

IBM i Services
as you've never seen
them before

—
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Business Architect
Db2 for i

2020
iSight



Core Knowledge

Documentation

Documentation for IBM i Services

- **Access directly in Knowledge Center**
 - https://www.ibm.com/support/knowledgecenter/ssw_ibm_i_74/rzajq/rzajq_servicessys.htm
- **Access through the Db2 for i Technology Updates wiki**
 - <http://ibm.biz/Db2foriServices>

IBM® i Services

Application Services

QSYS2.BOUND_MODULE_INFO – VIEW
QSYS2.BOUND_SRVPGM_INFO – VIEW
QSYS2.CLEAR_DATA_QUEUE – PROCEDURE
QSYS2.DATA_AREA_INFO – UDTF & VIEW
QSYS2.DATA_QUEUE_INFO – VIEW
QSYS2.DB_TRANSACTION_INFO – VIEW
QSYS2.ENVIRONMENT_VARIABLE_INFO – VIEW
QSYS2.PROGRAM_EXPORT_IMPORT_INFO – VIEW
QSYS2.PROGRAM_INFO – VIEW
QSYS2.QCMDXEC – PROCEDURE
QSYS2.RECEIVE_DATA_QUEUE – UDTF
QSYS2.SEND_DATA_QUEUE – PROCEDURE
QSYS2.SEND_DATA_QUEUE_BINARY – PROCEDURE
QSYS2.SEND_DATA_QUEUE_UTF8 – PROCEDURE
QSYS2.SERVICES_INFO – TABLE
QSYS2.SET_PASE_SHELL_INFO – PROCEDURE
QSYS2.STACK_INFO – UDTF
SYSTOOLS.SPLIT – UDTF

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

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

 — *New or Enhanced @ IBM i 7.3 TR8 and IBM i 7.4 TR2*

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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.CERTIFICATE_INFO – UDTF
 QSYS2.DRDA_AUTHENTICATION_ENTRY_INFO – VIEW
 QSYS2.FUNCTION_INFO – VIEW
 QSYS2.FUNCTION_USAGE – VIEW
 QSYS2.GROUP_PROFILE_ENTRIES – VIEW
 QSYS2.OBJECT_OWNERSHIP – VIEW
 QSYS2.OBJECT_PRIVILEGES – UDTF & VIEW
 QSYS2.SQL_CHECK_AUTHORITY – UDF
 QSYS2.USER_INFO – VIEW
 SYSPROC.SET_COLUMN_ATTRIBUTE – PROCEDURE

Spool Services

QSYS2.OUTPUT_QUEUE_ENTRIES – UDTF & VIEW
 QSYS2.OUTPUT_QUEUE_ENTRIES_BASIC – VIEW
 QSYS2.OUTPUT_QUEUE_INFO – VIEW
 SYSTOOLS.DELETE_OLD_SPOOLED_FILES – PROCEDURE
 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_INFO – UDTF
 QSYS2.LIBRARY_LIST_INFO – VIEW
 QSYS2.OBJECT_STATISTICS – UDTF

System Health Services

QSYS2.SYSLIMITS – VIEW
 QSYS2.SYSLIMTBL – TABLE

 — *New or Enhanced @ IBM i 7.3 TR8 and IBM i 7.4 TR2*

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IBM® i Services

Product Services

QSYS2.LICENSE_INFO – VIEW
SYSTOOLS.LICENSE_EXPIRATION_CHECK – PROCEDURE

IFS Services

QSYS2.IFS_JOB_INFO – UDTF
QSYS2.IFS_OBJECT_LOCK_INFO – UDTF
QSYS2.IFS_OBJECT_PRIVILEGES – UDTF
QSYS2.IFS_OBJECT_REFERENCES_INFO – UDTF
QSYS2.IFS_OBJECT_STATISTICS – UDTF

Communication Services

QSYS2.ACTIVE_DB_CONNECTIONS – UDTF
QSYS2.ADD_TIME_SERVER – PROCEDURE
QSYS2.HTTP_SERVER_INFO – VIEW
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_CONFIGURATION – VIEW
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

Work Management Services

QSYS2.ACTIVE_JOB_INFO – UDTF
QSYS2.AUTOSTART_JOB_INFO – VIEW
QSYS2.GET_JOB_INFO – UDTF
QSYS2.JOB_DESCRIPTION_INFO – VIEW
QSYS2.JOB_INFO – UDTF
QSYS2.JOB_LOCK_INFO – UDTF
QSYS2.JOB_QUEUE_INFO – VIEW
QSYS2.MEMORY_POOL – UDTF
QSYS2.MEMORY_POOL_INFO – VIEW
QSYS2.OBJECT_LOCK_INFO – VIEW
QSYS2.PRESTART_JOB_INFO – VIEW
QSYS2.PRESTART_JOB_STATISTICS – UDTF
QSYS2.RECORD_LOCK_INFO – VIEW
QSYS2.ROUTING_ENTRY_INFO – VIEW
QSYS2.SCHEDULED_JOB_INFO – VIEW
QSYS2.SUBSYSTEM_INFO – VIEW
QSYS2.SUBSYSTEM_POOL_INFO – VIEW
QSYS2.SYSTEM_STATUS – UDTF
QSYS2.SYSTEM_STATUS_INFO – VIEW
QSYS2.SYSTEM_VALUE_INFO – VIEW
QSYS2.WORKSTATION_INFO – VIEW



New or Enhanced @ IBM i 7.3 TR8 and IBM i 7.4 TR2

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SQL Reference

Programmers desk companion:

ibm.biz/Db2fori_SQL_Reference

What's new for IBM i 7.4

- ▶ Chapter 1. Concepts
- ▶ Chapter 2. Language elements
- ▶ Chapter 3. Built-in global variables
- ▶ Chapter 4. Built-in functions
- ▶ Chapter 5. Procedures
- ▶ Chapter 6. Queries
- ▶ Chapter 7. Statements
- ▶ Chapter 8. SQL procedural language (SQL PL)
- Appendix A. SQL limits
- ▶ Appendix B. Characteristics of SQL statements
- ▶ Appendix C. SQLCA (SQL communication area)
- ▶ Appendix D. SQLDA (SQL descriptor area)
- Appendix E. CCSID values
- ▶ Appendix F. Db2 for i catalog views

IBM i
Version 7.4

*Database
Db2 for i SQL Reference*



Query Construction Ahead... Please use appropriate speed



My goto page for joins...

Chapter 6. Queries 759

An inner join combines each row of the left table with every row of the right table keeping only the rows where the *join-condition* (or USING clause) is true. Thus, the result table may be missing rows from either or both of the joined tables. Outer joins include the rows produced by the inner join as well as the missing rows, depending on the type of outer join. Exception joins include only the missing rows, depending on the type of exception join.

- A left outer join includes the rows from the left table that were missing from the inner join.
- A right outer join includes the rows from the right table that were missing from the inner join.
- A full outer join includes the rows from both tables that were missing from the inner join.
- A left exception join includes only the rows from the left table that were missing from the inner join.
- A right exception join includes only the rows from the right table that were missing from the inner join.

An inner join combines each row of the left table with every row of the right table keeping only the rows where the *join-condition* (or USING clause) is true. Thus, the result table may be missing rows from either or both of the joined tables. Outer joins include the rows produced by the inner join as well as the missing rows, depending on the type of outer join. Exception joins include only the missing rows, depending on the type of exception join.

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- A right exception join includes only the rows from the right table that were missing from the inner join.

AUTHORIZATION_LIST_INFO

Use SQL to assess your security deployment vs security strategy

Strategy: All objects in
the TOYSTORE schema
are secured using the
TOYSTOREAL
authorization list

```
-- description: Find objects not included in the
--               authorization list
SELECT a.objname, objdefiner, objtype, sql_object_type
FROM TABLE(qsys2.object_statistics('TOYSTORE', 'ALL')) a
LEFT EXCEPTION JOIN LATERAL
  (SELECT system_object_name
   FROM qsys2.authorization_list_info x
   WHERE AUTHORIZATION_LIST = 'TOYSTOREAL') b
ON a.objname = b.system_object_name;
```

AUTHORIZATION_LIST_INFO

First, find all the objects within the TOYSTORE library

```
-- description: Find objects not included in the
--               authorization list
SELECT a.objname, objdefiner, objtype, sql_object_type
FROM TABLE(qsys2.object_statistics('TOYSTORE', 'ALL')) a
LEFT EXCEPTION JOIN LATERAL
  (SELECT system_object_name
   FROM qsys2.authorization_list_info x
   WHERE AUTHORIZATION_LIST = 'TOYSTOREAL') b
  ON a.objname = b.system_object_name;
```

AUTHORIZATION_LIST_INFO

Second, a left exception join includes only the rows from the left table that were missing from the inner join



```
-- description: Find objects not included in the
--               authorization list
SELECT a.objname, objdefiner, objtype, sql_object_type
FROM TABLE(qsys2.object_statistics('TOYSTORE', 'ALL')) a
LEFT EXCEPTION JOIN LATERAL
  (SELECT system_object_name
   FROM qsys2.authorization_list_info x
   WHERE AUTHORIZATION_LIST = 'TOYSTOREAL') b
  ON a.objname = b.system_object_name;
```

AUTHORIZATION_LIST_INFO

**Access the security
strategy vs the actual
security deployment**

```
-- description: Find objects not included in the
--               authorization list
SELECT a.objname, objdefiner, objtype, sql_object_type
FROM TABLE(qsys2.object_statistics('TOYSTORE', 'ALL')) a
LEFT EXCEPTION JOIN LATERAL
  (SELECT system_object_name
   FROM qsys2.authorization_list_info x
   WHERE AUTHORIZATION_LIST = 'TOYSTOREAL') b
ON a.objname = b.system_object_name;
```

OBJNAME	OBJDEFINER	OBJTYPE	SQL_OBJECT_TYPE
FOOF003	SCOTTF	*PGM	PROCEDURE

<http://ibm.biz/Db2foriServices>

IBM i Service	Type of Service	IBM i 7.4	IBM i 7.3	IBM i 7.2
Application Services				
QSYS2.BOUND_MODULE_INFO	View	SF99704 Level 4	SF99703 Level 16	Not Supported
QSYS2.BOUND_SRVPGM_INFO	View	SF99704 Level 4	SF99703 Level 16	Not Supported
QSYS2.CLEAR_DATA_QUEUE()	Procedure	SF99704 Level 4	SF99703 Level 16	Not Supported
QSYS2.DATA_AREA_INFO()	Table function	Base	SF99703 Level 15	Not Supported
QSYS2.DATA_AREA_INFO	View	Base	SF99703 Level 15	Not Supported
QSYS2.DATA_QUEUE_INFO	View	SF99704 Level 4	SF99703 Level 16	Not Supported

IBM i Access Client Solutions (ACS)

ACS – 1.1.8.4 is available

Full description of the ACS 1.1.8.4 enhancements:

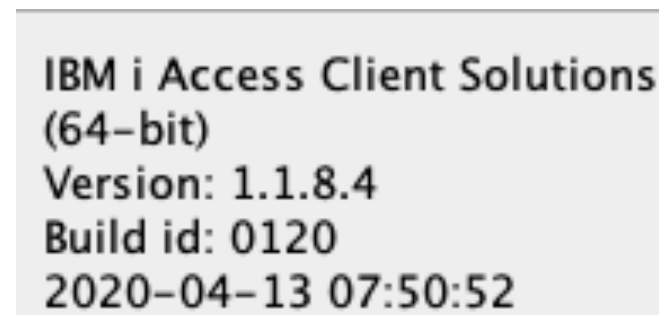
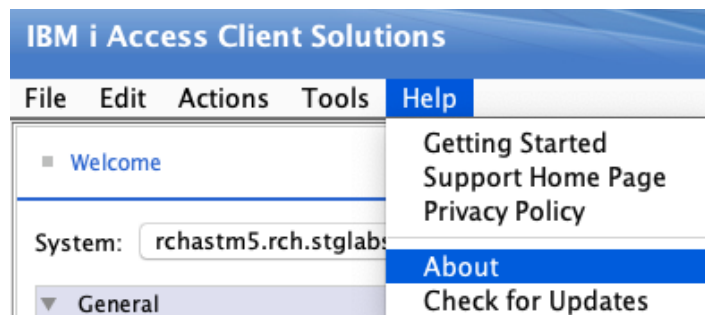
<https://www.ibm.com/support/pages/sites/default/files/inline-files/IBM%20i%20Access%20Client%20Solutions%20-%201.1.8.4.pdf>

ACS Download site:

<https://www.ibm.com/services/forms/preLogin.do?source=swg-ia>

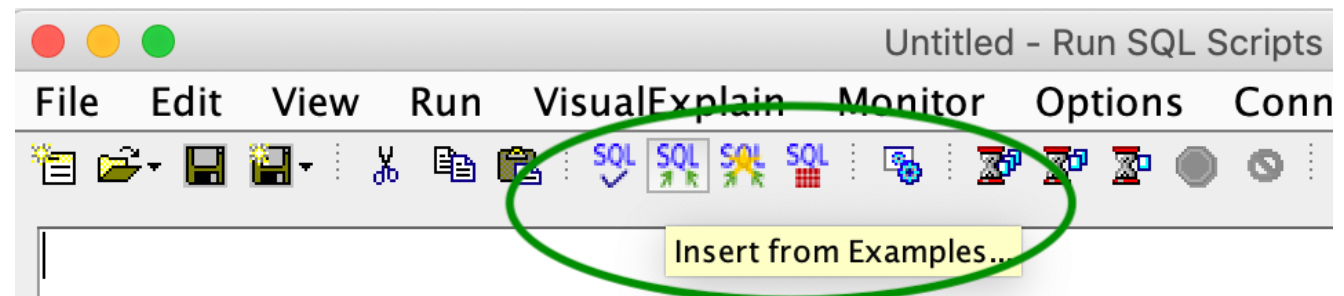
ACS Product Page:

<https://www.ibm.com/support/pages/ibm-i-access-client-solutions>

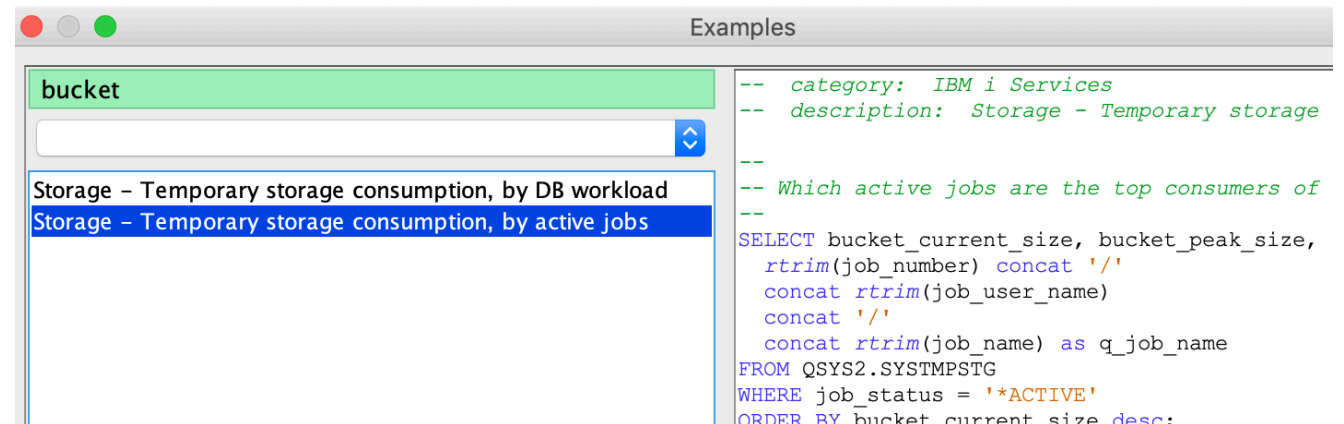


Run SQL Scripts – Insert from Examples

- **Working SQL**
- **300+ Examples**
- **SQL for everyone**



Data Definition Language (DDL)
 Data Manipulation Language (DML)
 Data Control Language (DCL)
 Routine (Function or Procedure) Statements
 Special Registers
 Built-in Global Variables
 Miscellaneous
IBM i Services
 DB2 for i Services
 SYSTOOLS for you
 Db2 Mirror



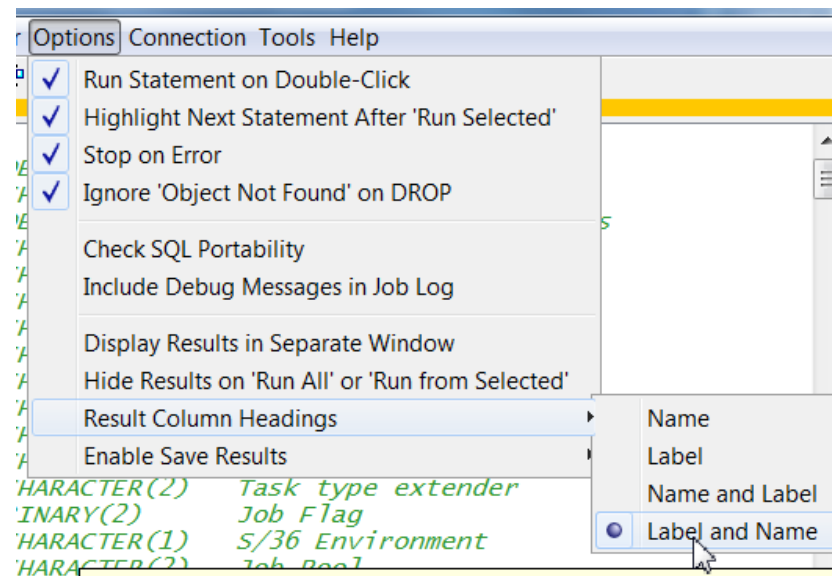
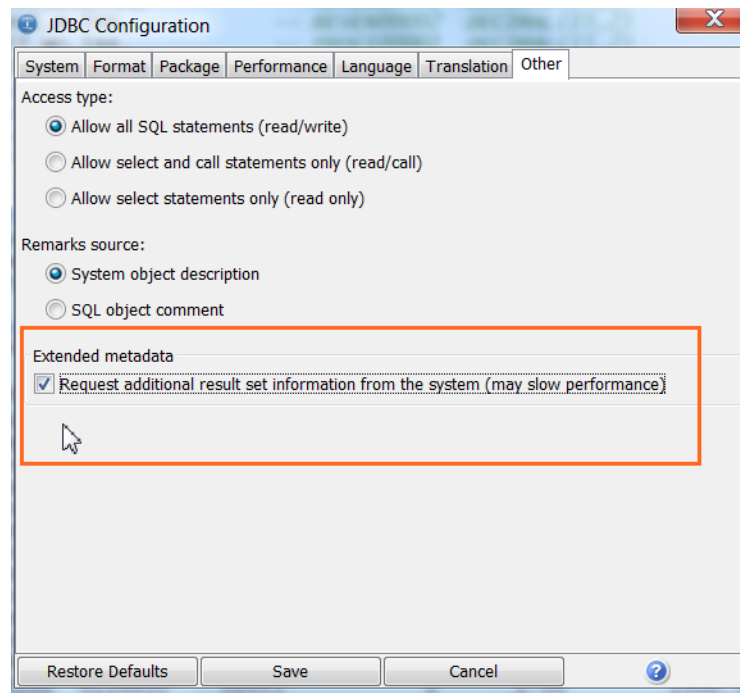
Run SQL Scripts

Which IBM i Services can I use today?

```
select * from qsys2.services_info
  where latest_db2_group_level is not null
 order by latest_db2_group_level desc, service_category,
        service_name, sql_object_type;
```

SERVICE_CATEGORY	LIBRARY	SERVICE_NAME	SQL_OBJECT_TYPE
DATABASE-UTILITY	QSYS2	GENERATE_SQL_OBJECTS	PROCEDURE
SECURITY	QSYS2	OBJECT_PRIVILEGES	VIEW
WORK MANAGEMENT	QSYS2	SYSTEM_STATUS	TABLE FUNCTION
WORK MANAGEMENT	QSYS2	SYSTEM_STATUS_INFO	VIEW
MESSAGE HANDLING	QSYS2	JOBLOG_INFO	TABLE FUNCTION
LIBRARIAN	QSYS2	OBJECT_STATISTICS	TABLE FUNCTION
COMMUNICATION	QSYS2	SET_SERVER_SBS_ROUTING	PROCEDURE

Run SQL Scripts → Result Set controls



Today's data

```
begin
  declare query_sqlstmt clob(1g) default '';
  declare sqlstmt clob(1g);
  declare v_partition_name varchar(10);
  declare disk_members cursor for
    select table_partition
      from qsys2.syspartitionstat
     where table_schema = 'QPFRDATA' and table_name = 'QAPMSMSDK'
     order by create_timestamp desc limit 1;
  open disk_members;
  fetch from disk_members into v_partition_name;
  set sqlstmt = 'create or replace alias QPFRDATA.TODAY' concat
    ' FOR QPFRDATA.QAPMSMSDK(' concat v_partition_name concat ')';
  execute immediate sqlstmt;
  close disk_members;
end;
```

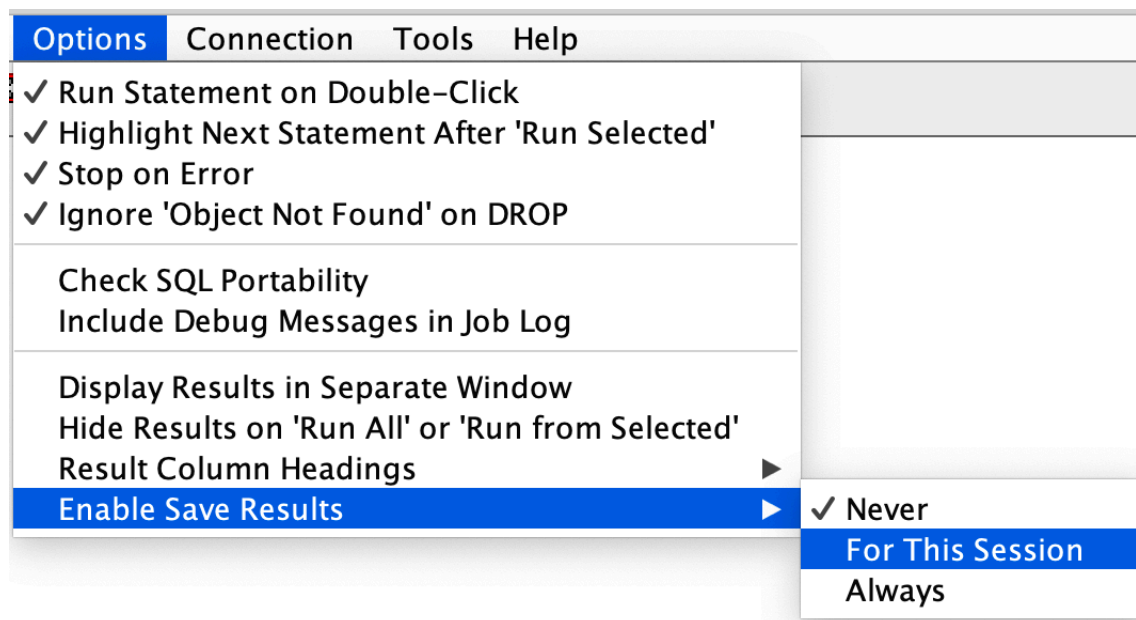
Today's data

www.ibm.com/support/knowledgecenter/ssw_ibm_i_74/rzahx/rzahxqapmsmdsk.htm

```
select * from QPFRDATA.TODAY;
```

INTNUM	DATETIME	INTSEC	SMDBDD	SMDNUM	SMDABSYP	SMDMBSYP	SMDMBPDRN	SMDASTGP
Interval number	Interval date time	Elapsed interval seconds	Breakdown dimension	Number of units	Average disk busy percent	Maximum disk busy percent	Maximum disk busy device	Average disk full percent
1	2020-06-09 12:00:00.000000	57 01		33	0.42	3.94	DMP046	59.60
1	2020-06-09 12:00:00.000000	57 02		33	0.42	3.94	DMP046	59.60
2	2020-06-09 12:30:00.000000	1800 01		33	0.05	0.25	DMP046	59.60
2	2020-06-09 12:30:00.000000	1800 02		33	0.05	0.25	DMP046	59.60
3	2020-06-09 13:00:00.000000	1800 01		33	0.05	0.31	DMP041	59.60
3	2020-06-09 13:00:00.000000	1800 02		33	0.05	0.31	DMP041	59.60
4	2020-06-09 13:30:00.000000	1800 01		33	0.02	0.12	DMP046	59.60
4	2020-06-09 13:30:00.000000	1800 02		33	0.02	0.12	DMP046	59.60
5	2020-06-09 14:00:00.000000	1800 01		36	0.25	2.12	DMP046	56.27

Run SQL Scripts → Saving query results



Run SQL Scripts → Saving query results

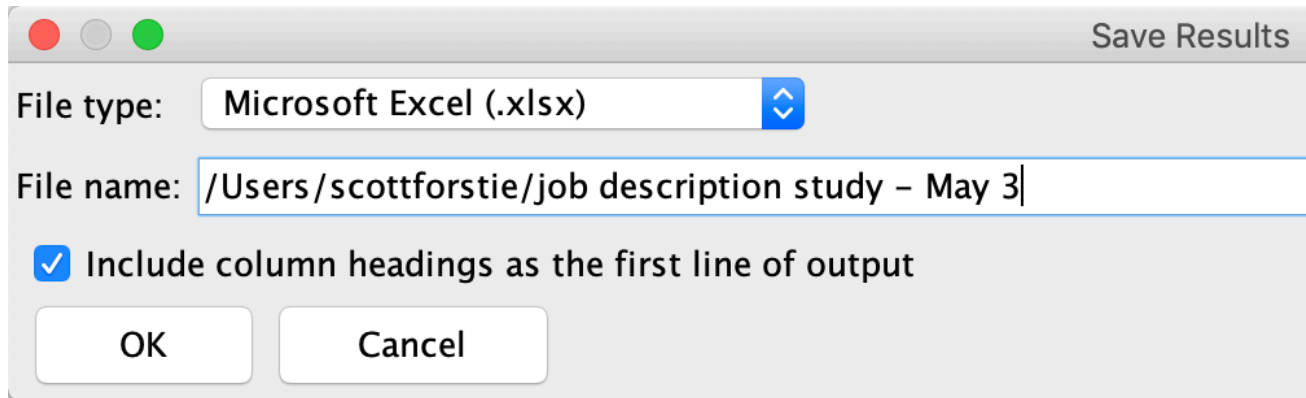
JOB_DESCRIPTION	JOB_DESCRIPTION_LIBRARY	LIBL_POSITION	LIBRARY_NAME
DAWNMAYJD	DAWNM		2 QGPL
DAWNUSER	DAWNM		5 QGPL
JVLABJOB	PHPTST		3 QGPL
AMQZLAA0	QMOM		3 QGPL
AMQZLSA0	QMOM		3 QGPL
AMQZXMA0	QMOM		3 QGPL
QMOMJOB	QMOM		3 QGPL
RLUJD	QPDA		3 QGPL
QPFRJOB	QPFR		3 QGPL
Q1PSCH1	QSYS		2 QGPL
Q1PSCH2	QSYS		2 QGPL
Q1PSCH3	QSYS		2 QGPL
QTCPTCP	QTCP		2 QGPL
XAN4	XA0BJ13000		3 QGPL
XAN4DEV	XA0BJ13000		3 QGPL
XA0BJ	XA0BJ13000		3 QGPL
XRESIZE	XA0BJ13000		3 QGPL
XSANITIZE	XA0BJ13000		3 QGPL
XAN4	XA0BJ13007		3 QGPL
XAN4DEV	XA0BJ13007		3 QGPL
XA0R1	XA0R113007		3 QGPL

Columns...
Column Headings ►
Refresh
Save Results...
Upload Results...
Copy ⌘C
Select All ⌘A
Print...

Done: 28 rows retrieved.

◀ select job_description, job_description_library, libl_position

Run SQL Scripts → Saving query results



A screenshot of a 'Save Results' dialog box. The dialog has a title bar with three colored buttons (red, grey, green) on the left and the text 'Save Results' on the right. Below the title bar, there are two main sections. The first section is labeled 'File type:' and contains a dropdown menu with 'Microsoft Excel (.xlsx)' selected. The second section is labeled 'File name:' and contains a text input field with the text '/Users/scottforstie/job description study - May 3'. Below these sections, there is a checkbox labeled 'Include column headings as the first line of output' which is checked. At the bottom of the dialog, there are two buttons: 'OK' and 'Cancel'.

Save Results

File type: Microsoft Excel (.xlsx)

File name: /Users/scottforstie/job description study - May 3

☒ Include column headings as the first line of output

OK Cancel

Run SQL Scripts → Deployment

1. Developed in ACS
2. Saved to the IFS
3. Deployed via RUNSQLSTM

-- Run now

```
c1: RUNSQLSTM SRCSTMF('/home/SCOTT/capture object info.sql')  
      COMMIT(*NONE) NAMING(*SQL);
```

-- Run now, in batch

```
c1: SBMJOB CMD(RUNSQLSTM SRCSTMF('/home/SCOTT/capture object info.sql')  
      COMMIT(*NONE) NAMING(*SQL)) JOB(CAPTUREIT);
```

-- Run nightly

```
c1: ADDJOBSCDE JOB(CAPTUREIT) CMD(RUNSQLSTM SRCSTMF('/home/SCOTT/capture object info.sql')  
      COMMIT(*NONE) NAMING(*SQL)) FRQ(*WEEKLY)  
      SCDDATE(*NONE) SCDDAY(*ALL) SCDTIME(235500) ;
```

Gists

Working examples of how to solve problems with SQL:

gist.github.com/forstie

GitHub Gist

All gists Back to GitHub



Scott Forstie

forstie

Db2 for i Business Architect

All gists
45

Forked
1

[forstie / Extract SQL DML insight from the Plan Cache.sql](#)

Last active 10 days ago

I had a client ask me... how do we see who is executing SQL INSERT, UPDATE, or DELETE statements? There are many approaches to this topic, with the best of breed answers including Guillaume Lelarge's answer.

That being said, if you want instance insight, look at your SQL Plan Cache.

```

1 --
2 -- Title: Capture detail where SQL DML is being executed
3 -- Author: Scott Forstie
4 -- Date: April 15, 2020
5 --
                    
```



Rochester Executive Briefing Center

2020
iSight


- In addition to the regular briefings held for clients, Rochester now hosts
- A Co-creation Center
 - What is that?
 - Joint workshops to develop plans/ best practices
 - Who can come there?
 - Business Partners
 - Customers
- Direct access to IBM i development team
- On-line briefings and webcasts



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Db2 for i

Enhancements with IBM i 7.4 TR2 and IBM i 7.3 TR8

Software GA – May 15, 2020

<http://www.ibm.com/ibmi/techupdates/i74-tr2>

<http://www.ibm.com/ibmi/techupdates/i73-tr8>

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Enhancement Landing Pages:

www.ibm.com/ibmi/techupdates/i74-tr2

&

www.ibm.com/ibmi/techupdates/i73-tr8

You are in: [IBM i Technology Updates](#) > IBM i 7.4 - TR2 Enhancements

IBM i 7.4 - Enhancements timed with Technology Refresh 2

Note: The announcement materials for IBM i 7.4 TR2 can be found here: <link to be added after announce>.
The remainder of this landing page intends to make it easy to see the supporting detail these enhancements.

Db2 for i Enhancements



Note: The following Db2 for i enhancements are delivered via Db2 for i PTF Group SF99704 Level 7.

Db2 for i - Functional Enhancements

Enhancement Landing Pages:

You are in: [IBM i Technology Updates](#) > IBM i 7.4 - TR2 Enhancements

IBM i 7.4 - Enhancements timed with Technology Refresh 2

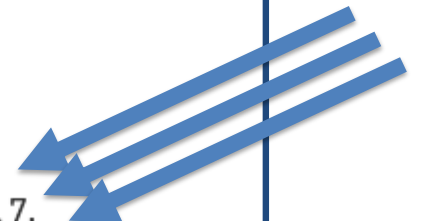
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Db2 for i Enhancements



Note: The following Db2 for i enhancements are delivered via Db2 for i PTF Group SF99704 Level 7.

Db2 for i - Functional Enhancements



Best practice... stay current on IBM i releases & service

All Time Favorites

Superusers

Find users who
have *ALLOBJ
authority

SQL Tip:

The **IN** predicate
compares a value
with a set of values

```
--  
-- description: See who has *ALLOBJ authority directly  
--              or via a Group or Supplemental profile  
--  
SELECT AUTHORIZATION_NAME, STATUS,  
       NO_PASSWORD_INDICATOR, PREVIOUS_SIGNON  
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;
```

Superusers

Find users who have *ALLOBJ authority

Security Concern:

A user may unexpectedly have *ALLOBJ authority because of the group or supplemental groups they belong to.

```
--  
-- description: See who has *ALLOBJ authority directly  
--              or via a Group or Supplemental profile  
--  
SELECT AUTHORIZATION_NAME, STATUS,  
       NO_PASSWORD_INDICATOR, PREVIOUS_SIGNON  
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;
```

QCMDExc

- SQL procedure that executes a CL command

```
call qsys2.qcmdexc('CHGJOB CCSID(37)');
```

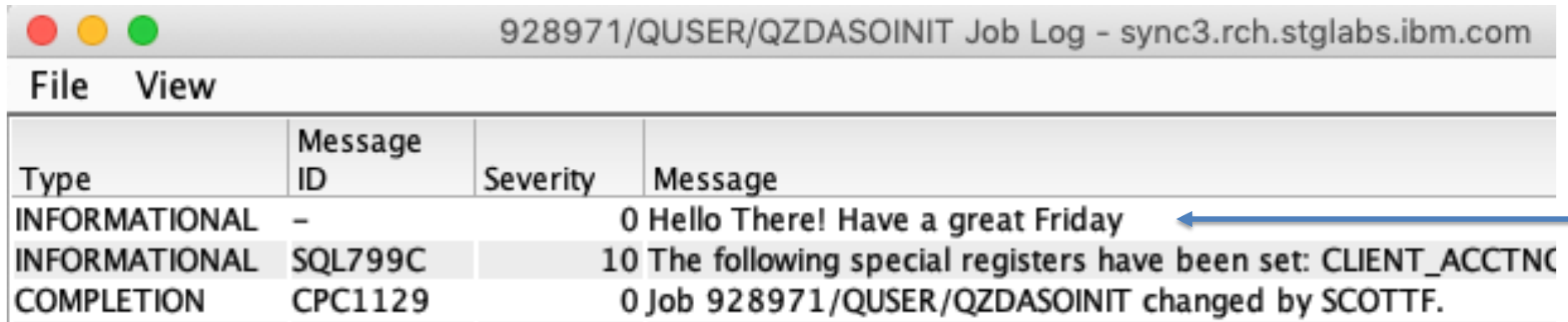
- Use expressions to build the CL command string

```
call qsys2.qcmdexc('ADDLIBLE ' CONCAT libname);
```

LPRINTF

- Print to the joblog using SQL

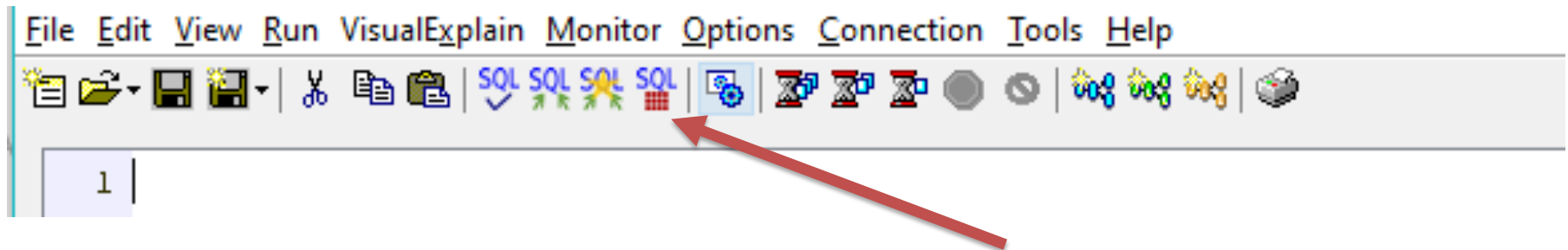
```
call systools.lprintf('Hello There! Have a great ' concat  
dayname(current date));
```



Type	Message ID	Severity	Message
INFORMATIONAL	-	0	Hello There! Have a great Friday
INFORMATIONAL	SQL799C	10	The following special registers have been set: CLIENT_ACCTNC
COMPLETION	CPC1129	0	Job 928971/QUSER/QZDASOINIT changed by SCOTTF.

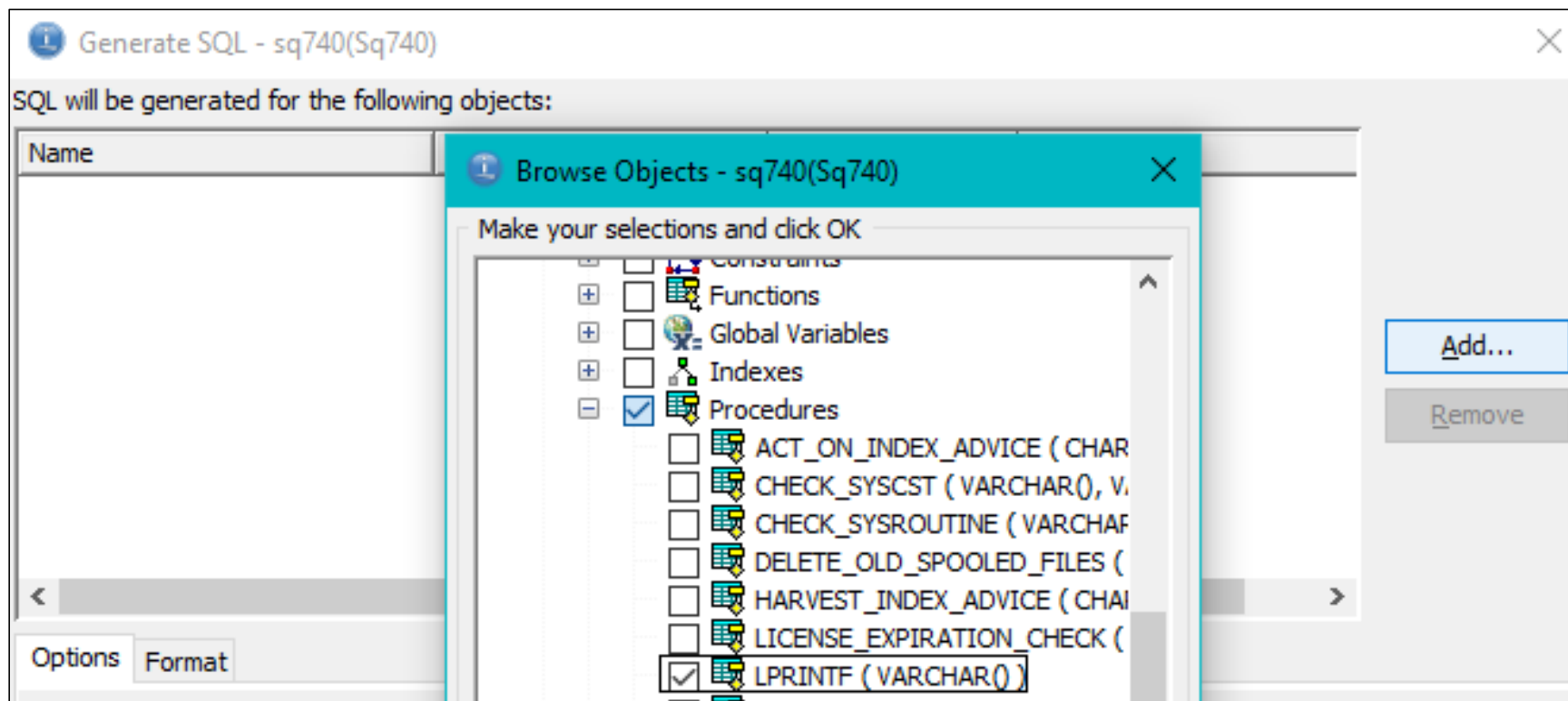
LPRINTF – get source for procedure

- Use ACS to extract the procedure source using Insert Generated SQL



LPRINTF – get source for procedure

- Select SYSTOOLS procedure LPRINTF



LPRINTF – get source for procedure

```
CREATE PROCEDURE SYSTOOLS.LPRINTF (IN PRINT_STRING VARCHAR(1000) CCSID 37 )
  SET OPTION BINDOPT = 'BNDSRVPGM(QSYS/QP0ZCPA)'
BEGIN
  -- Additional setup steps are required before creating this procedure.
  -- Create a C source member that contains the code for LPRINTF.
  -- The procedure will embed this with the INCLUDE statement and bind to the
  appropriate service program using BINDOPT.
  --CL:CRTSRCPF FILE(QTEMP/QCSRC) RCDLEN(160) MBR(*NONE);
  --CL:ADDPFM FILE(QTEMP/QCSRC) MBR(LPRINTF);
  --INSERT INTO QTEMP.QCSRC(SRCSEQ,SRCDTA) VALUES
  -- (1,'{'),
  -- (2,'extern int Qp0zLprintf (char *format, ...);'),
  -- (3,'Qp0zLprintf("%.s\n",LPRINTF.PRINT_STRING.LEN,LPRINTF.PRINT_STRING.DAT);'),
  -- (4,'}');
  IF PRINT_STRING IS NOT NULL THEN
INCLUDE QTEMP / QCSRC ( LPRINTF ) ;
  END IF ;
END ;
```

OBJECT_STATISTICS

- List details about objects in libraries, like DSPOBJD
 - 69 columns of information
- Return all objects in TOYSTORE created at least 2 years ago

```
select *  
  from table(qsys2.object_statistics('TOYSTORE', '*ALL'))  
 where objcreated < current date - 2 years;
```

OBJECT_STATISTICS

- Return only file names, no extended details, for all files in TOYSTORE

```
select *  
  from table(qsys2.object_statistics('TOYSTORE', '*FILE',  
                                     '*ALLSIMPLE'));
```

- Return a list of all libraries with no extended details

```
select *  
  from table(qsys2.object_statistics('*ALLSIMPLE', '*LIB'));
```

- Return all the information for a specific file in TOYSTORE

```
select *  
  from table(qsys2.object_statistics('TOYSTORE', '*FILE',  
                                     '*EMP'));
```

OBJECT_STATISTICS

- *ALLUSR or *ALLUSRAVL library options

```
select '*ALLUSR' search_style, count(*) lib_count
  from table (qsys2.object_statistics('*ALLUSR', '*LIB')) union
select '*ALLUSRAVL', count(*)
  from table (qsys2.object_statistics('*ALLUSRAVL', '*LIB')) union
select '*ALL', count(*)
  from table (qsys2.object_statistics('*ALL', '*LIB'))
order by 2 desc;
```

SEARCH_STYLE	LIB_COUNT
*ALL	2144
*ALLUSRAVL	1970
*ALLUSR	1928

- ☐ *ALL – All libraries
- ☐ *ALLUSRAVL – All user libraries in all available ASP groups
- ☐ *ALLUSR – All user libraries in *SYSBAS and the current thread's ASP group

IFS_OBJECT_STATISTICS

- SQL Alternative to RTVDIRINF and WRKLNK
- 87 columns of data returned
- Return object identified by a path name
 - OR –
- Return all objects that can be accessed starting with a path name

Search an IFS tree

- Find objects based on a partial name

```
select * from table(qsys2.ifs_object_statistics('/usr'))  
  where path_name like '%.txt'  
  order by path_name;
```

PATH_NAME	OBJECT_TYPE	CREATE_TIMESTAMP
/usr/install_out.txt	*STMF	2016-08-30 13:46:45
/usr/scottf/dlyjob CL source.txt	*STMF	2018-03-01 08:17:30
/usr/scottf/dlyjobCLsource.txt	*STMF	2018-03-01 08:35:08
/usr/local/guardium/install_out.txt	*STMF	2017-05-30 16:31:07
/usr/local/guardium/guard_itap.stderr.1.txt	*STMF	2017-05-30 16:31:27
/usr/local/guardium/guard_itap.stderr.2.txt	*STMF	2017-06-07 20:40:19

OUTPUT_QUEUE_ENTRIES_BASIC

```
select * from qsys2.output_queue_entries_basic
  where output_queue_library_name = 'QUSRSYS' and
        output_queue_name = 'PRT01'
 order by size desc
limit 5;
```

CREATE_TIMESTAMP	SPOOLED_FILE_NAME	USER_NAME	SIZE	TOTAL_PAGES	USER_DATA
2020-02-26 11:39:44.627389	QPSRVTRCJ	SBURRICH	10308	1711	T000000001
2020-02-26 11:35:47.354857	QPSRVTRCJ	SBURRICH	8260	1454	T000000001
2020-02-29 13:17:35.401442	QSQSYSIBM	SLROMANO	4164	566	CRTCMOD
2020-03-04 16:57:20.195250	QPSRVTRCJ	POIRIER	836	138	T000000002
2020-03-05 15:00:29.200888	QPSRVTRCJ	SBURRICH	836	121	T000000002

Example – Capture details for SQL0913

```
declare continue handler for sqlstate '57033'
begin /* Message SQL0913 object in use */
  declare msg_schema_name varchar(128);
  declare msg_table_name varchar(128);
  declare dot_location integer;
  declare msg_token varchar(1000);
  get diagnostics condition 1 msg_token = db2_ordinal_token_1;
  set dot_location = locate_in_string(msg_token, '.');
  set msg_schema_name = substr(msg_token, 1, dot_location - 1);
  set msg_table_name = substr(msg_token, dot_location + 1,
                              length(msg_token) - dot_location);
  insert into applib.hard_to_debug_problems
    select * from table (qsys2.joblog_info('*'))
    order by ordinal_position desc limit 5;
  insert into applib.hard_to_debug_lock_problems
    select * from qsys2.object_lock_info
    where object_schema = msg_schema_name and
    object_name = msg_table_name;
end;
```

Continue handler to print SQL failure information

```
declare v_stmt_text clob(50k) ccsid 37;
declare continue handler for sqlexception
begin
  declare local_sqlcode integer;
  declare local_sqlstate char(5);
  declare v_message_text varchar(200) ccsid 37;
  get diagnostics condition 1
    local_sqlcode = db2_returned_sqlcode,
    local_sqlstate = returned_sqlstate,
    v_message_text = message_text;
  call systools.lprintf('APP1 failed with SQLCODE=' concat local_sqlcode
    concat ' SQLSTATE=' concat local_sqlstate
    concat ' MESSAGE= ' concat v_message_text
    concat ' STMT=' concat v_stmt_text);
end;
```

THANK YOU!

