

Real customer experience rolling out DB2 V10 CM and NFM for over 45 Data Sharing groups supporting 24/7 Banking environments @ GAD



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- **GAD Overview**
- **DB2 Environment**
- **DB2 10 ESP/QPP Experiences**
- **Migration..... almost seamless**

GAD Overview

- IT service provider, software development company and data processing center for
 - approx. 450 Volksbanken, Raiffeisenbanken (cooperative banks) and retail banks in North-Germany
 - central banks (WGZ BANK, DZ BANK, apoBank), cooperative companies



- Facts and Figures (12/2010)
 - Consolidated revenue in million: 650 Euro
 - Employees: 1,695
 - Banks: 432
 - Bank workplaces: 60,779
 - Self-service devices 15,720
 - Bookings in billions: 2.25
 - Transactions in billions: 15.16
 - ATM withdrawals in millions: 209.15
 - Active accounts in millions: 29.69
 - Self-service current accounts with internet access in millions: 3.95

- **GAD Overview**
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- Mainframe Software
 - z/OS 1.12 & 1.13 Beta program (ESP/QPP)
 - DB2 z/OS V9 & V10 Beta program (ESP/QPP)
 - IMS V11 & V12 Beta Program (ESP/QPP)
 - WebSphere MQSeries V7.01
 - WebSphere Application Server V7.0.0.11

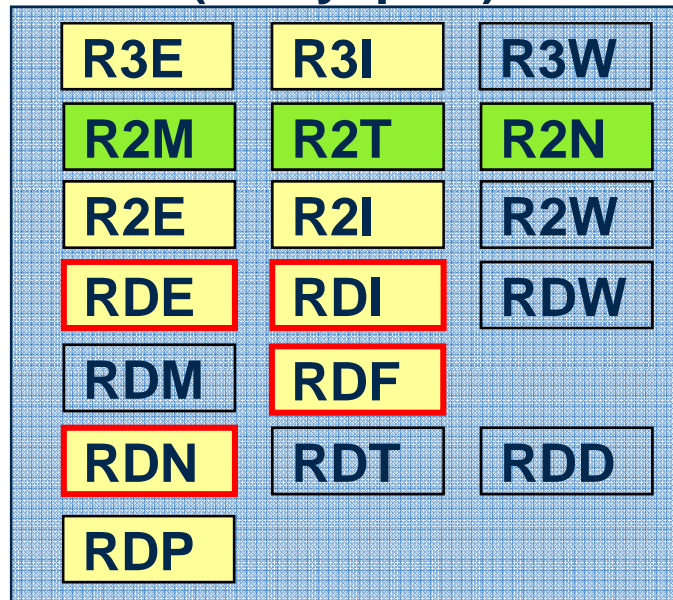
- IBM-Tools and -Products
 - DB2PE, QMF, WBIFN, Rational Tools
- CA-Tools
 - RC/Migrator/Compare, RC/Query, RC/Update, ...

GAD's DB2 Environment

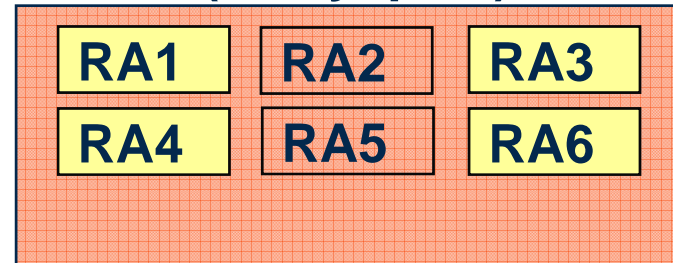
- 42 datasharing groups with 170 members
 - test, development, integration, maintenance:
 - 21 DS groups with 54 members
 - production:
 - 21 DS groups with 116 members
- 2- to 8-way datasharing
- DB2 objects
 - Databases 43,000
 - Tablespaces 700,000
 - Tables 720,000
 - Indexes 880,000
 - Views 750,000
 - Packages 2,100,000

GAD's DB2 Environment 8 Months ago

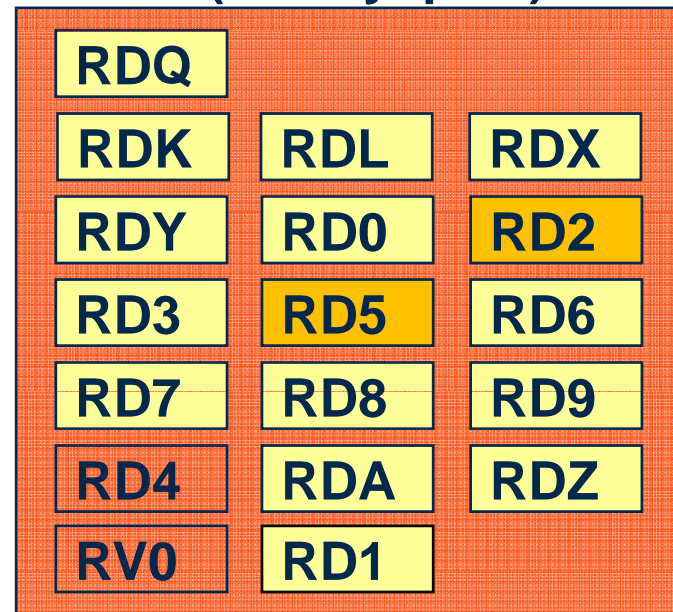
EXEX (6 //Sysplex)



AXAX (8 //Sysplex)



OXOX (18 //Sysplex)



TXTX (4 //Sysplex)



V10 CM9

ESP/QPP

V10 NFM

GAD's DB2 Environment as of yesterday

DB2 10 CM9

DB2 10 NFM

EXEX		OXOX		AXAX	
DSNE	V10 NFM	DSNQ	V10 NFM	RA1X	V10 NFM
DSNN	V10 NFM	DSN0	V10 NFM	RA2X	V10 CM9
DSNM	V10 NFM	DSN8	V10 NFM	RA3X	V10 CM9
DSNI	V10 NFM	DSNA	V10 CM9	RA4X	V10 CM9
DSNF	V10 NFM	DSNK	V10 CM9	RA5X	V10 CM9
DSNT	V10 NFM	DSNL	V10 CM9	RA6X	V10 CM9
DSND	V10 CM9	DSNX	V10 CM9		
DSNW	V10 CM9	DSNY	V10 CM9		
R2EX	V10 NFM	DSNZ	V10 CM9		
R2IX	V10 NFM	DSN1	V10 CM9		
R2WX	V10 CM9	DSN2	V10 NFM		
R2MX	V10 NFM	DSN3	V10 CM9		
R2NX	V10 NFM	DSN4	V10 CM9		
R2TX	V10 NFM	DSN5	V10 NFM		
R3EX	V10 NFM	DSN6	V10 CM9		
R3IX	V10 NFM	DSN7	V10 CM9		
R3WX	V10 CM9	DSN9	V10 CM9		
DSNP	V10 NFM	RV0X	V10 CM9		

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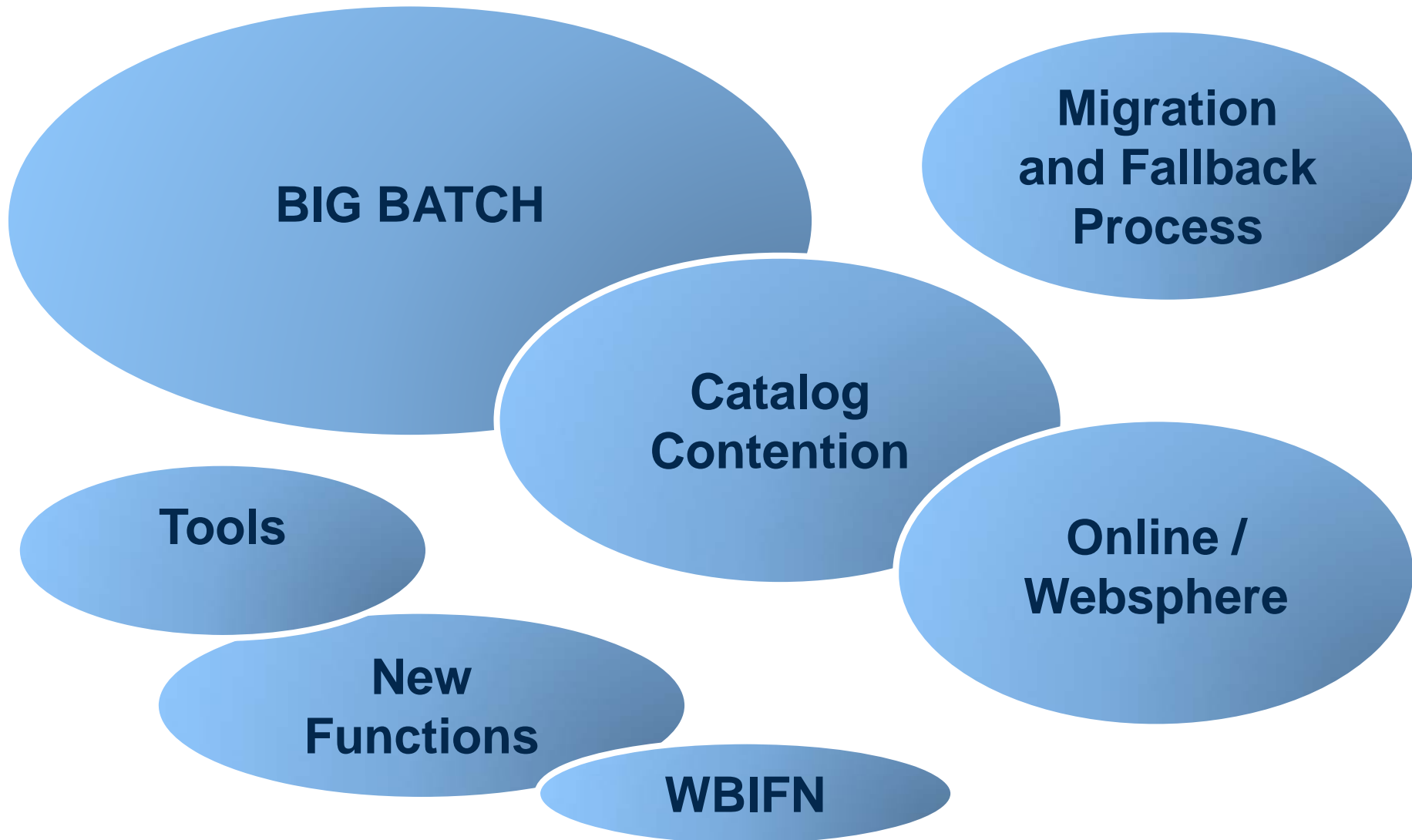
DB2 10 ESP/QPP – Reasons for Participation



- GAD's major objectives in joining an ESP/QPP
 - Test and prove stability and reliability of new DB2 release
 - Internal certification process to provide GAD required business resilience, stability and availability
 - Early startup in production with the latest DB2 release in order to pick up the new features and benefit from them
 - Improve the partnership program and quality of IBM's software products

- GAD ESP/QPP main efforts
 - Setup and run Big Batch environment on clone of biggest productive DB2 system
 - Setup and run WAS stresstest environment
 - NFM-Tests
 - Parallel DDL and BIND
 - new features (hash access, bi-temporal data)
 - Repeatedly cloning of many DB2 systems (catalog data) to test catalog migration process
 - Attempt to provide performance measurement data

DB2 10 ESP/QPP – Main Focus Areas



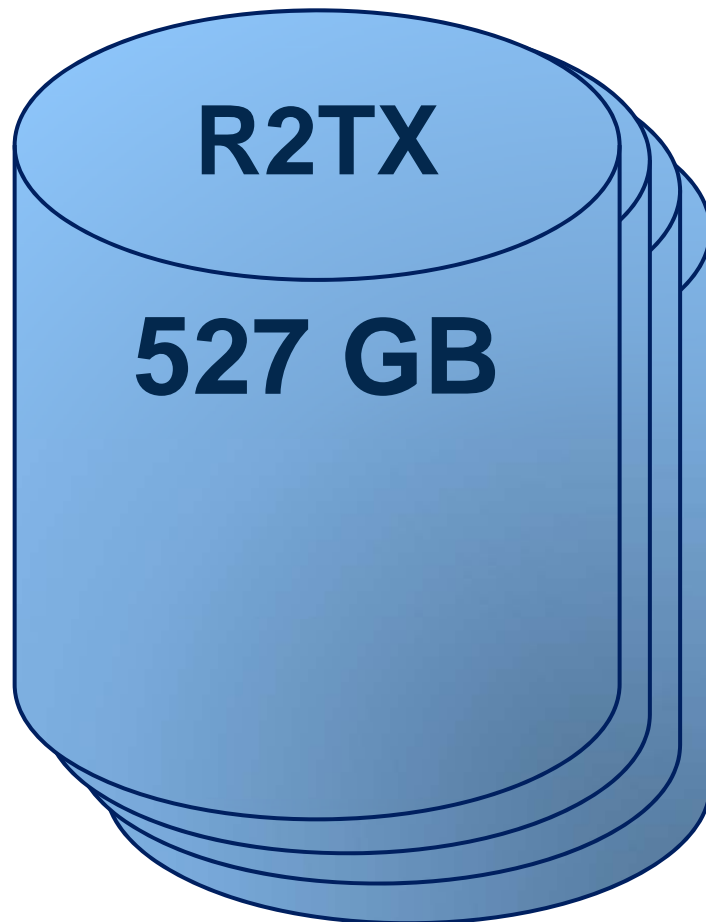
■ R2TX – Big Batch

- Base: Clone complete production DB2 system DSN4 (application and catalog data) to run the tests with “old” DB2 catalog structures (e.g. DBDs)
- Big Batch
 - Banking day end process of DSN4 / ZIS (central bank application)
 - About 1,500 jobs, OPC driven
- Regressiontests (32 overall)
- Performance Analysis accounting reports
 - V9 NFM
 - V10 CM9
 - V10 NFM
 - V10 fallback scenarios

GAD's DB2 V10 QPP Experiences

QPP Review – Regression Test Systems

Big Batch



**NFM: Catalog
Contention**



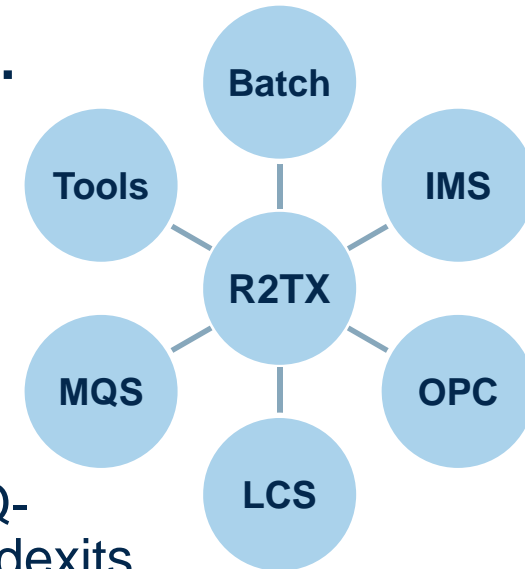
**Websphere
stresstest**



GAD's DB2 V10 QPP Experiences

QPP Review – Big Batch (R2TX) / 2

- **Why does GAD run the Big Batch? ...**
 - daily batch of central bank WGZ
 - DB2 infrastructure
 - 62,277 tables, 245,241 views
 - 70,520 indexes
 - 11,541 packages in 166,886 versions
 - Complex RI structure, Trigger with MQ-UDFs, STPs / ODBA / MQ-UDFs, Fieldexits, CheckConstraints, Declared GTT, generated Keys/Sequences
 - DB2 Utilities
 - Unload, Load, Runstats, Online REORGs
 - The entire regression test environment represents over 95% of the SQL functionality of our production environment.



- **R2NX – application release change**
 - Base: Clone catalog of production DB2 system DSNL (coop bank application)
 - Early migration to new function mode
 - Test of catalog contention:
 - Test mass DDL and BINDs in parallel by running an application release change
 - Test mass DDL and BINDs with increased parallelity in V10 NFM
 - Compare application release changes with different DB2 versions: V9 NFM, V10 CM9, V10 NFM
 - Test of new functions

- **R2MX - Websphere**
 - Base: Load application data of integration system R3I
 - Online: Websphere
Java workload driven by bank21 WebSphere application against DB2
 - Hash access
Perfect primary key solution for objects of bank21 WebSphere application

GAD's DB2 V10 QPP Experiences

QPP Review – Preproduction Systems



■ DSNE

- V10 – V9 coexistence mode
- Broker 6.0, WBIFN 2.2
- Broker 6.1, WBIFN 3.1 (official support of DB2 z/OS V10)

■ DSNN

- Fallback to V9 NFM because of loop in ALTER statement (CA)
 - Workaround: stop CA Detector
 - Solved after GA
- Remigration to V10 CM9

■ DSNI / DSNF

- Fallback to V9 NFM because of incompatible change of SQL scalar function CHAR()

GAD's DB2 V10 QPP Experiences

QPP Review

Migration to V10 CM9

29

Migration to V10 NFM

17

Fallback to V9 NFM (incl. V10 – V9 coexist.)

12

Fallback to V10 CM9*

2

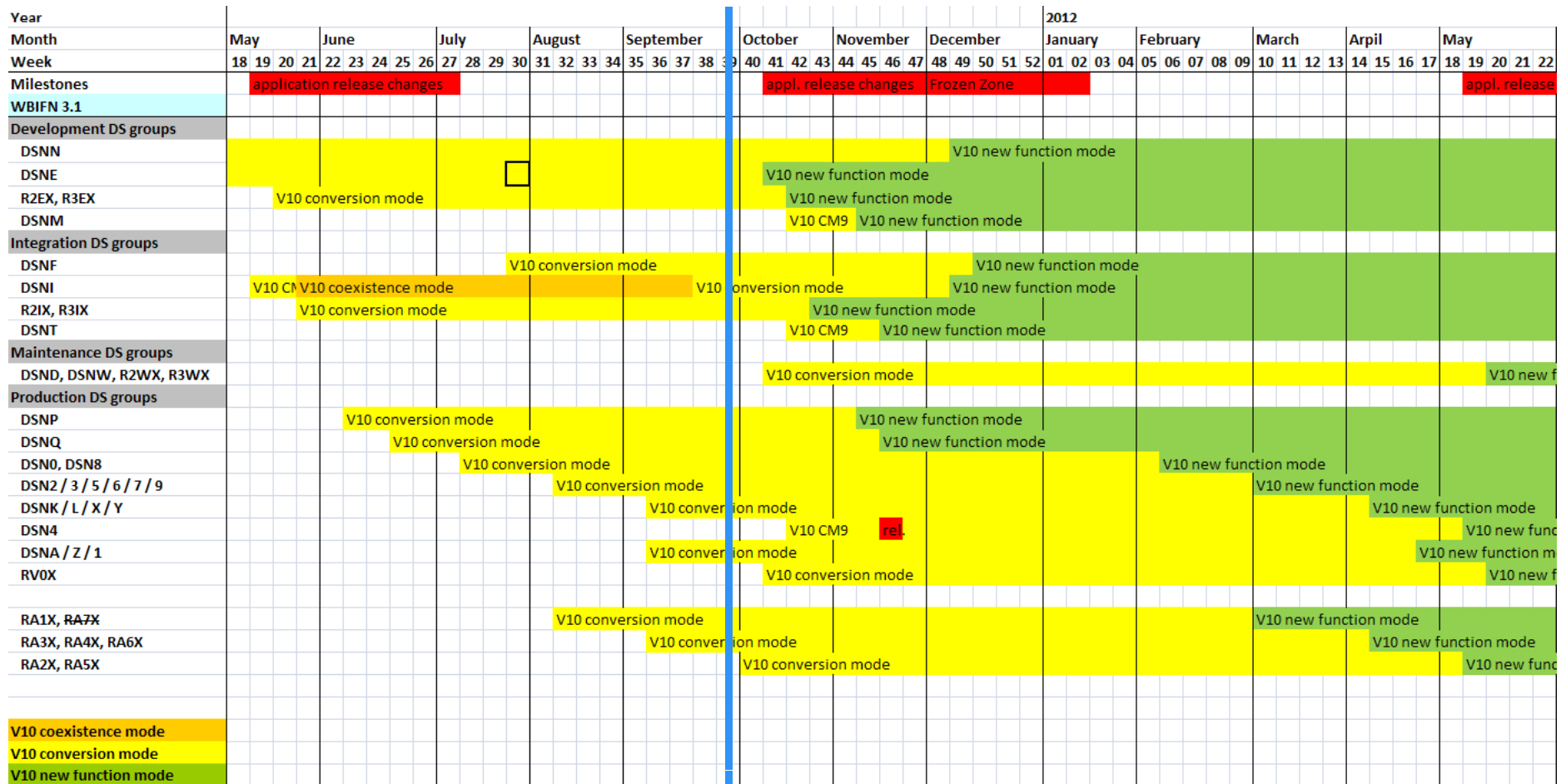
Restore QPP test system

43

Clone

5

DB2 10 ESP/QPP – Migration Tabletable



- Some key problems after the QPP during roll out...
 - DSNHDECP RDEC
 - SQL scalar CHAR function (coex)
 - SQL PL Procedures (coex)
 - Trigger Packages (coex)
 - Catalog inconsistencies

GAD's DB2 V10 QPP Experiences

Hints and Tips



- **SQL scalar function CHAR() / decimal conversion ...**
 - Incompatible changes are not acceptable for GAD, if they result in wide spread application changes and detection thereof.
 - ➔ PM29124 (V9 behaviour as default in V10)
 - Example: SQL scalar function CHAR() for COL1 DEC(004 , 000)

```
SELECT COL1
       ,CHAR(COL1)
       ,HEX(CHAR(COL1))
       ,SUBSTR(CHAR(COL1), 2, 4) APPL_SUBSTR
FROM DB2_TABLE;
```

COL1	CHAR_V9	HEX_CHAR_V9	APPL_SUBSTR	COL1	CHAR_V10	HEX_CHAR_V10	APPL_SUBSTR
9	0009,	40F0F0F0F96B	0009	9	9	F94040404040	9
99	0099,	40F0F0F9F96B	0099	99	99	F9F940404040	99
999	0999,	40F0F9F9F96B	0999	999	999	F9F9F9404040	999
9999	9999,	40F9F9F9F96B	9999	9999	9999	F9F9F9F94040	9999

GAD's DB2 V10 QPP Experiences

Hints and Tips



- SQL scalar function CHAR() / decimal conversion
 - There is not an easy way to identify infected applications.
 - Current business case:
 - Trigger statement creates MQ message.
Second host program processes this MQ message.
Therefore this second programm is also suffering from this output format change, **even if this program doesn't use DB2 at all.**

```
CREATE TRIGGER ZI1T.ZKTTR001
AFTER INSERT ON ZI1T.ZKT_KK
REFERENCING NEW AS NC
FOR EACH ROW MODE DB2SQL BEGIN ATOMIC
SELECT DB2MQ.MQSEND ( 'ZI1.KWG24C.SERVICE' , 'ZI1.KWG24C.POLICY' ,
'V01' CONCAT 'WISKWG' CONCAT CHAR ( CURRENT_TIMESTAMP ) CONCAT 'ZI1T '
CONCAT 'ZKT_KK ' CONCAT 'I' CONCAT CHAR ( NC.ZBK_NR )
CONCAT CHAR ( NC.ZBK_NR_BKR ) CONCAT CHAR ( NC.ZKT_NR_STA )
CONCAT CHAR ( NC.ZKT_NR ) CONCAT 'ZKT_NR_GP ' CONCAT CHAR ( NC.ZKT_NR_GP f)
CONCAT 'ZKT_DAT_BGSANL ' CONCAT CHAR ( NC.ZKT_DAT_BGS_ANL )
CONCAT 'ZKT_KZ_LOE ' CONCAT CHAR ( NC.ZKT_KZ_LOE ) , 'ZI1KWG' )
FROM SYSIBM.SYSDUMMY1 ;
```


GAD's DB2 V10 QPP Experiences

Hints and Tips



■ SQL PL Stored Procedures

- Native SQL procedures created or regenerated in DB2 V10 CM9 cannot run in DB2 V9.

```
SQLCODE = -904, ERROR: UNSUCCESSFUL EXECUTION CAUSED BY AN UNAVAILABLE  
RESOURCE. REASON 00E7009E, TYPE OF RESOURCE 00000801, AND RESOURCE NAME  
BE2TFKT.LESE_VARIANTEN.18DEB14D119115C4
```

- Impact: in V10 X deployment has to be executed on V9 member
- Workaround: run ALTER PROCEDURE REGENERATE on V9 member

➔ [PM13525](#)

■ Create Trigger

- Trigger created in DB2 V10 not executable in DB2 V9:

```
DSNT408I SQLCODE = -723, ERROR: AN ERROR OCCURRED IN A TRIGGERED SQL STATEMENT  
IN TRIGGER AWAT.OCA_TEST_TRIGGER. INFORMATION RETURNED: SQLCODE -904, SQLSTATE  
57011, MESSAGE TOKENS 00E30305,00000801,AWAT.OCA_TEST_TRIGGER-  
.18E5950B04A23EEC, SECTION NUMBER 1
```

- Impact: in V10 X trigger should only be created on V9 member
- Workaround: drop and create trigger on V9 member

➔ [PMR 27672](#)

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- **Migration..... almost seamless**

Migration - almost seamless

- **Supporting >45 data sharing groups requires a well defined and tested automation process.**
 - Mainly implemented in REXX and driven by GAD configuration specific naming conventions and installation parameters.
 - Is being permanently maintained (e.g. meet new version requirements)
- **Just before the migration (CM9 Catmain and/or ENFM/NFM)**
 - Move away workload from the DB2 system that will be migrated
 - Using WLM Scheduling environment to move away any new batch workload
 - STOP DDF
 - STOP all possible DDL
 - STOP all possible BIND
 - STOP all possible Batch
 - Basically all active workload except ONLINE
- **Permanently collecting information about inhibitors..**
 - Active, never ending THREAD's, holding locks on DB2 Catalog
 - Vendor products (Monitor like OMPE)
 - Bad behaving applications (not committing)
 - E.g. Long running Batches, or third party products...
 - Integrating the information in order to complete the automation process

- It is good practice to clone DB2 production catalog
 - Exercise DB2 migration processes in any given release.
 - Know the elapsed time of CATMAINT and ENFM/NFM
 - Avoids little issues like space allocation or missing DFSMS definitions,
 - A good QA for procedures and automation

- Running and improving a regression test environment
 - GAD claims that it catches over 90% of issues that are specific to their environment and would have create noticeable problems like outages in production.
 - GAD Integrated and enhanced these environments to regular system maintenance, application change process and system QA procedures.
 - Quote: Lets us sleep in our beds ;-)

Thank you!

Questions

