

# Agenda

What are IBM i Services?

Why should you use them?

How do you use them?

How do you get them?

How much do they cost?

# Nearly time to start the presentation

## But first a Disclaimer

- You may be used to seeing IBM Disclaimers



## Trademarks & Disclaimers

© IBM Corporation 1994-2005. All rights reserved.

References in this document to IBM products or services do not imply that IBM intends to make them available in every country.

The following terms are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both:

System I	IBM (logo)	OS/400
DB2 for iSeries	iSeries	AS/400
e (logo) business		iSeries
IBM		

Lotus, Freelance Graphics, and Word Pro are registered trademarks of Lotus Development Corporation and/or IBM Corporation. Domino is a trademark of Lotus Development Corporation and/or IBM Corporation.

C-bus is a trademark of Corollary, Inc. in the United States, other countries, or both.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

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

ActionMedia, LANDesk, MMX, Pentium and ProShare are trademarks of Intel Corporation in the United States, other countries, or both.

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

SET and the SET Logo are trademarks owned by SET Secure Electronic Transaction LLC.

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

Information is provided "AS IS" without warranty of any kind.

All customer examples described are presented as illustrations of how those customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics may vary by customer.

Information in this presentation concerning non-IBM products was obtained from a supplier of these products, published announcement material, or other publicly available sources and does not constitute an endorsement of such products by IBM. Sources for non-IBM list prices and performance numbers are taken from publicly available information, including vendor announcements and vendor worldwide homepages. IBM has not tested these products and cannot confirm the accuracy of performance, capability, or any other claims related to non-IBM products. Questions on the capability of non-IBM products should be addressed to the supplier of those products.

All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. Contact your local IBM office or IBM authorized reseller for the full text of the specific Statement of Direction.

Some information in this presentation addresses anticipated future capabilities. Such information is not intended as a definitive statement of a commitment to specific levels of performance, function or delivery schedules with respect to any future products. Such commitments are only made in IBM product announcements. The information is presented here to communicate IBM's current investment and development activities as a good faith effort to help with our customers' future planning.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput or performance improvements equivalent to the ratios stated here.

Photographs shown are of engineering prototypes. Changes may be incorporated in production models.

# This is mine

- I tried ever so hard to get it right
- “*Opinions are like buttocks – Everyone has them!*”
  - You are hearing mine and not necessarily IBM’s
  - My opinions are not necessarily right
  - But then again, neither are yours



# IBM i is a platform like no other



- So far I have found 52 IBM i user groups
- I'm told there are many more.
- They are literally a goldmine of information
- Their members are wonderful people

# Make contact, drop in on an event



**Make learn more than just IBM i skills**



# User groups make you happy!

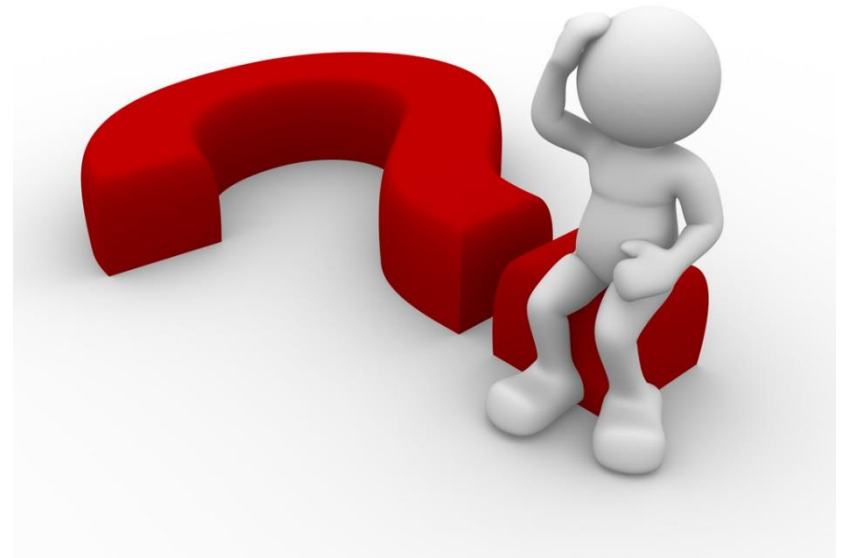


**They MIGHT even make smarter**  
**They WILL make you sound smarter**

# A quick question

Have you heard of IBM i APIs?

Do you use IBM i APIs?



# What are IBM i Services?

The next generation of System APIs  
(Application Program Interfaces)

Used to Manage and Monitor

Based on standard SQL statements

# IBM i APIs – Application Program Interfaces

IBM has provided APIs for many years

Most common reasons to use them are

- To perform advanced system functions
- To access low level (hidden) information
- To give more control to your system

# What is the problem with the old APIs?

- Designed 30 years ago
- Often require complex RPG Programs
- Hard to integrate into new applications
- Not easy to access the results
- Different APIs use different standards

# Lets look at an example

You want to know the following:  
which jobs have a lock on records in a file?



## Who has a record lock - API QDBRRCDL

[illegible][illegible]

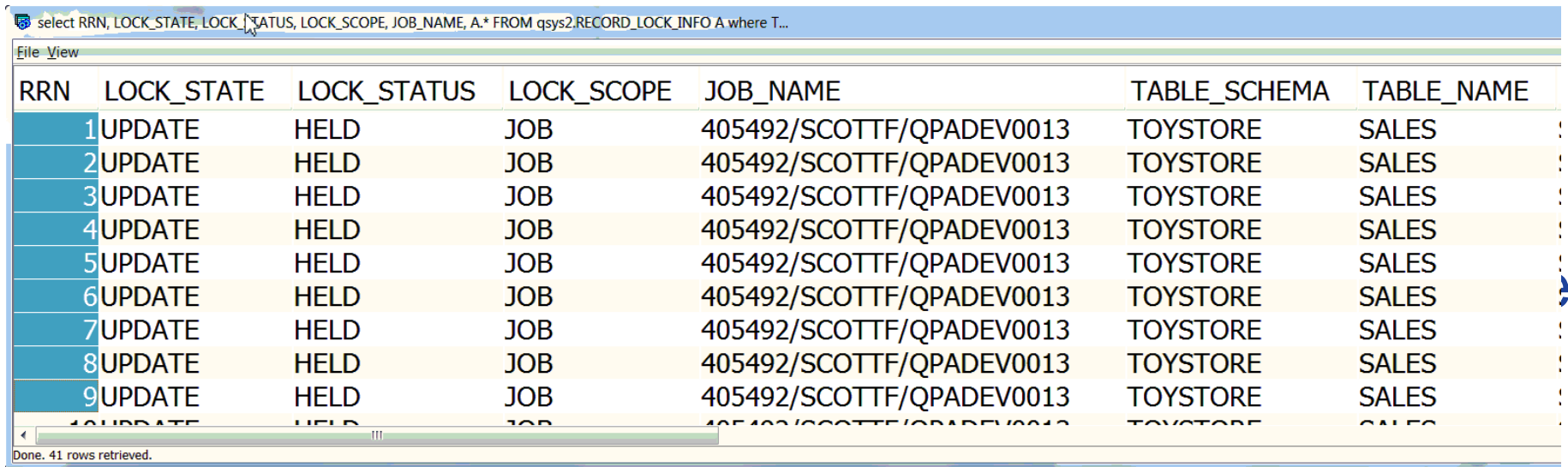
190 lines of code in total, the output sent to screen, this is excellent code but still no way to capture results

Sample by Jamief shared on Code400 website <http://www.code400.com/forum/showthread.php/611-Qdbrrcdl>

# An example of an IBM i Service

## Who has a record lock

```
SELECT RRN, LOCK_STATE, LOCK_STATUS, LOCK_SCOPE, JOB_NAME, A.*  
FROM QSYS2.RECORD_LOCK_INFO A  
WHERE TABLE_SCHEMA = 'TOYSTORE' AND TABLE_NAME = 'SALES'  
ORDER BY RRN;
```



The screenshot shows a DB2 query window with the following SQL statement: `select RRN, LOCK_STATE, LOCK_STATUS, LOCK_SCOPE, JOB_NAME, A.* FROM qsys2.RECORD_LOCK_INFO A where T...`. The results are displayed in a table with 7 columns: RRN, LOCK\_STATE, LOCK\_STATUS, LOCK\_SCOPE, JOB\_NAME, TABLE\_SCHEMA, and TABLE\_NAME. The table contains 9 rows of data, all showing 'UPDATE' locks held by 'JOB' on the 'TOYSTORE.SALES' table. The JOB\_NAME for all rows is '405492/SCOTT/PADEV0013'. The status bar at the bottom indicates 'Done. 41 rows retrieved.'

RRN	LOCK_STATE	LOCK_STATUS	LOCK_SCOPE	JOB_NAME	TABLE_SCHEMA	TABLE_NAME
1	UPDATE	HELD	JOB	405492/SCOTT/PADEV0013	TOYSTORE	SALES
2	UPDATE	HELD	JOB	405492/SCOTT/PADEV0013	TOYSTORE	SALES
3	UPDATE	HELD	JOB	405492/SCOTT/PADEV0013	TOYSTORE	SALES
4	UPDATE	HELD	JOB	405492/SCOTT/PADEV0013	TOYSTORE	SALES
5	UPDATE	HELD	JOB	405492/SCOTT/PADEV0013	TOYSTORE	SALES
6	UPDATE	HELD	JOB	405492/SCOTT/PADEV0013	TOYSTORE	SALES
7	UPDATE	HELD	JOB	405492/SCOTT/PADEV0013	TOYSTORE	SALES
8	UPDATE	HELD	JOB	405492/SCOTT/PADEV0013	TOYSTORE	SALES
9	UPDATE	HELD	JOB	405492/SCOTT/PADEV0013	TOYSTORE	SALES

Sample by Scott Forstie of IBM,  
More info at [ibm.biz/DB2foriServices](http://ibm.biz/DB2foriServices)

# Why should you use IBM i Services?

- Simpler – less programming
- Faster – less code and no compilation
- You get more information back
- Can access data from other systems

# Access data from other systems

Are you familiar with WRKPTFGRP?

PTF Group	Level	Status	Text
SF99776	1	Installed	HIGH AVAILABILITY FOR IBM I
SF99775	7	Installed	HARDWARE AND RELATED PTFS
SF99769	1	Installed	IBM I INTEGRATION WITH BLADECENTER AND SYSTEM X
SF99767	1	Installed	720 TCP/IP PTF
SF99766	3	Installed	PRINT PTFS
SF99759	3	Related group	IBM MQ FOR IBM I - V7.1.0/V8.0.0
SF99747	11	Installed	DB2 WEB QUERY FOR I V2.1.0
SF99721	4	Installed	ALL PTF GROUPS EXCEPT CUMULATIVE PTF PACKAGE
SF99720	15135	Installed	CUMULATIVE PTF PACKAGE C5135720
SF99719	34	Installed	GROUP HIPER
SF99718	15	Installed	GROUP SECURITY
SF99717	2	Installed	TECHNOLOGY REFRESH
SF99716	6	Installed	JAVA

It would be better if

- All details were on one screen (no F11)
- It told you if the PTFs were up to date

**Lets look at another example**

You want to know  
Are my PTFs up to date?



# An example of an IBM i Service

PTF Currency – Are my PTFs current?

```
SELECT * FROM SYSTOOLS.GROUP_PTF_CURRENCY  
ORDER BY ptf_group_level_available - ptf_group_level_installed DESC
```

PTF_GROUP_CURRENCY	PTF_GROUP_ID	PTF_GROUP_TITLE	PTF_GROUP_LEVEL_INSTALLED	PTF_GROUP_LEVEL_AVAILABLE	PTF_GROUP_LAST_UPDATED_BY_IBM	PTF_GROUP_RELEASE
UPDATE AVAILABLE	SF99719	720 Group Hiper	34	45	09/11/2015	R720
UPDATE AVAILABLE	SF99718	720 Group Security	15	20	09/11/2015	R720
UPDATE AVAILABLE	SF99775	720 Hardware and Related PTFs	7	11	09/11/2015	R720
UPDATE AVAILABLE	SF99702	720 DB2 for IBM i	5	8	08/21/2015	R720
UPDATE AVAILABLE	SF99713	720 IBM HTTP Server for i	7	10	08/26/2015	R720
UPDATE AVAILABLE	SF99715	720 Backup Recovery Solutions	11	14	08/25/2015	R720
UPDATE AVAILABLE	SF99481	720 WebSphere App Server V8.5	4	6	09/11/2015	R720
UPDATE AVAILABLE	SF99480	720 WebSphere App Server V8.0	3	4	08/17/2015	R720
UPDATE AVAILABLE	SF99716	720 Java	6	7	08/28/2015	R720
UPDATE AVAILABLE	SF99747	720 DB2 Web Query for i V2.1.0	11	12	08/12/2015	R720
UPDATE AVAILABLE	SF99776	720 High Availability for IBM i	1	2	06/11/2015	R720
INSTALLED LEVEL IS CURRENT	SF99714	720 Performance Tools	2	2	06/02/2015	R720
INSTALLED LEVEL IS CURRENT	SF99717	720 Technology Refresh	-2	2	05/29/2015	R720
INSTALLED LEVEL IS CURRENT	SF99720	Current Cumulative PTF Media Documentation	15135	15135	05/29/2015	R720
INSTALLED LEVEL IS CURRENT	SF99721	720 All PTF Groups except Cumulative PTF Package	4	4	01/23/2015	R720
INSTALLED LEVEL IS CURRENT	SF99766	720 Print PTFs	3	3	06/02/2015	R720
INSTALLED LEVEL IS CURRENT	SF99767	720 720 TCP/IP PTF	1	1	06/02/2015	R720
INSTALLED LEVEL IS CURRENT	SF99769	720 IBM i integration with BladeCenter and System x	1	1	06/02/2015	R720

## 1 SQL Statement

Checks your system, then checks with IBM for updates  
This statement took 6 seconds to complete

# An example of a new IBM i Service

PTF Currency – Are my PTFs current?

```
SELECT * FROM SYSTOOLS.GROUP_PTF_CURRENCY  
ORDER BY ptf_group_level_available - ptf_group_level_installed DESC
```

PTF_GROUP_CURRENCY	PTF_GROUP_ID	PTF_GROUP_TITLE
UPDATE AVAILABLE	SF99719	720 Group Hiper
UPDATE AVAILABLE	SF99718	720 Group Security
UPDATE AVAILABLE	SF99775	720 Hardware and Related PTFs
UPDATE AVAILABLE	SF99702	720 DB2 for IBM i
UPDATE AVAILABLE	SF99713	720 IBM HTTP Server for i
UPDATE AVAILABLE	SF99715	720 Backup Recovery Solutions
UPDATE AVAILABLE	SF99481	720 WebSphere App Server V8.5
UPDATE AVAILABLE	SF99480	720 WebSphere App Server V8.0
UPDATE AVAILABLE	SF99716	720 Java
UPDATE AVAILABLE	SF99747	720 DB2 Web Query for i V2.1.0
UPDATE AVAILABLE	SF99776	720 High Availability for IBM i
INSTALLED LEVEL IS CURRENT	SF99714	720 Performance Tools
INSTALLED LEVEL IS CURRENT	SF99717	720 Technology Refresh
INSTALLED LEVEL IS CURRENT	SF99720	Current Cumulative PTF Media Documentation
INSTALLED LEVEL IS CURRENT	SF99721	720 All PTF Groups except Cumulative PTF Package
INSTALLED LEVEL IS CURRENT	SF99766	720 Print PTFs
INSTALLED LEVEL IS CURRENT	SF99767	720 720 TCP/IP PTF
INSTALLED LEVEL IS CURRENT	SF99769	720 IBM i integration with BladeCenter and System x

And it tells you when the update is available

ProTip: From 7.3 you can automatically download the PTFs

# How do you use IBM i Services?

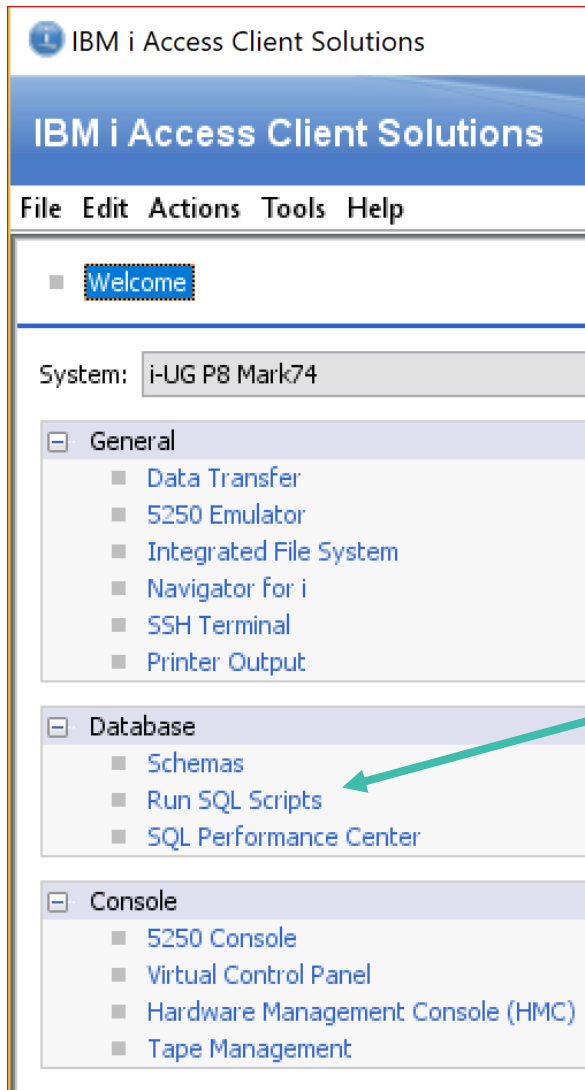
You run an SQL statement

- STRSQL – Not recommended
- IBM i ACS Run SQL
- IBM i Access for Web
- IBM RDi
- IBM Navigator for i
- Any ODBC / JDBC interface you prefer

# How do you use IBM i Services?

Advice from Uncle Scott

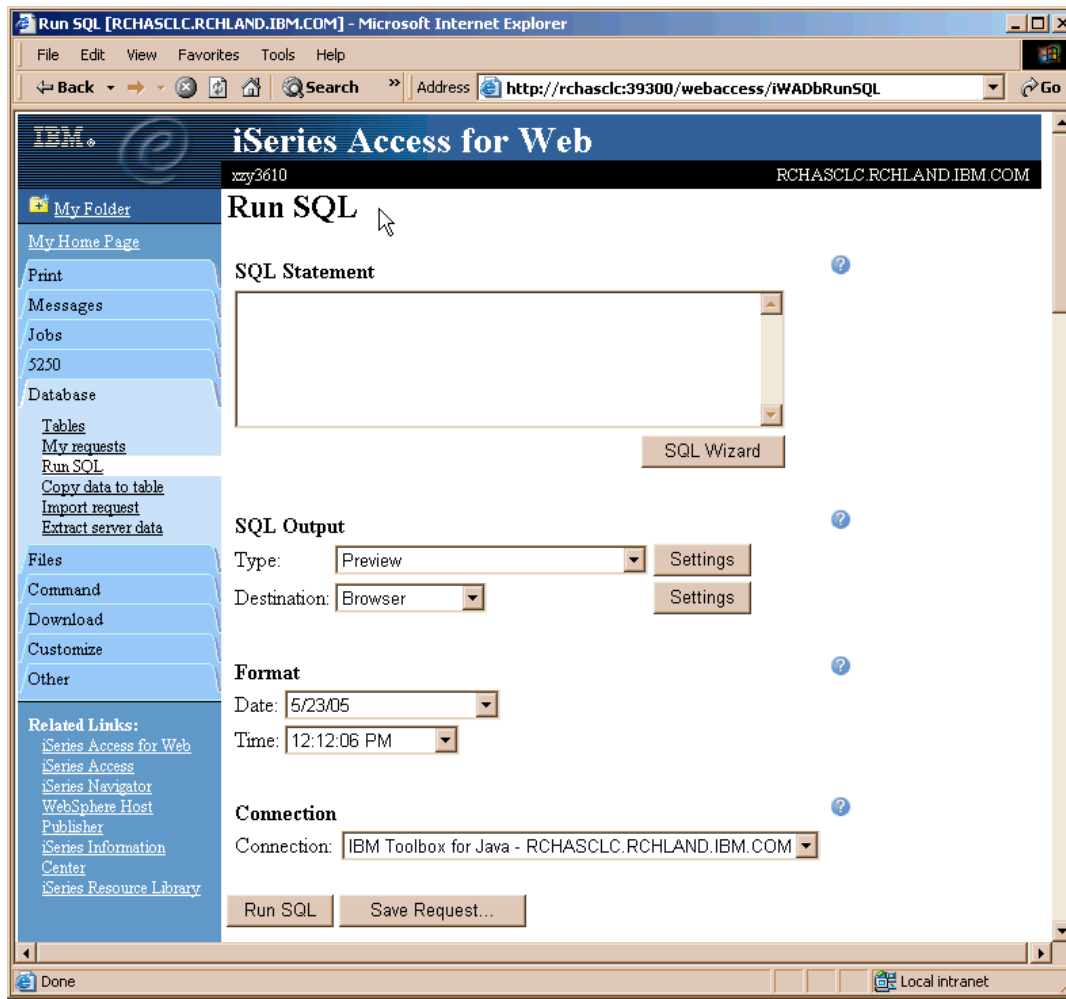
## Use IBM ACS Run SQL Scripts



Major overhaul of SQL interface.  
Now faster,  
more intuitive and has auto formatting

# How do you use IBM i Services?

## Use IBM i Access for Web (5770XH2)



# How do you use IBM i Services?

## Use IBM Navigator for i (Nav4i)

IBM® Navigator for i

Welcome rowton Target system: 192.168.2.184 Help Logout

Welcome Dashboard

IBM i Services

IBM i Management

- Target Systems and Groups
- Favorites
- System
  - System Status
  - System Operator Messages
  - History Log
  - Search
  - Disk Status
  - Run Command
- Emulation
  - Application Administration
  - IBM i Services
- All Tasks

Monitors

Basic Operations

Work Management

Configuration and Service

Network

Guest Partition Administration

Security

Users and Groups

Database

Journal Management

Performance

File Systems

- Internet Configurations

AFP Manager

Settings

IBM i Services - 192.168.2.184

No filter applied

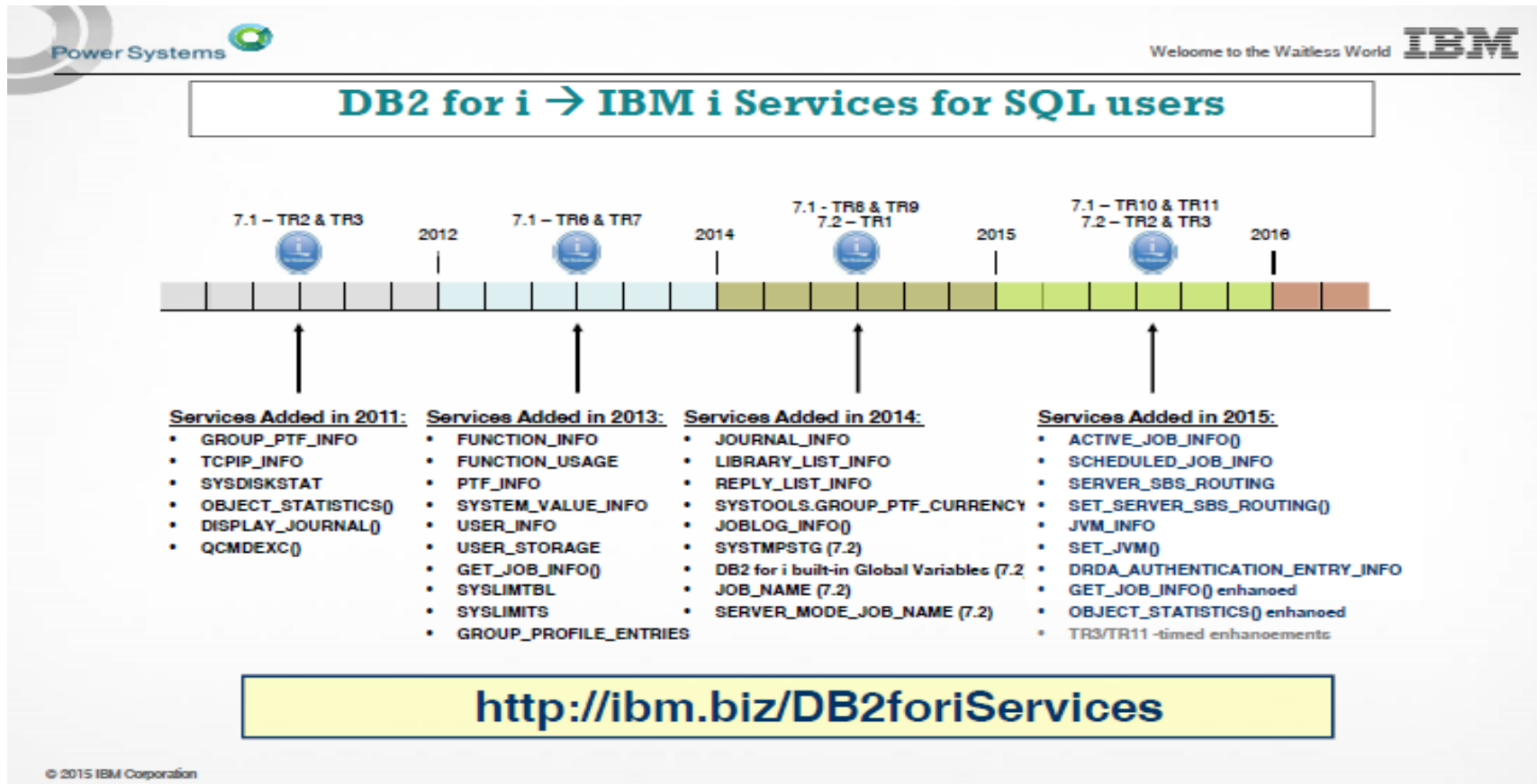
	Service Category	Service Schema	Service Name	SQL Object Type	Example
<input type="checkbox"/>	Application	QSYS2	SEND_DATA_QUEUE		-- Description: Send a message to data queue DQ1 in TESTLIB with ke
<input type="checkbox"/>	Application	QSYS2	SET_PASE_SHELL_INFO		-- Description: Set the current user's shell to BASH shipped by 5733-O
<input type="checkbox"/>	Application	QSYS2	DB_TRANSACTION_INFO	TRANS_INFO	-- Description: Show all jobs that have local work that has not been co
<input type="checkbox"/>	Application	QSYS2	BOUND_MODULE_INFO	MODULE_INF	-- Description: Find any bound modules that include source changes fr
<input type="checkbox"/>	Application	QSYS2	QCMDEXC		-- Description: Use QCMDEXC to execute CL command BEGIN CALL QS
<input type="checkbox"/>	Application	QSYS2	DATA_AREA_INFO	DTAARA_INF	-- Description: List all data areas named DTAARA1 and their values. SE
<input type="checkbox"/>	Application	QSYS2	DATA_AREA_INFO		-- Description: Show the value of DTAARA1 based on the current library
<input type="checkbox"/>	Application	QSYS2	SERVICES_INFO	SERV_INFO	-- Description: Review all the Security related IBM i Services SELECT *
<input type="checkbox"/>	Application	QSYS2	ENVIRONMENT_VARIABLE	ENV_VARS	-- Description: Review all system level environment variables for this c
<input type="checkbox"/>	Application	QSYS2	PROGRAM_INFO	PGM_INFO	-- Description: Summarize the activation group usage for all ILE progr
<input type="checkbox"/>	Application	SYSTOOLS	SPLIT		-- Description: Break a string into segments, using blank as the separa
<input type="checkbox"/>	Application	QSYS2	RECEIVE_DATA_QUEUE		-- Description: Get the message from data queue DQ1 in TESTLIB with
<input type="checkbox"/>	Application	QSYS2	DATA_QUEUE_INFO	DTAQ_INFO	-- Description: Find the number of messages currently on data queue D
<input type="checkbox"/>	Application	QSYS2	STACK_INFO		-- Description: Display the call stack for the current job. SELECT * FRO
<input type="checkbox"/>	Application	QSYS2	CLEAR_DATA_QUEUE		-- Description: Clear all entries from data queue DQ1 in library TESTLI
<input type="checkbox"/>	Application	QSYS2	BOUND_SRVPGM_INFO	SRVPGM_INF	-- Description: Examine whether service programs in APPLIB are taking
<input type="checkbox"/>	Application	QSYS2	PROGRAM_EXPORT_IMPOR	EXPIMP_INF	-- Description: Show all the procedure exports for service program APP
<input type="checkbox"/>	Communication	QSYS2	TIME_PROTOCOL_INFO	TIME_PROTO	-- Description: List all the registered time protocol servers SELECT * FR
<input type="checkbox"/>	Communication	QSYS2	NETSTAT_JOB_INFO	NS_JOB	-- Description: Review the network jobs coming in from a unique IP ad
<input type="checkbox"/>	Communication	QSYS2	TCPIP_INFO	TCPIP_INFO	-- Description: Retrieve the Host name, IBM i OS version and Client IP
<input type="checkbox"/>	Communication	QSYS2	SERVER_SBS_ROUTING	SRVR_RTG	-- Description: Review the existing configurations for users and groups
<input type="checkbox"/>	Communication	QSYS2	NETSTAT_INFO	NS_INFO	-- Description: Review the connections that are transferring the most d
<input type="checkbox"/>	Communication	QSYS2	NETSTAT_INTERFACE_INF	NS_INTER	-- Description: Review the TCP/IP Interface details SELECT * FROM QS
<input type="checkbox"/>	Communication	QSYS2	NETSTAT_ROUTE_INFO	NS_ROUTE	-- Description: Review the details of all TCP/IP routes SELECT * FROM

Total: 177 Selected: 0

5 | 10 | 25 | 50 | 100 | All

# How do you get IBM i Services?

If you run IBM i 7.1 or later, you have them



ProTip: Check [ibm.biz/DB2foriServices](http://ibm.biz/DB2foriServices) after each TR Announcement

# Do PTFs really help?

In a word – YES!

PTFs have always helped with database issues and performance

Now more than ever.

Since the introduction of Technology Refreshes in 7.1 IBM are not just fixing bugs and enabling new hardware with PTFs  
They boost performance & add new functions

More than half of the new functions written for 7.4 were made available in 7.3 via TR PTFs!

The same was true for 7.3 functions being PTF'd back into 7.2

Lets look at another example

You want to know

Which users on my system have \*ALLOBJ?



Can IBM i Services give you a better answer?

# Why are IBM i Services better?

Which users have \*ALLOBJ authority?

The old way is simple and quick

PRTUSRPRF TYPE(\*AUTINFO) SPCAUT(\*ALLOBJ)

```

User Profile Information
5770SS1 V7R1M0 100423
Report type . . . . . : *AUTINFO
Select by . . . . . : *SPCAUT
Special authorities . . . . . : *ALLOBJ
-----Special Authorities-----
*IO
User      Group      *ALL  *AUD  SYS  *JOB  *SAV  *SEC  *SER  *SPL  User
Profile   Profiles  OBJ   IT   CFG  CTL   SYS  ADM  VICE  CTL  Class
QLPAUTO   *NONE     X      X     X    X     X    X      X     X    *SYSOPR
QLPINSTALL *NONE     X      X     X    X     X    X      X     X    *SYSOPR
QSECOFR    *NONE     X      X     X    X     X    X      X     X    *SECOFR
QSECOFR1   *NONE     X      X     X    X     X    X      X     X    *SECOFR
QSYS       *NONE     X      X     X    X     X    X      X     X    *SECOFR
ROWTON     *NONE     X      X     X    X     X    X      X     X    *SECOFR
ZENDADMIN  *NONE     X      X     X    X     X    X      X     X    *SECOFR
* * * * * E N D O F L I S T I N G

```

So how could IBM i Services be better?

# Why are IBM i Services better?

Which users have \*ALLOBJ authority?

```
SELECT AUTHORIZATION_NAME, STATUS, NO_PASSWORD_INDICATOR, PREVIOUS_SIGNON,  
TEXT_DESCRIPTION FROM QSYS2.USER_INFO  
WHERE SPECIAL_AUTHORITIES LIKE '%*ALLOBJ%'  
OR AUTHORIZATION_NAME IN (SELECT USER_PROFILE_NAME FROM QSYS2.GROUP_PROFILE_ENTRIES  
WHERE GROUP_PROFILE_NAME IN (SELECT AUTHORIZATION_NAME FROM QSYS2.USER_INFO  
WHERE SPECIAL_AUTHORITIES like '%*ALLOBJ%'))  
ORDER BY AUTHORIZATION_NAME;
```

AUTHORIZATION_NAME	STATUS	NO_PASSWORD_INDICATOR	PREVIOUS_SIGNON	TEXT_DESCRIPTION
QLPAUTO	*ENABLED	NO	-	IBM-supplied User Profile
QLPINSTALL	*ENABLED	NO	-	IBM-supplied User Profile
QSECOFR	*ENABLED	YES	2015-09-20 13:05:04.000000	Security Officer
QSECOFR1	*ENABLED	YES	2015-09-20 14:29:08.000000	Security Officer
QSYS	*ENABLED	NO	-	Internal System User Profile
ROWTON	*ENABLED	YES	2015-09-20 13:56:51.000000	Rowton Support
SURPRISE	*ENABLED	YES	2015-09-20 14:29:52.000000	Has AllObj because Rowton is Group Profile
ZENDADMIN	*ENABLED	NO	-	Zend Server Administrator

This looks a lot more complex for the same answer.  
So, how can IBM i Services be better?

# Why are IBM i Services better?

Let's look at the answers again

User Profile	Group Profiles	*ALL OBJ	*AUD IT	SYS CFG	*JOB CTL	*SAV SYS	*SEC ADM	*SER VICE	*SPL CTL	User Class
QLPAUTO	*NONE	X		X	X	X	X			*SYSOPR
QLPINSTALL	*NONE	X		X	X	X	X			*SYSOPR
QSECOFR	*NONE	X	X	X	X	X	X	X	X	*SECOFR
QSECOFR1	*NONE	X	X	X	X	X	X	X	X	*SECOFR
QSYS	*NONE	X	X	X	X	X	X	X	X	*SECOFR
ROWTON	*NONE	X	X	X	X	X	X	X	X	*SECOFR
ZENDADMIN	*NONE	X	X	X	X	X	X	X	X	*SECOFR

AUTHORIZATION_NAME	STATUS	NO_PASSWORD_INDICATOR	PREVIOUS_SIGNON	TEXT_DESCRIPTION
QLPAUTO	*ENABLED	NO	-	IBM-supplied User Profile
QLPINSTALL	*ENABLED	NO	-	IBM-supplied User Profile
QSECOFR	*ENABLED	YES	2015-09-20 13:05:04.000000	Security Officer
QSECOFR1	*ENABLED	YES	2015-09-20 14:29:08.000000	Security Officer
QSYS	*ENABLED	NO	-	Internal System User Profile
ROWTON	*ENABLED	YES	2015-09-20 13:56:51.000000	Rowton Support
SURPRISE	*ENABLED	YES	2015-09-20 14:29:52.000000	Has AllObj because Rowton is Group Profile
ZENDADMIN	*ENABLED	NO	-	Zend Server Administrator

It does not have \*ALLOBJ specified in its own parameters, so does not show up on the PRTUSRPRF. That doesn't stop this user from having full access to every object on the system!

# IBM i Services can help with GDPR

Finding sensitive data is hard

- Inconsistent field names
- Multiple copies
- Millions of objects to analyse

Where do you start?

- Start with the System Table Service

```
SELECT SYSTEM_TABLE_SCHEMA library, SYSTEM_TABLE_NAME table, SYSTEM_COLUMN_NAME field, length,  
data_type, column_text, column_heading FROM qsys2.syscolumns  
WHERE length >= 20 and (lower(column_text) like '%address%')  
ORDER BY library, table, field ;
```

Protip: You can use ANY string that is a sensitive term that is key to your environment!  
Zip Code, Credit Card, Salary, Blood Type, Social Security No, Passport No, etc.....  
Thanks to Guy Marmorat at [resiliane.com](http://resiliane.com) for this tip

# How about the price?

So how much does it cost to purchase IBM i Services?

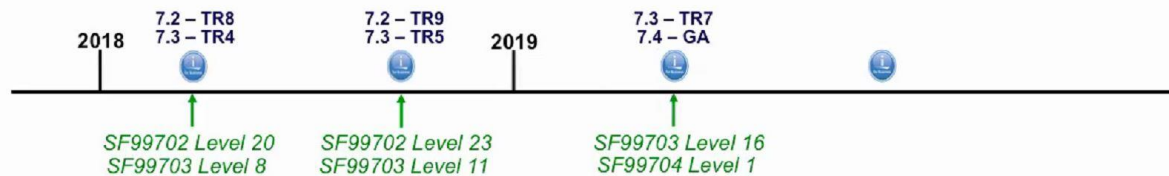
**NOTHING !** They are FREE and included by default



# IBM i Services are the future

## Currently 147 different IBM i Services

### 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>

Each service can answer many different questions

New services are regularly added by PTF

Many existing services have been further enhanced in the last 12 months

Source: Scott Forstie SQL for the Security Officer Presentation

# Grouped into the following categories

Group Name	Number of IBM i Services
Application Services	30
Work Management Services	25
Security Services	21
Communication Services	14
IFS Services	12
Storage Services	9
Message Handling Services	7
Spool Services	7
PTF Services	5
Librarian Services	4
Journaling Services	4
Product Services	3
System Health Services	3
Java Services	2
Performance	1

IBM have added new IBM i Services functionality in every TR level since 7.1

# Enough talking, let's get hands on

## Demonstration time



# Changing habits...

- WRKOBJ / DSPOBJ
- DSPOBJAUT
- RTVDIRINF
- WRKACTJOB
- NETSTAT



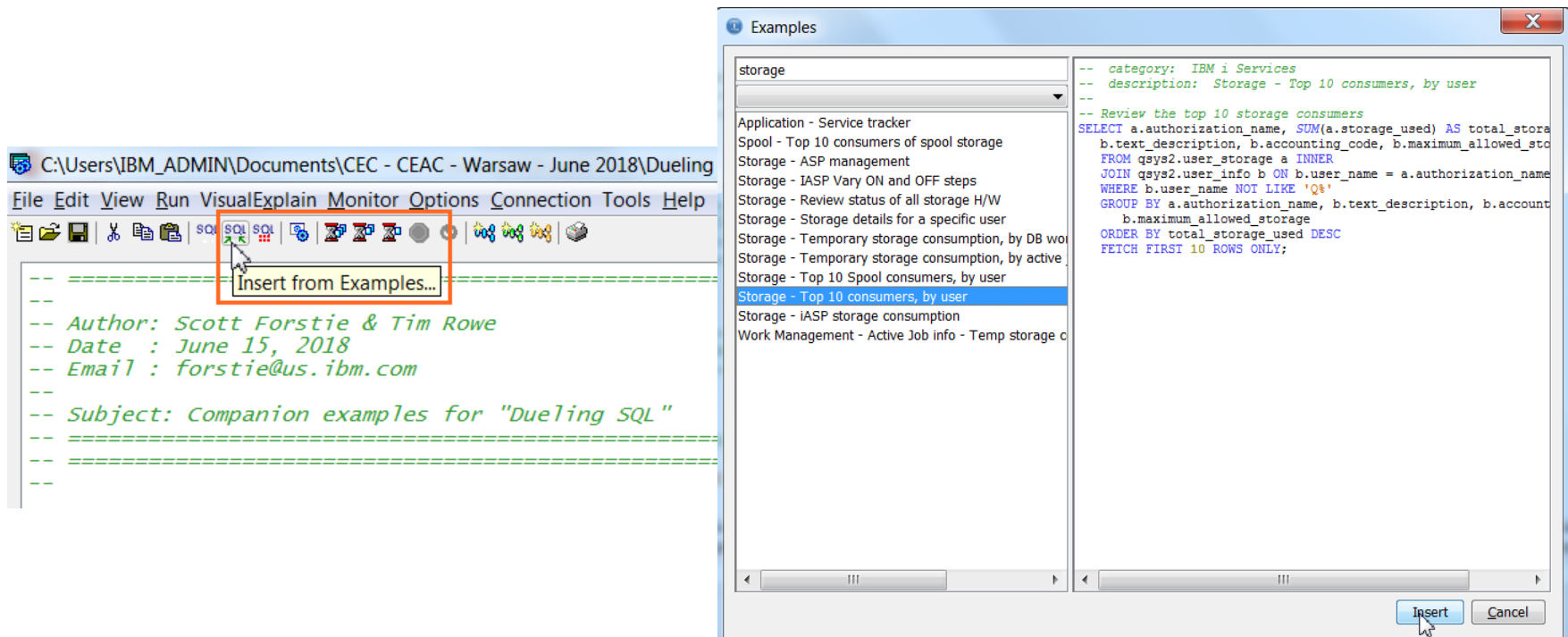
- And the list goes on...

- QSYS2.OBJECT\_STATISTICS()
- QSYS2.OBJECT\_PRIVILEGES
- QSYS2.IFS\_OBJECT\_STATISTICS()
- QSYS2.ACTIVE\_JOB\_INFO()
- QSYS2.NETSTAT\_INFO
- QSYS2.NETSTAT\_JOB\_INFO
- QSYS2.NETSTAT\_ROUTE\_INFO
- QSYS2.NETSTAT\_INTERFACE\_INFO
- **#SQLcandoit**

[ibm.biz/Db2foriServices](http://ibm.biz/Db2foriServices)

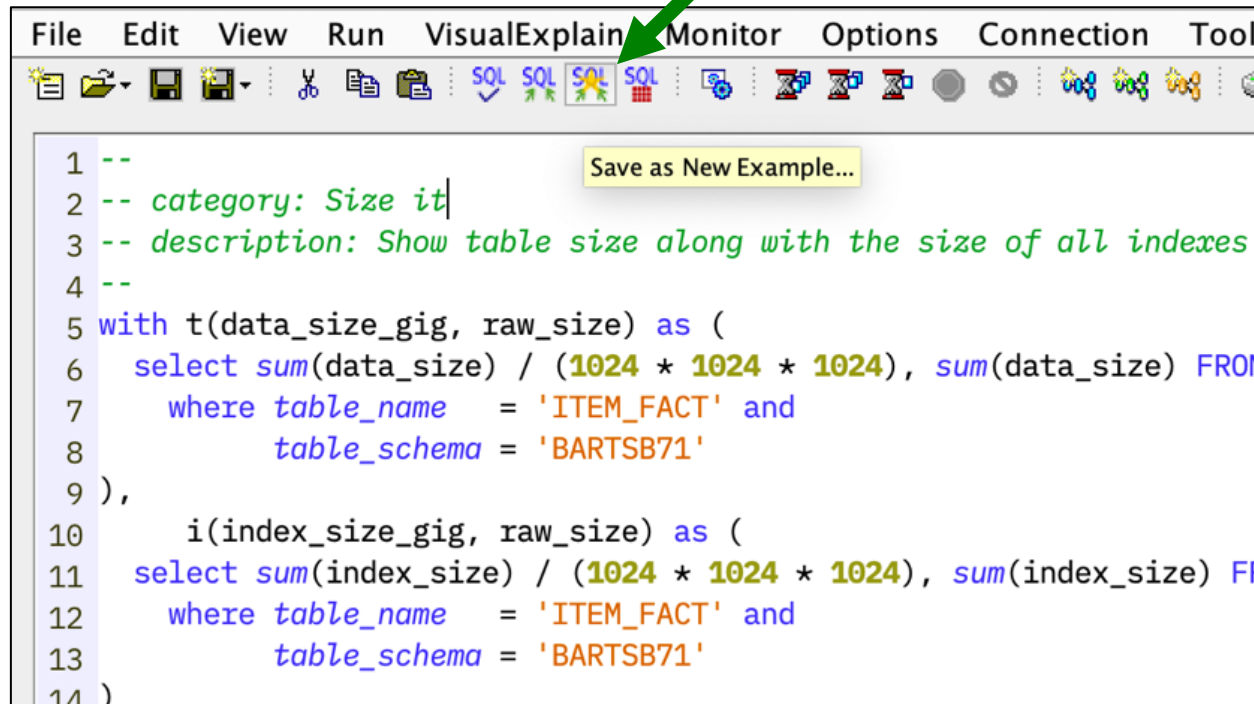
# SQL Made Easy – Use Insert From Examples

- Working examples are built into ACS
- **Many of the examples are focused on admin tasks**



# User Defined – Insert from Examples

- Save as New Example



# The new IBM i services are awesome too!

You can now view Journals from IBM i Services

- You can view Audit and Database Journals
- You can visualise more data
- You can select, subset & summarise all in one
- You can use this to link directly from your SIEM

## Viewing all User Profile changes in the last 24 hours

```
SELECT journal_code, journal_entry_type, object, object_type, X.*  
FROM TABLE (  
  QSYS2.Display_Journal(  
    'QSYS', 'QAUDJRN',           – Journal library and name  
    JOURNAL_ENTRY_TYPES => 'CP', – Journal entry types  
    STARTING_TIMESTAMP => CURRENT_TIMESTAMP - 24 HOURS – Time period  
  ) ) AS x
```

# Some of my favourites from Scott Forstie

## I'm about to IPL, will the IPL impact PTF state?

```
SELECT PTF_IDENTIFIER, PTF_IPL_ACTION, A.*  
FROM QSYS2.PTF_INFO A WHERE PTF_IPL_ACTION <> 'NONE';
```

## Which remote journals are the most heavily used?

```
SELECT JOURNALED_OBJECTS, A.* FROM QSYS2.JOURNAL_INFO A WHERE  
NUMBER_REMOTE_JOURNALS > 0 AND JOURNALED_OBJECTS IS NOT NULL ORDER BY  
JOURNALED_OBJECTS DESC;
```

## Remote journals that fell behind this week?

```
SELECT MAXIMUM_TIME_BEHIND, MAXIMUM_BEHIND_TIMESTAMP, ESTIMATED_TIME_BEHIND,  
TOTAL_SIZE_JOURNAL_RECEIVERS,  
RTRIM(ATTACHED_JOURNAL_RECEIVER_LIBRARY) CONCAT '/' CONCAT  
RTRIM(ATTACHED_JOURNAL_RECEIVER_NAME) AS JrnName, A.* FROM  
QSYS2.JOURNAL_INFO A WHERE  
MAXIMUM_BEHIND_TIMESTAMP > CURRENT_TIMESTAMP - 7 DAYS AND  
MAXIMUM_TIME_BEHIND > 0 AND MAXIMUM_TIME_BEHIND IS NOT NULL ORDER BY  
MAXIMUM_TIME_BEHIND DESC FETCH FIRST 10 ROWS ONLY;
```

# Some of my favourites from Scott Forstie

## Examine all groups and the group members

```
SELECT * from qsys2.group_profile_entries;
```

## Which users are having trouble signing on?

```
SELECT * FROM QSYS2.USER_INFO  
WHERE SIGN_ON_ATTEMPTS_NOT_VALID > 0;
```

## Review top 10 storage consumers

```
SELECT A.AUTHORIZATION_NAME, SUM(A.STORAGE_USED) AS TOTAL_STORAGE_USED,  
       B.TEXT_DESCRIPTION, B.ACCOUNTING_CODE, B.MAXIMUM_ALLOWED_STORAGE  
FROM QSYS2.USER_STORAGE A  
INNER JOIN QSYS2.USER_INFO B ON B.USER_NAME = A.AUTHORIZATION_NAME  
GROUP BY A.AUTHORIZATION_NAME, B.TEXT_DESCRIPTION, B.ACCOUNTING_CODE,  
         B.MAXIMUM_ALLOWED_STORAGE  
ORDER BY TOTAL_STORAGE_USED DESC FETCH FIRST 10 ROWS ONLY;
```

# Some of my favourites from Scott Forstie

## Which active jobs are the top consumers of temporary storage?

```
SELECT bucket_current_size, bucket_peak_size,  
       rtrim(job_number) concat '/' concat rtrim(job_user_name) concat '/' concat rtrim(job_name)  
       as q_job_name  
FROM QSYS2.SYSTMPSTG  
WHERE job_status = '*ACTIVE'  
ORDER BY bucket_current_size desc;
```

## Which active database server connections are consuming the most temporary storage?

```
WITH TOP_TMP_STG (bucket_current_size, q_job_name) AS (  
  SELECT bucket_current_size, rtrim(job_number) concat '/' concat rtrim(job_user_name) concat '/'  
        concat rtrim(job_name) as q_job_name  
  FROM QSYS2.SYSTMPSTG  
  WHERE job_status = '*ACTIVE' AND JOB_NAME IN ('QZDASOINIT', 'QZDASSINIT', 'QRWTSRVR',  
        'QSQSRVR')  
  ORDER BY bucket_current_size desc fetch first 10 rows only  
) SELECT bucket_current_size, q_job_name, V_SQL_STATEMENT_TEXT, B.* FROM TOP_TMP_STG  
TABLE(QSYS2.GET_JOB_INFO(q_job_name)) B;
```

# Some of my favourites from Scott Forstie

What data was deleted from PRODDATA/SALES table this week?

```
select
  cast(cast(substring(entry_data,610-610+1,10) as VARCHAR(10) for bit data) as DATE) AS
  SALES_DATE,
  cast(cast(substring(entry_data,622-610+1,15) as VARCHAR(15) for bit data) as varchar(15) ccsid 37) as
  SALES_PERSON,
  cast(cast(substring(entry_data,638-610+1,15) as VARCHAR(15) for bit data) as varchar(15) ccsid 37) as
  REGION,
  cast(cast(substring(entry_data,655-610+1,4) as VARCHAR(4) for bit data) as varchar(4)) as SALES
  from table (
    QSYS2.Display_Journal(
      'TOYSTORE', 'QSQJRN', -- Journal library and name
      STARTING_TIMESTAMP => CURRENT_TIMESTAMP - 7 DAYS,
      JOURNAL_ENTRY_TYPES => 'DL',
      OBJECT_LIBRARY     => 'TOYSTORE',
      OBJECT_NAME         => 'SALES',
      OBJECT_OBJTYPE      => '*FILE',
      OBJECT_MEMBER       => 'SALES'
    ) ) as x
  order by entry_timestamp desc;
```

# Some of my favourites from Scott Forstie

## Compare PTF levels of 2 machines

```
select * from qsys2.ptf_info;
```

```
DECLARE GLOBAL TEMPORARY TABLE SESSION.Remote_PTF_INFO  
( PTF_PRODUCT_ID,PTF_IDENTIFIER,PTF_LOADED_STATUS,PTF_CREATION_TIMESTAMP )  
AS (SELECT PTF_PRODUCT_ID,PTF_IDENTIFIER,PTF_LOADED_STATUS,PTF_CREATION_TIMESTAMP FROM  
LP02UT28.QSYS2.PTF_INFO WHERE PTF_LOADED_STATUS <> 'NOT LOADED') WITH DATA  
WITH REPLACE;
```

```
SELECT 'LP24UT27' AS "System Name",  
A.PTF_PRODUCT_ID,A.PTF_IDENTIFIER,A.PTF_LOADED_STATUS,A.PTF_CREATION_TIMESTAMP FROM  
QSYS2.PTF_INFO A  
LEFT EXCEPTION JOIN SESSION.Remote_PTF_INFO B  
ON A.PTF_PRODUCT_ID = B.PTF_PRODUCT_ID AND  
A.PTF_IDENTIFIER IS NOT DISTINCT FROM B.PTF_IDENTIFIER AND  
A.PTF_LOADED_STATUS IS NOT DISTINCT FROM B.PTF_LOADED_STATUS AND  
A.PTF_CREATION_TIMESTAMP IS NOT DISTINCT FROM B.PTF_CREATION_TIMESTAMP  
UNION ALL  
SELECT 'LP02UT28' AS "System Name",  
B.PTF_PRODUCT_ID,B.PTF_IDENTIFIER,B.PTF_LOADED_STATUS,B.PTF_CREATION_TIMESTAMP FROM  
QSYS2.PTF_INFO A  
RIGHT EXCEPTION JOIN SESSION.Remote_PTF_INFO B  
ON A.PTF_PRODUCT_ID = B.PTF_PRODUCT_ID AND  
A.PTF_IDENTIFIER IS NOT DISTINCT FROM B.PTF_IDENTIFIER AND  
A.PTF_LOADED_STATUS IS NOT DISTINCT FROM B.PTF_LOADED_STATUS AND  
A.PTF_CREATION_TIMESTAMP IS NOT DISTINCT FROM B.PTF_CREATION_TIMESTAMP  
ORDER BY PTF_IDENTIFIER;
```

# New Services for IBM i 7.4

## IBM i Services for Message Queues

```

1  --
2  -- Review messages sent to the system operator message queue
3  -- with license expiration details
4  --
5  select message_text, M.*
6         from Qsys2.Message_Queue_Info M
7        where Message_Queue_Name = 'QSYSOPR'
8              and message_text like '%exceeded%';

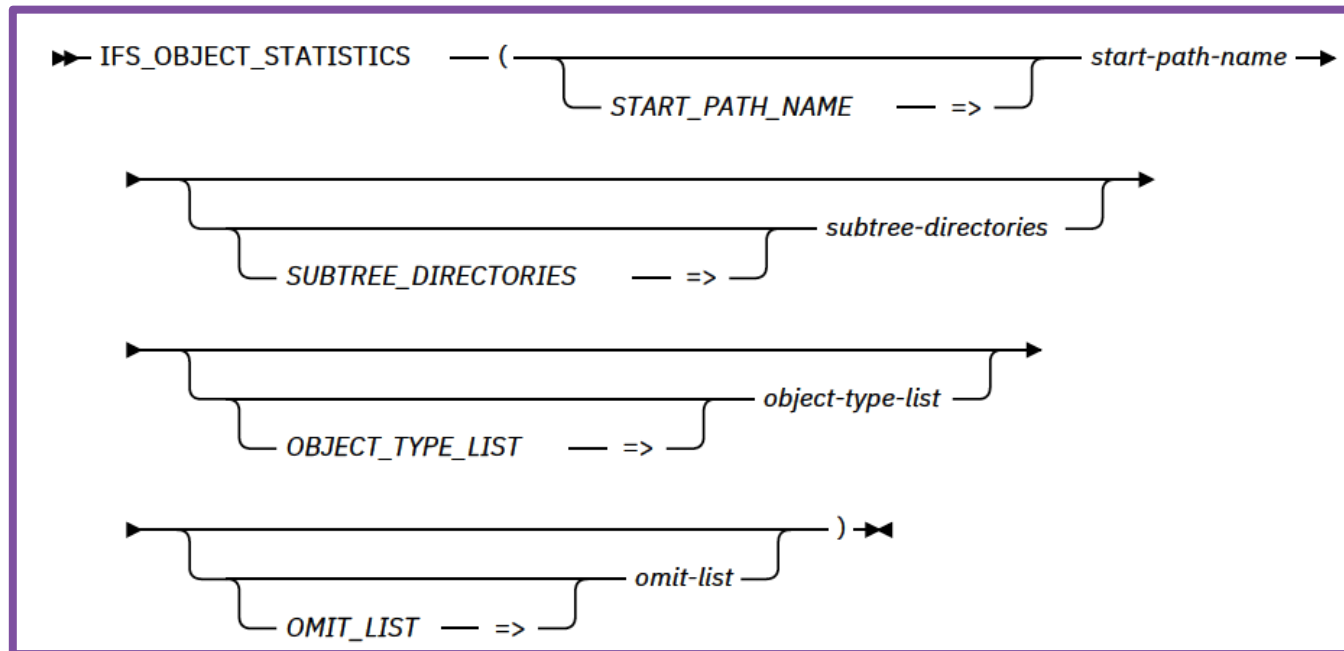
```

MESSAGE_TEXT	MESSAGE_QUEUE_LIBRARY	MESSAGE_QUEUE_NAME	MESSAGE_ID
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
Usage limit of 0 exceeded. Grace period expires in 69 days on 14/08/19.	QSYS	QSYSOPR	CPF9E72
IBM i usage limit exceeded - operator action required.	QSYS	QSYSOPR	CPF9E7F
IBM i usage limit exceeded - operator action required.	QSYS	QSYSOPR	CPF9E7F
IBM i usage limit exceeded - operator action required.	QSYS	QSYSOPR	CPF9E7F

Oops, someone forgot to enter the keys!

# IFS\_OBJECT\_STATISTICS

- SQL Alternative to RTVDIRINF, WRKLNK, readdir, opendir, etc...
- 87 columns of data returned



# Largest files under an IFS tree

```
select path_name, object_type, data_size, object_owner
  from table(qsys2.IFS_OBJECT_STATISTICS(
              start_path_name => '/usr',
              subtree_directories => 'YES'))

 order by 3 desc
 limit 10;
```

PATH_NAME	OBJECT_TYPE	DATA_SIZE	OBJECT_OWNER
/usr/scottf/guard-itap-10.0.0_r79963_trunk_1-aix-5.3-aix-powerpc.sh	*STMF	22990848	SCOTTf
/usr/local/guardium/libprotobuf.a	*STMF	11376527	SCOTTf
/usr/local/guardium/istap	*STMF	7620568	SCOTTf
/usr/local/guardium/just_send	*STMF	3962332	SCOTTf
/usr/bin	*DIR	73728	QSYS
/usr	*DIR	24576	QSYS
/usr/scottf	*DIR	12288	SCOTTf
/usr/local/guardium/iso-swid	*DIR	12288	SCOTTf
/usr/local	*DIR	8192	SCOTTf
/usr/local/guardium	*DIR	8192	SCOTTf

# IFS Storage Management by User

```
with ifsobjs (path, type) as (  
    select path_name, object_type  
    from table(qsys2.object_ownership('SCOTT')) a  
    where path_name is not null  
)  
select i.*, data_size, z.*  
from ifsobjs i, lateral (  
    select * from  
    table(qsys2.ifs_object_statistics(  
        start_path_name => path,  
        subtree_directories => 'NO')) z  
order by data_size desc;
```

PATH	TYPE	DATA_SIZE
/usr/scottf	*DIR	22990848
/usr/scottf/guard-itap-10.0.0_r7...	*STMF	22990848
/usr/local/guardium/libprotobuf.a	*STMF	11376527

## IFS Directories – Data size probe

```
select path_name, object_type, data_size, object_owner,  
       create_timestamp, access_timestamp,  
       data_change_timestamp, object_change_timestamp  
from table (  
    qsys2.ifs_object_statistics(  
        start_path_name => '/',  
        subtree_directories => 'YES',  
        object_type_list => '*ALLDIR *NOQSYS'))  
where data_size is not null and  
       object_owner not in ('QSYS')  
order by 3 desc limit 10;
```

PATH_NAME	OBJECT_TYPE	DATA_SIZE	OBJECT_OWNER	CREATE_TIMESTAMP
/QOPT/HMC-9.1.910.0	*DDIR	2147483647	QDFTOWN	2018-02-21
/home/jdbctest/ct/out/compare	*DIR	3825664	EBERHARD	2018-07-17
/home/jdbctest/test	*DIR	2646016	EBERHARD	2016-04-28
/tmp/SQE/CLRAMLER_991432	*DIR	909312	CLRAMLER	2019-03-26
/home/jdbctest/stp/locator/evn	*DIR	606320	EBERHARD	2016-01-28

# New Services for IBM i 7.4

## IBM i Service for Spool Data

```
1  --
2  -- Find the top 5 consumers of SPOOL storage.
3  --
4  select user_name, sum(size) as total_spool_space,
5         varchar_format(sum(size), '999G999G999G999G999')
6         as total_spool_space_formatted
7  from qsys2.output_queue_entries_basic
8  where user_name in (select user_name
9                      from qsys2.user_info
10                     where user_creator <> '*IBM')
11 group by user_name
12 order by total_spool_space desc
13 limit 5;
```

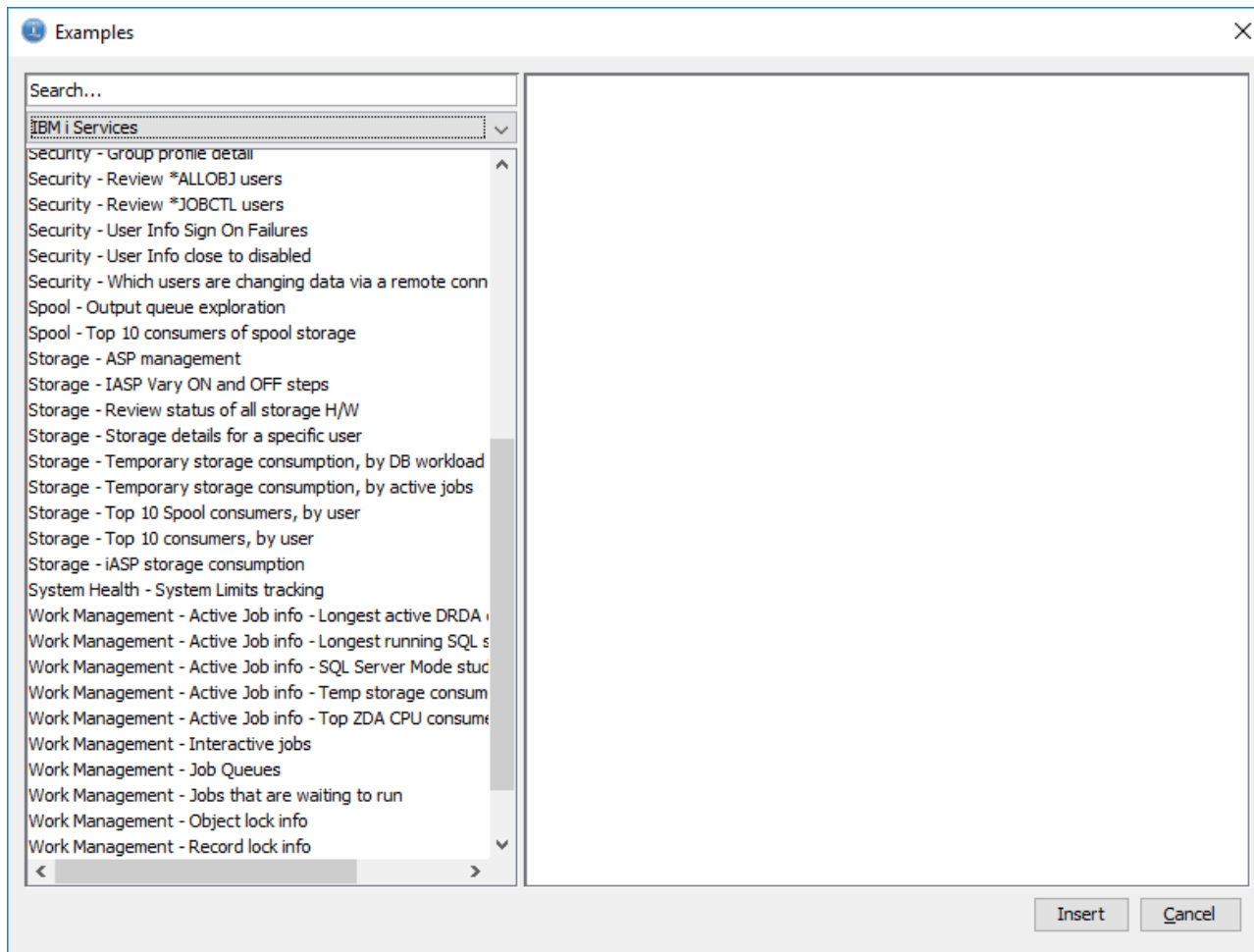
USER_NAME	TOTAL_SPOOL_SPACE	TOTAL_SPOOL_SPACE_FORMATTED
STEVE	41704	41,704
GSTREET	6416	6,416
QIJS	540	540
ROWTON	308	308
RUDI	36	36

Answers delivered in less than a second!

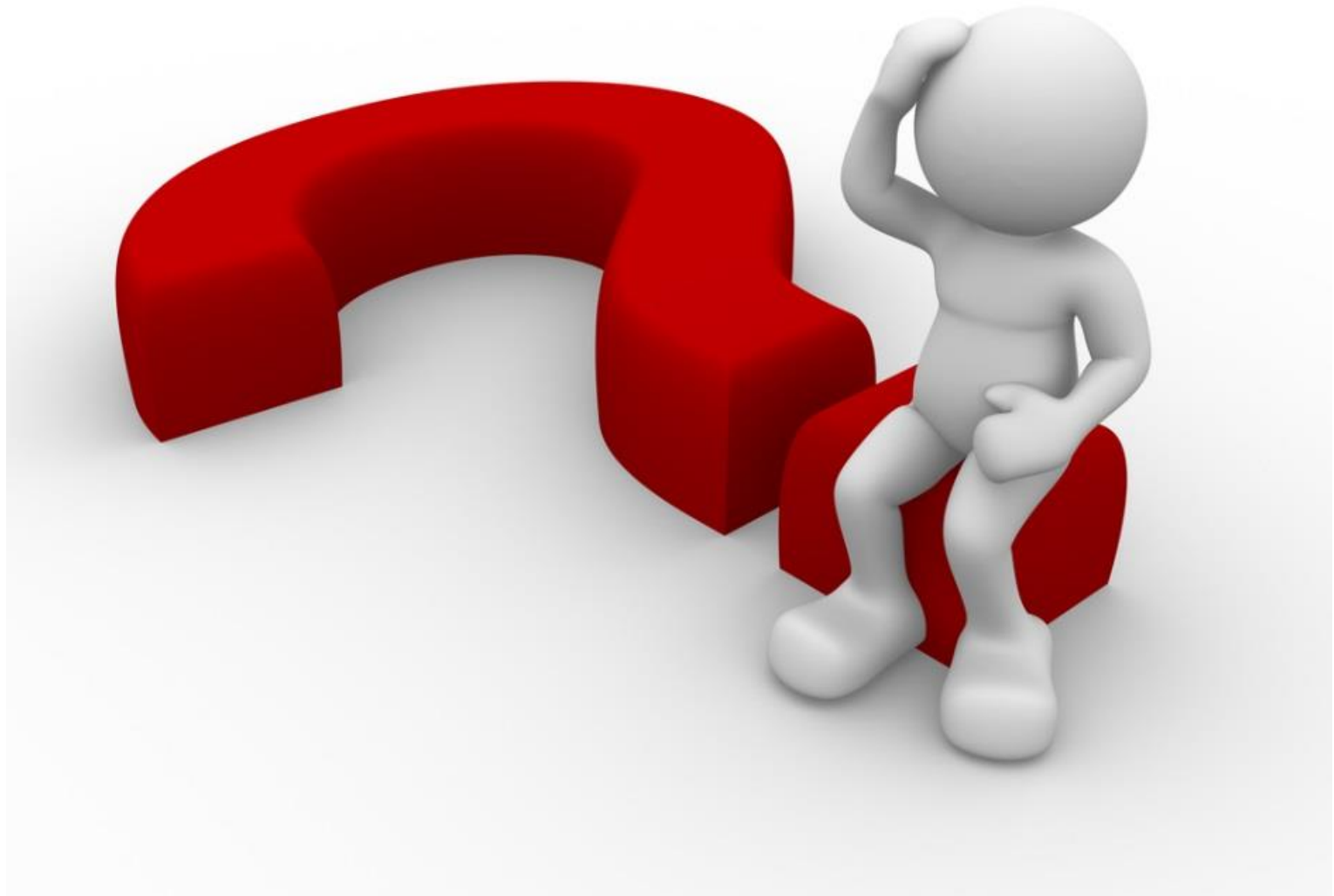
ProTip: This service PTFd back to IBM i 7.3 other OUTQ services go back to 7.2

# Where you start?

I recommend ACS Insert from examples



# Any Questions?



# Want to know more?

Check the Scott Forstie Blog

<http://ibm.biz/Db2foriServices>

Speak with your local IBM i BP / ISV

Speak with your local IBM support

Read my technical blog

[powerwire.eu/author/steve-bradshaw](http://powerwire.eu/author/steve-bradshaw)