



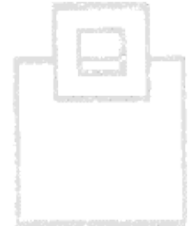
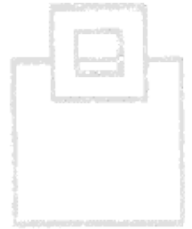
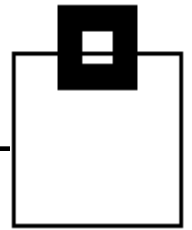
GIVE and TAKE
Programme
Inspiring experiences

Built in Function

BIF Compatibility

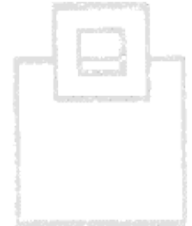
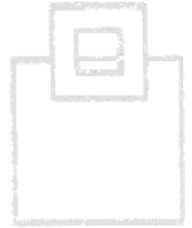
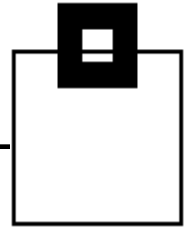
A german customer presentation translated and anonymized

by Siegfried Fürst
SOFTWARE ENGINEERING GmbH

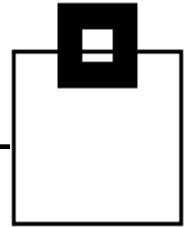


Initial situation

- DB2 10 compatibility mode
- Changes to the STRING formatting 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

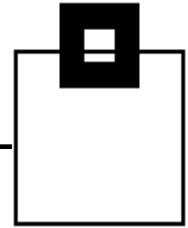


BIF_COMPATIBILITY	CHAR(000.1)	CHAR(1000.)	CHAR(1.1)
CURRENT	'.1'	'1000'	'1.1'
V9	' 000.1'	' 1000.'	' 1.1'
V9_DECIMAL_VARCHAR	' 000.1'	' 1000.'	' 1.1'

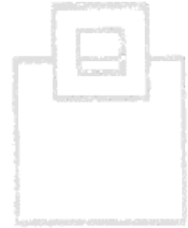
BIF_COMPATIBILITY	VARCHAR('00.10')	VARCHAR('1.')
CURRENT	'.10'	'1'
V9	' .10'	'1'
V9_DECIMAL_VARCHAR	'.0.10'	'1.'



ZPARM – BIF Compatibility Settings

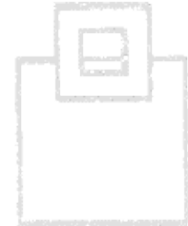


V9 For decimal input, the CHAR built-in function returns data in the DB2 Version 9 format. The VARCHAR function and the CAST(*decimal-expression* AS CHAR) and CAST(*decimal-expression* AS VARCHAR) specifications return data in the Version 10 format.



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.



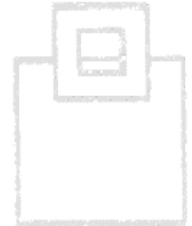
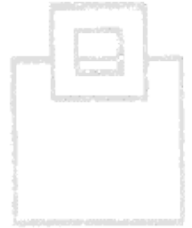
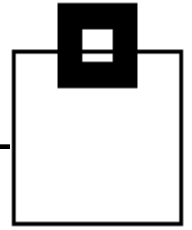
Information concerning the procedures

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

PM29124 / UK67578

PM66095 / UK51851

PM48741 / UK74765 (Unsupported Timestamp String)

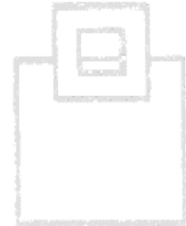
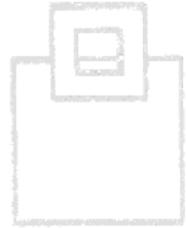
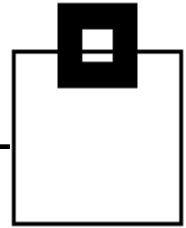


Methodology at customers site

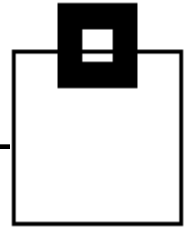
- To get all relevant applications (daily,weekly etc.) since mid of April 2014 a performance trace with IFCID 366 was run in production

```
-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)



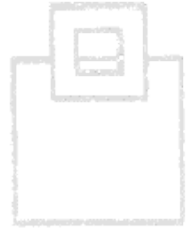
Evaluation of trace records



- Evaluation of SMF records with the help of

OMEGAMON XE FOR DB2 PERFORMANCE EXPERT

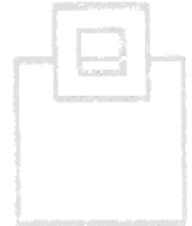
- BMC Mainview also offers reporting capabilities described in the „Performance Reporter User Guide“



The BMC Datacollector has to be active

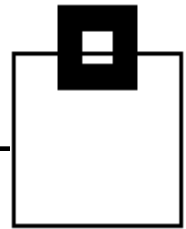
Attention:

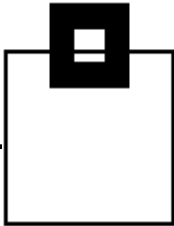
- Depending on the frequency of program calls space requirements for the SMF records increase drastically



JCL of the evaluation job (OMEGAMON)

```
//PEV330 EXEC PGM=DB2PM
//STEPLIB DD DISP=SHR,DSN=#003.DMP000.T0.AKANM00
// DD DISP=SHR,DSN=#003.DMP000.SYS3.AKANM00
//INPUTDD DD DISP=SHR,DSN=PS.SMPLOG.D02.02019073
//JOBSUMDD DD SYSOUT=*
//RTTRCDD1 DD SYSOUT=*
//SYSIN DD *
GLOBAL
        TIMEZONE (-2)
        EXCLUDE (
                PRIMAUTH (
                        IS*)
        )
        INCLUDE (
                IFCID (366)
                GROUP (DMP0035)
        )
RECTRACE
        TRACE
        LEVEL (SHORT)
        DDNAME (RTTRCDD1)
EXEC
```





Top of Data

LOCATION: ~~WUJ000~~ OMEGAMON XE FOR DB2 PERFORMANCE EXPERT (V5R3M0) PAGE: 1-1
GROUP: ~~DBP000~~ RECORD TRACE - SHORT REQUESTED FROM: NOT SPECIFIED
MEMBER: ~~PG00~~ TO: NOT SPECIFIED
SUBSYSTEM: ~~PG00~~ ACTUAL FROM: 03/31/15 01:05:43.52
DB2 VERSION: V10 PAGE DATE: 03/31/15

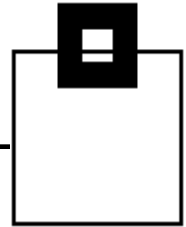
PRMAUTH	CONNECT	INSTANCE	END_USER	WS_NAME	TRANSACT	
ORIGAUTH	CORRNAME	CONNTYPE	RECORD TIME	DESTNO ACE IFC	DESCRIPTION	DATA
PLANNAME	CORRNMBR	TCB CPU TIME	ID			

CONTROL	DB2CALL	CEB99CE38ADB	CONTROL	DB2CALL								
CONTROL	F12AC005	DB2CALL	01:05:43.52254258	561390	1	366 INCOMPATIBLE	NETWORKID:	WUJ000	LUNAME:	PG00PG00	LWSEQ:	1
WUJ000	BLANK		N/P			FUNCTIONS						

INCOMPATIBLE FUNCTIONS EXECUTED

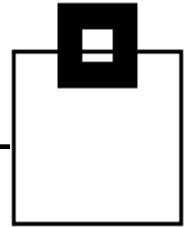
!COLLECTION ID : ~~WUJ000~~
!PROGRAM NAME : ~~DBP000~~
!TYPE : 1 REASON : V9 SYSIBM.CHAR(DECIMAL-EXPR) FUNCTION
!STMT NBR QUERY : 169 SECTION : 1 PLAN NAME QUERY: ~~WUJ000~~
!STMT ID : 4382822 STMT TYPE : DYNAMIC CONTOKEN (TS) : X'199387CC179A5487'
!VERSION LENGTH : 7 VERSION : ~~WUJ000~~

SET CURRENT PATH = SYSCOMPAT_V9 BIF_COMPATIBILITY=V9_DECIMAL_VARCHAR



```
-- AUSZUG JOB PT2A205
SET CURRENT PATH = SYSCOMPAT_V9;
RESULT OF SQL STATEMENT:
DSNT400I SQLCODE = 000, SUCCESSFUL EXECUTION
SET SUCCESSFUL
--
***INPUT STATEMENT:
SELECT SUBSTR (CHAR (R.RVTR_NR) , 2, 2) AS RVTR_NR
      , SUBSTR (CHAR (R.RENTE_VAID_SL), 2, 2) AS RENTE_VAID_SL
FROM DB2P.TKVA020_RENTE R
FETCH FIRST 2 ROWS ONLY WITH UR;
+-----+
! RVTR_NR ! RENTE_VAID_SL !
+-----+
1_! 70 ! 01 !
2_! 70 ! 01 !
+-----+
SUCCESSFUL RETRIEVAL OF 2 ROW(S)
```

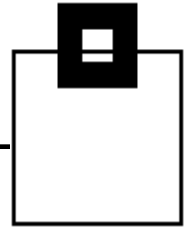
SET CURRENT PATH = SYSCURRENT, SYSIBM BIF_COMPATIBILITY=V9_DECIMAL_VARCHAR



```
-- AUSZUG JOB FTJW109
SET CURRENT PATH = SYSCURRENT, SYSIBM;
RESULT OF SQL STATEMENT:
DSNT400I  SQLCODE = 000,  SUCCESSFUL EXECUTION
SET      SUCCESSFUL
--
***INPUT STATEMENT:
SELECT  SUBSTR (CHAR (R.RYTB_NA)           , 2, 2)  AS RYTB_NA
        , SUBSTR (CHAR (R.RENTE_WAID_BL) , 2, 2)  AS RENTE_WAID_BL
FROM    QSQP.TCV8030_RENTE      R
FETCH FIRST 2 ROWS ONLY WITH UR;
+-----+
| RYTB_NA | RENTE_WAID_BL |
+-----+
1_!  0  |                |
2_!  0  |                |
+-----+
SUCCESSFUL RETRIEVAL OF          2 ROW(S)
```

Modified SQL Statement

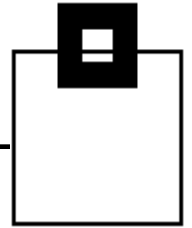
BIF_COMPATIBILITY=V9_DECIMAL_VARCHAR



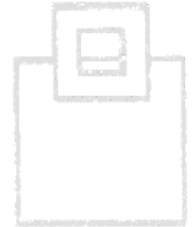
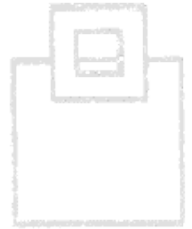
```
--#SET MAXERRORS 0
-- AUSZUG JOB #123456789
SET CURRENT PATH = SYSCURRENT, SYSIBM;
SET          SUCCESSFUL
--
***INPUT STATEMENT:
SELECT LPAD (R.RYTB_NA           , 2, '0') AS RYTB_NA
       , LPAD (R.RENTE_VAID_SL   , 2, '0') AS RENTE_VAID_SL
FROM    DBSP.TKVA030_RENTE      R
FETCH FIRST 2 ROWS ONLY WITH UR;
+-----+
| RYTB_NA | RENTE_VAID_SL |
+-----+
1_  70      | 01            |
2_  70      | 01            |
+-----+
SUCCESSFUL RETRIEVAL OF          2 ROW(S)
```



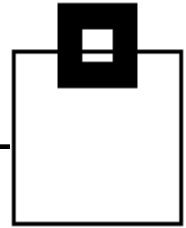
SQL WorkloadExpert (WLX) for DB2 z/OS



- 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)

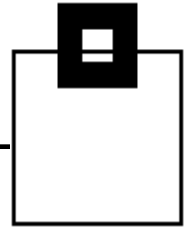


Eigenschaften SQL-Ergebnisse SQL WorkloadExpert

Anwendungs-Workload
Detaillierte Analyse des Anwendungs-Workload

- ▶ **BiF Nutzung**
Build-in-Funktion Nutzungsanalyse
- ▶ CPU intensive SQLs
CPU intensive SQL Statements
- ▶ DSC Flush Raten
Berechnung der DSC Flush Raten.
- ▶ Objekt Ruhezeiten
Objekt Ruhezeiten
- ▶ Skalierung von Workloads
Auf- und Abskalierung von Workloads.
- ▶ SELECT ONLY Ermittlung
Finde heraus welche Tabellen nur von SELECT SQL Statements benutzt werden.
- ▶ SQL gleich, mehr. Qual.
Gleiche SQL Statements, die sich nur in den Qualifizierungen (Schema) der Objekte unterscheiden.
- ▶ Verzögerungsermittlung
Finde heraus welche SQLs ungewöhnlich hohe Verzögerungen haben und finde verwandte SQL Statements um dies zu verhindern.
- ▶ WLX KPIs und Summaries
WLX Leistungskennzahlen (Key Performance Indicators) und Zusammenfassungen

Evaluation with SQL WorkloadExpert (2)



BIF Nutzung

Beschreibung: BIF Test1

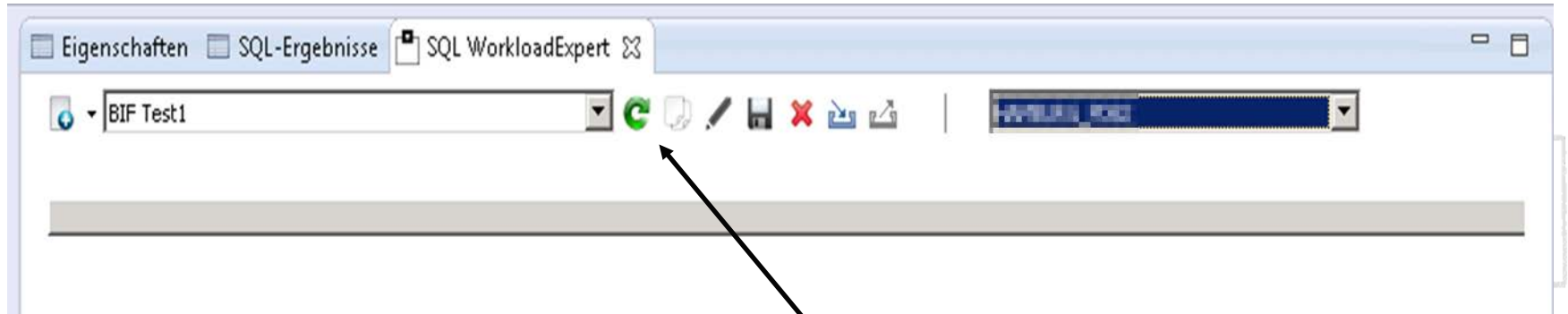
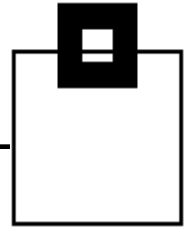
Projektion | Selektion | Sortierung

Bezeichnung	Beschreibung
WLX Key	Der WorkloadE...
Collection ID	Die Collection I...
Package	Das Package de...
Anzahl	Anzahl ...

Bezeichnung	Operator	Wert	Beschreibung
WLX Key	=	neuester	Der WorkloadExpert Key für diesen Wo...

OK Abbrechen

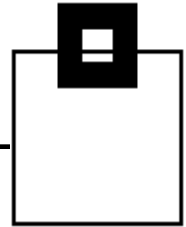
Evaluation with SQL WorkloadExpert (3)



Run query



Evaluation with SQL WorkloadExpert (4)



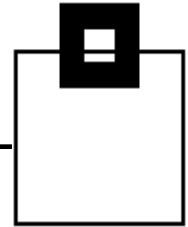
Eigenschaften SQL WorkloadExpert BIF Test1

BIF Test1

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	DSNŞEP4L	1



Evaluation with SQL WorkloadExpert (5)



SQL WorkloadExpert BIF Test1

BIF Test1

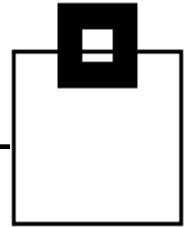
WLX Key	Collection ID	Package	Anzahl
2015-05-05-10.39.37.293082	NULLID	SYSLN200	77
2015-05-05-10.39.37.293082	IQA_COLLECTIO...	IQADB...	8
2015-05-05-10.39.37.293082	DSNTEP4	DSNSEP4L	1

Report
Drill down anzeigen
Compare View anzeigen

Select

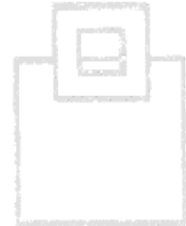


Evaluation with SQL WorkloadExpert (6)

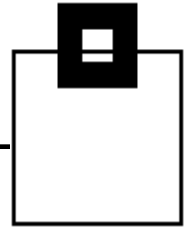


The screenshot shows the SQL WorkloadExpert interface. The window title is "SQL WorkloadExpert neueAbfrage1". The main area displays a table with the following data:

WLX Key	Collection ID	Package	ICI-Nummer	Anzahl	Grund
2015-05-05-10.39.37.293082	DSNTEP4	DSN\$EP4L		1	DB2 9 CHAR benutzt



Evaluation with SQL WorkloadExpert (7)

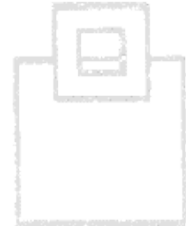


neueAbfrage1

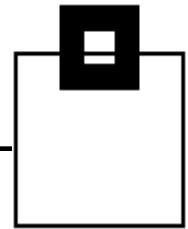
WLX Key	Collection ID	Package	ICI-Nummer	Anzahl	Grund
2015-05-05-10.39.37.293082	DSNTEP4	DSN\$EP4L		1	DB2 9 CHAR benutzt

Select →

- Report
- Drill down anzeigen
- Compare View anzeigen



Evaluation with SQL WorkloadExpert (8)

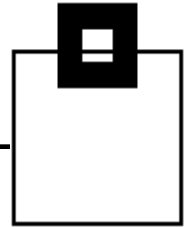


The screenshot shows the SQL WorkloadExpert application window. The title bar contains several tabs: 'Eigenschaften', 'SQL-Ergebnisse', 'SQL WorkloadExpert BIF Test1', 'SQL WorkloadExpert neueAbfra...', and 'SQL WorkloadExpert neueAbfra...'. The main area displays a table with the following data:

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	DB2	1.462.008	



Evaluation with SQL WorkloadExpert (9)

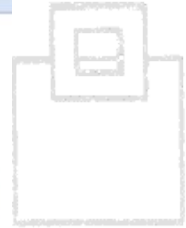


neueAbfrage1

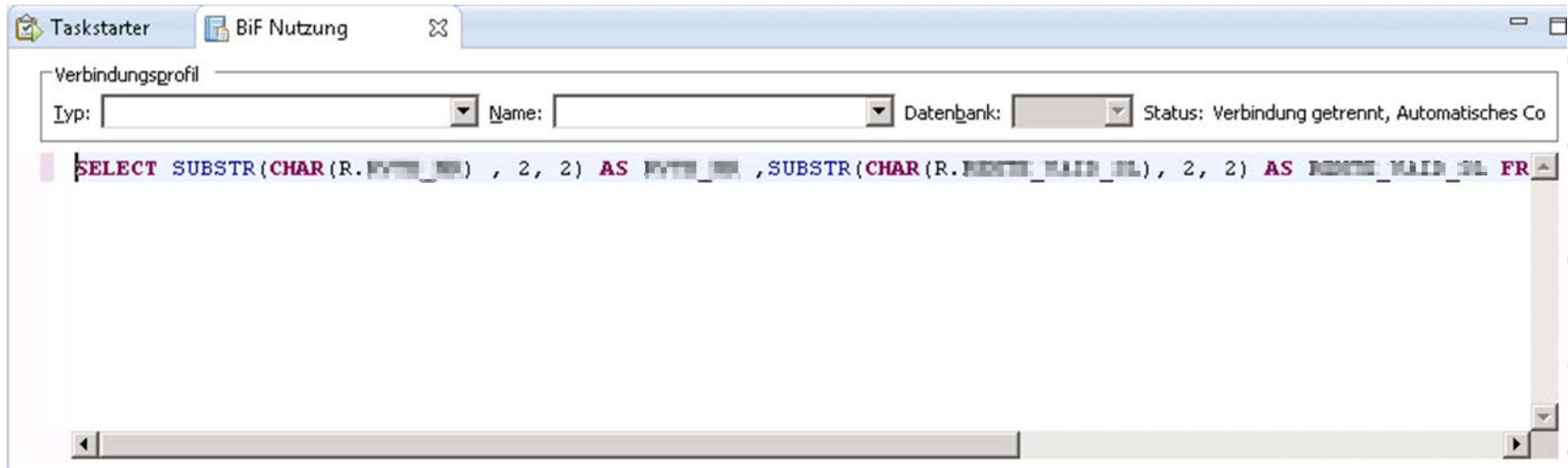
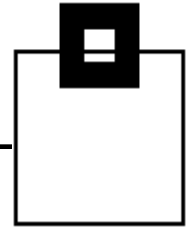
WLX Key	Collection ID	Package	ICI-Nummer	Grund	WLX DB2 SSID	Statement ID	Statement
2015-05-05-10.39.37.293082	DSNTEP4	DSNSEP4L	1	DB2 9 CHAR benutzt		1.462.008	

Select →

- Report
- SQL Anweisung in Zwischenablage kopieren
- Compare View anzeigen
- SQL Text anzeigen

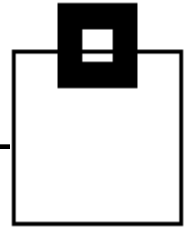


Evaluation with SQL WorkloadExpert (10)



```
SELECT  SUBSTR (CHAR (R. RYTB_NR)          , 2, 2)      AS RYTB_NR
        , SUBSTR (CHAR (R. RENTE_VAID_SL) , 2, 2)      AS RENTE_VAID_SL
FROM    DBSP.TICVRO20_RENTE      R
FETCH  FIRST 2 ROWS ONLY WITH UR;
```

Goal

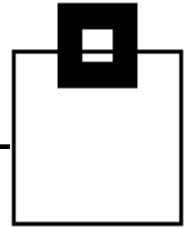


To already redress in DB2 10 all incompatibilities before the migration to DB2 11

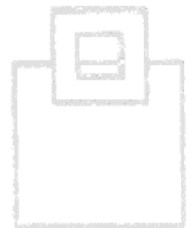
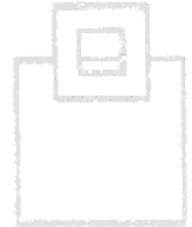
and to set the ZPARM **BIF_COMPATIBILITY**, still in DB2 10, to **CURRENT**.



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.

