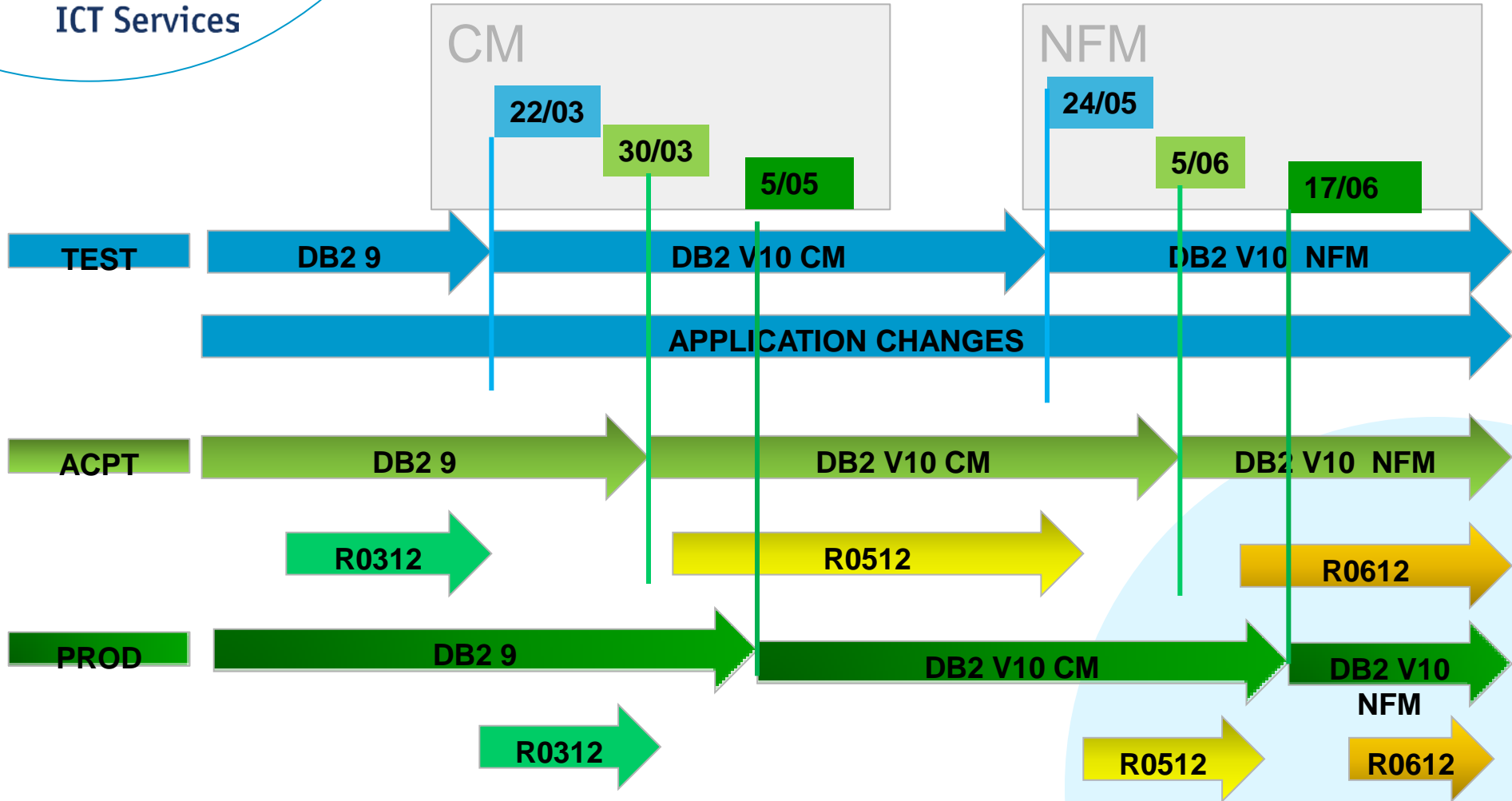


# DB2 V10 Application Experience and features @KBC

# System<>Application install



<b>DB2:</b>	<b>GDPC</b>	<b>GDPI</b>	<b>DPF0</b>
<b>&lt;V9</b>	<b>11.093</b>	<b>70.313</b>	<b>2.749</b>
<b>V10</b>	<b>4.813</b>	<b>11.365</b>	<b>431</b>
<b>Total</b>	<b>15.906</b>	<b>81.678</b>	<b>3.180</b>

# Packages rebind or not

## MUST

- All packages < V5

## “Please be kind and Rebind” (Roger Miller)

### To generate new 64-bit SQL runtime

- Avoid overhead of making the runtime for migrated package from earlier releases
- Re-enable fast column processing (SPROC)



# Not yet (re)binded package

## After applicative release (V10)

### **REBIND EXPLAIN(ONLY)** packages (11.093)

- Highest version/bindtime
- < V10

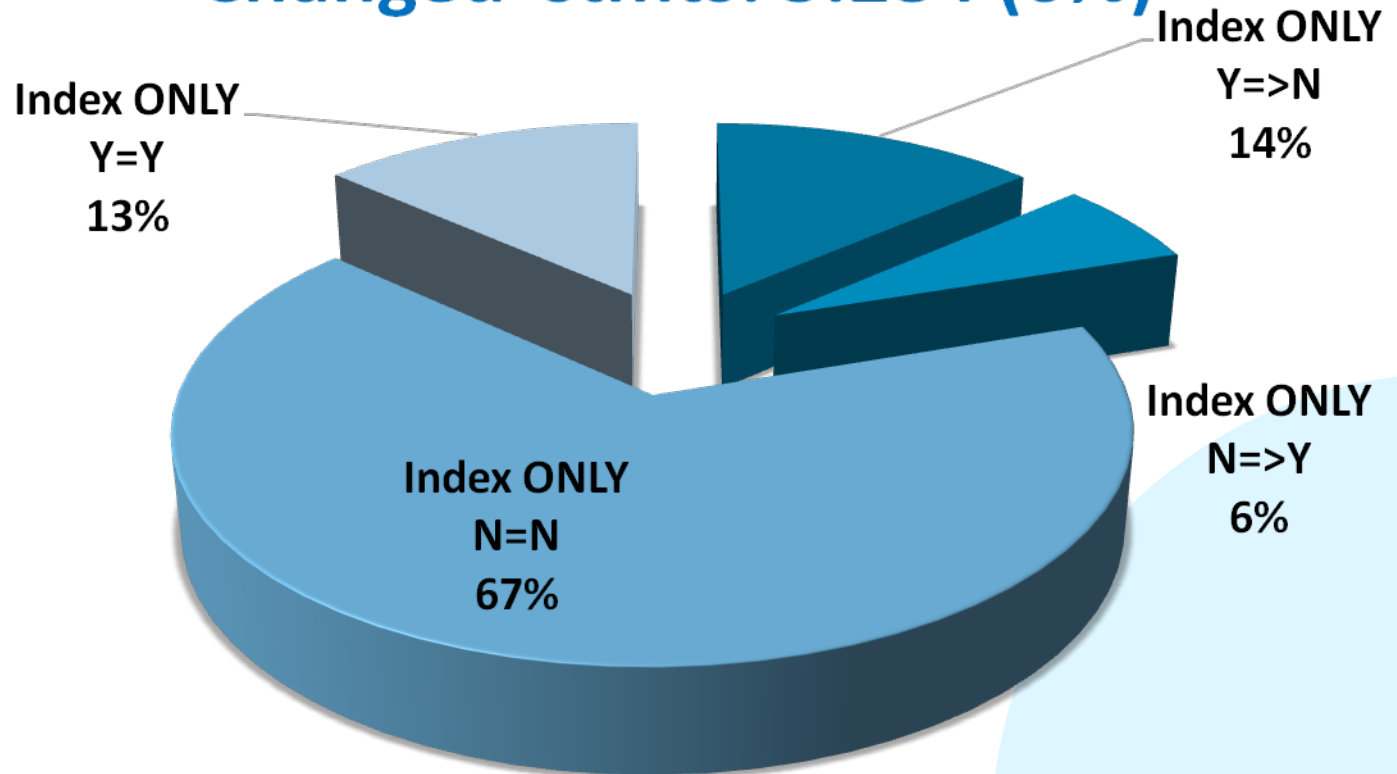
### Compare access paths

- 1.689 packages **with different accesspaths**
- 15,2%



# Not yet (re)binded package

**Changed stmts: 5.284 (6%)**



# Not yet (re)binded package

## V9 packages **REBIND APREUSE(ERROR)**



```
DSNT286I  -DTC2 DSNTBBP2 REBIND FOR PACKAGE =
BEBBCM_GDTC.CBCBAST.C4XH4,
        USE OF APREUSE RESULTS IN:
        1 STATEMENTS WHERE APREUSE IS SUCCESSFUL
        0 STATEMENTS WHERE APREUSE IS EITHER NOT SUCCESSFUL
          OR PARTIALLY SUCCESSFUL
        4 STATEMENTS WHERE APREUSE COULD NOT BE PERFORMED
        0 STATEMENTS WHERE APREUSE WAS SUPPRESSED BY OTHER HINTS.
DSNT233I  -DTC2 UNSUCCESSFUL REBIND FOR
        PACKAGE =
BEBBCM_GDTC.CBCBAST.C4XH4.(2011-12-02-13.02.00.725153)
-----
*** DSN RETURN CODE = 8 ***
```

**Error**           => **PLAN\_TABLE NOT POPULATED**  
**No Error**       => **PLAN\_TABLE POPULATED**

# Not yet (re)binded package

## V9 packages



### **REBIND APREUSE(ERROR) EXPLAIN(ONLY)**

DSNT286I -DTC1 DSNTBBP2 REBIND FOR PACKAGE =  
BEBBCM\_GDTC.CBCBAST.C4XH4,

USE OF APREUSE RESULTS IN:

5 STATEMENTS WHERE APREUSE IS SUCCESSFUL

0 STATEMENTS WHERE APREUSE IS EITHER NOT SUCCESSFUL  
OR PARTIALLY SUCCESSFUL

0 STATEMENTS WHERE APREUSE COULD NOT BE PERFORMED

0 STATEMENTS WHERE APREUSE WAS SUPPRESSED BY OTHER HINTS. N

Vb:

QUERY	PLN	HINTS	FET DX	UJOG
TYPE NO QBL PROG	NO MTH TABLE	AC MC USED	CH ONL	NOBB
OLD 262 1 C4XH4	1 0 CBTIARY2	R 0	S N	NNNN
NEW 1 C4XH4	1 0 CBTIARY2	R 0 <b>APREUSE</b>	S N	NNNN



# Not yet (re)binded package

- V8/V9 Unchanged access packages**
  - Will be rebind during multiple application release
  
- Changed access**
  - Analyze the impact & rebind



# Already (re)binded package

## □ 4.813 packages

### □ Elapse & CPU time complaints

- Most of the cases “OPTIMIZE FOR 1 ROW”
  - IT DEPENDS
- Access path changes due to data volume
- Switch from indexes
  - Impact s => no complaints (yet)

(  
*ZPARM : OPT1ROWBLOCKSORT=DISABLE (V9)  
OPT1ROWBLOCKSORT=ENABLE (V10)  
via fix UK77500)*

*APAR PM56845*



## Other issues

- We got Abend0c4 in programs, on *some* development and acceptance systems (CM)
  - in packages that were bound on Pre V9 and even V9 systems
  - To avoid problems after migration :
    - REBIND everything **before** migrating to V10
  - But also:
    - REBIND everything **after** migrating to V10



## Other issues

### □ REMOTE packages

□ - 551 sqlcode when a remote package is called

=> DB2 requires an **execute auth** on the remote package (Private Protocol <> DRDA)



CPU increase during **selective IBM unloads**

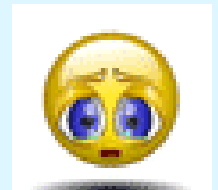
**X2**

**X3**

**X10**

**X100**

**After implementing fix (UK79770) → OK**



## POTENTIALLY INCONSISTENT DATA

### Scenario

- CREATE NEW INDEX ON EXISTING TABLE
- We **only** rebind package that will benefits the index

DSNI013I -DPC2 DSNIIDIS POTENTIALLY INCONSISTENT  
DATA

REASON 00C90206

ERQUAL 5002

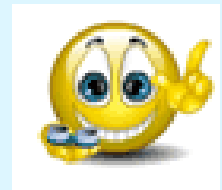
TYPE 00000302



## POTENTIALLY INCONSISTENT DATA

### Solution

- Rebuild index
- Rebind package ALL packages that does UPDATE/INSERT/DELETE on the TABLE
- Install IBM fix (UK76818)
  - New issue raised in DEV

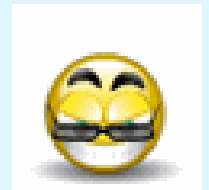


# Other issues

## “Describe” packages

### Situation

- **Catalog Manager (BMC)**
  - Functionality “display SQL & access path info of PLAN\_TABLE”





# Other issues

GDP-C-R                    Package: CBCBASP.COBA

Line 30 of 84 Col 1 80

Command ==>

Scroll ==> CSR

Lastused . . . . 01/01/0001

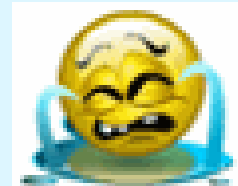
```
-----  
Stmntno  Stmt  
1163     SELECT   VNS_CTR_KD  
          ,RAP_DEV_KD  
          ,RAP_LAND_KD  
          ,HFD_CTR_NR  
  
INTO      :CBVPSN66-REC.VNS-CTR-KD, :CBVPSN66-REC.RAP-DEV-KD, :  
          CBVPSN66-REC.RAP-LAND-KD, :CBVPSN66-REC.HFD-CTR-NR :  
          IND-CBVPSN66-REC.IND-HFD-CTR-NR  
  
FROM      CBVPSN66  
  
WHERE     VNS_CTR_KD = :WS-WV.WWV-VNS-CTR-KD
```

```
>>> Explain info from CERA.PLAN_TABLE 2009-04-22-05.34.10.023645  
      Access table CERA.CBTPSN66  
          using index CERA.CBX1PSN66 (1 COL)  
          group member is SDPC
```

**VERY OLD packages → ABEND**

**Solution**

- **REBIND → NO**
- **BIND → YES**
  - DBRM's of very very old packages
  - Some NO DBRM !!!

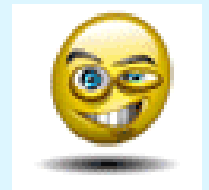


# Other issues

## “Describe” packages

### Situation

- Catalog Manager (BMC) → DESCR
- **DO NOT BELIEVE everything you see !!**



# Other issues

```
GDKC-R                               Package: CBCBASP.LEFQD                Line 30 of 696 Col 1 80
Command ===>                          Scroll ===> PAGE

Lastused . . . . 20/09/2012
-----
Stmtno   Stmt
8008     DECLARE  EZECURSOR4 CURSOR FOR
          SELECT   CR_FILE_NO
                  ,CR_STT_NO
-----
          ORDER   BY CR_FILE_NO ASC, CR_STT_NO ASC, APC_CD ASC, CLT_NO ASC

>>> Explain info from CERA.PLAN_TABLE 2012-05-27-00.33.56.090811
      Access table CERA.CBTCCR20
          group member is DPC4
      Access table CERA.CBTCCR20
          group member is DPC4
      Access table CERA.CBTCCR20
          group member is DPC4
      Access table CERA.CBTCCR20
          group member is DPC4
```

## PLAN\_TABLE :

QUERYNO	PROG	PLANNO	METHOD	TABEL	AC	MC	ACCESS
8008	LEFQD	1	0	CBTCCR20	NR	4	CBX2CCR20
8008	LEFQD	1	0	CBTCCR20	NR	2	CBX2CCR20
8008	LEFQD	1	0	CBTCCR20	NR	3	CBX2CCR20
8008	LEFQD	1	0	CBTCCR20	NR	1	CBX2CCR20

Fix installed → ok !!!



## ALTER old created Tablespace to UTG's

- IKJ56641I SYSTEM ABEND CODE 04E  
REASON CODE 00C90110 BIND

Nice to know DIAGNOSE of DBD =>

**NO PROBLEMS**



# Other issues

## □ Solution :

- Unload/drop/create/load
- Or
- REPAIR DBD REBUILD .... → First Image Copy
- Or
- Fix by novembre 2012 (UK76818)



# HOLD BACK FEATURES

## Instance-based statement hints

- New mechanism for matching hints to a given query (query text <> queryno)
- Sophisticated
  - ➔ Need of plan\_table who will implement the hints
  - ➔ Copy plan\_table (ex prod) to own plan\_table





## HASH ACCESS

(vs Index Only access)

### Choose hash candidates carefully:

- High NLEVELS in index ( $\geq 3$ )
- Purely direct row access by primary key
- Truly random access
- No range queries
- Low insert/update activity

### Pinpointed candidates



## Extended SQL TIMESTAMPS Precision

- V9 precision of 6
- V10 maximum of 12
  
- Applications heavy INSERTs behavior based on timestamp
  - Frequently -803



## □ **ADDITIONAL non-key columns in a UNIQUE index**

- V10 expands the index functionality of new-function mode by adding the optional INCLUDE clause to the CREATE INDEX and ALTER INDEX statements.
- The use of INCLUDE columns is supported only on unique indexes, with the purpose of decreasing the index maintenance and the physical storage that is required for additional indexes.

# USABLE FEATURES

```
DECLARE CURS_IV1 CURSOR FOR
SELECT  R_CLT_OPE_PCS
        ,R_SEQ_TRS
        ,R_CLT
        ,R_PRU
FROM    TFT0200
WHERE   R_SEQ_CLT = :W_R_SEQ_CLT
        AND C_STA_INV = '01'
        AND C_STA_TRS IN('997', '999')
UNION
SELECT  R_CLT_OPE_PCS
        ,R_SEQ_TRS
        ,R_CLT
        ,R_PRU
FROM    TFT0200
WHERE   R_SEQ_CLT = :W_R_SEQ_CLT
        AND C_STA_INV = '02'
        AND C_STA_TRS = '997'
FOR    FETCH ONLY
WITH   UR
```

Access table FINF1P.TFT0200  
using index FINF1P.XFT02002 (3 COLS)  
Access table FINF1P.TFT0200  
using index FINF1P.XFT02002 (3 COLS)

```
CREATE
INDEX FINF1P.XFT02002
ON FINF1P.TFT0200
(
  R_SEQ_CLT ASC
 ,C_STA_INV ASC
 ,C_STA_TRS ASC
 ,R_SEQ_TRS ASC
)
```

# USABLE FEATURES

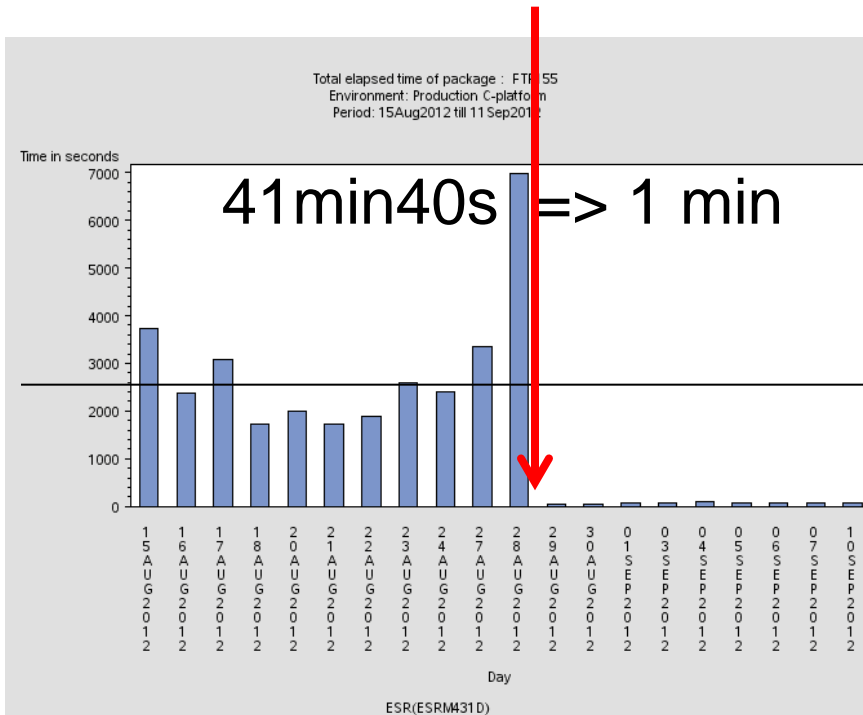
```
CREATE UNIQUE
INDEX FINF1P.XFT02002
ON FINF1P.TFT0200
(
  R_SEQ_CLT ASC
,C_STA_INV ASC
,C_STA_TRS ASC
,R_SEQ_TRS ASC
,R_CLT_OPE_PCS ASC
)
INCLUDE( R_CLT,
         R_PRU )
```

```
Access table FINF1P.TFT0200
scan index FINF1P.XFT02002 (3 COLS)
Sequential prefetch;
index only
Access table FINF1P.TFT0200
using index FINF1P.XFT02002 (3 COLS)
Sequential prefetch;
index only
```

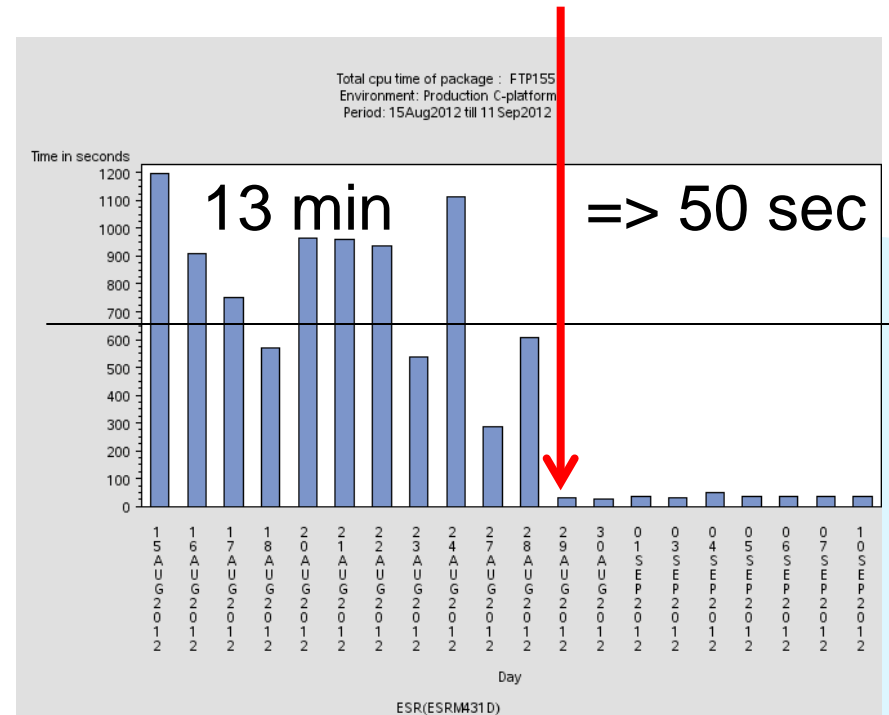
```
CREATE
INDEX FINF1P.XFT02002
ON FINF1P.TFT0200
(
  R_SEQ_CLT ASC
,C_STA_INV ASC
,C_STA_TRS ASC
,R_SEQ_TRS ASC
)
```

# USABLE FEATURES

## Elapse Time



## CPU Time

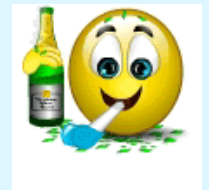


## Conclusion

**ADDITIONAL non-key columns in a UNIQUE index**

**Looking for more**

	ONLINE		DWH
GDPC	45	DWC0	145
GDPI	563	DWIO	695
DPF0	31	DWFO	2



## STATISTICS : TABLESAMPLE SYSTEM

- Collects statistics on a sample of the **data pages from a large table** (< 500.000 rows → all pages read !!! )
- size of the sample controlled by **integer parameter (= % OR default : AUTO)**
- only valid for **single-table table spaces**.
- not** valid for a LOB table space.



## □ STATISTICS : TABLESAMPLE SYSTEM

CBDJBO01.CBSJBO20 (12 part, 875084 rows)

### □ SAMPLE(25)

```
TABLE(ALL) SAMPLE(25) INDEX(ALL)  
KEYCARD CPU(0.13)
```

### □ TABLESAMPLE SYSTEM

SAMPLE SIZE USED :

ROWS SAMPLED = 492929

PAGES SAMPLED = 7413

SAMPLE RATE USED = 57.06

REPEATABLE = 1751010650

**CPU (0.07)**



## Dynamic BUILD OF dictionary

### When

- INSERT statements
- MERGE statements
- LOAD SHRLEVEL CHANGE
- Threshold :
  - 1,2 MB reading RTS

### Determine SYSLOG

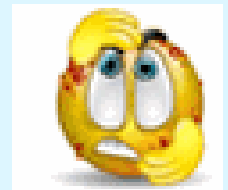
- DSNU241I for partitioned table space
- DSNU231I for non-partitioned

## Dynamic BUILD OF dictionary during insert

### Recoverability !!!

### Case :

- create tablespace/table
- Image copy
- DSN1PRINT



# USABLE FEATURES

DSN1998I INPUT DSNNAME = CERADTC.DSNDBD.CBDHQU01.CBSHQ01.I0001.A001 , VSAM

PAGE: # 00000000 -----

**HEADER PAGE:** PGCOMB='00'X PGLOGRBA='CA44B7860A43'X PGNUM='00000000'X PGFLAGS  
HPGOBID='026C000C'X HPGHPREF='00000708'X HPGCATRL='00'X HPGREL=  
HPGCATV='00'X HPGTORBA='000000000000'X HPGTSTMP='201206190932306  
HPGSSNM='DTC1' HPGFOID='000B'X HPGPGSZ='1000'X HPGSGSZ='0040'X  
HPGZ3PNO='000000'X HPGZNUMP='00'X HPGTBLC='0001'X HPGROID='0012  
HPGZ4PNO='00000000'X HPGMAXL='00A7'X HPGNUMCO='0007'X HPGFLAGS=  
HPGFLAGS2='00'X HPGCONTM='20121004144819495719'X HPGSGNAM='CBGRP  
HPGVCATN='CERADTC ' HPGRBRBA='CA44B7432909'X HPGLEVEL='CA44B7432  
HPGPLEVL='000000000000'X HPGCLRSN='CA44B7860A43'X HPGSCCSI='01F4  
HPGMCCSI='0000'X HPGDSSZ='00200000'X HPGFLAG2='00'X HPGEPOCH='0  
HPGRBLP='000000000000'X HPGDNUMB='1F'X HPGDNUMC='0007'X HPGDFSG  
HPGDLSG='00000000'X HPGSISP='00000000'X FOEND='E'

PAGE: # 00000001 -----

**SEGMENTED SPACEMAP PAGE:** PGCOMB='10'X PGLOGRBA='CA44B7433F42'X PGNUM='00000000  
SEGNUM='0056'X SEGFREE='0055'X SEGENT='0002'X SEGSI  
SEGLENT='00000000'X FOEND='N'

.....

DSN1994I DSN1PRNT COMPLETED SUCCESSFULLY, 00000002 PAGES PROCESSED

**Dynamic BUILD OF dictionary during insert**

**Case :**

**LOAD DATA INDDN SYSREC LOG YES RESUME  
YES SHRLEVEL CHANGE**

**DSN1PRINT**

PAGE: # 00000001 -----

**SEGMENTED SPACEMAP PAGE:** PGCOMB='10'X PLOGRBA='CA44B7433F42'X PGNUM='0000000  
SEGNUM='0056'X SEGFREE='0055'X SEGENT='0002'X SEGSI  
SEGLENT='00000000'X FOEND='N'

FIRST PART OF SEGMENTED SPACE MAP:

SEG 0001 000000000012C0 000

SECOND PART OF SEGMENTED SPACE MAP:

RELPG 00         20         40         60         80         A0         C0         E0  
0000   C0000000

DSN1985I ZERO PAGES ENCOUNTERED. FIRST PAGE = 00000002, LAST PAGE = 00000181

PAGE: # 00000182 -----

**DICTIONARY PAGE:** PGCOMB='00'X PLOGRBA='CA44B7D0474A'X PGNUM='00000182'X PGF  
PGLZDMNP='00000000'X PGLZDMLL='0DE0'X PGLZDMI1='LZDICK'

PGTAIL: PGLZDMI2='LZDICK' PGIDFREE='01'X PGEND='E'

DICTIONARY DATA:

## Dynamic BUILD OF dictionary during insert

- RECOVER
- DSN1PRNT



# USABLE FEATURES

HEADER PAGE: PGCOMB='10'X PGLOGRBA='CA44C222F58A'X PGNUM='00000000'X PGFLAGS  
HPGOBID='026C000C'X HPGHPREF='00000708'X HPGCATRL='00'X HPGREL=  
HPGCATV='00'X HPGTORBA='000000000000'X HPGTSTMP='201206190932306  
HPGSSNM='DTC1' HPGFOID='000B'X HPGPGSZ='1000'X HPGSGSZ='0040'X  
HPGZ3PNO='000191'X HPGZNUMP='10'X HPGTBLC='0001'X HPGROID='0012  
HPGZ4PNO='00000000'X HPGMAXL='00A7'X HPGNUMCO='0007'X HPGFLAGS=  
HPGFLAGS2='00'X HPGCONTM='20121004144819495719'X HPGSGNAM='CBGRP  
HPGVCATN='CERADTC ' HPGRBRBA='CA44C22352F8'X HPGLEVEL='CA44C2235  
HPGPLEVL='CA44B7432909'X HPGCLRSN='CA44C222F58A'X HPGSCCSI='01F4  
HPGMCCSI='0000'X HPGDSSZ='00200000'X HPGFLAG2='00'X HPGEPOCH='0  
HPGRBLP='000000000000'X HPGDNUMB='1F'X HPGDNUMC='0007'X HPGDFSG  
HPGDLSG='00000000'X HPGSISP='00000000'X FOEND='N'

PAGE: # 00000001 -----  
SEGMENTED SPACEMAP PAGE: PGCOMB='00'X PGLOGRBA='CA44B7D19648'X PGNUM='0000000  
SEGNUM='0056'X SEGFREE='004D'X SEGENT='0002'X SEGSI  
SEGLENT='00000216'X FOEND='E'

FIRST PART OF SEGMENTED SPACE MAP:

SEG 0001 000000020012C0 FF



# USABLE FEATURES

SECOND PART OF SEGMENTED SPACE MAP:

```
RELPG 00      20      40      60      80      A0      C0      E0
0000  FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
```

```
RELPG 00      20      40      60      80      A0      C0      E0
0001  FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF C0000000 00000000 3FFFFFFF FFFFFFFF
```

```
RELPG 00      20      40      60      80      A0      C0      E0
0002  FFFFFFF0
```

```
PAGE: # 00000002 -----
DATA PAGE:  PGCOMB='10'X  PGLOGRBA='CA44B7CEF493'X  PGNUM='00000002'X  PGFLAGS='
            PGFREE='0031'X  PGFREEP=3999  PGFREEP='0F9F'X  PGHOLE1='0000'X  PGMA
PGTAIL:  PGIDFREE='00'X  PGEND='N'
```

ID-MAP FOLLOWS:

```
01  0014 00C1 021B 02C8 016E 0422 04CF 0375
09  0629 06D6 057C 0783 08DD 0830 098A 0AE4
11  0B91 0A37 0CEB 0C3E 0D98 0E45 0EF2
```

```
RECORD:  XOFFSET='0014'X  PGSFLAGS='00'X  PGSPTH=173  PGSPTH='00AD'X  PGSOBD='00
C3C2C3C2 C1E2E340 40407BD7 E2C2C3D3 D3404040 40404040 40404040 40404040  CBCBAS
40404040 40404040 40404040 40404040 40404040 40404040 F0F1F0F0
E7D40040 40404040 40404040 40404040 40404040 40404040 40404040 40404040  XM.
```

## What about Binds/Rebinds ?

### No Statistics (-1)

- 60% cases → ok

### Copy

- `sysibm.sysindexes`

– NLEAVE, NLEVELS, FIRSTKEYCARD, FULLKEYCARD

→ ok



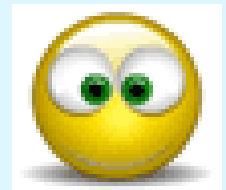
## Less contention on DB2 Catalog

**Removed all links in the catalog & directory**

**Concurrent binds optimal when everything is binded in V10**



- IN-list predicates to reduce
  - the number of index getpages
  - list prefetch operations
  
- resulting in less:
  - elapsed time
  - CPU time.



## IN LIST

```

FROM CBVCMW51 T1
WHERE TAAK_SRT_KD IN (?,?,?)
AND TWZ_USER_KD IN (?,?,?)
AND TWZ_VNS_NR = ?
AND TWZ_CWK_NR = ?
AND UITV_DT >= ? AND UITV_DT <= ?
AND ((TWZ_KD_2 = ? AND TWZ_USER_KD = ?)
OR (TWZ_KD_2 = ? AND TWZ_USER_KD = ?))
AND TAAK_TYPE_NR >= ? AND TAAK_TYPE_NR <= ?
AND WD_ZN >= ? AND WD_ZN <= ?
AND ((UITV_DT > ?)
OR (UITV_DT = ? AND TAAK_SRT_KD > ?)
OR (UITV_DT = ? AND TAAK_SRT_KD = ? AND UITV_B
OR (UITV_DT = ? AND TAAK_SRT_KD = ? AND UITV_B
AND TWZ_CTR_NR > ?)
OR (UITV_DT = ? AND TAAK_SRT_KD = ? AND UITV_BE
AND TWZ_CTR_NR = ? AND TAAK_NR >= ?))
ORDER BY PRIO_IK ,UITV_DT, TAAK_SRT_KD, UITV_BEG_TD, TWZ_CTR_NR, TAAK_NR

```

Access path V9 :

PLNO	MTH	TABEL	AC	MC	ACCESS
1	0	CBTCMW51	I	1	CBX4CMW51
2	3			0	

Access path V10

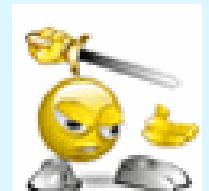
PLNO	MTH	TABEL	AC	MC	ACCESS
1	0	DSNIN003(01)	IN	0	
2	1	DSNIN002(01)	IN	0	
3	1	CBTCMW51	I	4	CBX4CMW51
4	3			0	

## For Free FEATURES

```
SELECT      A.KLN_NR
FROM        CBVPSN04 A
WHERE       A.KLN_NR >= ?
           AND A.FON_NM IN(?, ?, ?)
           AND EGN_KD = ?
           AND (VOOR_NM = ? OR ROEP_NM = ? OR ' ' = ?)
           AND VLD_KD IN ( ?, ?, ?, ?, ?)
           AND EXISTS (SELECT B.KLN_NR FROM CBVPSN11 B
WHERE        B.KLN_NR = A.KLN_NR
              AND B.SRT_KD = ?
              AND B.VNS_NR = ' '
              AND B.ADR_LAND_KD = ?
              AND B.POST_KD = ?
              AND B.STR_NM LIKE ? )

ORDER      BY A.KLN_NR
```

IT DEPENDS !!!



# For Free FEATURES

DB2V9:

QUERYNO	QBLOCKNO	PROG	PLANNO	MTH	TABLE	ACC	MC	INDEX	HINT_USED
2171	1	COFAAU	1	0	CBTPSN04	N	3	CBX2PSN04	
2171	1	COFAAU	2	1	CBTPSN11	I	5	CBX6PSN11	
2171	1	COFAAU	3	3			0		

DB2V9

HINTs

QUERYNO	QBLOCKNO	PROG	PLANNO	MTH	TABLE	ACC	MC	INDEX	HINT_USED
2171	1	COFAAU	1	0	CBTPSN11	I	5	CBX6PSN11	COFAAU
2171	1	COFAAU	2	1	CBTPSN04	N	3	CBX2PSN04	COFAAU
2171	1	COFAAU	3	3			0		COFAAU

# For Free FEATURES



DB2V10

QUERY NO	Q BLOCK NO	PROG	PLAN NO	MTH	TNAME	TAB NO	ACC	MC	ACCESSNAME	INDEX ONLY	PRE FETCH
2171	1	COFAAU	1	0	CBTPSN04	1	N	3	CBX2PSN04	Y	
2171	1	COFAAU	2	1	DSNWFQB(02)	3	O	0		N	
2171	1	COFAAU	3	3		0		0		N	
2171	2	COFAAU	1	0	CBTPSN11	2	I	5	CBX6PSN11	Y	

IBM Serv	QBLOCK TYPE	HINT_USED	PARENT_QBLOCKNO	TABLE_TYPE	PARENT_PLANNO
INITUK77407 OLCMUK70551 OLDEUK70233	SELECT		0	T	0
OGP UK77500 OPRPUK75592 OB2 UK77038	SELECT		0	W	0
OVM UK71946 OV1 UK77038 OB1 UK60509	SELECT		0		0
INITUK77407 OLCMUK70551 OLDEUK70233	CORSUB		1	T	2



# For Free FEATURES



PROG	PLAN NO	MTH	TNAME	TAB NO	ACC	MC	ACCESSNAME	INDEX ONLY	PRE FETCH
COFAAU	1	0	DSNWFQB(02)	3	R	0		N	S
COFAAU	2	1	CBTPSN04	1	N	3	CBX2PSN04	Y	
COFAAU	3	3		0		0		N	
COFAAU	1	0	CBTPSN11	2	I	5	CBX6PSN11	Y	

IBM Serv	QBLOCK TYPE	HINT USED	PARENT_QBLOCKNO	TABLE_TYPE	PARENT_PLANNO
INITUK77407 OLCMUK70551 OLDEUK70233	SELECT	COFAAU	0	W	0
OGP UK77500 OPRPUK75592 OB2 UK77038	SELECT	COFAAU	0	T	0
OVM UK71946 OV1 UK77038 OB1 UK60509	SELECT	COFAAU	0		0
INITUK77407 OLCMUK70551 OLDEUK70233	NCOSUB	COFAAU	1	T	1

## Better Use of Disorganised IX

- Version 10 provides several performance enhancements that reduce the need to **reorganize indexes frequently**, resulting in a reduction in CPU time and synchronous I/O waits.
  - List prefetch of index leaf pages
  - Faster IX Utilities
- Further work to do



Questions ?

