Power Systems

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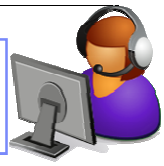
Today

Session 61: DB2 for IBM i Services

Starting at 14:00 UK time with Scott Forstie
90 min session



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- 0800 279 6716= UK Toll Free
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- Then 93505484# Participant Code
- Other countries ibm.biz/globalaccessnumbers

Previous Sessions:
IBM i PDI
Top Tech Tips
LPM/SRR Automation Tool
PowerVC 1.3.1 update
IBM i Mobile Access
Application Runtime Expert
Hands-On with AIX7.2
Accessing IBM i Now/Future
PowerVC New Features
Boost IBM i perfm with Flash
Simplified Remote Restart
Linux on POWER Field Exp
And more…..

Future Sessions:
8th Feb: HMC V8R860 - recent, important updates and changes
15th Mar: IBM i Predictive Performance Management
19th Apr: IBM i Virtualization Performance
17th May: Relax and Recover (the opensource mksysb for Linux on Power

Webinar wiki: http://tinyurl.com/PowerSystemsTechnicalWebinars
Youtube Channel: http://tinyurl.com/IBMPowerVUGYoutubeChannel

Twitter:
Scott Forstie @Forstie_IBMi
Jyoti Dodhia @JyotiDodhia
Therese Eaton @tetweetings

IBM Power Systems technical webinar series

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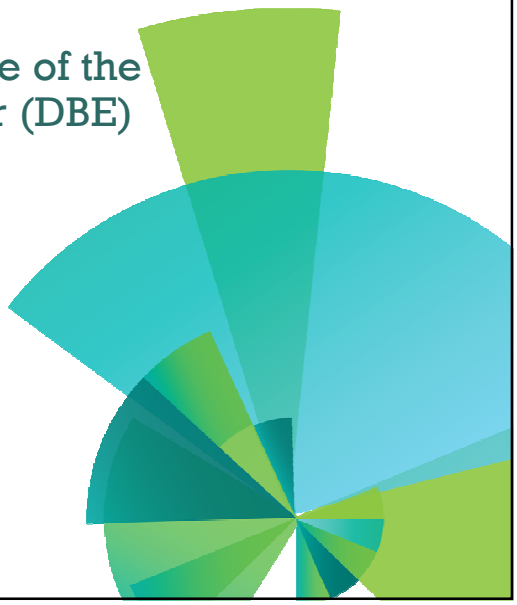
Automating the role of the Database Engineer (DBE)



Scott Forstie
DB2 for i Business Architect
forstie@us.ibm.com
@Forstie_IBMi

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Database Engineer (DBE)

Challenge:
- DB2 for i is easy to use and also easy to neglect
- You should have a Database Engineer (DBE) on staff

Benefit:
- Pain can be detected and avoided
- Performance can be optimized
- Avoid solving performance issues with cores and upgrades

How:
- Job description: http://db2fori.blogspot.com/2012/11/db2-for-i-database-engineer-description.html
- How to become one: http://db2fori.blogspot.com/2012/12/how-to-become-ibm-i-database-engineer.html
- Also…have this person introduced to me

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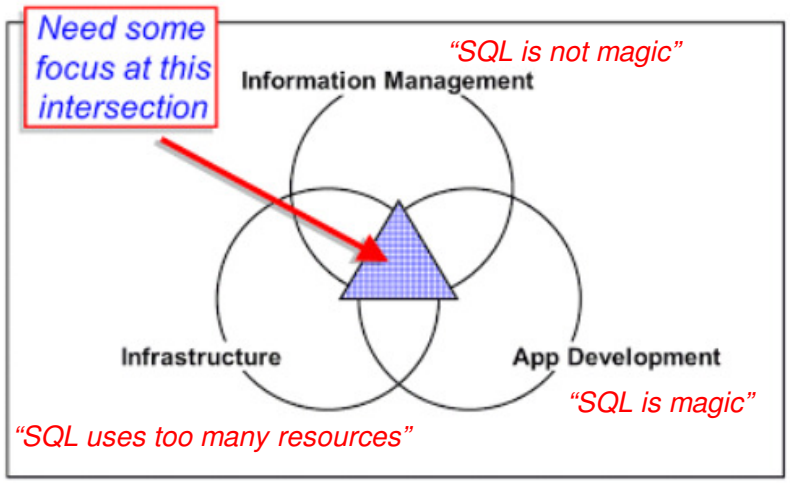
Skillset



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DBA/DBE – Topic areas

What can we hope to automate?

- Performance oriented indexes
- Database health checking
- Regular capture of database query detail
- Enforcement of business guidelines
- Maintaining a central hub for DBE meta-data
- Find the highest use SQL statements & programs
- Find the lowest use indexes
- And more…

Will the results be perfect, complete now and forever?

No… that's another reason why you need a DBE

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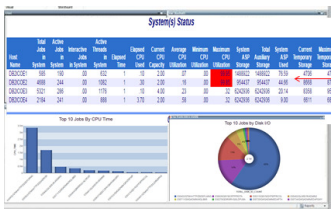
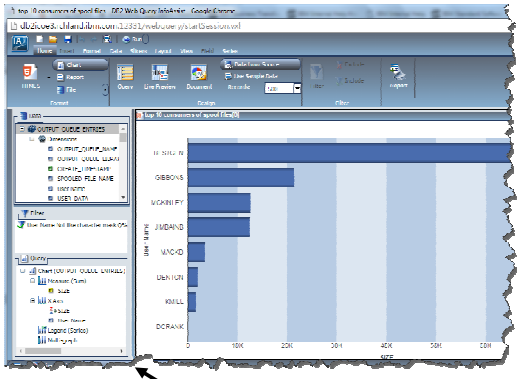
DB2 Web Query and IBM i Services

- DB2 Web Query can jump-start your consumption of IBM i Services
- Built-in reports, dashboards and stored procedures
- Enables mobile, graphical, modern system administration
- **If you'd like some help with this, contact qu2@us.ibm.com**

Follow DB2 Web Query:

- @mckdrmoly
- db2webqueryi@blogspot.com
- ibm.co/db2wqwiki





No need to start from scratch

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DBA/DBE – Setup

The DBE needs to establish processes and procedures for the database detail which is captured and archived.

Topics:

1. **Organization**
   Why? Statistical and definitional detail should be easily consumed
   Suggestion: Create and use a standard set of libraries
2. **Cadence**
   Why? By establishing a cadence for collection of detail, the DBE will be well positioned to recognize and understand anomalies
   Suggestion: Start with weekly collections and revise as needed
3. **Security**
   Why? DBE detail most likely contains sensitive information and should be governed
   Suggestion: Remove *PUBLIC access to the DBE libraries, leverage the function usage ID for Database administration, and leverage a group profile for DBE membership
4. **And more…**

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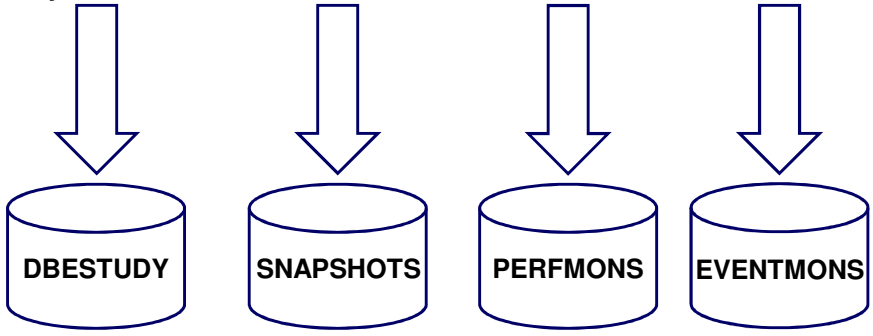
DBA/DBE – Setup

DBE Statistical Detail
- ❑ **Object statistics**
- ❑ **Index Advice**
- ❑ **System Limits**

SQE Plan Cache Snapshots (full or partial)

SQL Performance Monitors (database traces)

SQE Event Monitors (pruned plans)



Also: optionally dedicate a library to generated DDL source

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DBA/DBE – Setup

How?

```
-- Establish DBE authorization
CL: CRTUSRPRF USRPRF(DBEGROUP) PASSWORD(*NONE)
              SPCAUT(*ALLOBJ);
CL: CHGFCNUSG FCNID(QIBM_DB_SQLADM) USER(DBEGROUP)
              USAGE(*ALLOWED);
CL: CHGUSRPRF USRPRF(FRANKDBA) GRPPRF(DBEGROUP);

-- Establish Database artifact libraries for the DBE
CL: CRTLIB DBESTUDY;
…

-- Establish group management and authorization
CL: CHGOBJOWN OBJ(DBESTUDY) OBJTYPE(*LIB) NEWOWN(DBEGROUP);
…
```


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IBM® DB2® for i Services

Health Center Procedures

QSYS2.HEALTH_ACTIVITY
QSYS2.HEALTH_DATABASE_OVERVIEW
QSYS2.HEALTH_DESIGN_LIMITS
QSYS2.HEALTH_ENVIRONMENTAL_LIMITS
QSYS2.HEALTH_SIZE_LIMITS
QSYS2.RESET_ENVIRONMENTAL_LIMITS

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SYSTOOLS.HARVEST_INDEX_ADVICE – PROCEDURE
QSYS2.OVERRIDE_QAQQINI – PROCEDURE
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QSYS2.FIND_QSQSRVR_JOBS
QSYS2.GENERATE_SQL
QSYS2.RESTART_IDENTITY
SYSTOOLS.CHECK_CST
SYSTOOLS.CHECK_SYSROUTINE

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QSYS2.CLEAR_PLAN_CACHE
QSYS2.DUMP_PLAN_CACHE
QSYS2.DUMP_PLAN_CACHE_PROPERTIES
QSYS2.DUMP_PLAN_CACHE_topN
QSYS2.DUMP_SNAP_SHOT_PROPERTIES
QSYS2.END_ALL_PLAN_CACHE_EVENT_MONITORS
QSYS2.END_PLAN_CACHE_EVENT_MONITOR
QSYS2.IMPORT_PC_EVENT_MONITOR
QSYS2.IMPORT_PC_SNAPSHOT
QSYS2.REMOVE_PERFORMANCE_MONITOR
QSYS2.REMOVE_PC_EVENT_MONITOR
QSYS2.REMOVE_PC_SNAPSHOT
QSYS2.START_PLAN_CACHE_EVENT_MONITOR

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QSYS2.OVERRIDE_TABLE – PROCEDURE
QSYS2.DELIMIT_NAME – UDF
SYSPROC.WLM_SET_CLIENT_INFO – PROCEDURE

DB2 for i Services

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

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SYSTOOLS.ACT_ON_INDEX_ADVICE – Procedure

- **Input parameters are criteria for finding actionable advice**

1. IN P_LIBRARY CHAR(10)
2. IN P_FILE CHAR(10)
3. IN P_TIMES_ADVISED BIGINT
4. IN P_MTI_USED BIGINT
5. IN P_AVERAGE_QUERY_ESTIMATE INTEGER

```
-- If a Maintained Temporary Index (MTI) has been used
-- more than 1000 times, for any table create a permanent
  index

CALL SYSTOOLS.ACT_ON_INDEX_ADVICE('TOYSTORE',
                                  NULL,
                                  NULL,
                                  1000,
                                  NULL)
```


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SYSTOOLS.REMOVE_INDEXES – Procedure

- **Input parameters are criteria for detecting performance indexes that should be removed due to lack of use**
- **Only indexes created by the ACT_ON_INDEX_ADVICE or HARVEST_INDEX_ADVICE are examined**

1. IN P_LIBRARY CHAR(10)
2. IN P_TIMES_USED BIGINT
3. IN P_INDEX_AGE VARCHAR(100)

```
-- Find indexes created by ACT_ON_INDEX_ADVICE
-- that are at least 7 days old.
-- For any index which has been used less than 500 times
-- by the Query engine, drop the index

CALL SYSTOOLS.REMOVE_INDEXES('TOYSTORE', 500, ' 7 days ')
```

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SYSTOOLS.HARVEST_INDEX_ADVICE – Procedure

- **Input parameters are criteria for finding actionable advice**

1. IN P_LIBRARY CHAR(10)
2. IN P_FILE CHAR(10)
3. IN P_TIMES_ADVISED BIGINT
4. IN P_MTI_USED BIGINT
5. IN P_AVERAGE_QUERY_ESTIMATE INTEGER
6. IN T_LIBRARY CHAR(10)
7. IN T_FILE CHAR(10)

```
-- If a Maintained Temporary Index (MTI) has been used
-- more than 1000 times, build CREATE INDEX statements
-- and place them in the GENSOURCE/IDXSRC file

CALL SYSTOOLS.HARVEST_INDEX_ADVICE('TOYSTORE',
                                   NULL,
                                   NULL,
                                   1000,
                                   NULL,
                                   GENSOURCE,
                                   IDXSRC)
```


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Automation Example

Create the SQL source:
CRTSRCPF QGPL/QSQLSRC
STRSEU SRCFILE(QGPL/QSQLSRC) SRCMBR(INDEXMAINT)

Add these lines:
CALL SYSTOOLS.ACT_ON_INDEX_ADVICE(NULL, NULL, NULL, 1000, NULL);
CALL SYSTOOLS.REMOVE_INDEXES(NULL, 500, ' 7 DAYS ');

Retrieve and modify the system startup program source code:
RTVCLSRC PGM(QSYS/QSTRUP) SRCFILE(QGPL/QCLSRC)
STRSEU SRCFILE(QGPL/QCLSRC) SRCMBR(QSTRUP) TYPE(CLP)
OPTION(2)

Immediately after the DONE: label, add the following three lines:
SBMJOB SCDDATE(*SAT) SCDTIME(040000) +
CMD(RUNSQLSTM SRCFILE(QGPL/QCLSRC) SRCMBR(INDEXMAINT) +
COMMIT(*NONE) NAMING(*SQL) OUTPUT(*PRINT))

Build and replace the system startup program:
CRTCLPGM PGM(QSYS/QSTRUP) SRCFILE(QGPL/QCLSRC)
REPLACE(*YES)

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Reading material

IBM Knowledge Center:
http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/rzajq/idxadvisor.htm
http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/rzajq/rzajqservicesperf.htm
http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/rzajq/rzajqserviceshealth.htm
http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/rzajq/rzajqhealthcentersqlprocs.htm
https://www.ibm.com/support/knowledgecenter/beta/ssw_ibm_i_73/db2/rbafzcatalogtbls.htm

IBM developerWorks:
http://ibm.biz/DB2foriServices

Articles:
SYSTOOLS Brings on the Advice
http://www.ibmsystemsmag.com/ibmi/administrator/db2/SYSTOOLS-Brings-on-the-Advice/

Are deleted rows wasting resources on your IBM i system?
http://www.ibm.com/developerworks/ibmi/library/i-db2-table-with-deleted-rows/index.html

Automate Index Creation and Removal with SYSTOOLS Procedures
http://iprodeveloper.com/database/automate-index-creation-and-removal-systools-procedures

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QSYS2.RESET_TABLE_INDEX_STATISTICS – Procedure

- Zeroes the **QUERY_USE_COUNT** and **QUERY_STATISTICS_COUNT** usage statistics for indexes over a specified table(s), without needing an exclusive lock
- The CHGOBJD command includes USECOUNT(*RESET), but requires **an exclusive lock**
- LAST_QUERY_USE, LAST_STATISTICS_USE, LAST_USE_DATE and NUMBER_DAYS_USED are not affected
- The same wild card characters (_ and %) allowed in the SQL LIKE predicate are supported.

```
-- Description: Reset indexes over the EMPLOYEE table
CALL QSYS2.RESET_TABLE_INDEX_STATISTICS(
                                  'TOYSTORE', 'EMPLOYEE');
-- Description: Reset any table like TOYSTORE/S%
CALL QSYS2.RESET_TABLE_INDEX_STATISTICS('TOYSTORE','S%');
```

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Archiving index statistics

- **QSYS2.RESET_TABLE_INDEX_STATISTICS() processed index detail can be archived**

```
-- Description: Review indexes that were reset

SELECT INDEX_NAME, INDEX_TYPE, LAST_STATISTICS_USE,
LAST_QUERY_USE, QUERY_USE_COUNT, QUERY_STATISTICS_COUNT
  FROM SESSION.SQL_INDEXES_RESET;
```

INDEX_NAME	INDEX_TYPE	LAST_STATISTICS_USE	LAST_QUERY_USE	QUERY_USE_COUNT	QUERY_STATISTICS_COUNT
Q_TOYSTORE_EMPLOYEE_EMPNO_00001	PRIMARY KEY	-	-	0	0
RED	FOREIGN KEY	2016-04-26 06:39:40.000000	-	0	0
Q_TOYSTORE_EMPLOYEE_TESTING_EMPNO_00001	PRIMARY KEY	-	-	0	0
REDT	FOREIGN KEY	2016-04-26 15:57:01.000000	-	0	0
Q_TOYSTORE_EMPLOYEE_TESTING22_EMPNO_00001	PRIMARY KEY	-	-	0	0
REDT22	FOREIGN KEY	-	-	0	0
EMP_IND1	INDEX	-	-	0	0
EMP_IND1	INDEX	-	-	0	0
EMP_IND1	INDEX	-	-	0	0
EMP_IND1	INDEX	-	-	0	0
Q_TOYSTORE_DEPARTMENT_DEPTNO_00001	PRIMARY KEY	2016-04-25 16:08:41.000000	-	0	0
RDE	FOREIGN KEY	-	-	0	0
ROD	FOREIGN KEY	-	-	0	0
Q_TOYSTORE_PROJECT_PROJNO_00001	PRIMARY KEY	2015-10-12 19:59:12.000000	-	0	0

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Health Center Procedures

QSYS2.HEALTH_ACTIVITY
QSYS2.HEALTH_DATABASE_OVERVIEW
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DB2 for i Services

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

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Daily Plan Cache Snapshot

- A daily capture of the most expensive queries enables several DBE tasks
- Most expensive is defined as the longest elapsed time

```
--
-- Procedure: Daily Plan Cache snapper
-- Purpose: This procedure captures the 100 most expensive queries
--          within a plan cache snapshot
--          Naming formula: "SNP<Julian date>"
--
--          The new snapshot is imported into the Navigator control
--          table.
--
--          The procedure deletes the snapshot that is 60 days old,
--          to prevent an endless accumulation of snapshots.
--
```


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Daily Plan Cache Snapshot

Source code

```
CREATE OR REPLACE PROCEDURE SNAPSHOTS.DAILY_PC()
LANGUAGE SQL
BEGIN
DECLARE SNAP_NAME CHAR(10);
DECLARE OLDEST_SNAP_NAME CHAR(10);
DECLARE SNAP_COMMENT VARCHAR(100);

-- A Julian date is the integer value representing a number of days
-- from January 1, 4713 B.C. (the start of the Julian calendar) to
-- the date specified in the argument.
SET SNAP_NAME = 'SNP' CONCAT JULIAN_DAY(current date);
SET OLDEST_SNAP_NAME = 'SNP' CONCAT
                       JULIAN_DAY(current date - 60 days);

CALL QSYS2.DUMP_PLAN_CACHE_topN('SNAPSHOTS', SNAP_NAME, 100);
CALL QSYS2.IMPORT_PC_SNAPSHOT('SNAPSHOTS', SNAP_NAME, 'Top 100
  Queries-' CONCAT CHAR(CURRENT DATE));
CALL QSYS2.REMOVE_PC_SNAPSHOT('SNAPSHOTS', OLDEST_SNAP_NAME);
END;
```

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SYSTOOLS.CHECK_SYSROUTINE() procedure

• **High Availability (HA)** and **Disaster Recovery (DR)** work better when the database catalogs are identical, across Production, HA, and DR.

• DB2 for i Catalogs are not replicated objects

• Given the complex nature of keeping SQL and external procedure/function database catalog entries in sync, DB2 for i has provided a catalog assessment utility

```
-- Search for procedure and function differences
CALL SYSTOOLS.CHECK_SYSROUTINE(<target-database-name>,
                               <schema-to-compare>,
                               <optional-result-set-parameter>)
```

CALL SYSTOOLS.CHECK_SYSROUTINE('LP01UT18', 'SYSIBM', default) - X1423p1(X1423p1)

SERVER_NAME	ROUTINE_CREATED	ROUTINE_DEFINER	LAST_ALTERED	SPECIFIC_SCHEMA	SPECIFIC_NAME	ROUTINE_SCHEMA	ROUTINE_NAME
X1423P1	2012-09-14 08:41:48.885000	QSYS	-	SYSIBM	SQLPS00002	SYSIBM	SQLPSEUDOCOLUMNS
X1423P1	2012-09-13 19:09:53.937000	QSYS	-	SYSIBM	SQLPS00001	SYSIBM	SQLPSEUDOCOLUMNS
X1423P1	2012-09-30 20:25:00.230000	JMBROICH	-	SYSIBM	DB2CON_LIC	SYSIBM	DB2CON_LIC
X1423P1	2012-10-16 12:13:37.805000	QLPINSTALL	-	SYSIBM	CPRIVS	SYSIBM	CPRIVILEGES

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SYSTOOLS.CHECK_SYSCST() procedure

- Similar to the COMPARE_SYSROUTINE() procedure, but for Constraints
- Expectation is to receive an empty result set
- Not satisfied with the procedure? Extract the source and modify.

```
-- Search for constraint differences
CALL SYSTOOLS.CHECK_SYSCST (<target-database-name>,
                            <schema-to-compare>,
                            <optional-result-set-parameter>)
```

CALL SYSTOOLS.CHECK_SYSCST('LP01UT18', 'CORPDB_EX') - X1423p1(X1423p1)

SERVER_NAME	CONSTRAINT_SCHEMA	CONSTRAINT_NAME	CONSTRAINT_TYPE	CONSTRAINT_STATE	ENABLE
LP01UT18	CORPDB_EX	Q_CORPDB_EX_EM...	PRIMARY KEY	ESTABLISHED	YES
LP01UT18	CORPDB_EX	NUMBER	CHECK	ESTABLISHED	YES
X1423P1	CORPDB_EX	NUMBER	CHECK	ESTABLISHED	NO

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IBM® DB2® for i Catalogs

Catalogs
- SYSCATALOGS
- INFORMATION_SCHEMA_CATALOG_NAME

Schemas
- SYSSCHEMAS
- SQLSCHEMAS
- SCHEMATA

Database Support
- SQL_FEATURES
- SQL_LANGUAGES
- SQL_SIZING
- CHARACTER_SETS

Tables Views Indexes
- SYSCOLUMNS
- SYSCOLUMNS2
- SYSFIELDS
- SYSHISTORYTABLES
- SYSINDEXES
- SYSKEYS
- SYSPERIODS
- SYSTABLEDEP
- SYSTABLES
- SYSVIEWDEP
- SYSVIEWS
- SQLCOLUMNS
- SQLSPECIALCOLUMNS
- SQLTABLES
- COLUMNS
- TABLES
- VIEWS

Constraints
- SYSCHKCST
- SYSCST
- SYSCSTCOL
- SYSCSTDEP
- SYSKEYCST
- SYSREFCST
- SQLFOREIGNKEYS
- SQLPRIMARYKEYS
- CHECK_CONSTRAINTS
- REFERENTIAL_CONSTRAINTS
- TABLE_CONSTRAINTS

Privileges
- SYSCOLAUTH
- SYSCONTROLS
- SYSCONTROLSDEP
- SYSPACKAGEAUTH
- SYSROUTINEAUTH
- SYSSCHEMAAUTH
- SYSSEQUENCEAUTH
- SYSTABAUTH
- SYSUDTAUTH
- SYSVARIABLEAUTH
- SYSXSROBJECTAUTH
- SQLCOLPRIVILEGES
- SQLTABLEPRIVILEGES
- AUTHORIZATIONS
- ROUTINE_PRIVILEGES
- UDT_PRIVILEGES
- USAGE_PRIVILEGES
- VARIABLE_PRIVILEGES

Triggers
- SYSTRIGCOL
- SYSTRIGDEP
- SYSTRIGGERS
- SYSTRIGUPD

Routines
- SYSFUNCS
- SYSJARCONTENTS
- SYSJAROBJECTS
- SYSPARMS
- SYSPROCS
- SYSROUTINEDEP
- SYSROUTINES
- SQLFUNCTIONCOLS
- SQLFUNCTIONS
- SQLPROCEDURECOLS
- SQLPROCEDURES
- PARAMETERS
- ROUTINES

XML Schemas
- XSRANNOTATIONINFO
- XSROBJECTCOMPONENTS
- XSROBJECTHIERARCHIES
- XSROBJECTS

Statistics
- SYSCOLUMNSTAT
- SYSINDEXSTAT
- SYSMQTSTAT
- SYSPACKAGESTAT
- SYSPACKAGESTMTSTAT
- SYSPARTITIONDISK
- SYSPARTITIONINDEXES
- SYSPARTITIONINDEXDISK
- SYSPARTITIONINDEXSTAT
- SYSPARTITIONMQTS
- SYSPARTITIONSTAT
- SYSPROGRAMSTAT
- SYSPROGRAMSTMTSTAT
- SYSTABLEINDEXSTAT
- SYSTABLESTAT
- SQLSTATISTICS

Miscellaneous Objects
- SYSSEQUENCES
- SYSTYPES
- SYSVARIABLEDEP
- SYSVARIABLES
- SQLTYPEINFO
- SQLUDTS
- USER_DEFINED_TYPES
- SEQUENCES

DB2 for i catalog views (QSYS2)
ODBC and JDBC™ catalog views (SYSIBM)
ANS and ISO catalog views (QSYS2)

http://www.ibm.com/systems/i/software/db2/

Power Systems IBM

QSYS2.SYSPARTITIONSTAT - View

- This catalog is a DBE's best friend
- Some of this data is reset to zero on an IPL, restore or alteration of the file

```
-- Capture database file detail
CREATE OR REPLACE TABLE DBESTUDY.STAR100G_TABLE_RUNTIME_DETAILS
(TABLE_SCHEMA,TABLE_NAME, TABLE_PARTITION, PARTITION_TYPE,
NUMBER_DELETED_ROWS, NUMBER_ROWS, DATA_SIZE, OVERFLOW,
VARIABLE_LENGTH_SIZE, MAINTAINED_TEMPORARY_INDEX_SIZE,
OPEN_OPERATIONS, CLOSE_OPERATIONS, INSERT_OPERATIONS,
UPDATE_OPERATIONS, DELETE_OPERATIONS, PHYSICAL_READS,
SEQUENTIAL_READS, RANDOM_READS, KEEP_IN_MEMORY, MEDIA_PREFERENCE,
CAPTURE_TIME)
   AS (SELECT TABLE_SCHEMA, TABLE_NAME, TABLE_PARTITION,
PARTITION_TYPE, NUMBER_DELETED_ROWS, NUMBER_ROWS, DATA_SIZE,
OVERFLOW, VARIABLE_LENGTH_SIZE, MAINTAINED_TEMPORARY_INDEX_SIZE,
OPEN_OPERATIONS, CLOSE_OPERATIONS, INSERT_OPERATIONS,
UPDATE_OPERATIONS, DELETE_OPERATIONS, PHYSICAL_READS,
SEQUENTIAL_READS, RANDOM_READS, VARCHAR(CASE KEEP_IN_MEMORY WHEN
'1' THEN 'YES' ELSE 'NO' END, DEFAULT, 37), VARCHAR(CASE
MEDIA_PREFERENCE WHEN 255 THEN 'SSD' ELSE 'ANY' END, DEFAULT, 37),
CURRENT TIMESTAMP FROM QSYS2.SYSPARTITIONSTAT
WHERE TABLE_SCHEMA = 'PRODLIB') WITH DATA ON REPLACE DELETE ROWS;
```


Power Systems IBM

QSYS2.SYSPARTITIONSTAT - View

```
-- Identify candidates for physical file reorganization
SELECT TABLE_SCHEMA,
       TABLE_NAME,
       NUMBER_ROWS AS VALID_ROWS,
       NUMBER_DELETED_ROWS AS DELETED_ROWS,
       DATA_SIZE AS DATA_SPACE_SIZE_IN_BYTES,
       DEC(DEC(NUMBER_DELETED_ROWS,19,2) /
  DEC(NUMBER_ROWS + NUMBER_DELETED_ROWS,19,2) * 100,19,2) AS
  DELETED_ROW_PERCENTAGE
    FROM DBESTUDY.STAR100G_TABLE_RUNTIME_DETAILS A
    WHERE NUMBER_DELETED_ROWS > 100000
    ORDER BY DELETED_ROW_PERCENTAGE DESC ;
```

TABLE_SCHEMA	TABLE_NAME	VALID_ROWS	DELETED_ROWS	DATA_SPACE_SIZE_IN_BYTES	DELETED_ROW_PERCENTAGE
STAR100G	SUPP_DIM	330000	1650000	46157824	83.33
STAR100G	PART_DIM	6600000	33000000	958488576	83.33
STAR100G	ITEM_FACT	197999368	989996840	53064544256	83.33
STAR100G	CUST_DIM	4950000	24750000	1109471232	83.33
STAR100G	CUST2_DIM	4950000	24750000	11196968960	83.33
STAR100G	PART2_DIM	6600000	33000000	2414055424	83.33
STAR100G	SUPP2_DIM	330000	1650000	199450624	83.33

Power Systems

IBM

QSYS2.SYSPARTITIONSTAT - View

```
--
-- Review variable length column efficiency
--

SELECT *
   FROM DBESTUDY.STAR100G_TABLE_RUNTIME_DETAILS
   ORDER BY VARIABLE_LENGTH_SIZE DESC;
```

TABLE_SCHEMA	TABLE_NAME	TABLE_PARTITION	NUMBER_ROWS	OVERFLOW	VARIABLE_LENGTH_SIZE
STAR100G	CUST2_DIM	CUST2_DIM	4950000	4950000	10084827136
STAR100G	PART2_DIM	PART2_DIM	6600000	6600000	1353031680
STAR100G	ORDERS2	ORDERS2	5	5	150994944
STAR100G	SUPP2_DIM	SUPP2_DIM	330000	330000	95375360
STAR100G	ORDERS1	ORDERS1	2000	2000	32755712
STAR100G	SUPP_DIM	SUPP_DIM	330000	0	0
STAR100G	PART_DIM	PART_DIM	6600000	0	0
STAR100G	ITEM_FACT	ITEM_FACT	197999368	0	0
STAR100G	CUST_DIM	CUST_DIM	4950000	0	0
STAR100G	CURRENCY	CURRENCY	6	0	0

Power Systems

IBM

QSYS2.SYSPARTITIONINDEXSTAT - View

- Another good friend to the DBE
- Some of this data is reset to zero on an IPL, restore or alteration of the file

```
-- Capture database index detail
CREATE OR REPLACE TABLE DBESTUDY.STAR100G_INDEX_RUNTIME_DETAILS
(INDEX_SCHEMA, INDEX_NAME, INDEX_MEMBER, INDEX_TYPE, TABLE_SCHEMA, TABLE_NAME,
TABLE_PARTITION, PARTITION_TYPE, LAST_QUERY_USE, LAST_STATISTICS_USE,
QUERY_USE_COUNT, QUERY_STATISTICS_COUNT, LAST_USED_TIMESTAMP, DAYS_USED_COUNT,
INDEX_VALID, INDEX_SIZE, ESTIMATED_BUILD_TIME, LAST_BUILD_TIME, LAST_BUILD_DEGREE,
SPARSE, DERIVED_KEY, PARTITIONED, ACCPTH_TYPE, INDEX_HELD, PHYSICAL_READS,
SEQUENTIAL_READS, RANDOM_READS, KEEP_IN_MEMORY, MEDIA_PREFERENCE, CAPTURE_TIME)
AS
(SELECT INDEX_SCHEMA, INDEX_NAME,INDEX_MEMBER, INDEX_TYPE, TABLE_SCHEMA, TABLE_NAME,
TABLE_PARTITION, PARTITION_TYPE, LAST_QUERY_USE, LAST_STATISTICS_USE,
QUERY_USE_COUNT, QUERY_STATISTICS_COUNT, LAST_USED_TIMESTAMP, DAYS_USED_COUNT,
VARCHAR(CASE INDEX_VALID WHEN '0' THEN 'NO' ELSE 'YES' END, DEFAULT, 37),
INDEX_SIZE, ESTIMATED_BUILD_TIME, LAST_BUILD_TIME, LAST_BUILD_DEGREE, VARCHAR(CASE
SPARSE WHEN '0' THEN 'NO' ELSE 'YES' END, DEFAULT, 37), VARCHAR(CASE DERIVED_KEY
WHEN '0' THEN 'NO' ELSE 'YES' END, DEFAULT, 37), PARTITIONED, VARCHAR(CASE
ACCPTH_TYPE WHEN '0' THEN '1 TB' WHEN '1' THEN '4 GB' ELSE 'EVI' END, DEFAULT, 37),
VARCHAR(CASE INDEX_HELD WHEN '0' THEN 'NO' ELSE 'YES' END, DEFAULT, 37),
PHYSICAL_READS, SEQUENTIAL_READS, RANDOM_READS, VARCHAR(CASE KEEP_IN_MEMORY WHEN '1'
THEN 'YES' ELSE 'NO' END, DEFAULT, 37), VARCHAR(CASE MEDIA_PREFERENCE WHEN 255 THEN
'SSD' ELSE 'ANY' END, DEFAULT, 37), CURRENT TIMESTAMP
FROM QSYS2.SYSPARTITIONINDEXSTAT
WHERE TABLE_SCHEMA = 'STAR100G') WITH DATA ON REPLACE DELETE ROWS;
```

Power Systems

IBM

QSYS2.SYSPARTITIONINDEXSTAT - View

```
--
-- Identify candidates for SSD
--

SELECT *
   FROM DBESTUDY.STAR100G_TABLE_RUNTIME_DETAILS
   ORDER BY VARIABLE_LENGTH_SIZE DESC;
```

INDEX_NAME	TABLE_NAME	SEQUENTIAL_READS	RANDOM_READS	RANDOM_READS_PERCENTAGE
RADIX_ON_ORDERDATE	ITEM_FACT	4100000	88556849	95.57
Q_STAR100G_SUPP...	SUPP_DIM	100000000000	10000000	0.00
SUPP_IDX3	SUPP_DIM	100000000000	10000000	0.00
SUPP_IDX2	SUPP_DIM	100000000000	10000000	0.00
SUPP_IDX1	SUPP_DIM	100000000000	10000000	0.00
Q_STAR100G_PART...	PART_DIM	100000000000	10000000	0.00
PART_IDX4	PART_DIM	100000000000	10000000	0.00

Power Systems

IBM

QSYS2.SYSPARTITIONINDEXDISK - View

- Another good friend to the DBE
- Study storage use

```
-- Contrast Solid State Drives (SSD) vs Spinning Disk
CREATE OR REPLACE TABLE DBESTUDY.STAR100G_INDEX_STORAGE
(Index_Name, Index_Member, Index_Type, SSD_Space, NonSSD_Space,
Collection_time)
AS (SELECT INDEX_NAME, INDEX_MEMBER, INDEX_TYPE, SUM(CASE UNIT_TYPE
WHEN 1 THEN UNIT_SPACE_USED ELSE 0 END) AS SSD_SPACE, SUM(CASE
UNIT_TYPE WHEN 0 THEN UNIT_SPACE_USED ELSE 0 END) AS NONSSD_SPACE,
CURRENT TIMESTAMP
FROM QSYS2.SYSPARTITIONINDEXDISK B
WHERE INDEX_SCHEMA = 'STAR100G'
GROUP BY INDEX_NAME, INDEX_MEMBER, INDEX_TYPE, TABLE_SCHEMA,
TABLE_NAME, TABLE_PARTITION)
WITH DATA ON REPLACE DELETE ROWS;
```

Power Systems

IBM

IBM® i Services

Application Services
- QSYS2.QCMDEXC – PROCEDURE
- QSYS2.ENVIRONMENT_VARIABLE_INFO – VIEW
- QSYS2.SERVICES_INFO – VIEW

Security Services
- QSYS2.AUTHORITY_COLLECTION – VIEW
- QSYS2.DRDA_AUTHENTICATION_ENTRY_INFO – VIEW
- QSYS2.FUNCTION_INFO – VIEW
- QSYS2.FUNCTION_USAGE – VIEW
- QSYS2.GROUP_PROFILE_ENTRIES – VIEW
- QSYS2.SQL_CHECK_AUTHORITY – UDF
- QSYS2.USER_INFO – VIEW
- SYSPROC.SET_COLUMN_ATTRIBUTE – PROCEDURE

Communication Services
- QSYS2.NETSTAT_INFO – VIEW
- QSYS2.NETSTAT_INTERFACE_INFO – VIEW
- QSYS2.NETSTAT_JOB_INFO – VIEW
- QSYS2.NETSTAT_ROUTE_INFO – VIEW
- QSYS2.SERVER_SBS_ROUTING – VIEW
- QSYS2.SET_SERVER_SBS_ROUTING – PROCEDURE
- QSYS2.TCPIP_INFO – VIEW
- SYSIBMADM.ENV_SYS_INFO – VIEW

Storage Services
- 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

Product Services
- QSYS2.LICENSE_INFO – VIEW

Spool Services
- QSYS2.OUTPUT_QUEUE_ENTRIES – VIEW
- QSYS2.OUTPUT_QUEUE_ENTRIES – UDTF
- QSYS2.OUTPUT_QUEUE_INFO – VIEW

System Health Services
- QSYS2.SYSLIMITS – VIEW
- QSYS2.SYSLIMTBL – TABLE

Message Handling Services
- QSYS2.JOBLOG_INFO – UDTF
- QSYS2.REPLY_LIST_INFO – VIEW

Librarian Services
- QSYS2.LIBRARY_LIST_INFO – VIEW
- QSYS2.OBJECT_STATISTICS – UDTF

Work Management Services
- QSYS2.ACTIVE_JOB_INFO – UDTF
- QSYS2.GET_JOB_INFO – UDTF
- 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

PTF Services
- QSYS2.PTF_INFO – VIEW
- QSYS2.GROUP_PTF_INFO – VIEW
- SYSTOOLS.GROUP_PTF_CURRENCY – VIEW
- SYSTOOLS.GROUP_PTF_DETAILS – UDTF

IBM i Services

http://ibm.biz/DB2foriServices
http://www.ibm.com/developerworks/ibmi/techupdates/db2/landscape

Power Systems

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Alert when a DB file is growing very large

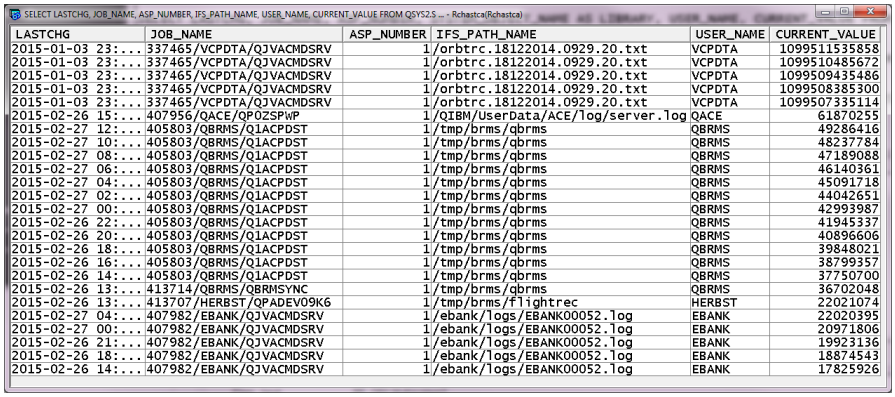
```
CL: ALCOBJ OBJ((QSYS2/SYSLIMTBL *FILE *EXCL)) CONFLICT(*RQSRLS) ;
CL: DLCOBJ OBJ((QSYS2/SYSLIMTBL *FILE *EXCL));

CREATE OR REPLACE TRIGGER MYLIB.SYSTEM_LIMITS_LARGE_FILE
        AFTER INSERT ON QSYS2.SYSLIMTBL
        REFERENCING NEW AS N FOR EACH ROW MODE DB2ROW
SET OPTION USRPRF=*OWNER, DYNUSRPRF=*OWNER
BEGIN ATOMIC
DECLARE V_CMDSTMT VARCHAR(200) ;
DECLARE ERROR INTEGER;
DECLARE EXIT HANDLER FOR SQLEXCEPTION SET ERROR = 1;
/* ---------------------------------------------------------------- */
/* If a table is nearing the maximum size, alert the operator       */
/* ---------------------------------------------------------------- */
IF (N.LIMIT_ID = 15000 AND
    N.CURRENT_VALUE > 3000000000) THEN

SET V_CMDSTMT = 'SNDMSG MSG(''Table: '
     CONCAT N.SYSTEM_SCHEMA_NAME CONCAT '/' CONCAT N.SYSTEM_OBJECT_NAME
     CONCAT ' (' CONCAT N.SYSTEM_TABLE_MEMBER CONCAT
     ') IS GETTING VERY LARGE - ROW COUNT =  '
     CONCAT CURRENT_VALUE CONCAT ' '') TOUSR(*SYSOPR) MSGTYPE(*INFO) ';
 CALL QSYS2.QCMDEXC( V_CMDSTMT );
END IF;
END;
```

Power Systems

IBM

Find the largest IFS Stream Files

```
SELECT LASTCHG, JOB_NAME, ASP_NUMBER, IFS_PATH_NAME,
USER_NAME, CURRENT_VALUE FROM QSYS2.SYSLIMITS WHERE
LIMIT_ID = 18409 ORDER BY CURRENT_VALUE DESC;
```



LASTCHG	JOB_NAME	ASP_NUMBER	IFS_PATH_NAME	USER_NAME	CURRENT_VALUE
2015-01-03 23:...	337465/VCPDTA/QJVACMDSRV	1	/orbtrc.18122014.0929.20.txt	VCPDTA	1099511535858
2015-01-03 23:...	337465/VCPDTA/QJVACMDSRV	1	/orbtrc.18122014.0929.20.txt	VCPDTA	1099510485672
2015-01-03 23:...	337465/VCPDTA/QJVACMDSRV	1	/orbtrc.18122014.0929.20.txt	VCPDTA	1099509435486
2015-01-03 23:...	337465/VCPDTA/QJVACMDSRV	1	/orbtrc.18122014.0929.20.txt	VCPDTA	1099508385300
2015-01-03 23:...	337465/VCPDTA/QJVACMDSRV	1	/orbtrc.18122014.0929.20.txt	VCPDTA	1099507335114
2015-02-26 15:...	407956/QACE/QP0ZSPWP	1	/QIBM/UserData/ACE/log/server.log	QACE	61870255
2015-02-27 12:...	405803/QBRMS/Q1ACPDST	1	/tmp/brms/qbrms	QBRMS	49286416
2015-02-27 10:...	405803/QBRMS/Q1ACPDST	1	/tmp/brms/qbrms	QBRMS	48237784
2015-02-27 08:...	405803/QBRMS/Q1ACPDST	1	/tmp/brms/qbrms	QBRMS	47189088
2015-02-27 06:...	405803/QBRMS/Q1ACPDST	1	/tmp/brms/qbrms	QBRMS	46140361
2015-02-27 04:...	405803/QBRMS/Q1ACPDST	1	/tmp/brms/qbrms	QBRMS	45091718
2015-02-27 02:...	405803/QBRMS/Q1ACPDST	1	/tmp/brms/qbrms	QBRMS	44042651
2015-02-27 00:...	405803/QBRMS/Q1ACPDST	1	/tmp/brms/qbrms	QBRMS	42993987
2015-02-26 22:...	405803/QBRMS/Q1ACPDST	1	/tmp/brms/qbrms	QBRMS	41945337
2015-02-26 20:...	405803/QBRMS/Q1ACPDST	1	/tmp/brms/qbrms	QBRMS	40896606
2015-02-26 18:...	405803/QBRMS/Q1ACPDST	1	/tmp/brms/qbrms	QBRMS	39848021
2015-02-26 16:...	405803/QBRMS/Q1ACPDST	1	/tmp/brms/qbrms	QBRMS	38799357
2015-02-26 14:...	405803/QBRMS/Q1ACPDST	1	/tmp/brms/qbrms	QBRMS	37750700
2015-02-26 13:...	413714/QBRMS/QBRMSYNC	1	/tmp/brms/qbrms	QBRMS	36702048
2015-02-26 13:...	413707/HERBST/QPADEV09K6	1	/tmp/brms/flightrec	HERBST	22021074
2015-02-27 04:...	407982/EBANK/QJVACMDSRV	1	/ebank/logs/EBANK00052.log	EBANK	22020395
2015-02-27 00:...	407982/EBANK/QJVACMDSRV	1	/ebank/logs/EBANK00052.log	EBANK	20971806
2015-02-26 21:...	407982/EBANK/QJVACMDSRV	1	/ebank/logs/EBANK00052.log	EBANK	19923136
2015-02-26 18:...	407982/EBANK/QJVACMDSRV	1	/ebank/logs/EBANK00052.log	EBANK	18874543
2015-02-26 14:...	407982/EBANK/QJVACMDSRV	1	/ebank/logs/EBANK00052.log	EBANK	17825926

Power Systems

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DB2 for IBM i Lab Services

- Facilitated workshops covering current state, requirements, future state, possible solutions, implementation best practices, and formulation of a strategic roadmap:
  - ❑ RCAC
  - ❑ Temporal Tables
- Customized consulting workshops
  - ❑ Advanced SQL and Data-centric Programming
  - ❑ SQL Performance Best Practices, Monitoring and Tuning
  - ❑ Remote performance assessments
- Consulting on any DB2 for i topic
- For more information, contact mcain@us.ibm.com

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ithankyou

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

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IBM® DB2® for i Services

Health Center Procedures

QSYS2.HEALTH_ACTIVITY
QSYS2.HEALTH_DATABASE_OVERVIEW
QSYS2.HEALTH_DESIGN_LIMITS
QSYS2.HEALTH_ENVIRONMENTAL_LIMITS
QSYS2.HEALTH_SIZE_LIMITS
QSYS2.RESET_ENVIRONMENTAL_LIMITS

Utility Procedures

QSYS2.CANCEL_SQL
QSYS2.DUMP_SQL_CURSORS
QSYS2.EXTRACT_STATEMENTS
QSYS2.FIND_AND_CANCEL_QSQSRVR_SQL
QSYS2.FIND_QSQSRVR_JOBS
QSYS2.GENERATE_SQL
QSYS2.RESTART_IDENTITY
SYSTOOLS.CHECK_CST
SYSTOOLS.CHECK_SYSROUTINE

Application Services

QSYS2.OVERRIDE_TABLE – PROCEDURE
QSYS2.DELIMIT_NAME – UDF
SYSPROC.WLM_SET_CLIENT_INFO – PROCEDURE

Performance Services

SYSTOOLS.ACT_ON_INDEX_ADVICE – PROCEDURE
SYSTOOLS.HARVEST_INDEX_ADVICE – PROCEDURE
QSYS2.OVERRIDE_QAQQINI – PROCEDURE
QSYS2.RESET_TABLE_INDEX_STATISTICS – PROCEDURE
QSYS2.SYSIXADV – TABLE
SYSTOLS.REMOVE_INDEXES – PROCEDURE
QSYS2.DATABASE_MONITOR_INFO – VIEW

Plan Cache Procedures

QSYS2.CHANGE_PLAN_CACHE_SIZE
QSYS2.CLEAR_PLAN_CACHE
QSYS2.DUMP_PLAN_CACHE
QSYS2.DUMP_PLAN_CACHE_PROPERTIES
QSYS2.DUMP_PLAN_CACHE_topN
QSYS2.DUMP_SNAP_SHOT_PROPERTIES
QSYS2.END_ALL_PLAN_CACHE_EVENT_MONITORS
QSYS2.END_PLAN_CACHE_EVENT_MONITOR
QSYS2.IMPORT_PC_EVENT_MONITOR
QSYS2.IMPORT_PC_SNAPSHOT
QSYS2.REMOVE_PERFORMANCE_MONITOR
QSYS2.REMOVE_PC_EVENT_MONITOR
QSYS2.REMOVE_PC_SNAPSHOT
QSYS2.START_PLAN_CACHE_EVENT_MONITOR

DB2 for i Services

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

Power Systems IBM

QSYS2.HEALTH_DATABASE_OVERVIEW – procedure

- Service used by System i Navigator for Database -> Health Center -> Overview
- The QSYS2.Health_Database_Overview() procedure returns counts of all the different types of DB2 for i objects within the target schema or schemas. The counts are broken down by object type and subtype.
- '%' is used to wildcard the schema name
- A single row result set is returned for all matching schema names

```
-- Retrieve the overview for the entire database
CALL QSYS2.Health_Database_Overview(1, '%', NULL, NULL, NULL);
```


Power Systems IBM

QSYS2.HEALTH_DESIGN_LIMITS – procedure

- The QSYS2.Health_Design_Limits() procedure returns detailed counts of design limits over a set of objects within one or more schemas. Design limits correspond to architectural constructs.
- **The Database Health Center Design limits include:**

MAXIMUM NUMBER OF MEMBERS
MAXIMUM NUMBER OF RECORD FORMATS
MAXIMUM JOURNAL RECEIVER SIZE
TOTAL SQL STATEMENTS
TOTAL ACTIVE SQL STATEMENTS
MAXIMUM SQL PACKAGE SIZE
MAXIMUM LARGE SQL PACKAGE SIZE
MAXIMUM SQL PROGRAM ASSOCIATED SPACE SIZE

```
-- Retrieve the overview for the entire database
CALL QSYS2.Health_Design_Limits(1, 0, 'PRODLIB1', '%', 20, NULL, NULL,
   NULL);
```


Power Systems IBM

QSYS2.HEALTH_SIZE_LIMITS – procedure

- The QSYS2.Health_Size_Limits () procedure returns detailed size information for database objects within one or more schemas. Size limits help you understand trends towards reaching a database limit.
- **The Database Health Center Design limits include:**

MAXIMUM NUMBER OF ALL ROWS	MAXIMUM NUMBER OF VALID ROWS
MAXIMUM NUMBER OF DELETED ROWS	MAXIMUM TABLE PARTITION SIZE
MAXIMUM ROW LENGTH	MAXIMUM ROW LENGTH WITH LOBS
MAXIMUM NUMBER OF PARTITIONS	MAXIMUM NUMBER OF REFERENCED TABLES
MAXIMUM NUMBER OF TRIGGERS	MAXIMUM NUMBER OF CONSTRAINTS
MAXIMUM LENGTH OF CHECK CONSTRAINT	
MAXIMUM *MAX4GB INDEX SIZE	MAXIMUM *MAX1TB INDEX SIZE
MAXIMUM NUMBER OF INDEX ENTRIES	MAXIMUM KEY COLUMNS
MAXIMUM KEY LENGTH	MAXIMUM NUMBER OF PARTITIONING KEYS
MAXIMUM NUMBER OF FUNCTION PARAMETERS	
MAXIMUM NUMBER OF PROCEDURE PARAMETERS	

```
-- Retrieve the size limits for TOYSTORE/S* objects
CALL QSYS2.Health_Size_Limits(1, 0, TOYSTORE', 'S%', 5, NULL, NULL,
   NULL);
```


Power Systems IBM

QSYS2.HEALTH_ACTIVITY – procedure

- The QSYS2.Health_Activity () procedure returns summary counts of database and SQL operations over a set of objects within one or more schemas.

- **The Database Health Center Activity counts include:**

INSERT OPERATIONS	UPDATE OPERATIONS
DELETE OPERATIONS	LOGICAL READS
PHYSICAL READS	CLEAR OPERATIONS
INDEX BUILDS/REBUILDS	DATA SPACE REORGANIZE OPERATIONS
DATA SPACE COPY OPERATIONS	FULL OPENS
FULL CLOSES	DAYS USED
INDEX QUERY USE	INDEX QUERY STATISTICS USE
INDEX LOGICAL READS	INDEX RANDOM READS
SQL STATEMENT COMPRESSION COUNT	SQL STATEMENT CONTENTION COUNT
RANDOM READS	SEQUENTIAL READS

```
-- Retrieve the size limits for TOYSTORE/S* objects
CALL QSYS2.Health_Activity(1, 0, TOYSTORE', '%', 10, NULL, NULL,
   NULL);
```


Power Systems IBM

QSYS2.HEALTH_ENVIRONMENTAL_LIMITS – procedure

- The QSYS2.Health_Environmental_Limits() procedure returns detail on the top 10 jobs on the system, for different SQL or application limits.
- The jobs do not have to be in existence.
- The top 10 information is maintained within DB2® for i and gets reset when the machine is IPLed, the IASP is varied ON, or when the QSYS2.Reset_Environmental_Limits() procedure is called.
- **The Database Health Center Environmental limits include:**
  MAXIMUM NUMBER OF LOB AND XML LOCATORS PER JOB
  MAXIMUM NUMBER OF LOB AND XML LOCATORS PER SERVER JOB
  MAXIMUM NUMBER OF ACTIVATION GROUPS
  MAXIMUM NUMBER OF DESCRIPTORS
  MAXIMUM NUMBER OF CLI HANDLES
  MAXIMUM NUMBER OF SQL OPEN CURSORS
  MAXIMUM NUMBER OF SQL PSEUDO OPEN CURSORS
  MAXIMUM LENGTH OF SQL STATEMENT

```
-- Retrieve the size limits for TOYSTORE/S* objects
CALL QSYS2.Health_Environmental_Limits(1, 0, NULL, NULL);
```


Power Systems IBM

QSYS2.RESET_ENVIRONMENTAL_LIMITS – procedure

- The QSYS2.Reset_Environmental_Limits () procedure clears out the environment limit cache for the database. If IASPs are being used, this procedure clears the environment limit cache for the IASP within which it is called.
- Consider calling this procedure if you are iterating through applications changes based upon Health_Environmental_Limits data.

```
-- Reset the top 10
CALL QSYS2.RESET_ENVIRONMENTAL_LIMITS;
```


Power Systems

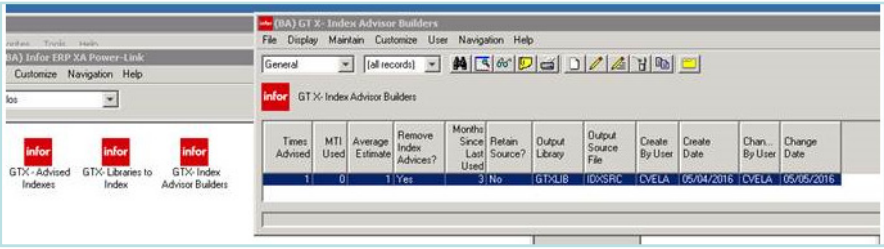
IBM

Automating performance index creation and removal

Real example of automating performance indexes… for Infor clients

"Scott:

I have developed a tool to automate (to a certain extent) the build of indexes and have beta tested the process at a single customer. The front end seen below interfaces with SYSTOOLS capabilities on the backend to run scheduled jobs."



Power Systems

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