Built in Function

BIF Compatibility

A german customer presentation translated and anonymized

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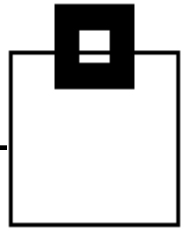
Initial situation



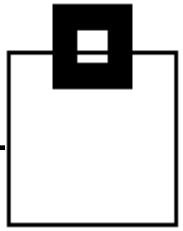
- DB2 10 compatibility mode
- Changes to the STRING formating of decimal data within the CHAR and VARCHAR built-in function and to the CAST specification with CHAR and VARCHAR result types as well as UNSUPPORTED TIMESTAMP STRINGs.
- Reason for the changes in DB2 10 – SQL standards compliance
- How many applications are affected by the changes?
- Temporary solution for the problem until the affected applications are identified:
  `ZPARM=BIF_COMPATIBILITY=V9_DECIMAL_VARCHAR`

ZPARM – BIF_Compatibility Settings

BIF_COMPATIBILITY	CHAR(000.1)	CHAR(1000.)	CHAR(1.1)
CURRENT	'.1'	'1000'	'1.1'
V9	' 000.1'	' 1000.'	' 1.1'
V9_DECIMAL_VARCHAR	' 000.1'	' 1000.'	' 1.1'

BIF_COMPATIBILITY	VARCHAR('00.10')	VARCHAR('1.')
CURRENT	'.10'	'1'
V9	'.10'	'1'
V9_DECIMAL_VARCHAR	.0.10'	'1.'

ZPARM – BIF Compatibility Settings



V9 For decimal input, the CHAR built-in function returns data in the DB2 Version 9 format. The VARCHAR function and the CAST(*decimal-expression* AS CHAR) and CAST(*decimal-expression* AS VARCHAR) specifications return data in the Version 10 format.

V9_DECIMAL_VARCHAR
For decimal input, the CHAR and VARCHAR functions and the CAST(*decimal-expression* AS CHAR) and CAST(*decimal-expression* AS VARCHAR) specifications return data in the DB2 Version 9 format. When you run the installation CLIST in MIGRATE mode with a DSNTIDXA or DSNTIDXB input member, V9_DECIMAL_VARCHAR is the default setting

CURRENT
For decimal input, the CHAR and VARCHAR functions and the CAST(*decimal-expression* AS CHAR) and CAST(*decimal-expression* AS VARCHAR) specifications return data in the DB2 Version 10 format. When you run the installation CLIST in INSTALL mode, CURRENT is the default setting for this parameter.

Information concerning the procedures

- For detailed descriptions see in the Installation and Migration Guide and in the following APARs:

  PM29124 / UK67578

  PM66095 / UK51851

  PM48741 / UK74765 (Unsupported Timestamp String)

Methodology at customers site

- To get all relevant applications (daily,weekly etc.) since mid of April 2014 a performance trace with IFCID 366 was run in production

```
-STA TRACE(P) CLASS(32) IFCID(366) DEST(SMF) SCOPE(GROUP)
```

- For packages with static SQL additionally IFCID 63 was activated

- Identified were 18 programs

1	Cobol Program	(Static SQL)
1	C++ Program	(Dynamic SQL) 3rd party
4	Java Programs	(Dynamic SQL)
12	High Performance Unloads	(Dynamic SQL)

Evaluation of trace records

- Evaluation of SMF records with the help of
  OMEGAMON XE FOR DB2 PERFORMANCE EXPERT

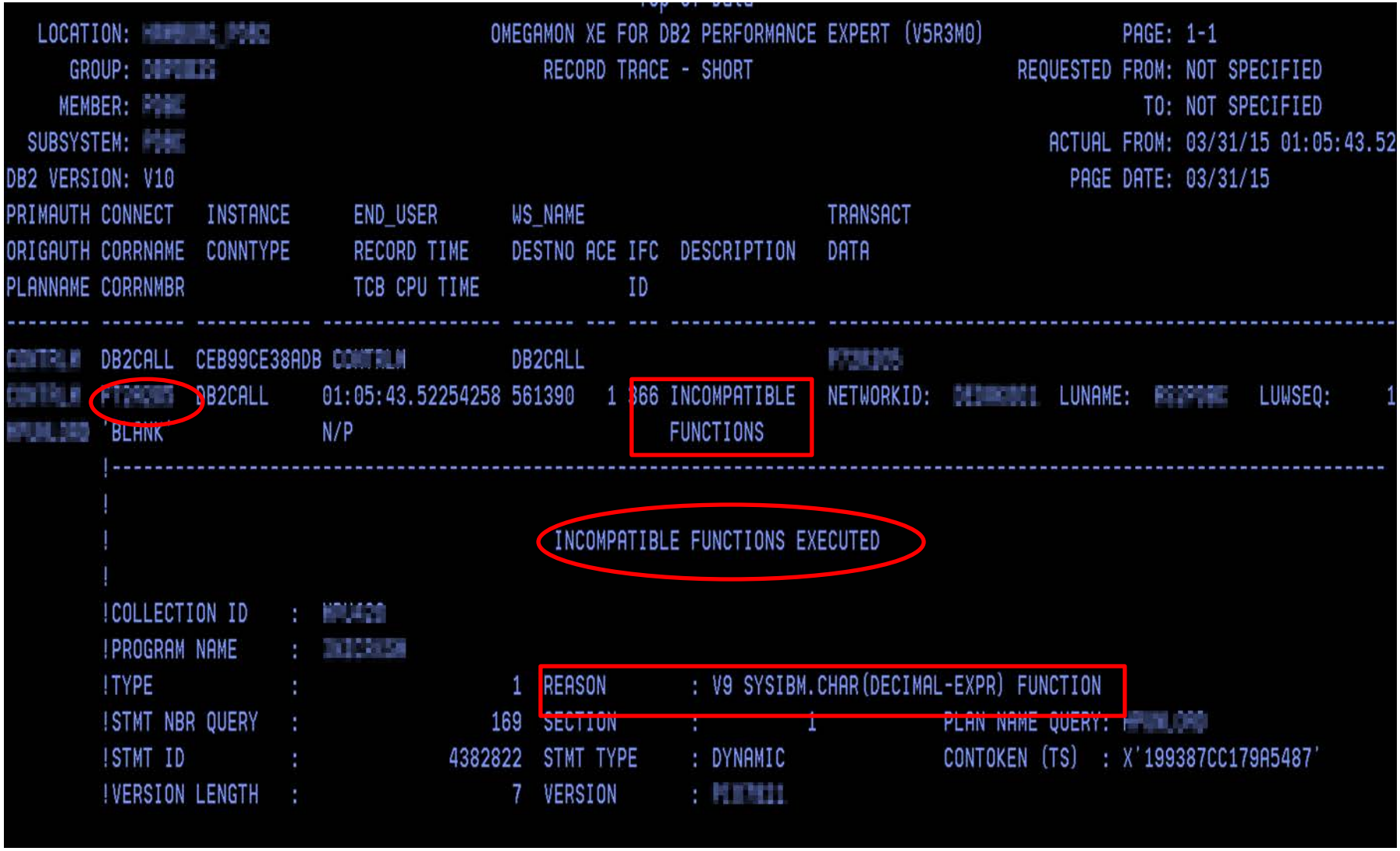
- BMC Mainview also offers reporting capabilities described in the „Performance Reporter User Guide“

  The BMC Datacollector has to be active

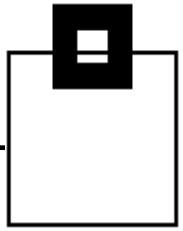
  Attention:
- Depending on the frequency of program calls space requirements for the SMF records increase drastically

JCL of the evaluation job (OMEGAMON)

```
//[redacted]   EXEC PGM=DB2PM
//STEPLIB   DD   DISP=SHR,DSN=[redacted]
//          DD   DISP=SHR,DSN=[redacted]
//INPUTDD   DD   DISP=SHR,DSN=[redacted]
//JOBSUMDD  DD   SYSOUT=*
//RTTRCDD1  DD   SYSOUT=*
//SYSIN     DD   *
  GLOBAL
                       TIMEZONE(-2)
                       EXCLUDE(
                               PRIMAUTH   (
                                          [redacted]*))
                       INCLUDE(
                               IFCID  (366)
                               GROUP  ([redacted])
                               )
  RECTRACE
              TRACE
                       LEVEL(SHORT)
                       DDNAME(RTTRCDD1)
  EXEC
```

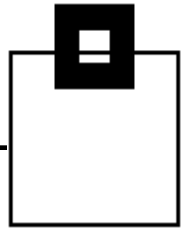

LOCATION:
OMEGAMON XE FOR DB2 PERFORMANCE EXPERT (V5R3M0)
PAGE: 1-1
GROUP:
RECORD TRACE - SHORT
REQUESTED FROM: NOT SPECIFIED
MEMBER:
TO: NOT SPECIFIED
SUBSYSTEM:
ACTUAL FROM: 03/31/15 01:05:43.52
DB2 VERSION: V10
PAGE DATE: 03/31/15
PRIMAUTH CONNECT INSTANCE END_USER WS_NAME TRANSACT
ORIGAUTH CORRNAME CONNTYPE RECORD TIME DESTNO ACE IFC DESCRIPTION DATA
PLANNAME CORRNMBR TCB CPU TIME ID
DB2CALL CEB99CE38ADB DB2CALL
DB2CALL 01:05:43.52254258 561390 1 366 INCOMPATIBLE NETWORKID: LUNAME: LUWSEQ: 1
'BLANK' N/P FUNCTIONS
INCOMPATIBLE FUNCTIONS EXECUTED
!COLLECTION ID :
!PROGRAM NAME :
!TYPE : 1 REASON : V9 SYSIBM.CHAR(DECIMAL-EXPR) FUNCTION
!STMT NBR QUERY : 169 SECTION : 1 PLAN NAME QUERY:
!STMT ID : 4382822 STMT TYPE : DYNAMIC CONTOKEN (TS) : X'199387CC179A5487'
!VERSION LENGTH : 7 VERSION :

SET CURRENT PATH = SYSCOMPAT_V9
BIF_COMPATIBILITY=V9_DECIMAL_VARCHAR



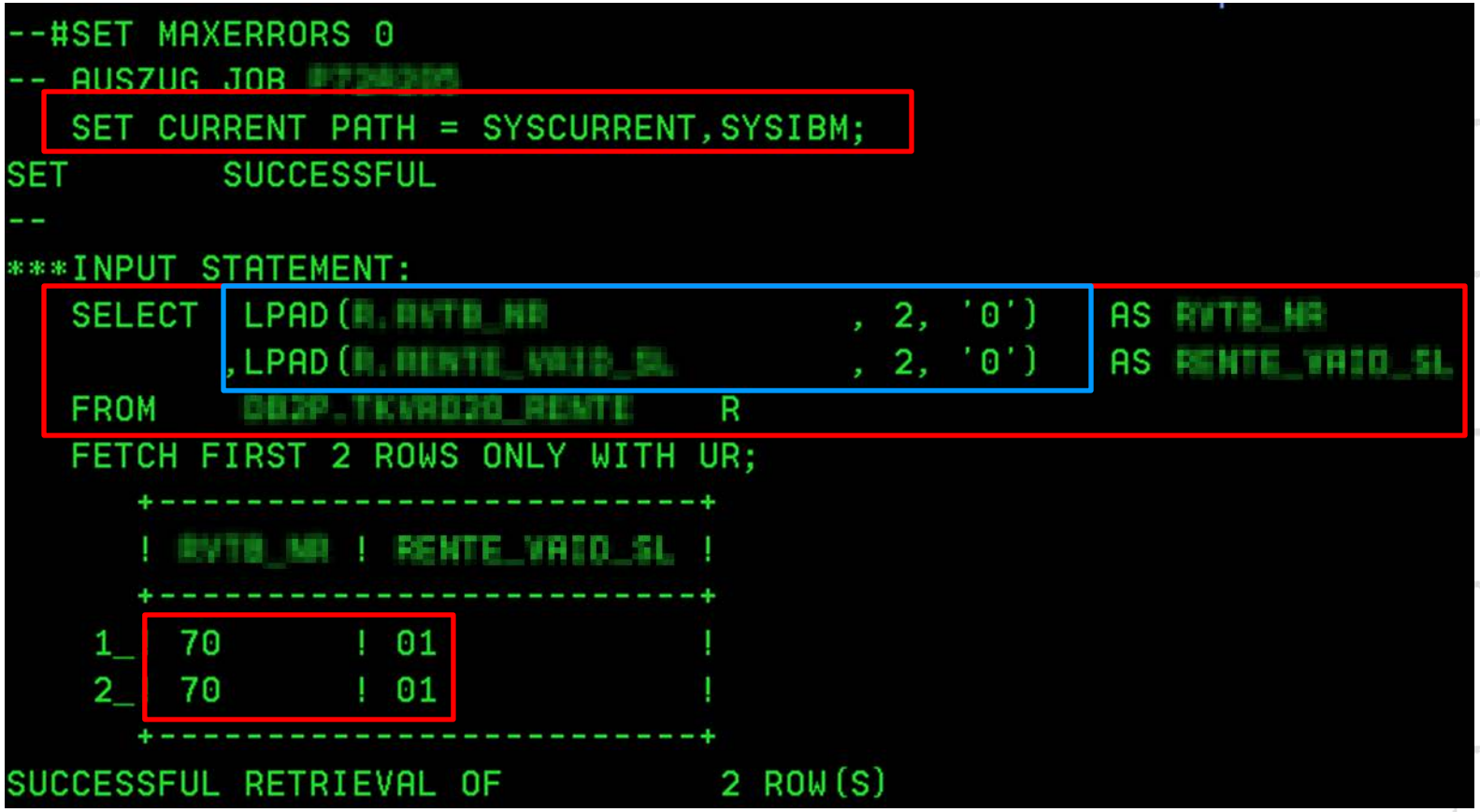
```
-- AUSZUG JOB PT2A2D5
   SET CURRENT PATH = SYSCOMPAT_V9;
RESULT OF SQL STATEMENT:
DSNT400I SQLCODE = 000,  SUCCESSFUL EXECUTION
SET       SUCCESSFUL
--
***INPUT STATEMENT:
   SELECT  SUBSTR(CHAR(R.AVTB_NR)       , 2, 2)     AS AVTB_NR
          ,SUBSTR(CHAR(R.RENTE_VAID_SL), 2, 2)     AS RENTE_VAID_SL
   FROM    DB3P.TEVA02D_RENTE    R
   FETCH FIRST 2 ROWS ONLY WITH UR;
      +-------------------------+
      ! AVTB_NR ! RENTE_VAID_SL !
      +-------------------------+
    1_! 70       ! 01            !
    2_! 70       ! 01            !
      +-------------------------+
SUCCESSFUL RETRIEVAL OF          2 ROW(S)
```

SET CURRENT PATH = SYSCURRENT,SYSIBM BIF_COMPATIBILITY=V9_DECIMAL_VARCHAR



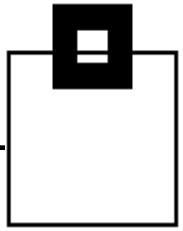
```
-- AUSZUG JOB [illegible]
   SET CURRENT PATH = SYSCURRENT,SYSIBM;
RESULT OF SQL STATEMENT:
DSNT400I SQLCODE = 000,  SUCCESSFUL EXECUTION
SET        SUCCESSFUL
--
***INPUT STATEMENT:
   SELECT   SUBSTR(CHAR([illegible])       , 2, 2)      AS [illegible]
           ,SUBSTR(CHAR([illegible]), 2, 2)      AS [illegible]
   FROM     [illegible]     R
   FETCH FIRST 2 ROWS ONLY WITH UR;
      +-------------------------+
      ! [illegible] ! [illegible] !
      +-------------------------+
    1_! 0         !               !
    2_! 0         !               !
      +-------------------------+
SUCCESSFUL RETRIEVAL OF          2 ROW(S)
```

Modified SQL Statement
BIF_COMPATIBILITY=V9_DECIMAL_VARCHAR



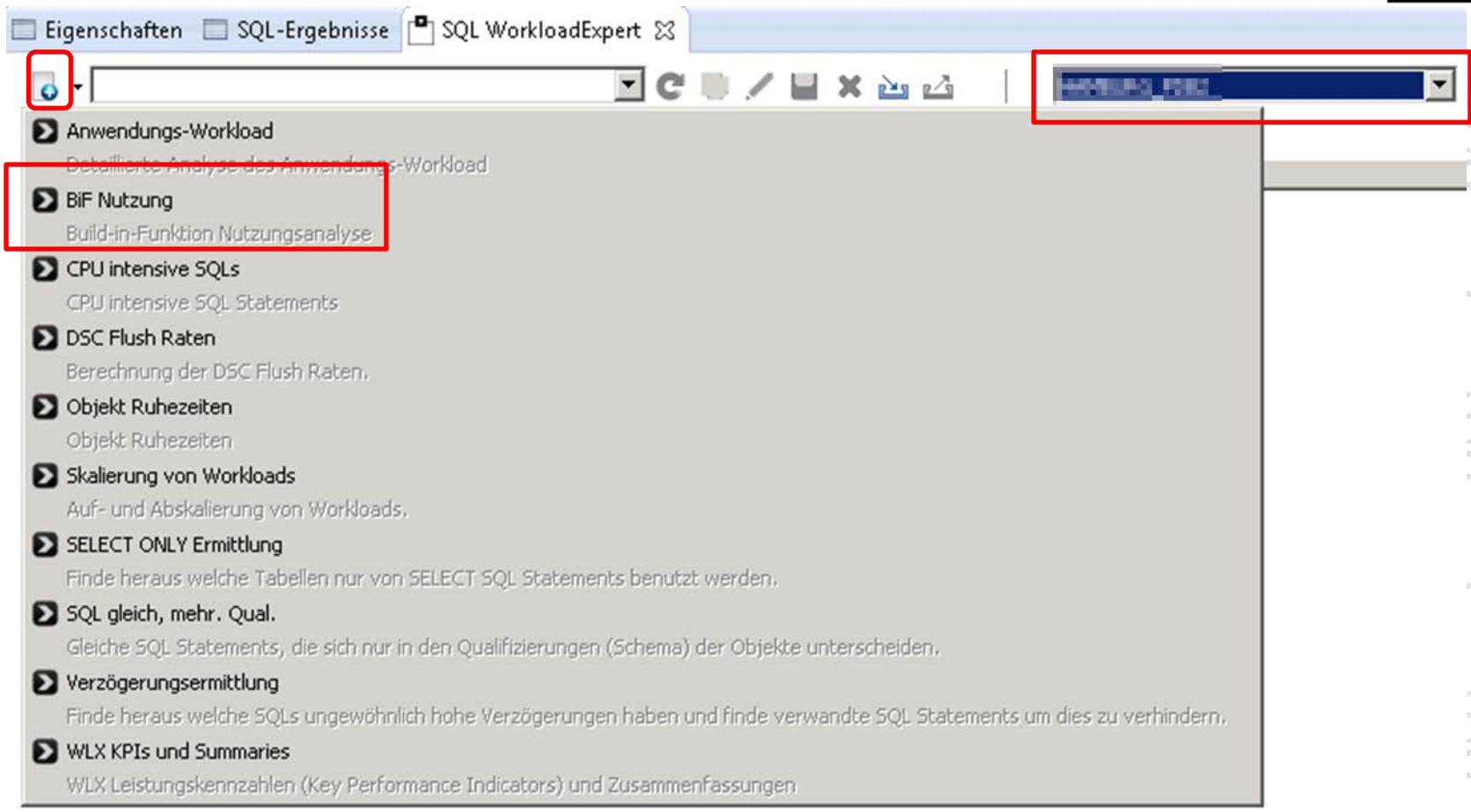
```
--#SET MAXERRORS 0
-- AUSZUG JOB
   SET CURRENT PATH = SYSCURRENT,SYSIBM;
SET        SUCCESSFUL
--
***INPUT STATEMENT:
   SELECT  LPAD(R.RVTB_NR                    , 2, '0')   AS RVTB_NR
          ,LPAD(R.RENTE_VAIO_SL              , 2, '0')   AS RENTE_VAIO_SL
   FROM     DB2P.TKVA030_RENTE     R
   FETCH FIRST 2 ROWS ONLY WITH UR;
      +--------------------------+
      ! RVTB_NR ! RENTE_VAIO_SL !
      +--------------------------+
    1_  70       ! 01            !
    2_  70       ! 01            !
      +--------------------------+
SUCCESSFUL RETRIEVAL OF           2 ROW(S)
```

SQL WorkloadExpert (WLX) for DB2 z/OS

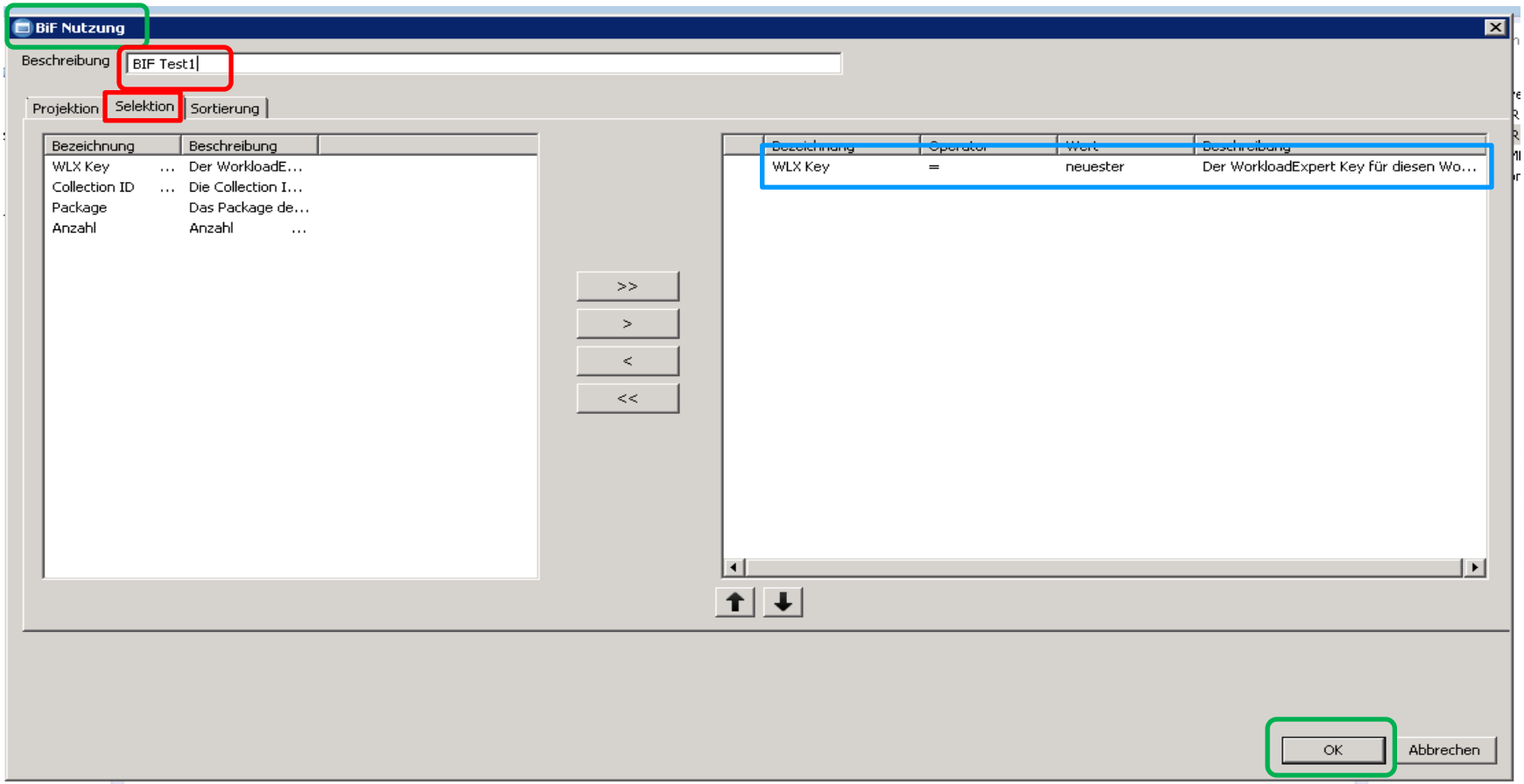


- The SQL WorkloadExpert architecture comes in two parts
  - Mainframe DB2 Workload collector and processing engine
  - Workstation analysis and reporting engine
- DSC and SSC were selected and the data is stored in WLX tables
- Processing and display of the data in Datastudio 4.1.1 or Eclipse on the workstation

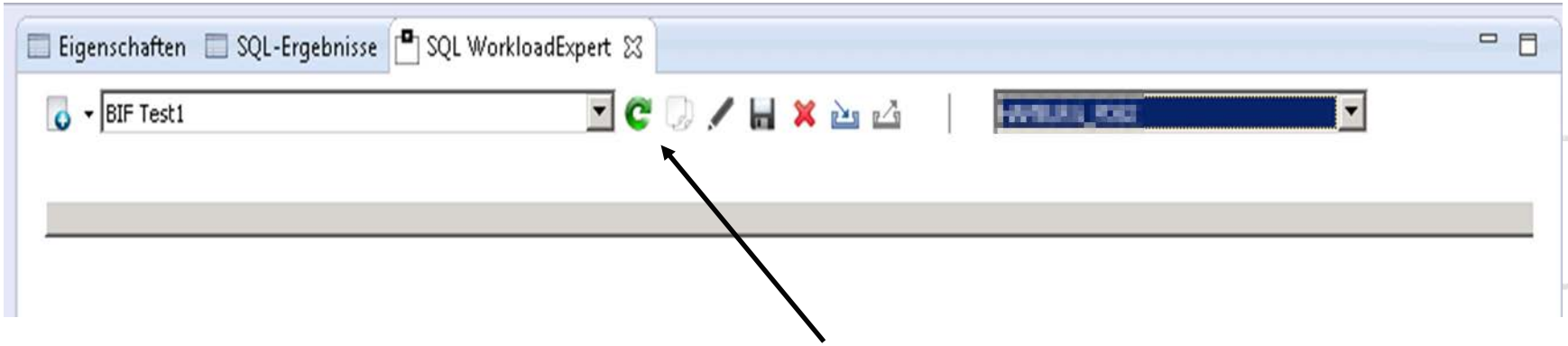
Evaluation with SQL WorkloadExpert (1)



Evaluation with SQL WorkloadExpert (2)

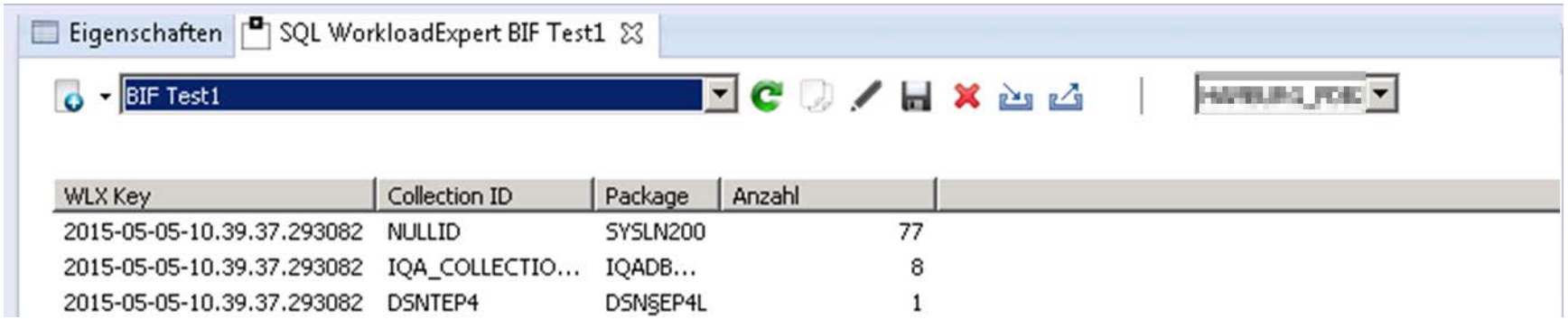


Evaluation with SQL WorkloadExpert (3)



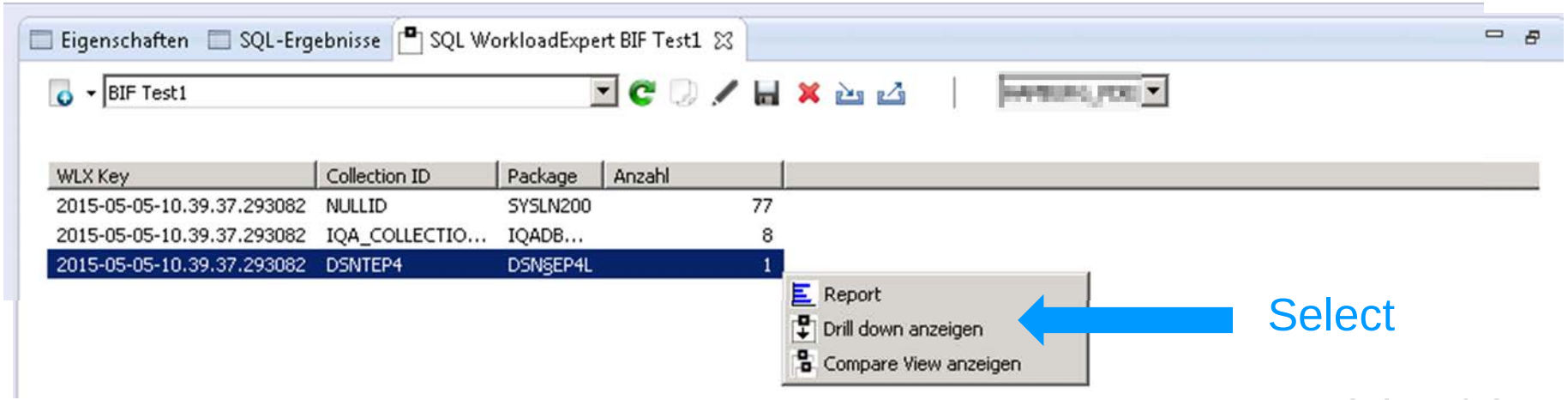
Run query

Evaluation with SQL WorkloadExpert (4)

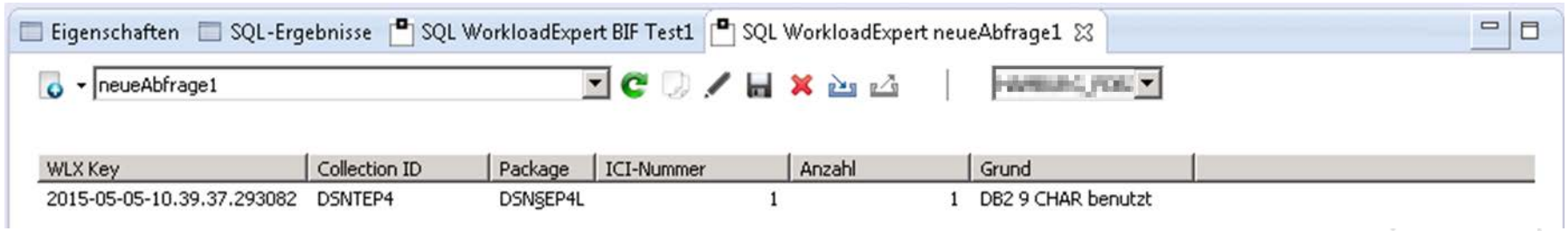


WLX Key	Collection ID	Package	Anzahl
2015-05-05-10.39.37.293082	NULLID	SYSLN200	77
2015-05-05-10.39.37.293082	IQA_COLLECTIO...	IQADB...	8
2015-05-05-10.39.37.293082	DSNTEP4	DSNSEP4L	1

Evaluation with SQL WorkloadExpert (5)

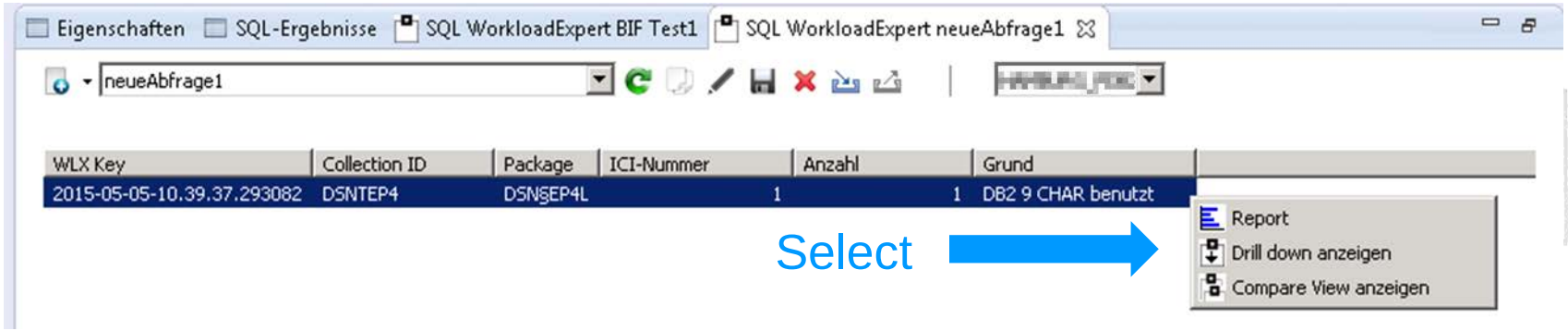


Evaluation with SQL WorkloadExpert (6)

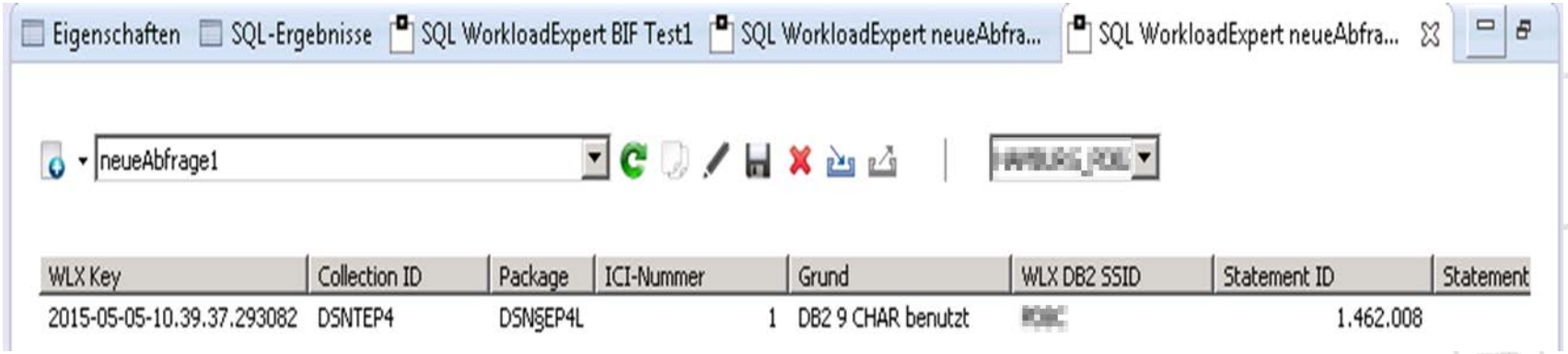


WLX Key	Collection ID	Package	ICI-Nummer	Anzahl	Grund
2015-05-05-10.39.37.293082	DSNTEP4	DSNSEP4L	1	1	DB2 9 CHAR benutzt

Evaluation with SQL WorkloadExpert (7)

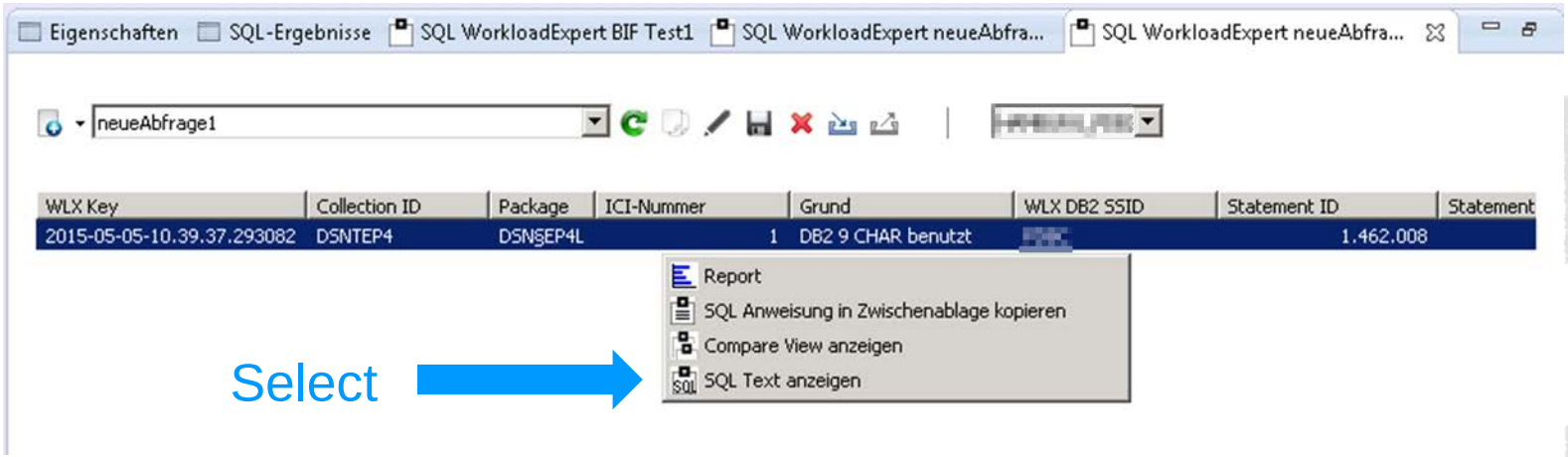


Evaluation with SQL WorkloadExpert (8)

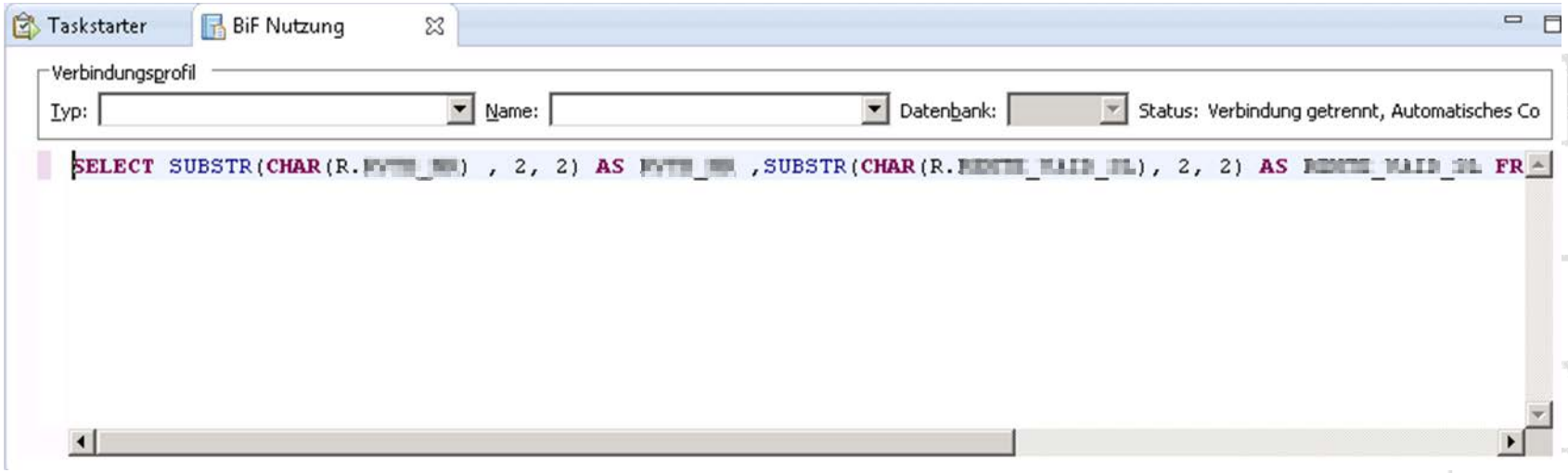


WLX Key	Collection ID	Package	ICI-Nummer	Grund	WLX DB2 SSID	Statement ID	Statement
2015-05-05-10.39.37.293082	DSNTEP4	DSNSEP4L	1	DB2 9 CHAR benutzt	[redacted]	1.462.008	

Evaluation with SQL WorkloadExpert (9)

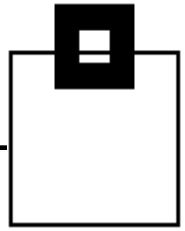


Evaluation with SQL WorkloadExpert (10)




```
SELECT   SUBSTR(CHAR(R.[illegible])        , 2, 2)      AS [illegible]
       ,SUBSTR(CHAR(R.[illegible]), 2, 2)      AS [illegible]
FROM     [illegible]      R
FETCH FIRST 2 ROWS ONLY WITH UR;
```

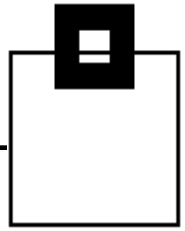
Goal



To already redress in DB2 10 all incompatibilities before the migration to DB2 11

and to set the ZPARM BIF_COMPATIBILITY, still in DB2 10, to CURRENT.

Continuing with…DB2 11



- New ZPARM APPLCOMPAT
- New extended IFCID 376 (Aggregated BIFs, Incompatible SQL and XML statements)
- START TRACE with IFCID 376 in DB2 11 in CM mode
- ZPARM BIF_COMPATIBILITY still exists
- Redbook: IBM DB2 11 for z/OS Technical Overview SG24-8180-00

What we have learnt

- In contrast to the previously performed examinations using Omegamon, with WLX you need not collect SMF data for more than 12 months before the migration and analyze them.
- With WLX you do not even need SMF data. The WLX straight-forward approach saves enormous time, manpower, and storage.
- “Where is the BIF?” Is answered directly and the SQL is categorized and shown – Even for dynamic SQL you get the entire SQL text displayed.