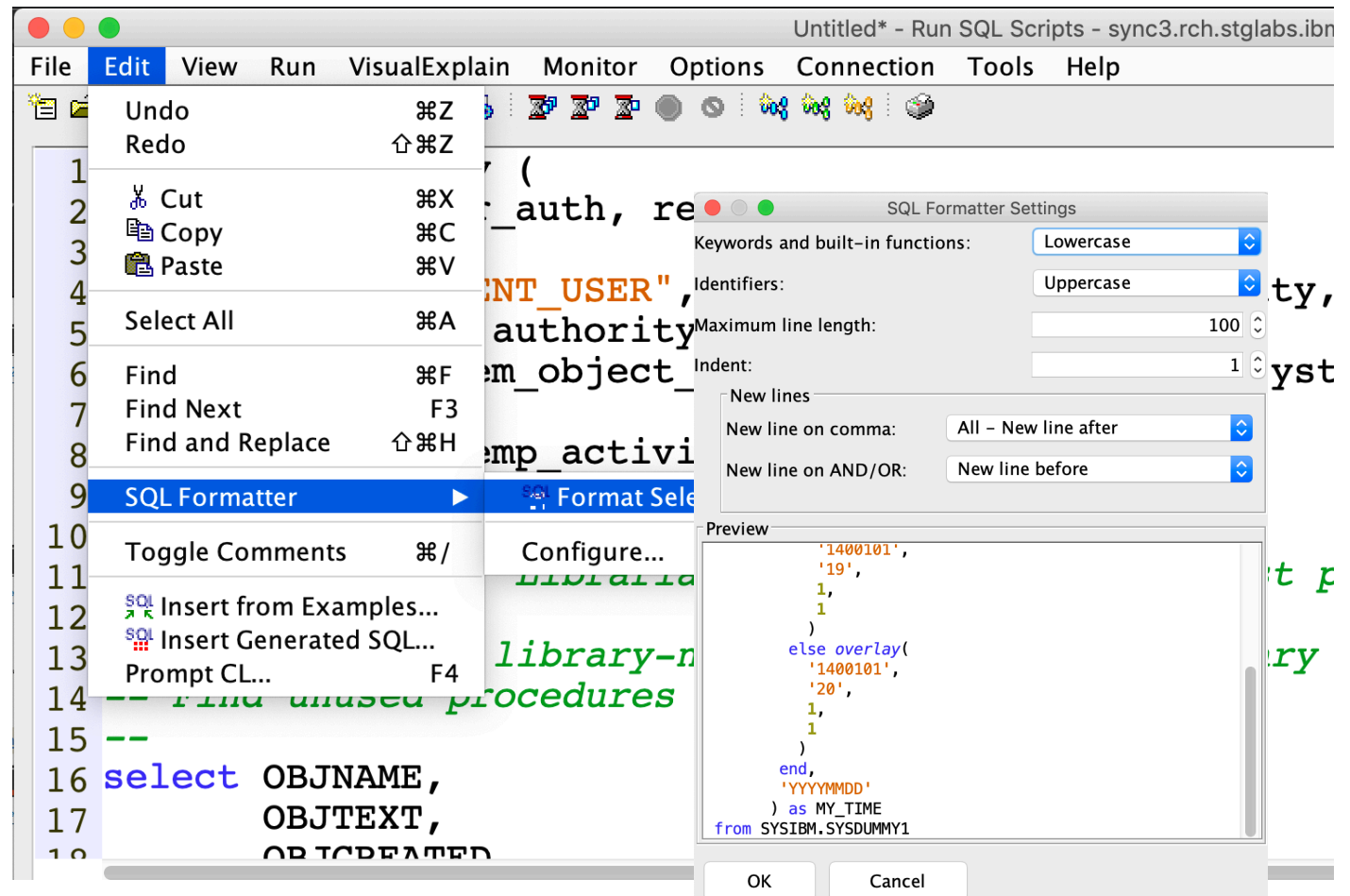
Syntax Validation

- No extra charge

IASP and DB

Connections

Remembered





# IBM® i Services – ACS Run SQL Scripts!



## Security Services

QSYS2.AUTHORITY\_COLLECTION – VIEW  
QSYS2.AUTHORITY\_COLLECTION\_DLO – VIEW  
QSYS2.AUTHORITY\_COLLECTION\_FSOBJ – VIEW  
QSYS2.AUTHORITY\_COLLECTION\_LIBRARIES – VIEW  
QSYS2.AUTHORITY\_COLLECTION\_OBJECT – VIEW  
QSYS2.AUTHORIZATION\_LIST\_INFO – VIEW  
QSYS2.AUTHORIZATION\_LIST\_USER\_INFO – VIEW  
QSYS2.DRDA\_AUTHENTICATION\_ENTRY\_INFO – VIEW  
QSYS2.FUNCTION\_INFO – VIEW  
QSYS2.FUNCTION\_USAGE – VIEW  
QSYS2.GROUP\_PROFILE\_ENTRIES – VIEW  
QSYS2.OBJECT\_PRIVILEGES – VIEW  
QSYS2.SQL\_CHECK\_AUTHORITY – UDF  
QSYS2.USER\_INFO – VIEW  
SYSPROC.SET\_COLUMN\_ATTRIBUTE – PROCEDURE

## Spool Services

QSYS2.OUTPUT\_QUEUE\_ENTRIES – VIEW  
QSYS2.OUTPUT\_QUEUE\_ENTRIES\_BASIC – VIEW  
QSYS2.OUTPUT\_QUEUE\_ENTRIES – UDTF  
QSYS2.OUTPUT\_QUEUE\_INFO – VIEW  
SYSTOOLS.SPOOLED\_FILE\_DATA – UDTF

## Storage Services

QSYS2.ASP\_INFO – VIEW  
QSYS2.ASP\_JOB\_INFO – VIEW  
QSYS2.ASP\_VARY\_INFO – VIEW  
QSYS2.MEDIA\_LIBRARY\_INFO – VIEW  
QSYS2.SYS  
QSYS2.SY  
QSYS2.USER

## Journal Services

QSYS2.DISPLAY  
QSYS2.JOUR

## Java Services

QSYS2.  
QSYS2.SET\_J

## Librarian Services

QSYS2.LIBRARY  
QSYS2.OBJECT\_S

## System Health

QSYS2.  
QSYS2.SY

All in ACS!

No more posters required

The screenshot shows the 'Run SQL Scripts' interface in ACS. A search box is highlighted with a red arrow, containing the text 'IBM i Services'. Below the search box is a list of search results, including 'Application - Environment variable information', 'Application - Examine my stack', 'Application - PASE Shell', 'Application - Service tracker', 'Communications - Network Statistics Info (NETSTAT)', 'Communications - Network Statistics Interface (NETS...', 'Communications - Network Statistics Job Info (NETS...', 'Communications - Network Statistics Route Info (NET...', 'Communications - TCP/IP Information', 'Find objects in a library, not included in an authoriz...', 'History Log - Study job longevity', 'Java - JVM Health', 'Librarian - Examine least and most popular routines', 'Librarian - Find objects', 'Librarian - Library list', 'License Management - Expiration processing', 'Message Handling - Abnormal IPL Predictor', 'Message Handling - Reply List', 'Message Handling - Review system operator inquiry', 'Message Handling - Review system operator unansv', 'PTF - Group PTF Currency', 'PTF - Group PTF Details', 'PTF - PTF information', 'Password failures over the last 24 hours', 'Product - Expiring license info', and 'Review public authority to files in library TOYSTORE'. The interface also shows a SQL script editor with the following code:

```
1 with emp_activ  
2 username,  
3 ) as (  
4 select "ct  
5 from qsy  
6 where sy  
7 )  
8 select * fro  
9  
10
```

# Access Client Solutions – IFS



Include - Only bring into the IFS interface the files & directories that match the include value

Filter – Contextual filter of displayed content

The screenshot shows a web browser window with the URL `/ on common1.idevcloud.com`. The interface includes a menu bar (File, Edit, View, Actions), a search bar containing `common1.idevcloud.com`, and a directory path `/`. Two buttons, `Filter` and `Include`, are circled in red. Below the search bar is a table listing objects:

Icon	Name	Size (KB)	Last Modified
Folder	.ssh		March 30, 2019 6:00:57 PM CDT
Folder	ACSLab		March 30, 2019 6:00:57 PM CDT
Folder	ALAMO		November 5, 2018 10:51:29 AM CST
Folder	COMMON		March 30, 2019 6:00:57 PM CDT
Folder	dev		March 30, 2019 6:05:35 PM CDT
Folder	etc		March 30, 2019 6:05:35 PM CDT
Folder	home		March 30, 2019 6:05:35 PM CDT
Folder	IFSMP06		May 23, 2018 2:57:26 PM CDT
Folder	IWSLAB01		March 30, 2019 6:00:57 PM CDT
Folder	IWSLAB02		March 30, 2019 6:00:57 PM CDT
Folder	IWSLAB03		March 30, 2019 6:00:57 PM CDT
Folder	IWSLAB04		March 30, 2019 6:00:57 PM CDT
Folder	IWSLAB05		March 30, 2019 6:00:57 PM CDT
Folder	IWSLAB06		March 30, 2019 6:00:57 PM CDT
Folder	IWSLAB07		March 30, 2019 6:00:57 PM CDT

Listing objects: 31 objects

Messages

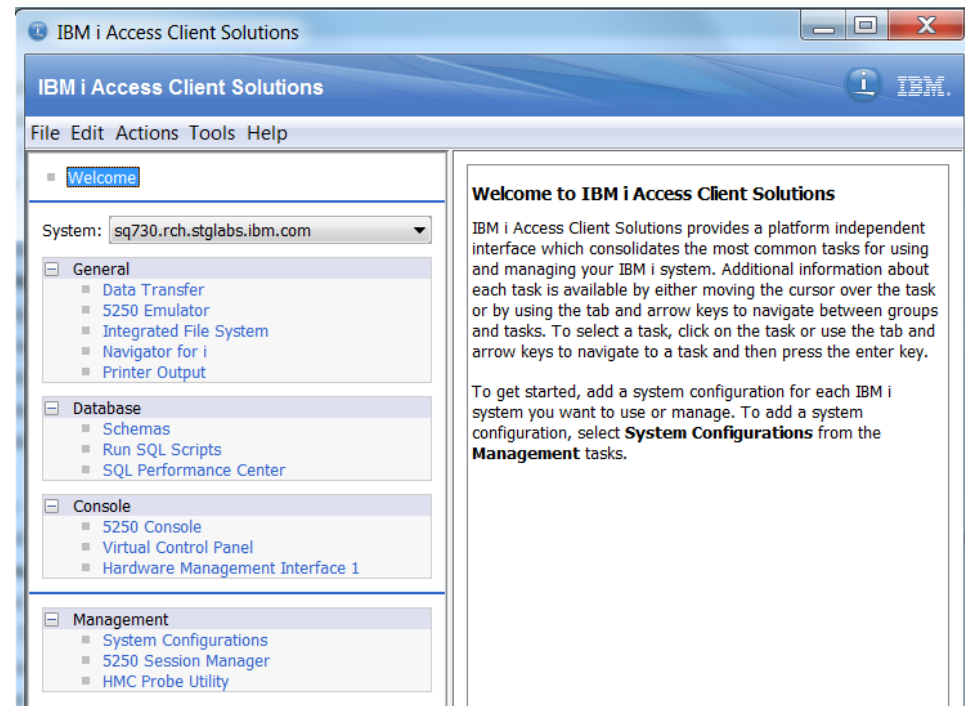


# ACS Version 1.1.8.2

- Updated several times per year (stay current)
- Something for every user
- Database continues to be a focal point

Download site:

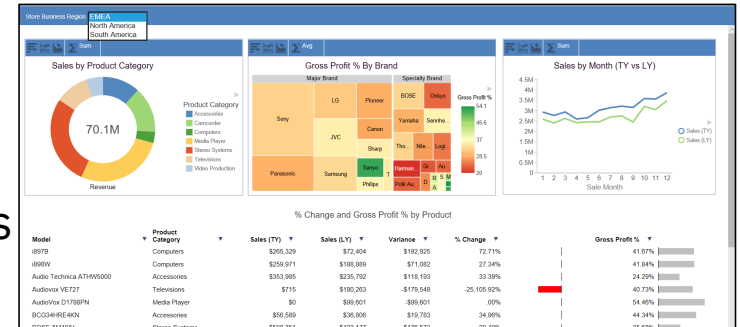
[http://ibm.biz/IBMi\\_ACS](http://ibm.biz/IBMi_ACS)





# Db2 Web Query for i

- Integrated IBM i Business Intelligence and Data Warehousing family of products
  - IBM i Licensed Program Products (5733-WQX)
- From Basic Reports to Powerful Interactive Dashboards
- Updated EZ-Install Package for Fast Start
  - **NEW** reports for the IBM i Systems Administrator
    - System Limits; Track File/Temp Storage Size Growth; Display Journal Info;
    - Cross System Reports: PTF Currency, CPU Utilization; System Status
  - GA May 2019 - To Request EZ-Install:
    - Send email to [QU2@us.ibm.com](mailto:QU2@us.ibm.com) and include name, company name, and serial number of your system



System	OS Release	Date Information Gathered	Status	PTF Group ID	PTF Name	Installed Level	Available Level	Date of First IBM Update
DB2IC0E3	V7R2M0	2019/04/15	INSTALLED LEVEL IS CURRENT	SF99719	Group Security	72	72	2019/04/02
				SF99720	Current Cumulative PTF Media Documentation	18249	18249	2018/10/01
				SF99721	All PTF Groups except Cumulative PTF Package	10	10	2018/01/12
				SF99747	DB2 Web Query for I V2.1.0	17	17	2017/08/04
				SF99766	Print PTFs	3	3	2015/01/07
				SF99767	730 TCP/IP PTF	4	4	2018/06/22
				SF99769	IBM I Integration with BladeCenter and System	1	1	2014/12/18
				SF99775	Hardware and Related PTFs	33	33	2019/02/08
				SF99776	High Availability for IBM I	10	10	2018/09/14
				SF99702	DB2 for IBM I	24	25	2019/04/10
DB2IC0E4	V7R3M0	2019/04/12	INSTALLED LEVEL IS CURRENT	SF99759	IBM MQ for IBM I - v7.1.0.v8.0.0.v9.0.0.v9.1.0	7	22	2019/04/01
				SF99825	IBM Open Source Solutions for I	6	6	2017/11/06
				SF99826	Content Manager OnDemand for I - 5770-RD1.7.3	10	10	2018/10/15
				SF99433	DB2 Web Query for I V2.2.1	5	5	2018/12/23
				SF99723	Performance Tools	4	4	2017/10/25
				SF99727	Technology Refresh	5	5	2018/09/13
				SF99730	Current Cumulative PTF Media Documentation	18242	18242	2018/09/14
				SF99731	All PTF Groups except Cumulative PTF Package	11	11	2018/08/28
				SF99667	730 TCP/IP PTF	1	1	2018/06/21
				SF99676	High Availability for IBM I	7	7	2018/09/14
RELATED GROUP			NOT AVAILABLE	SF99581	WebSphere App Server V8.5	6	7	2019/03/01
				SF99703	DB2 for IBM I	12	14	2019/03/04
				SF99722	IBM HTTP Server for I	16	18	2019/04/08
				SF99724	Backup Recovery Solutions	23	27	2019/03/20
				SF99725	Java	10	12	2019/03/28

Learn more at [ibm.biz/db2webqueryi](http://ibm.biz/db2webqueryi) & [db2webqueryi.blogspot.com](http://db2webqueryi.blogspot.com)

# Db2 Web Query for i - System and Security Management



scottf | Sign Out | Resources | Administ

## Db2 Web Query for i

Powered By Information Builders

Reporting

- Repository
  - Common
  - IBM Db2 Web Query Information
  - IBM i Administration Samples
    - Utilities
      - Get Status of Sys Admin Reports
      - PTF Group Currency Report**
      - Spool File Usage
      - Subsystem summary report
      - System CPU Dashboard
      - System environment info report
      - System(s) status dashboard
      - Systems CPU Utilization over 1 hour
      - Systems CPU Utilization over 2 hours
      - Systems CPU Utilization over 24 hours
      - Systems CPU Utilization over 8 hours
      - Top 10 jobs by CPU chart
      - Top 10 jobs by disk I/O chart
      - Top 10 jobs by temp storage chart
      - Top 10 spool file consumers chart
      - Top 10 spool files by output queues chart
  - Retail Samples
  - Century Electronics
- Favorites
  - Mobile Favorites
  - Reporting Servers
  - Change Management

### PTF Group - Currency Report

Status	PTF Group ID	PTF Group Name	Installed Level	Level Available	Date of last IBM Update
<b>UPDATE AVAILABLE</b>	SF99433	Db2 Web Query for i V2.2.1	4	5	2018/12/23
	SF99727	Technology Refresh	4	5	2018/09/13
	SF99730	Current Cumulative PTF Media Documentation	16299	18242	2018/09/14
SF99859	IBM MQ for IBM i - v7.1.0/v8.0.0/v9.0.0/v9.1.0	3	15	2018/12/20	
RELATED GROUP	SF99333	DB2 Web Query for i V2.2.0	5	5	2018/05/13
<b>INSTALLED LEVEL IS CURRENT</b>	SF99225	IBM Open Source Solutions for i	6	6	2017/11/06
	SF99252	Content Manager OnDemand for i - 5770-RD1 7.3	10	10	2018/10/15
	SF99581	WebSphere App Server V8.5	6	6	2018/08/17
	SF99703	DB2 for IBM i	12	12	2018/09/25
	SF99722	IBM HTTP Server for i	17	17	2018/12/27
	SF99723	Performance Tools	4	4	2017/10/25
	SF99724	Backup Recovery Solutions	25	25	2019/01/02
	SF99725	Java	11	11	2018/12/18
	SF99728	Group Security	38	38	2019/01/08
	SF99729	Group Hiper	75	75	2019/01/08
	SF99731	All PTF Groups except Cumulative PTF Package	11	11	2018/08/28
	SF99867	730 TCP/IP PTF	1	1	2018/06/21
	SF99875	Hardware and Related PTFS	15	15	2018/06/01
	SF99876	High Availability for IBM i	7	7	2018/09/14

**13 January, 2019 at 10.08.56**

# Cloud Options



IBM i & IBM Cloud

**IBM POWER9 on  
IBM Cloud: More  
Choice and  
Flexibility, On-  
Premise and Off**



<https://www.ibm.com/blogs/bluemix/2019/02/ibm-power9-on-ibm-cloud/>

# IBM i & IBM Cloud

With IBM i access in the IBM Cloud:

- 1) **Reach** new markets with the global IBM Cloud data center footprint
- 2) **Enable** their core applications in the cloud without migration disruption
- 3) **Leverage** our leadership in cloud-native services
- 4) **Rely** on our built-in security for highly sensitive, compliance-heavy data



<https://www.ibm.com/blogs/bluemix/2019/02/ibm-power9-on-ibm-cloud/>



# IBM Cloud Storage Solutions (5733ICC)



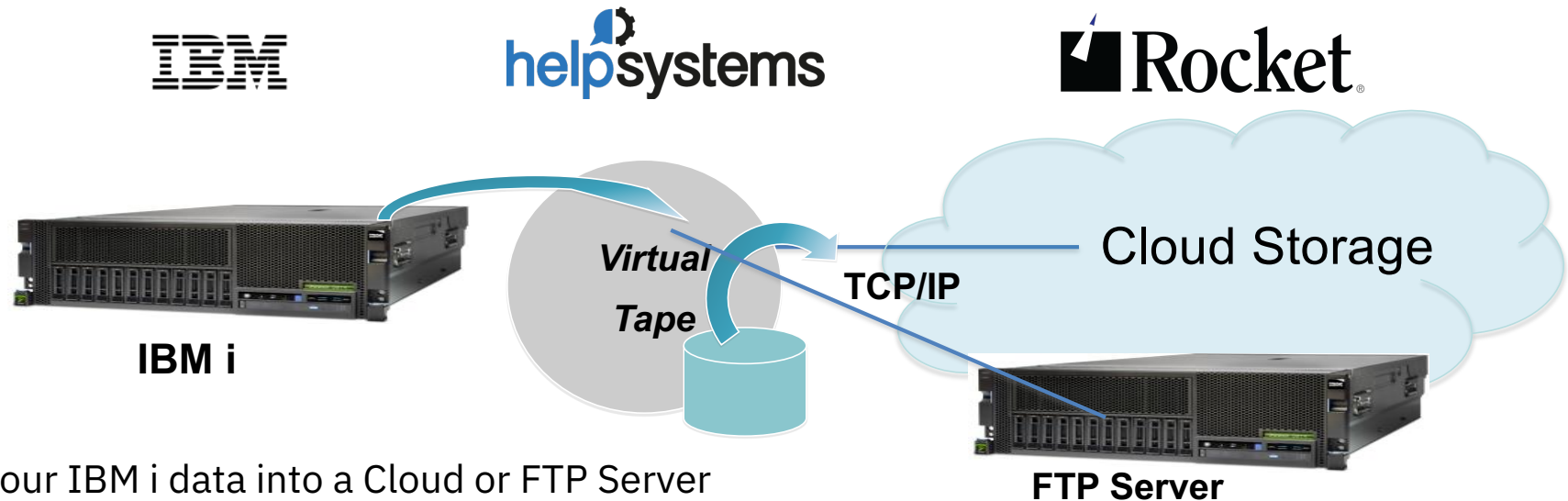
- Today
  - Tape Drives
  - Tapes are then shipped to offsite location
  - Disaster Recovery
  - Tapes need to be shipped back
- Why not remove the tape drive from the equation
- Send the backup 'directly' to an off site location



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# IBM Cloud Storage Solutions for i ([5733ICC](#))



Save your IBM i data into a Cloud or FTP Server

- Two modes
  1. BRMS to Cloud for backup operations
  2. GUI dashboard for storing files in the Cloud (think of BOX-like usage cases)

[http://www.ibm.com/support/knowledgecenter/ssw\\_ibm\\_i\\_73/icc/topics/iccuoverview.htm](http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/icc/topics/iccuoverview.htm)

... and More!





## ... and More Innovations!

- PowerHA
- IFS
- Domino 10
- Apache 2.4.36
- SMTP
- Service Tools
- System Limits
- More Cores & Threads per partition
- LUN Sizes
- ...



## Important Dates and Links

- **IBM i 7.3 TR6 and IBM i 7.4 – Announce: April 23, 2019**
  - Books updated in IBM Knowledge Center
  - Enhancement fact pages added to the IBM i Technology Updates wiki
- **IBM i 7.3 TR6 – GA: May 10, 2019**
- **IBM i 7.4 – GA: June 21, 2019**
- **Enhancement Landing pages...**  
<http://www.ibm.com/developerworks/ibmi/techupdates/i73-TR6>  
and  
<http://www.ibm.com/developerworks/ibmi/techupdates/i74>
- **IBM i 7.2 → No further enhancements**

# IBM i System Support



Servers	IBM i 7.2	IBM i 7.3	IBM i 7.4
<b>POWER9</b> S914, S922 (VIOS only), H922 (VIOS only), S924, H924, E980	✓	✓	✓
<b>POWER8</b> S812, S814, S822 (VIOS only), S824, E870, E870C, E880, E880C	✓	✓	✓
<b>POWER7/7+</b> 710, 720, 730, 740, 750, 760, 770, 780, 795	✓	✓	
<b>POWER7 BladeCenter</b> PS700/701/702/703/704 (all VIOS only) <b>POWER7/7+ Flex</b> p260/270/460 (all VIOS only)	✓		
<b>POWER6+</b> 520, 550, 560, 570, JS23/43 (VIOS only) <b>POWER6</b> 520, 550, 570, 595, JS12/22 (VIOS only)	✓ 1		

1 – no IOP or HSL support

Current as of 2019-04-23

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

# Client Stories



**Power Systems** Hardware ▾ OS ▾ Software Resources ▾

## IBM i Customer Stories

For over thirty years, IBM i has supported thousands of customers worldwide and continues to be the backbone of their infrastructure into the future. Read why customers are continuing to choose IBM i as their platform of choice.



**See innovation at work in the IBM i community**

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# Client Stories



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Thank You!

