DB2PM - trace av dynamisk SQL

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Bakgrund

- Prestandaproblem i ett köpt system
  - Java
  - Batch (och lite online)
  - LOB-data
  - BEA WebLogic Server på W2k
  - DB2 Connect v 7.2
  - DB2 för z/OS v 7
- Förstå prestandaproblemet
- Få reda på vilken SQL som exekveras (dynamisk)
  - Måste exekvera genom systemet för att fånga all SQL

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Trace information

```
DSN SYSTEM(DSNN)
-DIS    TRACE(*) DETAIL(1,2)
-START TRACE  (ACCTG) CLASS(1,2,3,7,8)                    -
                      DEST(GTF)                           -
                      AUTHID(US00140)                     -
                      TDATA(COR,TRA,CPU,DIST)
-START TRACE  (PERFM) CLASS(2,3,4,6,8,9,10,13,16,17)      -
                      DEST(GTF)                           -
                      AUTHID(US00140)                     -
                      TDATA(COR,TRA,CPU,DIST)
-DIS    TRACE(*) DETAIL(1,2)
```

Accounting - rapport

```
1   LOCATION: DSNN                          DB2 PERFORMANCE EXPERT (V1)                          PAGE: 1-1
       GROUP: DSNNGRP                        ACCOUNTING REPORT - LONG                REQUESTED FROM: ALL      07:51:01.00
      MEMBER: DSNN                                                                              TO: DATES    07:52:18.00
   SUBSYSTEM: DSNN                          ORDER: PRIMAUTH-PLANNAME                 INTERVAL FROM: 12/11/03 07:51:08.03
 DB2 VERSION: V7                               SCOPE: MEMBER                                    TO: 12/11/03 07:52:17.51

 PRIMAUTH: US00140  PLANNAME: java.exe

 ELAPSED TIME DISTRIBUTION                                          CLASS 2 TIME DISTRIBUTION
 ------------------------------------------------------------       ------------------------------------------------------------
 APPL   !=============================================> 86%        CPU    !======> 12%
 DB2    !=> 3%                                                      NOTACC !=====> 10%
 SUSP   !=====> 11%                                                 SUSP   !=======================================> 79%

 AVERAGE       APPL(CL.1)  DB2 (CL.2)  IFI (CL.5)    CLASS 3 SUSPENSIONS   AVERAGE TIME  AV.EVENT    HIGHLIGHTS
 ------------  ----------  ----------  ----------    --------------------  ------------  --------    --------------------------
 ELAPSED TIME    0.653852    0.093762         N/P    LOCK/LATCH(DB2+IRLM)      0.018857      0.12    ÄOCCURRENCES    :      183
  NONNESTED      0.653852    0.093750         N/A    SYNCHRON. I/O             0.015500      3.55    ÄALLIEDS        :        0
  STORED PROC    0.000000    0.000000         N/A     DATABASE I/O             0.010771      3.25    ÄALLIEDS DISTRIB:        0
  UDF            0.000000    0.000000         N/A     LOG WRITE I/O            0.004729      0.30    ÄDBATS          :      183
  TRIGGER        0.000000    0.000000         N/A    OTHER READ I/O            0.000289      0.16    ÄDBATS DISTRIB. :        0
                                                     OTHER WRTE I/O            0.001499      0.06    ÄNO PROGRAM DATA:        6
 CPU TIME        0.013680    0.010794         N/P    SER.TASK SWTCH            0.029437      0.95    ÄNORMAL TERMINAT:      183
  AGENT          0.013680    0.010794         N/A     UPDATE COMMIT            0.000006      0.03    ÄABNORMAL TERMIN:        0
   NONNESTED     0.013680    0.010794         N/P     OPEN/CLOSE               0.020014      0.26    ÄCP/X PARALLEL. :        0
   STORED PRC    0.000000    0.000000         N/A     SYSLGRNG REC             0.004323      0.16    ÄIO PARALLELISM :        0
   UDF           0.000000    0.000000         N/A     EXT/DEL/DEF              0.004142      0.26    ÄINCREMENT. BIND:        0
```

SQL activity - rapport

```
1   LOCATION: DSNN                          DB2 PERFORMANCE EXPERT (V1)                          PAGE: 1-1
       GROUP: DSNNGRP                          SQL ACTIVITY - REPORT                REQUESTED FROM: NOT SPECIFIED
      MEMBER: DSNN                                                                            TO: NOT SPECIFIED
   SUBSYSTEM: DSNN                         ORDER: PRIMAUTH-PLANNAME                  ACTUAL FROM: 12/11/03 07:50:05.13
 DB2 VERSION: V7                                                                            TO: 12/11/03 07:56:38.23
                                                  SUMMARIZED BY STMTNO

 PRIMAUTH: US00140     PLANNAME: DISTSERV                          THREAD TOTAL:     7  START AET: N/P       STOP AET: N/P

        EVENT            COUNT     TOT.ELAPS  TOTAL TCB                              DETAIL
                                   AET/EVENT  TCB/EVENT
 -------------------- ----------- ----------- --------- ------------------------------------------------------------------------------

  Ä   101                     20    0.000699  0.000533 CLOSE       CURSOR: SQLCUR4
                                    0.000035  0.000027

 Ä   101                     20                        DESCRIBE

 Ä   101                     37    0.146346  0.008634 FETCH       CURSOR: SQLCUR4
                                    0.003955  0.000233

 Ä   101                     20    0.000578  0.000390 OPEN        CURSOR: SQLCUR4           ISO(CS) REOPT(NO)  KEEP UPD LOCKS: NO
                                    0.000029  0.000019

 Ä   101                     20    0.009840  0.006418 PREPARE     CURSOR: SQLCUR4
                                    0.000492  0.000321
```

Accounting trace - laddfil

```
//ACFILDD1 DD   DSN=N314890.PM.ACFIL,
//              DISP=(,CATLG,DELETE),
//              SPACE=(CYL,(1,10)),
//              DCB=(LRECL=9072,RECFM=VB,BLKSIZE=9076)
//SYSIN    DD   *
GLOBAL
ACCOUNTING
   TRACE
     FILE
EXEC
```

Record trace - laddfil

```
//RTFILDD1 DD   DSN=N314890.PM.RTFIL,
//              DISP=(,CATLG,DELETE),
//              SPACE=(CYL,(1,10)),
//              DCB=(LRECL=9072,RECFM=VB,BLKSIZE=9076)
//SYSIN    DD   *
GLOBAL
RECTRACE
   TRACE
     FILE
EXEC
```

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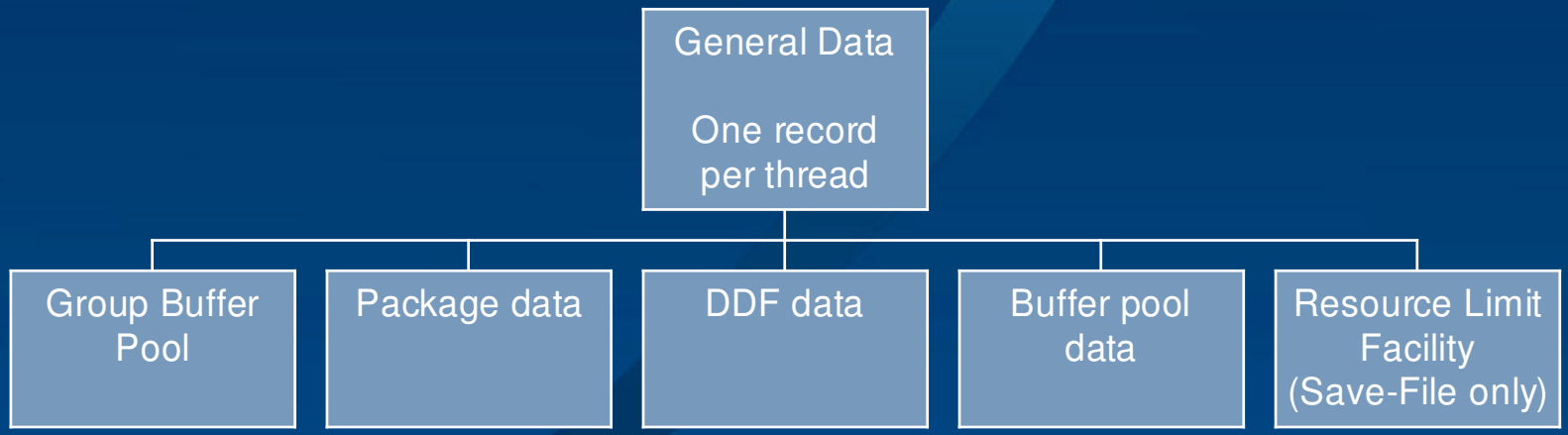
Accounting Tables



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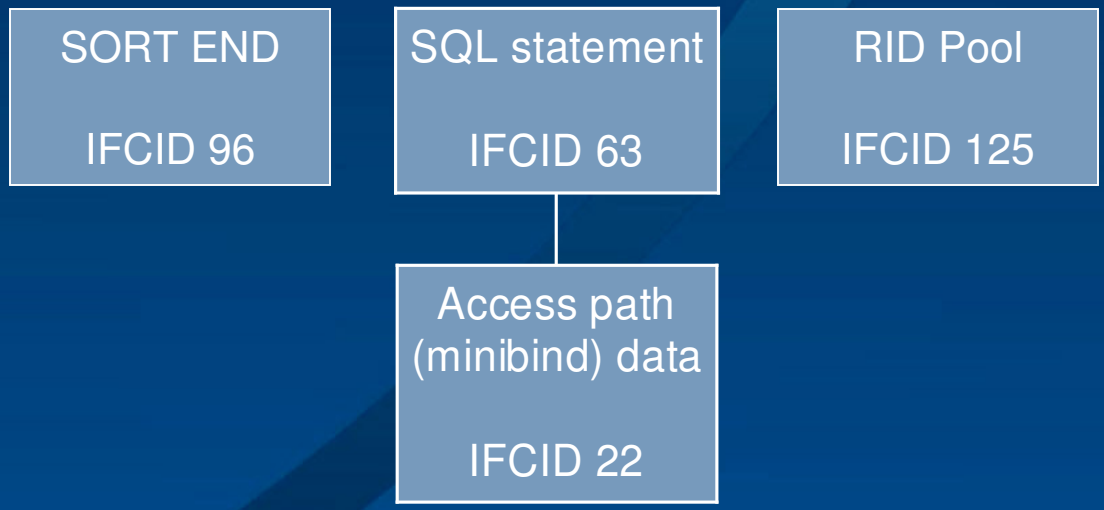
Record Trace Tables



LOAD av DB2PM-tabeller med acct. trace info

```
LOAD DATA INDDN(SYSREC)
   RESUME NO LOG NO
 INTO TABLE DB2PMFACCT_BUFFER
   WHEN (9:9) = 'B'
  (DB2PM_REL              POSITION(3) SMALLINT,
..
INTO TABLE DB2PMFACCT_DDF
  WHEN (9:9) = 'D'
 (DB2PM_REL              POSITION(3) SMALLINT,
.. o.s.v
```

LOAD av DB2PM-tabeller med record trace info

```
 LOAD DATA INDDN(SYSREC)
   RESUME YES LOG NO
 INTO TABLE DB2PMFRTRC_MINIPLN
   WHEN (85:86) = X'0016'
  (DB2PM_REL              POSITION(3) SMALLINT,
..
INTO TABLE DB2PMFRTRC_RIDLIST
  WHEN (85:86) = X'007D'
 (DB2PM_REL              POSITION(3) SMALLINT,
.. o.s.v
```

Lista all SQL som det gjorts bind på

```
SELECT   SUBSTR(DIGITS(M.QBLOCKNO),5,1)                  AS QB,
         SUBSTR(DIGITS(M.PLANNO),5,1)                    AS P,
         SUBSTR(DIGITS(IFNULL(M.NEXTSTEP,0)),10,1)       AS NS,
         SUBSTR(DIGITS(M.METHOD),5,1)!!M.JOINTYPE        AS MT,
         SUBSTR(M.TNAME,1,10)                            AS TAB,
         SUBSTR(DIGITS(M.MATCHCOLS),5,1)                 AS MC,
         M.ACCESSTYPE                                    AS AT,
         SUBSTR(M.ACCESSNAME,1,10)                       AS IX,
         M.INDEXONLY                                     AS IXO,
         SUBSTR(DIGITS(M.MIXOPSEQ),5,1)                  AS MX,
         M.SORT, T.STATEMENT_TEXT, T.CPU_TIME, M.COST
  FROM DB2PMFRTRC_SQLTEXT T INNER JOIN
       DB2PMFRTRC_MINIPLN M
    ON T.TIMESTAMP = M.SQLTEXT_TIMESTAMP
 ORDER BY M.TIMESTAMP,M.QUERYNO,M.QBLOCKNO,M.PLANNO,M.MIXOPSEQ;
```

Resultat - all SQL med miniplan

QB	P	NS	MT	TAB	MC	AT	IX	IXO	MX	SORT	STATEMENT_TEXT
1	1	0	0N	T_ISSUER	1	I	FL1ISSU1	N	1	NNNNNNNN	SELECT ID, USE ...
1	1	0	0N	T_BATCH	0	R			0	NNNNNNNN	select OID fro ...
1	1	0	0N	T_PROD_PRO	1	I	FL1PRPR2	N	1	NNNNNNNN	select T_PROD_ ...
1	1	0	0N	T_CARD_TYP	2	I	FL1CRDT2	N	1	NNNNNNNN	SELECT OID, IS ...
...											
1	1	1	0N	T_DOMAIN_P	0	I	FL1DOPR2	N	1	NNNNNNNN	SELECT OID, NA ...
1	2	0	1I	T_PROD_HAS	1	I	FL1PRHD1	N	1	NNNNNNNN	SELECT OID, NA ...
1	1	0	0N	T_CARD_TYP	1	I	FL1CRDT1	N	1	NNNNNNNN	select T_CARD_ ...
1	1	0	0N	T_HSM_DOMA	1	I	FL1HSDO1	N	1	NNNNNNNN	select T_HSM_D ...
1	1	1	0N	T_APP_PROF	0	I	FL1APPR2	N	1	NNNNNNNN	SELECT OID, NA ...
1	1	0	0N	T_AGENT_PE	2	B	FL1AGPD3	N	1	NNNNNNNN	SELECT OUT_PAR ...
1	1	0	0N	T_CARD_PER	0	R			0	NNNNNNNN	DELETE FROM T_ ...
1	1	0	0N	T_CARD_IMA	1	I	FL1CRDI3	N	1	NNNNNNNN	SELECT OID FRO ...
1	1	0	0N	T_AGENT_PE	1	B	FL1AGPD3	N	1	NNNNNNNN	DELETE FROM T_ ...
1	2	0	1I	T_DOMAIN_H	0	R			0	NNNNNNNN	SELECT OID, NA ...

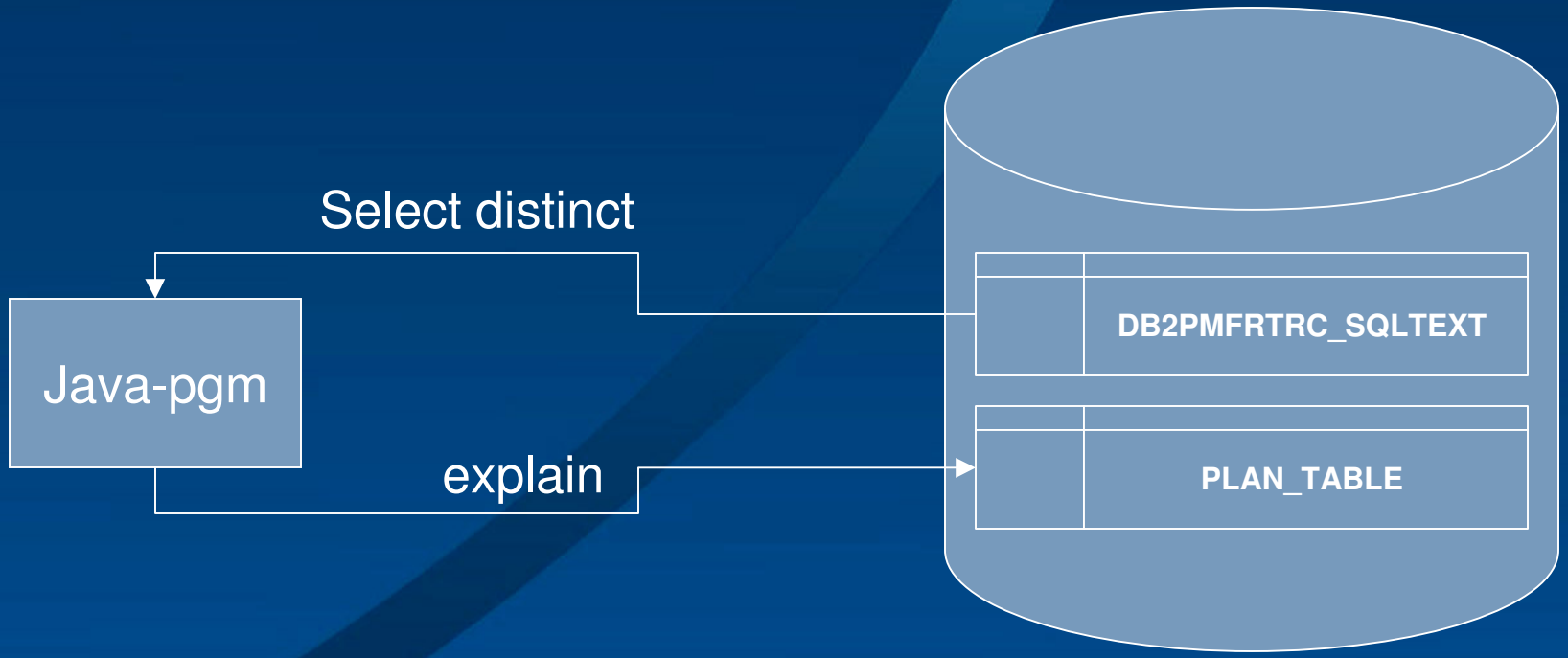
Lista SQL per CPU åtgång

```
SELECT TAB.COUNT,
       TAB.SUMCPU,
       S.STATEMENT_TEXT
  FROM N314890.DB2PMFRTRC_SQLTEXT S,
      (SELECT MIN(A.TIMESTAMP) AS TSP,
              SUM(A.CPU_TIME)  AS SUMCPU,
              COUNT(*)         AS COUNT
         FROM ( SELECT SUBSTR(STATEMENT_TEXT,1,255) AS TEXT
                     ,TIMESTAMP
                     ,CPU_TIME
                     FROM N314890.DB2PMFRTRC_SQLTEXT ) AS A
        GROUP BY TEXT   )                              AS TAB
 WHERE S.TIMESTAMP = TAB.TSP
 ORDER BY 2 DESC
;
```

Resultat - SQL per CPU åtgång

COUNT	SUMCPU	STATEMENT_TEXT
50	38.323324	SELECT OUT_PARAMS FROM T_AGENT_PERSO_DATA WHERE CARD_I ...
24	29.989513	SELECT ISSUER_ID, BATCH_ID, PERSO_BUREAU_ID, REQ_TYPE, ...
40	27.089606	UPDATE T_CARD_PERSO_DATA SET CARD_IMAGE_OID= ?, CARD_I ...
30	25.807901	UPDATE T_AGENT_PERSO_DATA SET CARD_IMAGE_OID= ?, ISSUE ...
11	25.455141	select OID, ISSUER_ID, CARD_ID, CARD_HOLDER_OID, BATCH ...
20	23.338716	SELECT OID, ISSUER_ID, CARD_ID, CARD_HOLDER_OID, BATCH ...
10	22.719574	UPDATE T_CARD_IMAGE SET PIN_EXISTS = ?, DEFAULT_DOMAIN ...
10	22.671713	INSERT INTO T_CARD_PERSO_DATA (OID, CARD_IMAGE_OID, CA ...
10	22.479529	INSERT INTO T_AGENT_PERSO_DATA (OID, CARD_IMAGE_OID, I ...
10	22.444858	insert into T_APP_IMAGE (OID, DOMAIN_IMAGE_OID, APP_PR ...
10	22.425882	insert into T_APPLICATION (OID, DOMAIN_OID, LIFE_CYCLE ...
10	22.407734	SELECT OID, DOMAIN_OID, LIFE_CYCLE_STATE FROM T_APPLIC ...
10	22.381403	insert into T_DOMAIN (OID, CARD_OID, KEY_OID, LIFE_CYC ...
10	22.345809	insert into T_DOMAIN_IMAGE (OID, CARD_IMAGE_OID, DOMAI ...
10	22.326495	insert into T_CARD (OID, PIN, PIN_MAC, REMAINING_TRIES ...
...		

Batch explain via Java-pgm



Select distinct - ”alla” unika förekomster av SQL

```
SELECT STATEMENT_TEXT
  FROM N314890.DB2PMFRTRC_SQLTEXT S
  JOIN (SELECT MIN(TIMESTAMP) AS TSP
          FROM ( SELECT SUBSTR(STATEMENT_TEXT,1,255) AS TEXT
                      , TIMESTAMP
                   FROM N314890.DB2PMFRTRC_SQLTEXT ) AS A
         GROUP BY TEXT ) AS B
    ON S.TIMESTAMP = B.TSP
;
```

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Explain - på alla unika statements

```
while (rsSel.next()) {
            PreparedStatement explstmt =
            conn.prepareStatement(
            "EXPLAIN PLAN SET QUERYNO = "
            + qnr++
            + " FOR "
            + rsSel.getString("STATEMENT_TEXT"));

            explstmt.executeUpdate();
        }
```

Lista SQL från PLAN_TABLE

```
SELECT SUBSTR(DIGITS(QUERYNO),6,5)              AS QNO,
       SUBSTR(DIGITS(QBLOCKNO),5,1)             AS QB,
       SUBSTR(DIGITS(PLANNO),5,1)               AS P,
       SUBSTR(DIGITS(METHOD),5,1)!!
       JOIN_TYPE                                AS MT,
       SUBSTR(TNAME,1,10)                       AS TAB,
       SUBSTR(DIGITS(MATCHCOLS),5,1)            AS MC,
       ACCESSTYPE                               AS AT,
       SUBSTR(ACCESSNAME,1,10)                  AS IX,
       INDEXONLY                                AS IXO,
       SORTN_JOIN!!' '!!
       SORTC_UNIQ!!SORTC_JOIN!!SORTC_ORDERBY!!SORTC_GROUPBY AS SORT,
FROM PLAN_TABLE A
 WHERE  QUERYNO > 1000 ;
```

DB2PM performance database

Detta är dokumenterat i:

IBM DB2 Performance Expert for z/OS Report Reference SC27-1647-03

finns på IBM DB2 and IMS Tools på adressen

http://www-306.ibm.com/software/data/db2imstools/db2tools-library.html

Kapitel 37. Database Structure - Beskriver vilka medlemmar som finns på hlq.SFPESAMP

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Problem som vi stött på

- Buggar i laddkort
  - `hlq.SFPESAMP(DGONLFSQ)`
    - `INTO TABLE DB2PMFRTRC_SQLTEXT`
      - `fel  STATEMENT_TEXT  POSITION(233) VARCHAR`
      - `rätt STATEMENT_TEXT  POSITION(231) VARCHAR`
  - `hlq.SFPESAMP(DGONLFMB)`
    - `INTO TABLE DB2PMFRTRC_MINIPLAN`
      - `fel  VERSION POSITION(472) VARCHAR(64) NULLIF((424)='N'))`
      - `rätt VERSION POSITION(472) VARCHAR NULLIF((425)='N'))`
- Sql för select distinct (hantering av långa strängar > 255 tkn)

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Funderingar

- Hur fångar vi upp dynamisk SQL (skriven & genererad) för review?
  - DETECTOR
  - DB2PM
  - P6SPY (eller annat verktyg på server / arbetsstation)
  - o.s.v