Access Path Recovery for DB2 11 + 12

Using RUNSTATS Rescue

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Session Code: <V10>
Tuesday November 15th, 2016 – Time: 11.30-12.30 am | Platform: DB2 z/OS

RUNSTATS Rescue – Why?

- A fact of life is:
  - Access Paths change…
    - Sometimes they get better…
    - Sometimes they don't!

- Why does that happen? The classic reasons are:
  - Statistic changes
  - Index changes
  - Any other reason… (APAR, Version, Rainy day etc.)

Wouldn't it be great if you could „turn back time“ – To get the last „good“ statistics and then be rescued from your bad access path!

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RUNSTATS Rescue – DB2 Help?

What does DB2 offer when this situation occurs?

You have two different choices:

- Static SQL – Plan Stability and BIND QUERY
  - Original Package
  - Previous Package
  - Current Package

Does Plan Management work all the time?

With Schema changes it fails… (View, Index etc.)

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RUNSTATS Rescue – DB2 Help?

For Dynamic SQL you get:

- BIND QUERY

However BIND QUERY has one major limitation:

> "Ensure that object names and SQL keywords in the statement text are specified by uppercase characters, especially for dynamic SQL statements."

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RUNSTATS Rescue – DB2 Help?

DB2 12 now has:

IBM Analytics

Dynamic Plan Stability

- DB2 12 plan – base infrastructure
  - Opaque parameter CACHEDYN_STABILIZATION
  - Capture
    - Command with / without monitoring
    - Global variable
  - FREE
  - EXPLAIN (current, invalid)
  - Invalidation
  - LASTUSED (identify stale statements)
  - Instrumentation (query hash, explain, cache + catalog hit ratio)
  - APPLCOMPAT is part of matching criteria
- Key DB2 12 limitations
  - Temporal stabilization not currently included
  - REBIND support not included
    - No PLANMGMT/SWITCH/APREUSE

How many SQLs are “worth” locking down? Top 10, 20?

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RUNSTATS Rescue at a glance

- Keeps a stats repository and allows to consistently restore statistics
- Quick and easy to use
- Supports dynamic SQL out-of-the-box
- Supports static SQL where Plan Management fails:
  - BINDs resulting from modified programs
  - Schema changes – VIEW changes etc.
- Verifies RUNSTATs as the reason of performance degradations
- Cross checks affected objects
- Add-on to Impact Expert or stand-alone to recover from bad RUNSTATS
- In future slides shortened to be **RR**

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RUNSTATS Rescue procedure

Schedule RR-batch job to maintain a history of optimizer relevant statistics (using a GDG).

If a (dynamic) SQL statement performs badly:

- Point RR on the STMT
  → RR shows the associated tablespaces/indexspaces for stats recovery
- Specify since when it degraded
  → RR checks if a RUNSTATS was executed since then and shows the details per object
  → RR verifies potential object (re-) creation within the timeframe
- RR generates jobs to
  - Extract the stats from its repository
  - Rescue the stats

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RUNSTATS Rescue – Embedded or Stand alone

```
ImpactExpert for DB2 z/OS ------ Main Menu ---------------------- Version 6.10
Command ===> ____________________________________________________ DB2: QB1A

Primary cmd: END, S(ettings), C(leanup), F(ilter Jobs), H(istory), A(bout), FAQ
Line    cmd: S(elect), I(nfo), F(ilter Jobs)

                                                  Dyn   Migr. Convert
  Scenario                  Base     / Recent     Expl  Rules Qual.  DRDA  VOX
  ------------------------  ---------------------  ----  ----- -----  ----  ---
_ REBIND Analysis           Catalog                YES   N     -      -     -
_ Pre-BIND  Local           Catalog / DBRM         YES   -     -      -     -
_ Post-BIND Local           History / Catalog      NO    -     -      -     -
_ Pre-BIND  Prod-Baseline   Export  / DBRM     (*) YES   -     N      N     N
_ Post-BIND Prod-Baseline   Export  / Catalog (*) NO    -     N      N     -
_ Early Precheck Static     Export (*)             YES   Y     N      N     N
_ Early Precheck Dynamic    Export (*)             YES   Y     N      -     N
_ DSC Protection            Export (*)             YES   -     N      -     -
_ Dynamic SQL               DynStmtCache           YES   -     -      -     -
_ Static and dynamic SQL    Trace                  YES   -     -      -     -
_ Local APAR Check Static   Catalog                YES   -     -      -     -
_ Local APAR Check Dynamic  DynStmtCache           YES   -     -      -     -

S RUNSTATS Rescue           Plan_table
_ Plan_table compare        Plan_table
_ DBRM reconstruct          Catalog

NOTE (*): Use export/import function to update product internal copy tables
```

Start RUNSTATS Rescue from the main menu

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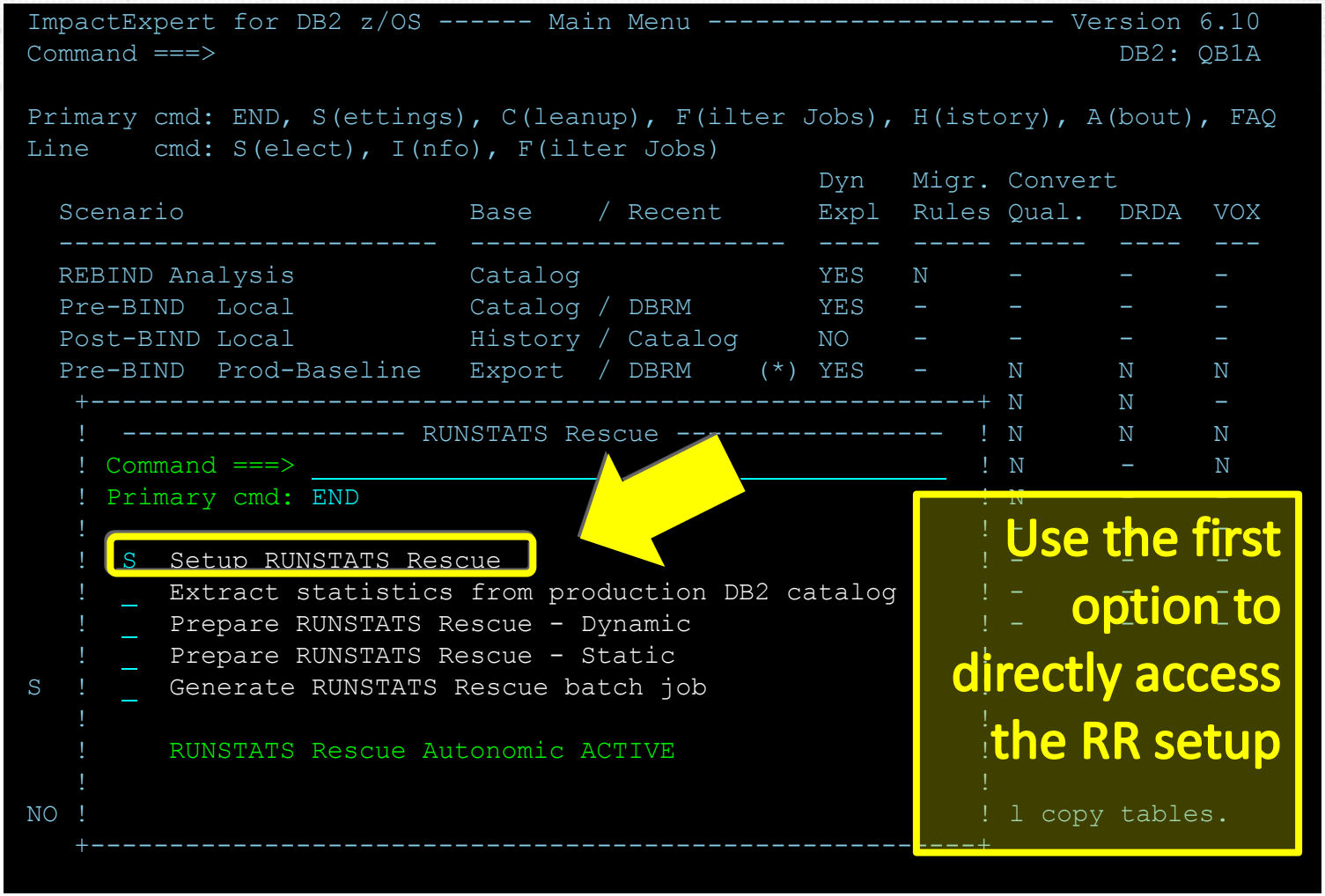
RUNSTATS Rescue – setup



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RUNSTATS Rescue – setup

```
ImpactExpert for DB2 z/OS ----- RUNSTATS Rescue Settings ---- Setting 1 from 4
Command ===> ____________________________________________ Scroll ===> CSR
                                                            DB2: QB1A
Primary cmd: END, CAN(cel), F(ilter), T(ext on/off), L(ocate) setting
Line     cmd: S(elect), R(eset to DEFAULT)

Profile: HEINRIC      Creator . .: HEINRIC
                      Description: Default profile for IQA
    Category
      Setting                          Value     Valid Input
    ------------------------------------------------------------------------
    BIX RUNSTATS Rescue
_     USE GDG FILES                    Y         Y/N

_     GDG NAME                         SETEST..  CHAR(35)

_     VSAM PREFIX FOR RUNSTATS RESCUE  SETEST..  CHAR(33)

_     SHOW CATALOG BROWSER             Y         Y/N
    ------------------------------------------------------------------------
```

A GDG is perfect for a stats history

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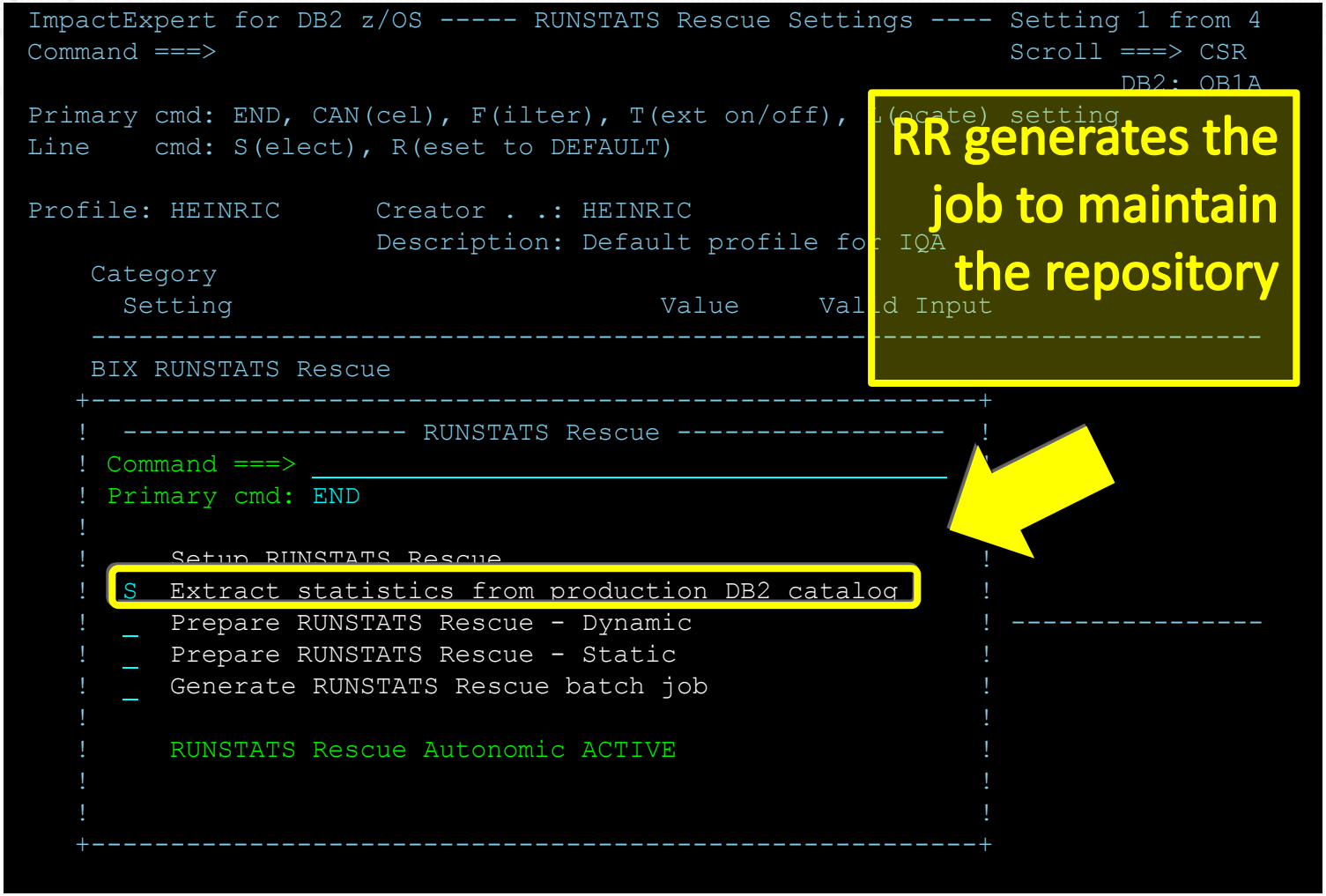
RUNSTATS Rescue – statistics repository



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RUNSTATS Rescue – statistics repository

```
ImpactExpert for DB2 z/OS ----- RUNSTATS Rescue Settings ---- Setting 1 from 4
 +-------------------------------------------------------------------------------+
 ! ImpactExpert for DB2 z/OS ----- Jobcard ---------------------------------  !
 ! Command ===> ____________________________________________________________   !
 !                                                                             !
 ! The following jobcard is used. Type in your changes.                        !
 !                                                                             !
 ! //&JOBNAME JOB (),CLASS=A,NOTIFY=&SYSUID                                    !
 ! //*                                                                         !
 ! //*                                                                         !
 ! //*                                                                         !
 ! //*                                                                         !
 ! //*                                                                         !
 ! //*                                                                         !
 ! //*                                                                         !
 ! //*                                                                         !
 ! //*                                                                         !
 !                                                                             !
 ! STEP ACCT : ________________                                               !
 !                                                                             !
 !                                                                             !
 +-------------------------------------------------------------------------------+
```

Verify your jobcard to maintain the statistics repository

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RUNSTATS Rescue – statistics repository

```
ImpactExpert for DB2 z/OS ----- Change Data ----------------------------------
EDIT       SYS16200.T134620.RA000.HEINRIC.R0118781          Columns 00001 00072
Command ===> _____________________________________________ Scroll ===> CSR
000125 </PROD-SIM>
000126 //REPRO2    EXEC PGM=IDCAMS,COND=(0,LT)
000127 //SYSPRINT  DD SYSOUT=*
000128 //SYSIN     DD *
000129   REPRO INFILE(IN)     OUTFILE(OUT)
000130 //IN        DD DISP=SHR,
000131 //             DSN=SETEST.BIX-RR.CATSTTS.STATS
000132 //OUT       DD DISP=(,CATLG),SPACE=(CYL,(50,10)
000133 //             DCB=(RECFM=VB,LRECL=8500),
000134 //             DSN=SETEST.BIX-RR.STATS(+1)
000135 //BIX6RSCG EXEC PGM=BIX6RSCG,
000136 //       PARM=('QB1A,IQAP06QB,IQA061QB,Y,N')
000137 //STEPLIB  DD DISP=SHR,DSN=SE.PRODUCT.PTFQB.IQA0610.QB1A.LOAD
000138 //         DD DISP=SHR,DSN=CEE.SCEERUN
000139 //         DD DISP=SHR,DSN=DSN[illegible]
000140 //         DD DISP=SHR,DSN=DSNB10.SDSNLOAD
000141 //BIXGDG    DD DISP=SHR,DSN=[illegible]
000142 //BIXPROT   DD SYSOUT=*
000143 //BIXINPUT  DD *
000144 //SYSOUT    DD SYSOUT=*
000145 //ERRORLOG  DD SYSOUT=*
000146 //*SEDYNSQL  DD SYSOUT=*
000147 //
****** ***************************** Bottom of Data ****************************
```

Using a GDG is a simple way to keep *n* generations of statistics. In z/OS 2.2 limit raised from 255 -> 999

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RUNSTATS Rescue – procedure

Schedule RR-batch job to maintain a history of optimizer relevant statistics (using a GDG).

If a (dynamic) SQL statement performs badly:

- **Point RR on the STMT**
  - RR shows the associated tablespaces/indexspaces for stats recovery
- Specify since when it degraded
  - RR checks if a RUNSTATS was executed since then and shows the details per object
  - RR verifies potential object (re-) creation within the timeframe
- RR generates jobs to
  - Extract the stats from its repository
  - Rescue the stats

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RUNSTATS Rescue – dynamic SQL

```
ImpactExpert for DB2 z/OS ----- RUNSTATS Rescue Settings ---- Setting 1 from 4
Command ===>                                                  Scroll ===> CSR
                                                                     DB2: QB1A
Primary cmd: END, CAN(cel), F(ilter), T(ext on/off), L(ocate) setting
Line    cmd: S(elect), R(eset to DEFAULT)

Profile: HEINRIC      Creator . .: HEINRIC
                      Description: Default profile for IQA
    Category
      Setting                            Value     Valid Input
    ------------------------------------------------------------------------------
    BIX RUNSTATS Rescue
   +-----------------------------------------------------------+
   !  ------------------ RUNSTATS Rescue -----------------  !
   ! Command ===> _____________________________________  !
   ! Primary cmd: END                                    !
   !                                                     !
   !   _  Setup RUNSTATS Rescue                          !
   !   _  Extract statistics from production DB2         !
   !   S  Prepare RUNSTATS Rescue - Dynamic              ! ----------------
   !   _  Prepare RUNSTATS Rescue - Static               !
   !   _  Generate RUNSTATS Rescue batch job             !
   !                                                     !
   !      RUNSTATS Rescue Autonomic ACTIVE               !
   !                                                     !
   !                                                     !
   +-----------------------------------------------------------+
```

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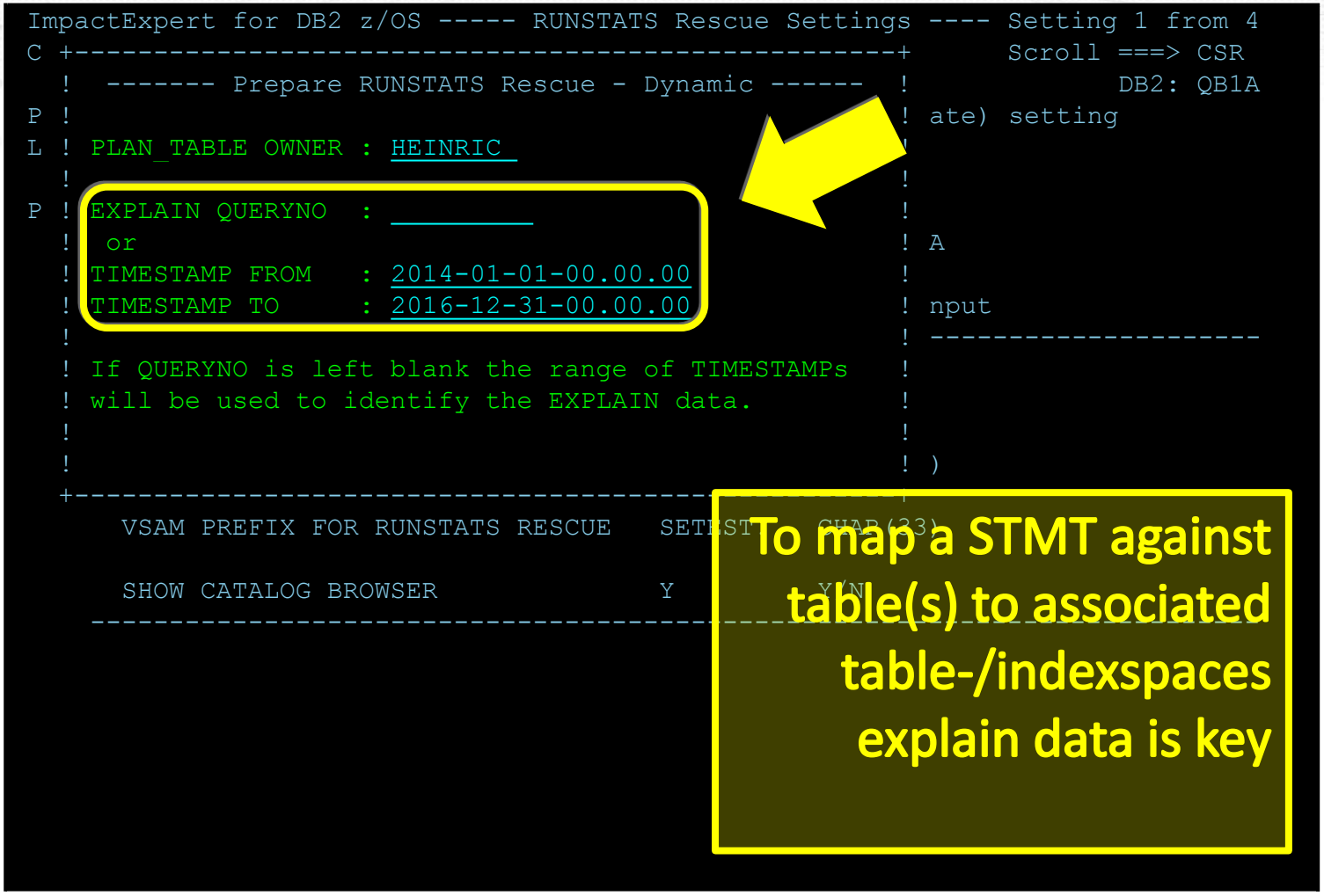
RUNSTATS Rescue – dynamic SQL



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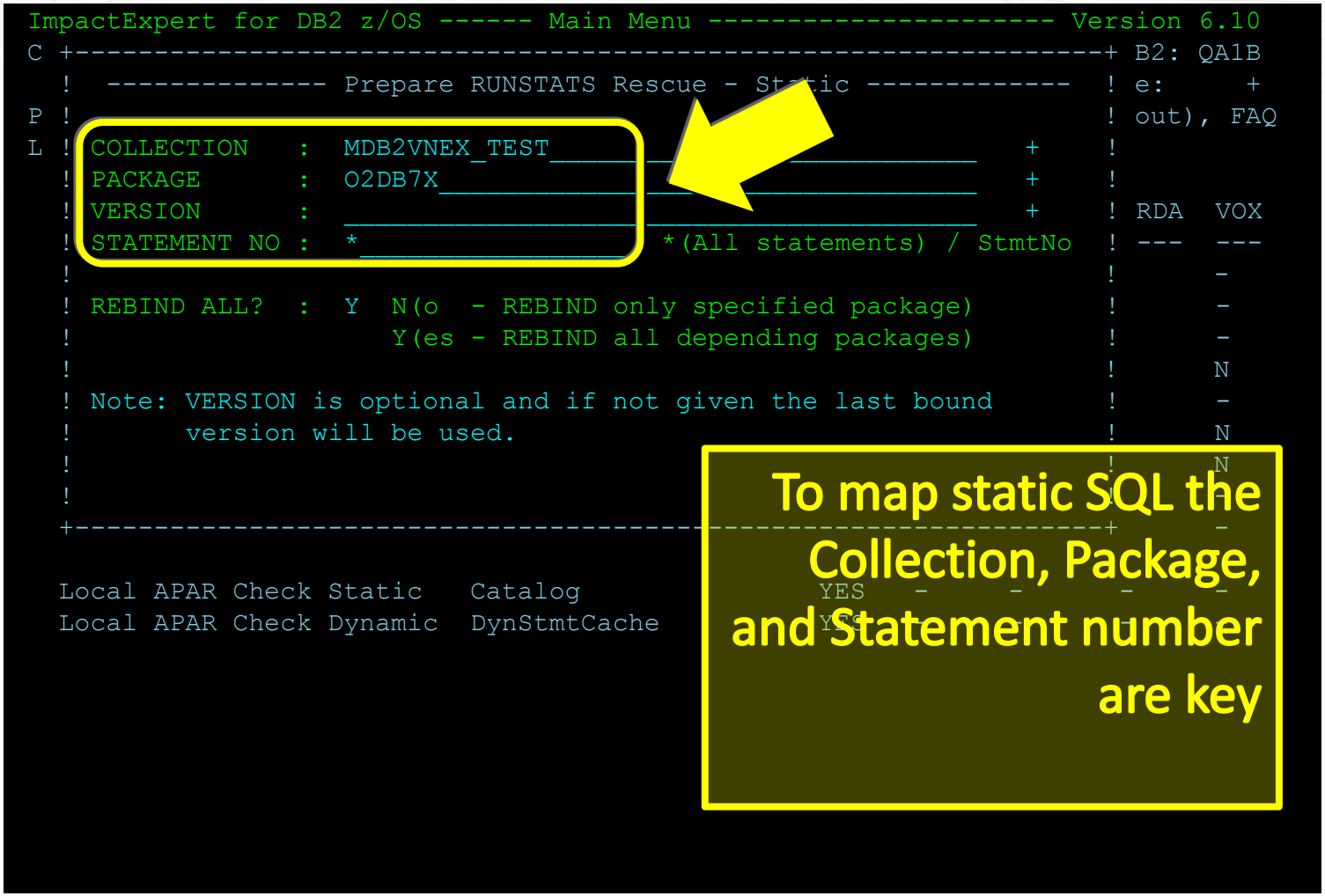
RUNSTATS Rescue – static SQL



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RUNSTATS Rescue – procedure

Schedule RR-batch job to maintain a history of optimizer relevant statistics (using a GDG).

If a (dynamic) SQL statement performs badly:

- Point RR on the STMT
  - **RR shows the associated tablespaces/indexspaces for stats recovery**
- Specify since when it degraded
  - RR checks if a RUNSTATS was executed since then and shows the details per object
  - RR verifies potential object (re-) creation within the timeframe
- RR generates jobs to
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  - Rescue the stats

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RUNSTATS Rescue – dynamic SQL

```
ImpactExpert for DB2 z/OS ----- Tables of Explained SQL ------- Table 1 from 4
Command ===> _____________________________________________ Scroll ===> CSR
MODE:                                                          DB2: QB1A
Primary cmd: END, CAN(cel), Z(oom), L(ocate) creator
Line     cmd: C(olumns), D(atabase), I(ndexes), L(CoLdist), P(artitions),
              T(ablespace), Z(oom)

     Creator  +   Name             +   Database  Tablespace  Statstime          +
     ----------   ------------------   --------  ----------  -------------------
_    IQA061QB     IQATI004             IQAD06QB  IQASI004    2016-07-18-13.51.33
_    IQA061QB     IQATI006             IQAD06QB  IQASI006    2016-07-18-13.51.29
_    IQA061QB     IQATI007             IQAD06QB  IQASI007    2016-07-18-13.51.27
_    IQA061QB     IQATI009             IQAD06QB  IQASI009    2016-07-18-13.51.22
     ----------   ------------------   --------  ----------  -------------------
```

If desired:

```
VSAM PREFIX FOR RUNSTATS RESCUE   SETEST..   CHAR

SHOW CATALOG BROWSER              Y          Y/N
```

The determined spaces are shown

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RUNSTATS Rescue – procedure

Schedule RR-batch job to maintain a history of optimizer relevant statistics (using a GDG).

If a (dynamic) SQL statement performs badly:

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RUNSTATS Rescue – dynamic SQL

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RUNSTATS Rescue – procedure

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RUNSTATS Rescue – dynamic SQL

```
ImpactExpert for DB2 z/OS -------------------------- LINE 00000001 COL 001 080
Command ===>                                                   Scroll ===> PAGE
Press END to continue

--------------------------------------------------------------------------------
Timestamp of GDG generation : 2016-07-18-1 .49.25.570000
Dataset   of GDG generation : SETEST.BIX-R .STATS.G0002V00
Specified search timestamp  : 2016-07-18-1 .50.00.000000
Determined minimum statstime: 2016-07-18-13.51.22.065344
Determined maximum statstime: 2016-07-18-13.51.33.036285
Determined maximum create TS: 2016-06-27-13.40.17.365875
-------------------------------------------------------------------------------

Queryno :      11111              EXPLAIN_TIME : 2016-07-18-12.48.24.460000

Tablespace IQAD06QB.IQASI009          Statstime : 2016-07-18-13.51.22.065344
Table IQA061QB.IQATI009               Statstime : 2016-07-18-13.51.22.065344
                                      Created   : 2016-06-27-13.40.17.146617
 - Index IQA061QB.IQAXI0091           Statstime : 2016-07-18-13.51.22.065344
    Indexspace: IQAD06QB.IQAXI009     Created   : 2016-06-27-13.40.17.365875

+---------------------------------------------------------------------------+
! RSCU002B Either object(s) with statstime greater than the specified time !
! found or recreated object(s) with created timestamp greater than the     ! --
! specified time found.                                                     !
+---------------------------------------------------------------------------+
```

RR transparently shows which object was RUNSTATed

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RUNSTATS Rescue – procedure

Schedule RR-batch job to maintain a history of optimizer relevant statistics (using a GDG).

If a (dynamic) SQL statement performs badly:

- Point RR on the STMT
  - RR shows the associated tablespaces/indexspaces for stats recovery
- Specify since when it degraded
  - RR checks if a RUNSTATS was executed since then and shows the details per object
  - RR verifies potential object (re-) creation within the timeframe
- **RR generates jobs to**
  - **Extract the stats from its repository**
  - Rescue the stats

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RUNSTATS Rescue – dynamic SQL

```
ImpactExpert for DB2 z/OS ------------------------- LINE 00000001 COL 001 080
C +-------------------------------------------------------------+ oll ===> PAGE
P !  ---------------- Confirm GDG Generation ------------------  !     DB2: QB1A
  !                                                             !
- !  S Use file SETEST.BIX-RR.STATS.G0002V00                    ! --------------
T !          of 2016-07-18-13.49.25.570000                      !
D !                                                             !
S !    Select GDG generation from list                         !
D !                                                             !
D !                                                             !
D +-------------------------------------------------------------+
-------------------------------------------------------------------------------

Queryno :      11111              EXPLAIN_TIME : 2016-07-18-13.49.24.570000

Tablespace IQAD06QB.IQASI009          Statstime : 2016-07-18-13.51.22.065344
Table IQA061QB.IQATI009               Statstime : 2016-07-18-13.51.22.065344
                                      Created   : 2016-06-27-13.40.17.146617
 - Index IQA061QB.IQAXI0091           Statstime : 2016-07-18-13.51.22.065344
    Indexspace: IQAD06QB.IQAXI009     Created   : 2016-06-27-13.40.17.146617

-------------------------------------------------------------------------------

Queryno :       2773              EXPLAIN_TIME : 2016-07-18-12.51.12.260000

Tablespace IQAD06QB.IQASI009          Statstime : 2016-07-18-13.51.22.065344
Table IQA061QB.IQATI009               Statstime : 2016-07-18-13.51.22.065344
                                      Created   : 2016-06-27-13.40.17.146617
```

RR automatically selects the right Stats for fallback, but an override option is available as well

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RUNSTATS Rescue – dynamic SQL

```
ImpactExpert for DB2 z/OS -------------------------- LINE 00000001 COL 001 080
 +-------------------------------------------------------------------------------+
 ! ImpactExpert for DB2 z/OS ----- Jobcard ------------------------------------  !
 ! Command ===> ____________________________________________________________    !
 !                                                                               !
 ! The following jobcard is used. Type in your changes.                          !
 !                                                                               !
 ! //&JOBNAME JOB (),CLASS=A,NOTIFY=&SYSUID                                      !
 ! //*                                                                           !
 ! //*                                                                           !
 ! //*                                                                           !
 ! //*                                                                           !
 ! //*                                                                           !
 ! //*                                                                           !
 ! //*                                                                           !
 ! //*                                                                           !
 ! //*                                                                           !
 !                                                                               !
 ! STEP ACCT : ________________                                                  !
 !                                                                               !
 !                                                                               !
 +-------------------------------------------------------------------------------+

Queryno :       2773              EXPLAIN_TIME : 2016-07-18-12.51.12.260000

Tablespace IQAD06QB.IQASI009         Statstime : 2016-07-18-13.51.22.065344
Table IQA061QB.IQATI009              Statstime : 2016-07-18-13.51.22.065344
                                     Created   : 2016-06-27-13.40.17.146617
```

Verify your jobcard for statistics restore

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RUNSTATS Rescue – dynamic SQL

```
ImpactExpert for DB2 z/OS ----- Change Data ----------------------------------
EDIT       SYS16200.T134620.RA000.HEINRIC.R0118781          Columns 00001 00072
Command ===> _____________________________________________ Scroll ===> CSR
000106 //          DD DISP=SHR,DSN=CEE.SCEERUN
000107 //          DD DISP=SHR,DSN=DSNB10.SDSNEXIT.QB1A
000108 //          DD DISP=SHR,DSN=DSNB10.SDSNLOAD
000109 //SYSOUT    DD SYSOUT=*
000110 //ERRORLOG DD SYSOUT=*
000111 //BIXINPUT DD DISP=OLD,DSN=*.REPRO.IN1
000112 //PDB2OUT   DD SYSOUT=*,RECFM=FBA
000113 //PDB2RUNI DD DISP=OLD,DSN=SETEST.BIX-RR.STATS.GDG
000114 //PDB2RUNO DD DISP=OLD,DSN=SETEST.BIX-RR.CATSTTS.RESCUE
000115 //PDB2IN    DD *
000116 <PROD-SIM>
000117   <DB2-SYSTEM ALIAS-CREATOR="IQA061QB"
000118               CATALOG-CREATOR="SYSIBM"
000119               GTT-IX-BPOOL="BP0"
000120          >
000121   </DB2-SYSTEM>
000122 </PROD-SIM>
000123 //PDB2TSIN DD *
000124 IQAD06QB.IQASI004
000125 IQAD06QB.IQASI006
000126 IQAD06QB.IQASI007
000127 IQAD06QB.IQASI009
000128 //
****** ***************************** Bottom of Data ****************************
```

Extract job is tailored for execution

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RUNSTATS Rescue – procedure

Schedule RR-batch job to maintain a history of optimizer relevant statistics (using a GDG).

If a (dynamic) SQL statement performs badly:

- Point RR on the STMT
  - RR shows the associated tablespaces/indexspaces for stats recovery
- Specify since when it degraded
  - RR checks if a RUNSTATS was executed since then and shows the details per object
  - RR verifies potential object (re-) creation within the timeframe
- RR generates jobs to
  - Extract the stats from its repository
  - **Rescue the stats**

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RUNSTATS Rescue – dynamic SQL

```
ImpactExpert for DB2 z/OS ------------------------- LINE 00000001 COL 001 080
Command ===>                                          Scroll ===> PAGE
Press END to continue                                        DB2: QB1A

-------------------------------------------------------------------------------
Timestamp of GDG generation : 2016-07-18-13.49.25.570000
Dataset   of GDG generation : SETEST.BIX-RR.STATS.G0002V00
Specified search timestamp  : 2016-07-18-13.50.00.000000
Determined minimum statstime: 2016-07-18-13.51.22.065344
Determined maximum statstime: 2016-07-18-13.51.30.000245
Determined maximum create TS: 2016-06-27-13.40.17.365875
-------------------------------------------------------------------------------
   +-------------------------------------------------------+
Qu !  ------------------ RUNSTATS Rescue -----------------  ! .48.24.460000
   ! Command ===> _____________________________________     !
Ta ! Primary cmd: END                                      ! .51.22.065344
Ta !                                                       ! .51.22.065344
   !   _  Setup RUNSTATS Rescue                            ! .40.17.146617
 - !   _  Extract statistics from production DB2 cat       ! .51.22.065344
   !   _  Prepare RUNSTATS Rescue - Dynamic                ! .40.17.365875
   !   _  Prepare RUNSTATS Rescue - Static                 !
-- !   S  Generate RUNSTATS Rescue batch job               ! -----------------
   !                                                       !
Qu !      RUNSTATS Rescue Autonomic ACTIVE                 ! .51.12.260000
   !                                                       !
Ta !                                                       ! .51.22.065344
Ta +-------------------------------------------------------+ .51.22.065344
                                  Created    : 2016-06-27-13.40.17.146617
```

RR not only Rescues but also invalidates the bad access path from the DSC

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RUNSTATS Rescue – dynamic SQL

```
ImpactExpert for DB2 z/OS ----- Change Data ----------------------------------
EDIT       SYS16200.T134620.RA000.HEINRIC.R0118781          Columns 00001 00072
Command ===> _____________________________________________ Scroll ===> CSR
000067 ALIAS-CREATOR=IQA061QB
000068 //PDB2OUT  DD SYSOUT=*,RECFM=FBA
000069 //PDB2RUNS DD DISP=SHR,DSN=SETEST.BIX-RR.CATSTTS.RESCUE
000070 //*-------------------------------------------------------------------
000071 //RUNSTATS EXEC PGM=DSNUTILB,REGION=32M,
000072 // PARM='QB1A,RSCURUNS'
000073 //STEPLIB  DD DISP=SHR,DSN=DSNB10.SDSNEXIT.QB1A
000074 //         DD DISP=SHR,DSN=DSNB10.SDSNLOAD
000075 //SYSPRINT DD SYSOUT=*
000076 //SYSIN    DD *
000077 RUNSTATS TABLESPACE IQAD06QB.IQASI004
000078 UPDATE NONE REPORT NO
000079
000080 RUNSTATS TABLESPACE IQAD06QB.IQASI006
000081 UPDATE NONE REPORT NO
000082
000083 RUNSTATS TABLESPACE IQAD06QB.IQASI007
000084 UPDATE NONE REPORT NO
000085
000086 RUNSTATS TABLESPACE IQAD06QB.IQASI009
000087 UPDATE NONE REPORT NO
000088
000089 //
****** **************************** Bottom of Data ****************************
```

Runstats Rescue

DSC invalidation by UPDATE NONE

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RUNSTATS Rescue – Summary I

- When you have 1000's of partitions on a multi tera-byte database - Without a tool you have no chance to react effectively!
- Buys much-needed time during critical events
- Cost-effective and time-saving
- Identifies whether or not RUNSTATS was guilty (ZPARM, SQL New Release, Bufferpool etc.)

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RUNSTATS Rescue – Summary II

- Complements IBM-Plan Management where it does not work (any changed object e.g. views, dynamic SQL)
- Saves statistics and recovers back to them using a simple, guided semi-automatic process
- Helps to automate a rescue process
- Works for both dynamic and static SQL
- Guarantees stable Access Paths for Dynamic as well as Static SQL in DB2 11 & 12 and not just for your “Top 10 or 20”

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RUNSTATS – Future Automation Chances?

I have one last thing for you…

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RUNSTATS – Future Automation Chances?

I have one last thing for you…

IBM Analytics

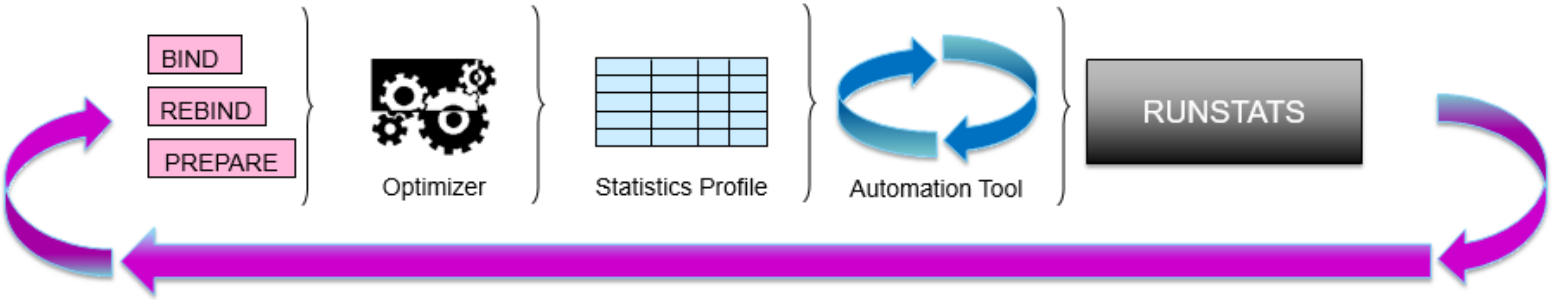
IBM DB2 Utilities and Tools – Moving from Automation to Self-Management

- Continue to build upon existing self-management infrastructure
- Managing statistics in DB2 12
  - Direct update of statistics profiles
    - Optimizer
    - DDL
  - Utility inline statistics support for USE PROFILE
  - Automation Tool completes the cycle to detect profile changes & drive new statistics gathering

ITERGO

"The RUNSTATS enhancement with profiles, inline stats and optimizer ability to update, completes the picture for us. We are extremely satisfied."

Walter Janißen, ITERGO



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RUNSTATS – Future Automation Chances?

Is, for me, the same as Pandora's box!

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RUNSTATS – Future Automation Chances?

The Four Horsemen of the Apocalypse?

Is it so bad you may well ask?

- My answer is an emphatic Yes!
- Just think what a perfect feed back loop actually enables?

Anyone, running and doing anything, think QMF here, gets SYSSTATSFEEDBACK options. Which then *automatically* updates the PROFILE which then grows and grows and grows until your "simple" RUNSTATS takes four hours of CPU with thousands of COLGROUP definitions leading to hugely increased PREPARE and BIND/REBIND times.

This is a real disaster just waiting to happen!

But please remember –

left in the bottom of Pandora's box was "Hope"

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Questions???

Many thanks for your attention and now….

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Please fill out your session evaluation before leaving!

Session <V10>

Access Path Recovery for DB2 11 + 12

Using RUNSTATS Rescue