DB2 op IBM i - Ervaringen in de praktijk

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Agenda

- IBM i Access Client Solutions
- DB2 for i – Services
- Praktijkvoorbeelden:
  - Check inactieve gebruikers
  - PTF overview
  - Inventariseren “deleted” records

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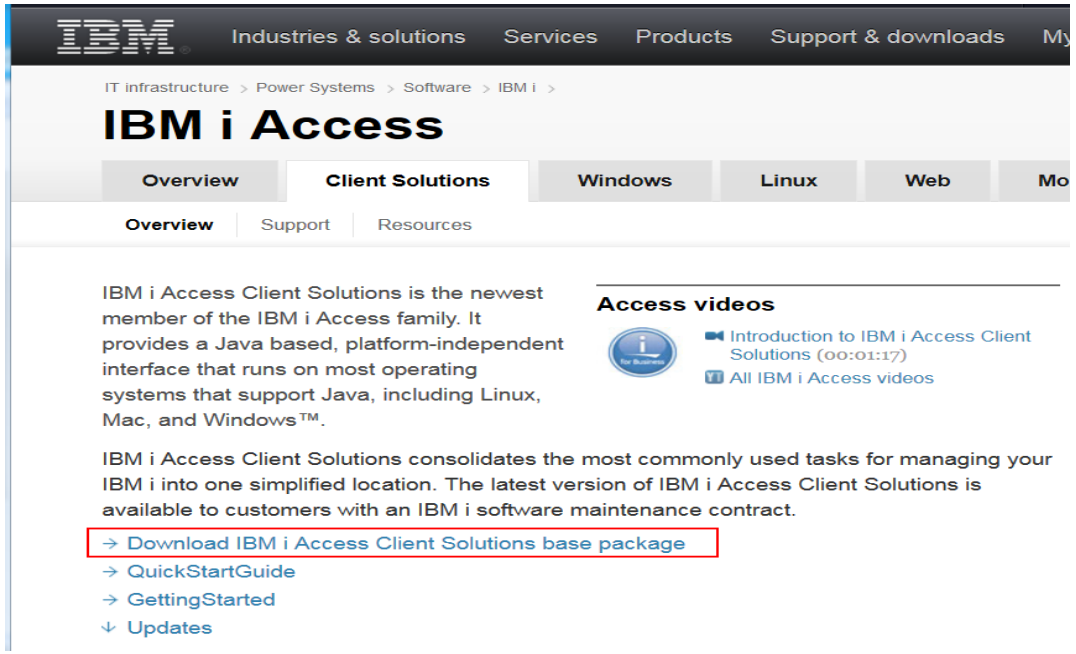
IBM i Access Client Solutions

- Beschikbaar sinds juli 2012
- Laatste update januari 2017 version 1.1.6.2
- Download locatie:

  http://www-03.ibm.com/systems/power/software/i/access/solutions.html



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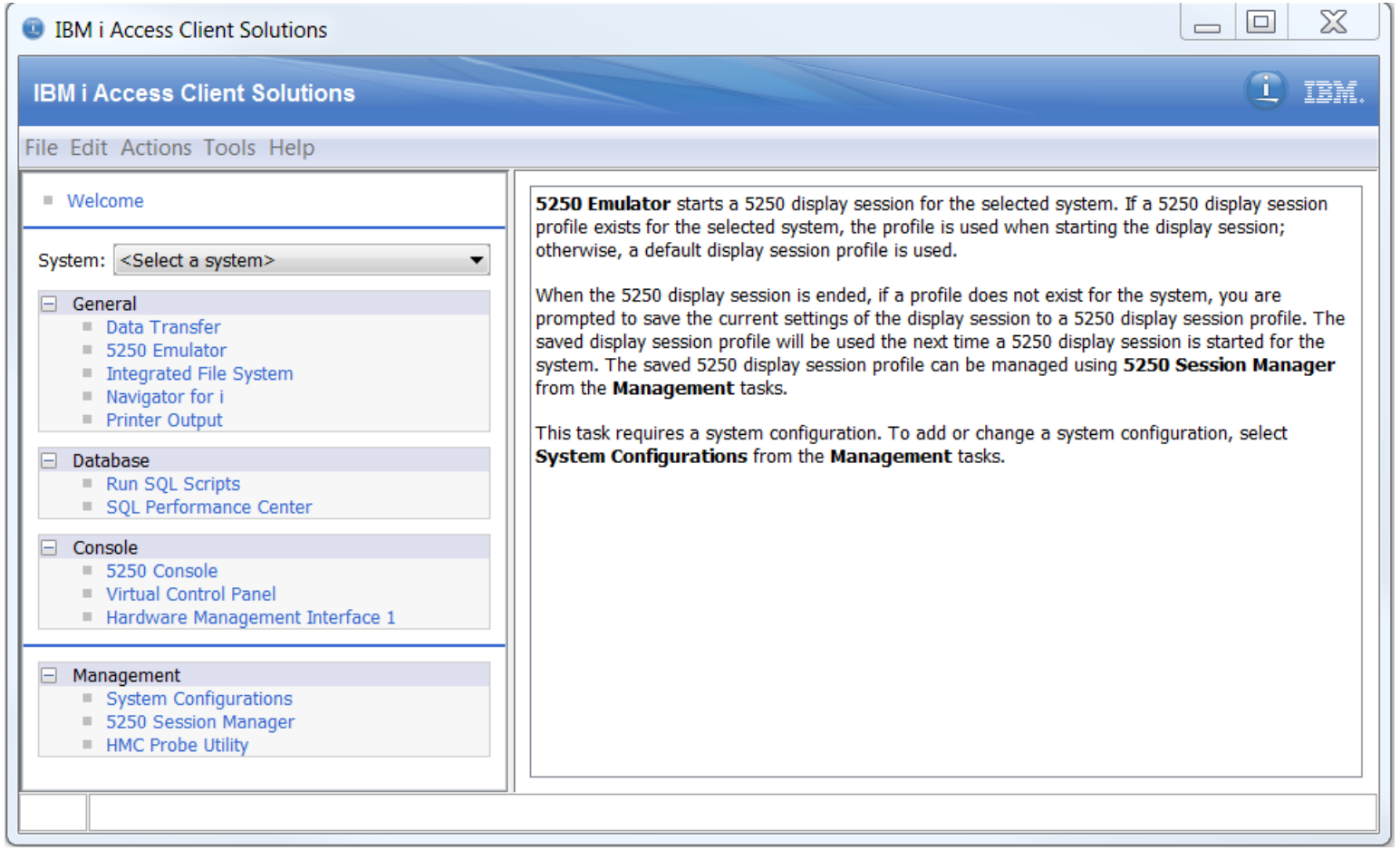

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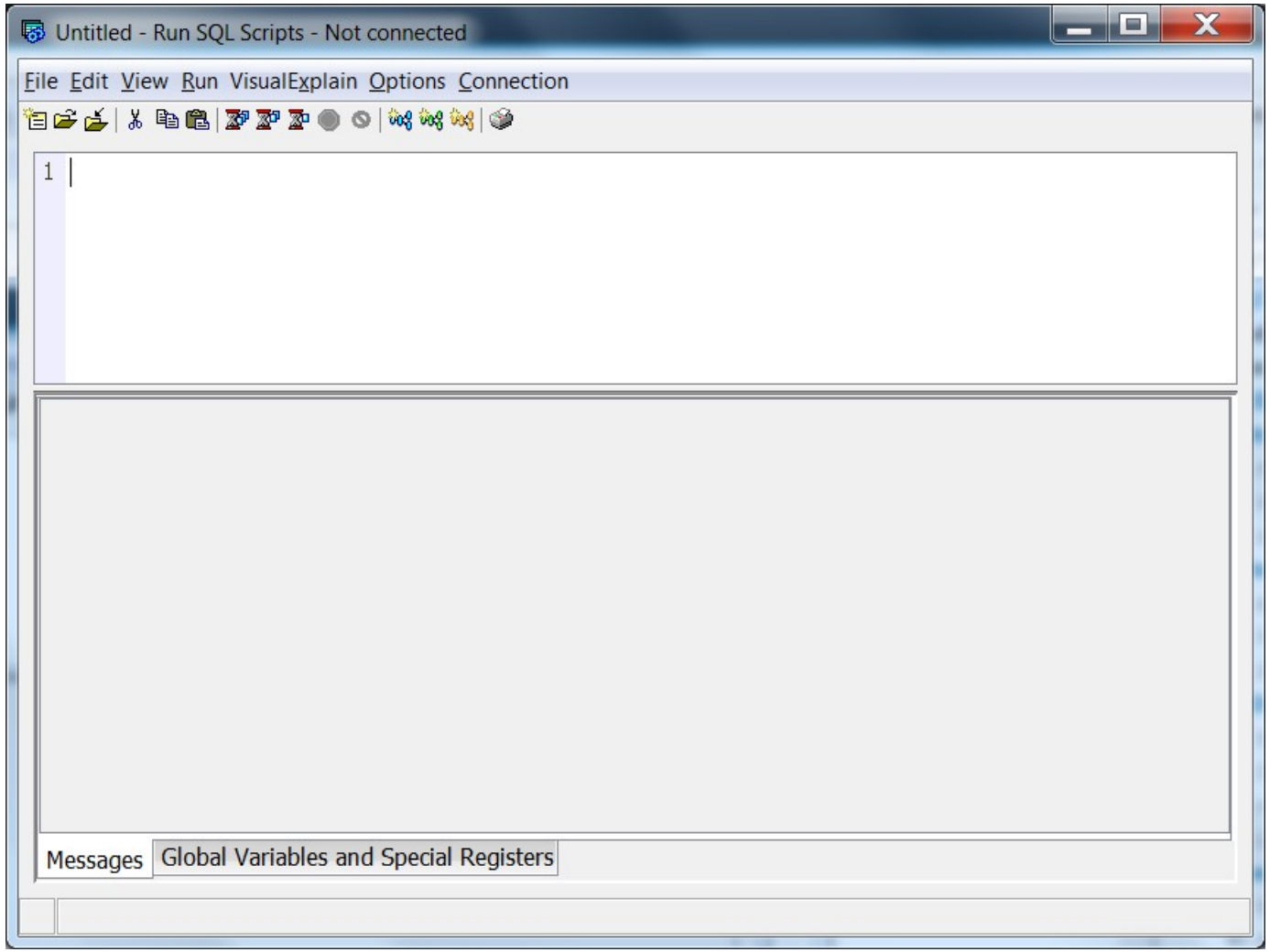

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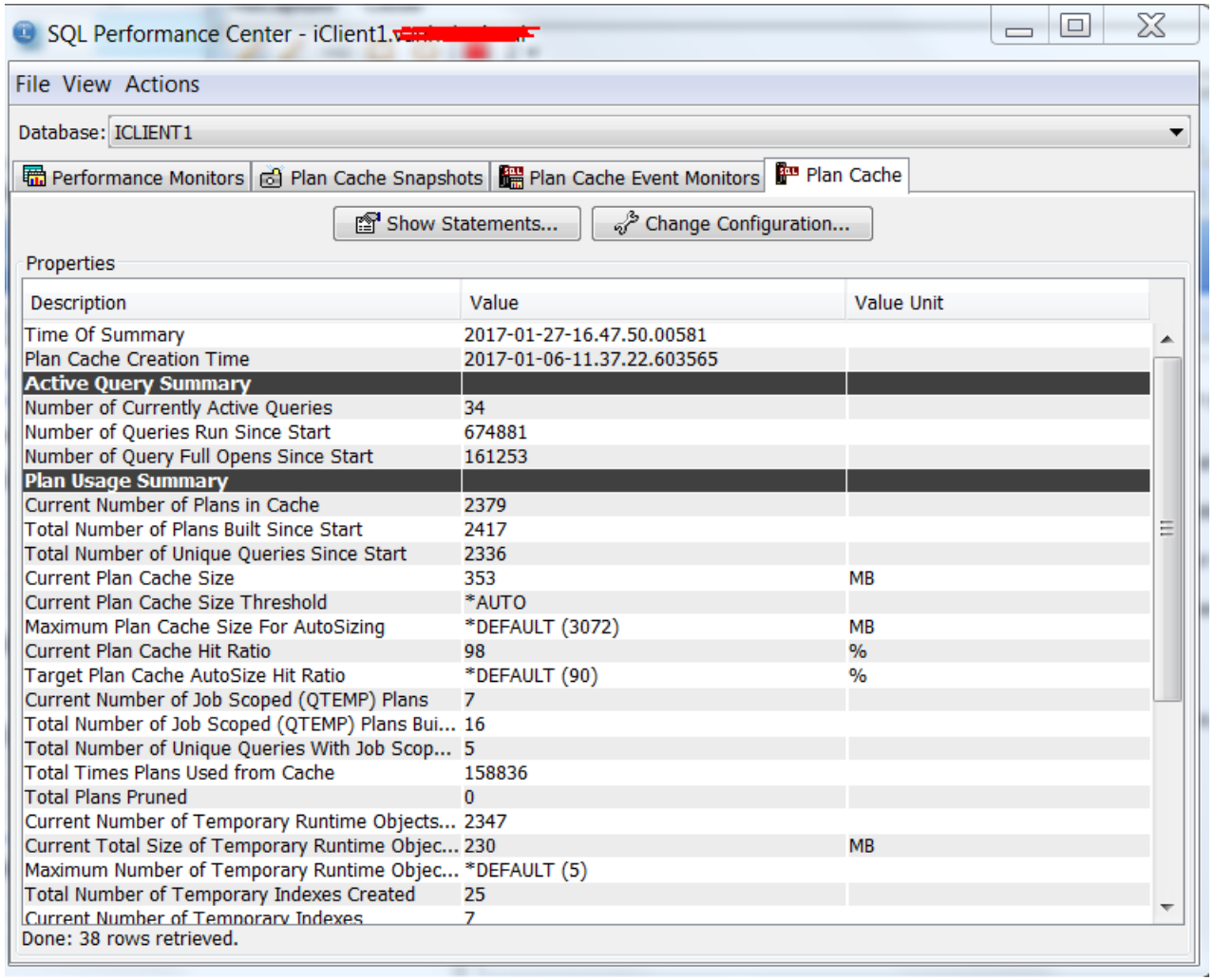

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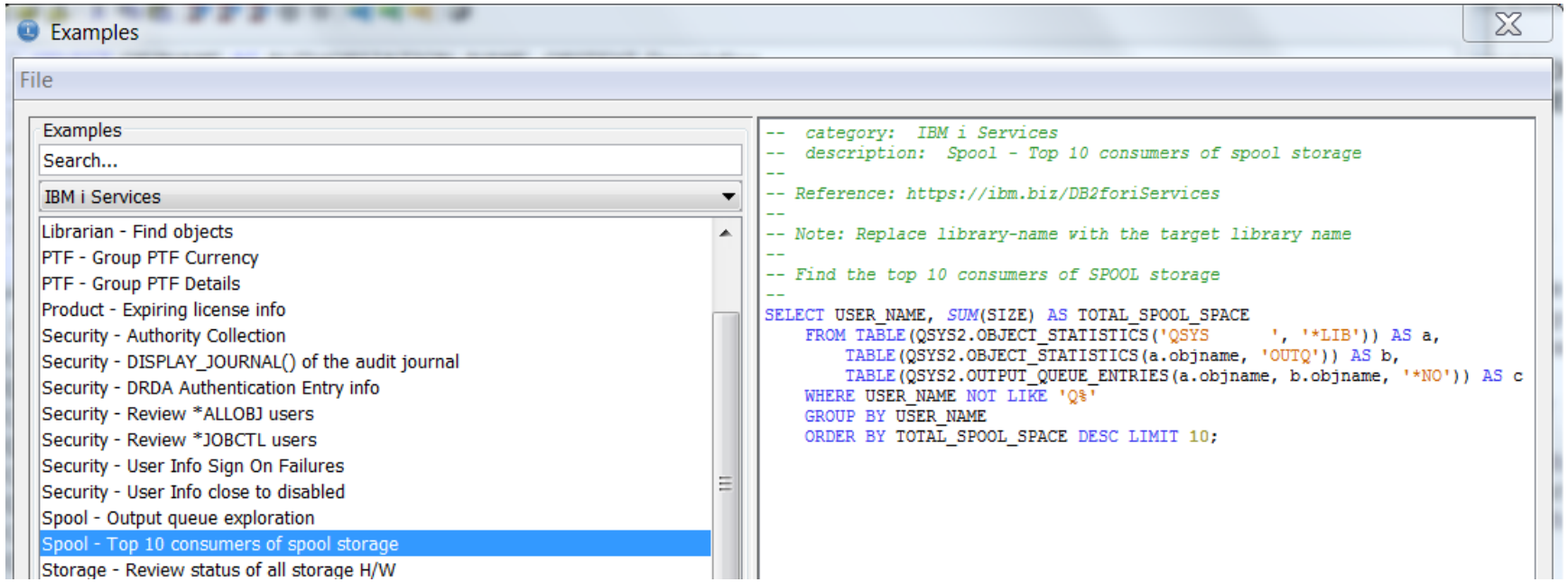
DB2 for i – Services

- SQL is de standaard makkelijker dan API's
- DB2 for i – Services documentation link
- DB2 for i – Services examples: Menu => Edit => Insert from Examples



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Praktijkvoorbeeld - Check inactieve gebruikers

File Edit View Run VisualExplain Options Connection

```
1  SELECT OBJNAME AS AUTHORIZATION_NAME, OBJTEXT Description,
2     DATE(OBJECT_STATITICS.LAST_USED_TIMESTAMP) AS LAST_USED_DATE, DATE(PREVIOUS_SIGNON) AS
3     PREVIOUS_SIGNON
4     FROM QSYS2.USER_INFO AS USER_INFO, TABLE(QSYS2.OBJECT_STATISTICS('QSYS', '*USRPRF')) AS
5        OBJECT_STATITICS
6     WHERE (DATE(OBJECT_STATITICS.LAST_USED_TIMESTAMP) <= CURRENT DATE - (90 DAYS) OR
7        OBJECT_STATITICS.LAST_USED_TIMESTAMP IS NULL) AND AUTHORIZATION_NAME = OBJNAME;
```

AUTHORIZATION_NAME	DESCRIPTION	LAST_USED_DATE	PREVIOUS_SIGNON
QEJBSVR	IBM-supplied User Profile	-	-
QFNC	IBM-supplied User Profile	-	-
QGATE	IBM-supplied User Profile	2013-03-15	-
QIBMHELP	IBM Eclipse Online Help	-	-
QIPP	IBM-supplied User Profile	-	-
QLPAUTO	IBM-supplied User Profile	2016-01-22	-
QLPINSTALL	IBM-supplied User Profile	2016-01-23	-
QMGTC	IBM-supplied User Profile	-	-
QNETSPLF	Internal Spool Network Profile	-	-
QNFSANON	IBM-supplied User Profile	-	-
QNTP	IBM-supplied User Profile	-	-

Praktijkvoorbeeld - PTF overview

```
16 --
17 -- If using IBM i 7.2
18 --
19  SELECT *
20     FROM SYSTOOLS.GROUP_PTF_CURRENCY
21     WHERE PTF_GROUP_RELEASE = 'R720'
22     ORDER BY PTF_GROUP_LEVEL_AVAILABLE - PTF_GROUP_LEVEL_INSTALLED DESC;
23
```

PTF_GROUP_CURRENCY	PTF_GROUP_ID	PTF_GROUP_TITLE	PTF_GROUP_LEVEL_INSTALLED	PTF_GROUP_LEVEL_AVAILABLE	PTF_GROUP_LAST_UPDATED_BY_IBM
UPDATE AVAILABLE	SF99719	SF99719 720 Group Hiper	77	82	01/24/2017
UPDATE AVAILABLE	SF99775	SF99775 720 Hardware and Related PTFs	19	22	01/23/2017
UPDATE AVAILABLE	SF99223	SF99223 720 IBM Open Source Solutions for i	1	3	01/19/2017
UPDATE AVAILABLE	SF99713	SF99713 720 IBM HTTP Server for i	17	19	01/23/2017
UPDATE AVAILABLE	SF99718	SF99718 720 Group Security	39	41	12/13/2016
UPDATE AVAILABLE	SF99251	SF99251 720 Content Manager OnDemand f...	3	4	01/09/2017
UPDATE AVAILABLE	SF99334	SF99334 720 DB2 Web Query for i V2.2.0	1	2	01/10/2017
UPDATE AVAILABLE	SF99481	SF99481 720 WebSphere App Server V8.5	9	10	12/22/2016
UPDATE AVAILABLE	SF99658	SF99658 720 DB2 Web Query for i V2.1.1	4	5	12/29/2016
UPDATE AVAILABLE	SF99702	SF99702 720 DB2 for IBM i	14	15	01/19/2017
UPDATE AVAILABLE	SF99715	SF99715 720 Backup Recovery Solutions	28	29	12/22/2016
UPDATE AVAILABLE	SF99747	SF99747 720 DB2 Web Query for i V2.1.0	15	16	12/29/2016
UPDATE AVAILABLE	SF99759	SF99759 720 IBM MQ for IBM i - v7.1.0/v8.0.0	7	8	01/19/2017
INSTALLED LEVEL IS CU...	SF99480	720 WebSphere App Server V8.0	6	6	02/01/2016
INSTALLED LEVEL IS CU...	SF99714	SF99714 720 Performance Tools	4	4	05/17/2016
INSTALLED LEVEL IS CU...	SF99716	SF99716 720 Java	11	11	09/05/2016
INSTALLED LEVEL IS CU...	SF99717	SF99717 720 Technology Refresh	5	5	11/10/2016
INSTALLED LEVEL IS CU...	SF99720	Current Cumulative PTF Media Documentation	16306	16306	11/10/2016

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Praktijkvoorbeeld - Inventariseren “deleted” records

Gebaseerd op het artikel op IBM i Developerworks

“Are deleted rows wasting resources on your IBM i system?”

A task for database engineers on IBM DB2 for i

Figure 1 – Example output from step 1 query

FILENAME	MEMBER	LIBRARY	Number Non-Deleted Rows	Number Deleted Rows	Reusing Deleted Rows	Percent Deleted	SIZE	Deleted Space
DELTEST	DELTEST	MCKINLEY2	3,700,000	4,300,000	Y	53	392,011,776	210,706,329
ITEM_FACT	ITEM_FACT	PURGETEST	3,568,632	2,432,583	Y	40	1,612,763,136	653,730,984
QAPZREQ	QAPZREQ	QUSRSYS	44,236	121,803	N	73	16,781,312	12,310,446
QAPZSYM	QAPZSYM	QUSRSYS	43,824	118,801	N	73	50,335,744	36,771,324
SELECT1P	TEST1	MCKINLEY2	550,000	50,000	Y	8	7,221,248	601,770
QAPZGRP	QAPZGRP	QUSRSYS	8,212	2,389	N	22	3,690,496	831,675
QAPZPTF	QAPZPTF	QUSRSYS	11,308	361	N	3	1,581,056	48,912
QAPMCCCNAT	QAPMCCCNA	QUSRSYS	37	299	Y	88	217,088	193,182
CLASSDBMON	CLASSDBMOI	DENTON	430,959	256	Y	0	1,122,041,856	666,124
KENTJOB	KENTJOB	DENTON	271	126	Y	31	3,309,568	1,050,391
QZG0000777	KENTJOB	DBQTEAM03	271	126	Y	31	3,145,728	998,392
QZG0000777	KENTJOB	DBQTEAM04	271	126	Y	31	3,145,728	998,392
QZG0000777	KENTJOB	DBQTEAM05	271	126	Y	31	3,145,728	998,392

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Praktijkvoorbeeld - Inventariseren “deleted” records

File Edit View Run VisualExplain Options Connection

```
1  /*********************************************************************************************/
2  /* Create the DB2 tables with physical files to investigate the number of deleted rows */
3  /*********************************************************************************************/
4
5  CL:DSPFD FILE(*ALLUSR/*ALL) TYPE(*MBR) OUTPUT(*OUTFILE) FILEATR(*PF)
6  OUTFILE(QRPLOBJ/DSPFD_MBR) OUTMBR(*FIRST *ADD);
7
8  CL:DSPFD FILE(*ALLUSR/*ALL) TYPE(*ATR) OUTPUT(*OUTFILE) FILEATR(*PF)
9  OUTFILE(QRPLOBJ/DSPFD_ATR) OUTMBR(*FIRST *ADD);
10
11 /*********************************************************************************************/
12 /* Create indexes over these two files to improve the performance of your analysis     */
13 /*********************************************************************************************/
14
15 CREATE INDEX QRPLOBJ.DSPFD_ATR_IX ON QRPLOBJ.DSPFD_ATR(PHFILE);
16 CREATE INDEX QRPLOBJ.DSPFD_MBR_IX
17   ON QRPLOBJ.DSPFD_MBR(MBFTYP, MBFILE, MBNDTR);
18
19 /*********************************************************/
20 /* Stored procedure dumps SQL plan cache entries to a table */
21 /*********************************************************/
22
23 CALL QSYS2.DUMP_PLAN_CACHE('QRPLOBJ', 'PCSS');
```

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Praktijkvoorbeeld - Inventariseren “deleted” records

```
/*********************************************************************/
/* Step 1 - Identify tables that have a large number of deleted rows */
/*********************************************************************/
SELECT DISTINCT F.MBFILE AS FILENAME, F.MBNAME AS Member, MBLIB AS LIBRARY, MBNRCD AS
  "Number Non-Deleted Rows", MBNDTR AS "Number Deleted Rows", PHRUSE AS "Reusing Deleted Rows",
  BIGINT(mbndtr /
    (
CASE
       WHEN mbnrcd + mbndtr = 0
          THEN CAST(1 AS BIGINT)
          ELSE CAST(mbnrcd + mbndtr AS BIGINT)
END)
           * 100) AS "Percent Deleted",
              CASE
                 WHEN MBDSSZ > 0
                    THEN CAST(MBDSSZ AS BIGINT)
                    ELSE CAST(MBDSZ2 AS BIGINT)
              END AS SIZE, BIGINT(CASE WHEN MBDSSZ > 0 THEN CAST(MBDSSZ AS BIGINT) ELSE
                 CAST(MBDSZ2 AS BIGINT) END * (CAST(mbndtr AS BIGINT) /
                 (
CASE
                    WHEN mbnrcd + mbndtr = 0
                       THEN CAST(1 AS BIGINT)
                       ELSE CAST(mbnrcd + mbndtr AS BIGINT)
END)
)) AS "Deleted Space" FROM QRPLOBJ.DSPFD_MBR AS F JOIN QRPLOBJ.DSPFD_ATR AS A ON F.MBFILE =
          A.PHFILE WHERE MBFTYP = 'P' AND MBNDTR > 10000 ORDER BY MBNDTR DESC
         FETCH FIRST 25 ROWS ONLY;
```

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Praktijkvoorbeeld - Inventariseren “deleted” records

```
/*************************************************************/
/* Step 2 ◆ Look for SQL statements that are wasting resources */
/*************************************************************/
WITH bigdel
   AS (SELECT DISTINCT mbfile AS FILE, mbname AS Member, mblib AS Library, mbnrcd AS
         NumberRecords, mbndtr AS NumberDeletedRecords, phruse AS ReuseDeleted
        FROM qrplobj.DSPFD_MBR F
        JOIN qrplobj.DSPFD_ATR a ON f.MBFILE = a.PHFILE
        WHERE mbftyp = 'P' AND mbndtr > 10000)
-- Join table scan info from the plan cache
   SELECT QQTLN
   AS LIBrary, QQTFN
   AS "Table Name", D.REUSEDELETED
   AS "Reusing Deleted Rows" , MAX(QQTOTR)
   AS "Number Non-Deleted Rows", MAX(d.numberDeletedRecords)
   AS "Number Deleted Rows" , SUM(d.numberDeletedRecords)
   AS "Total Deleted Rows Scanned", COUNT(*)
   AS TotalScans FROM QRPLOBJ.PCSS M JOIN bigdel d ON d.library = m.qqtln AND d.file = m.qqtfn
      AND d.Member = m.qqtmn WHERE qqrid = 3000 AND QQC11 <> 'Y' GROUP BY qqtln, qqtfn,
      d.reusedeleted ORDER BY SUM(d.numberDeletedRecords) DESC FETCH FIRST 25 ROWS ONLY
      OPTIMIZE FOR ALL ROWS;
```

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Praktijkvoorbeeld - Inventariseren “deleted” records

```
76  /*****************************************/
77  /* Step 3 ♦ Look at highly accessed tables */
78  /*****************************************/
79  WITH bigdel
80     AS (SELECT mbfile, mblib,F.MBNAME AS Member, mbftyp, MBNRCD AS NumberRecords, MBNDTR AS
81           numberDeletedRecords, PHRUSE AS REUSEDELETED, MBDSSZ AS MBRSIZE
82          FROM QRPLOBJ.DSPFD_MBR F
83          JOIN QRPLOBJ.DSPFD_ATR a ON f.MBFILE = a.PHFILE
84          WHERE MBFTYP = 'P' AND mbndtr > 10000)
85  -- Join Index builds to the tables with large number of deleted rows
86     SELECT QQTLN
87     AS Library, QQTFN
88     AS "Table Name", D.REUSEDELETED
89     AS "Reusing Delweted Rows", MAX(QQTOTR)
90     AS "Non-Deleted Rows", MAX(d.numberDeletedRecords)
91     AS "Deleted Rows", SUM(d.numberDeletedRecords)
92     AS "Total Deleted Rows Scanned", SUM(M.QQRIDX)
93     AS "Total index entries created", QQIDXD
94     AS Index_Advised_Columns, SUM(CASE WHEN QQC16 = 'N' THEN qqi6 ELSE 0 END)
95       AS total_keys_built, SUM(CASE WHEN QQC16 = 'N' THEN 1 ELSE 0 END) as indexCreated, SUM(CASE
96          WHEN QQC16 = 'Y' THEN 1 ELSE 0 END) as indexreused, COUNT(*)
97     AS TotalIXsCreated FROM QRPLOBJ.PCSS M JOIN bigdel d ON d.mblib = m.qqtln AND d.mbfile =
98        m.qqtfn AND d.Member = m.qqtmn WHERE qqrid = 3002 GROUP BY qqtln, qqtfn ,qqtmn,
99        d.REUSEDELETED, m.QQRCOD , QQIDXD ORDER BY SUM(d.numberDeletedRecords)DESC FETCH FIRST 25
100       ROWS ONLY OPTIMIZE FOR ALL ROWS;
101
```

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Praktijkvoorbeeld - Inventariseren “deleted” records

```
102 /*****************************************/
103 /* Step 4 → Fix the problematic tables */
104 /*****************************************/
105 /* Look at highly accessed tables */
106 SELECT table_schema, TABLE_NAME, Data_size, Number_Deleted_Rows, Logical_Reads, Physical_reads,
107    Sequential_reads, Random_reads
108    FROM qsys2.systablestat
109    ORDER BY Logical_reads DESC
110    FETCH FIRST 25 ROWS ONLY
```

Praktijkvoorbeeld - Inventariseren “deleted” records

TABLE_SCHEMA	TABLE_NAME	DATA_SIZE	NUMBER_DELETED_ROWS	LOGICAL_READS	PHYSICAL_READS	SEQUENTIAL_READS	RANDOM_READS
QUSRBRM	QA1ALI2	22297612288	3260176	394471138	4411768	394471138	0
QSYS2	SYSLIMTBL	15347712	2844	189214240	30945	189214240	0
QUSRIJS	QAIJS4CM	15106048	2265	154733512	47681	0	0
QPFRDATA	QAPMSMDSK	12242944	0	118544901	2643	118544901	0
PCSECDTA	TRAPOD	2168590336	0	82922315	189218	81077346	226558
QUSRBRM	QA1ADI2	1595006976	224709	56149005	1029078	30265173	25883832
QNAVSRV	QINAVMNTRG	688128	953	34524196	85	34352403	171793
QUSRSYS	QA1PJ1	794624	0	31211691	802	0	0
QPFRDATA	QAPMJOBMI	10907090944	0	28207647	371367	18448384	9759263
QUSRBRM	QA1AOR	126455808	253	20726266	39276	20726266	0
QUSRBRM	QA1AOD	488808448	125100	19627078	245486	1926920	17657375
QPFRDATA	QAPMJOBOS	2802761728	0	19296761	10324	81920	19214841
QPFRDATA	QAPMSMSYS	737280	0	14797850	120	14797850	0
QUSRSYS	QAPZGRP	1290240	797	12024795	896	0	0
QUSRBRM	QA1AMB	336707584	71522	10138672	55778	10138672	0
QUSRSYS	QA1PSBS	12288	0	9978840	0	0	0
QUSRBRM	QA1AHS	15458304	1797	9879320	35445	4735868	2243340
QUSRSYS	QA1PONE	23068672	0	8839073	35573	684871	0
PR_MAILRCV	VHA_DISKUSG	6385664	0	6113930	2564	6113930	0
QPFRHIST	QAPMHDJOBM	253849600	308557	5686783	552	0	5686783
QUSRBRM	QA1AOQ	169930752	152950	5491411	31631	5491411	0
QRPLOBJ	QAEZD0001D	679936	0	4295211	3	4086420	208791
PR_MAILRCV	VHA_CPUUSG	4284416	0	4095444	1984	4095444	0
QPFRHIST	QAPMHDJOBO	144764928	309133	3339756	425	0	3339756

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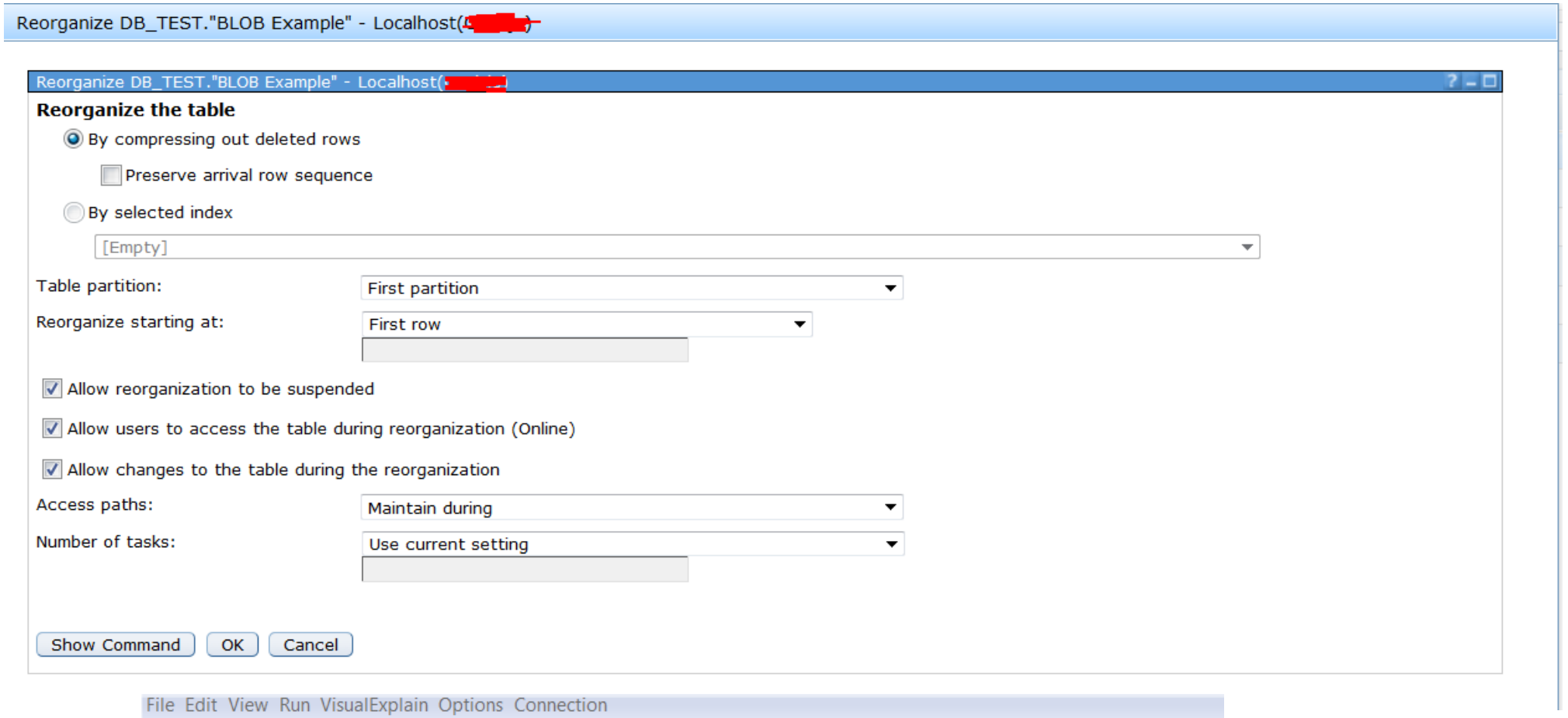

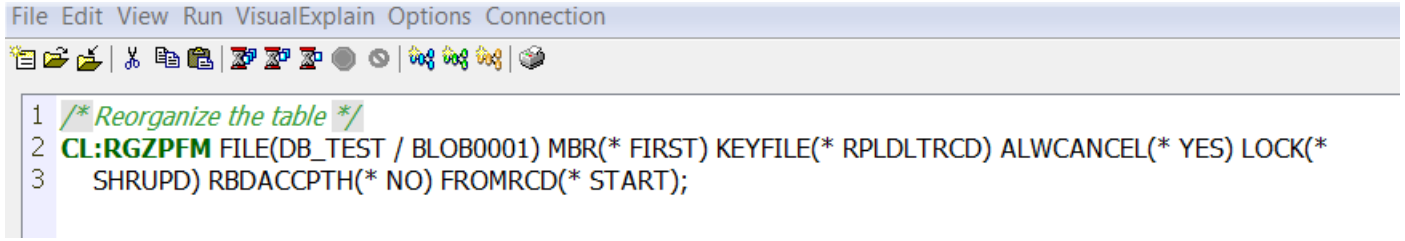

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