

Automation, Health Checks & KPIs @KBC

GSE DB2 March 23th

Gilbert Sieben

Agenda

- 1 Automation
- 2 Health Checks
- 3 KPIs

Agenda

1 Automation

1.1 DB2 Messages

1.2 Daily operation jobs

1.3 Automation of stop/start DB2 subsystems

1.4 Automation of switching workload

1.1 DB2 messages captured by Automation (MainView) and coupled actions

➤ Messages :

- partly history (based on issues in the past)
- but also based on DB2 Messages Manual who directs to the online IBM Knowledge Center :
 - new messages
 - changed messages
 - deleted messages
 - updated message explanations (might be useful for Automation because of positioning of parms)

Note : reviewed every release of DB2

1.1 DB2 messages captured by Automation (MainView) and coupled actions (cont)

➤ Example of new messages :

➤ DSNI052I : csect-name AN AGENT HAS EXCEEDED THE WARNING THRESHOLD FOR STORAGE USE IN WORK FILE DATABASE database-name FOR object-type. THRESHOLD=percentage PERCENT. TOTAL STORAGE CONFIGURED=total-storage KB. CONNECTION ID = connection-id. CORRELATION ID = correlation-id. LUWID=luwid. PACKAGE NAME=package-name. PLAN NAME=plan-name.

➤ DSNI053I : csect-name THE DB2 SUBSYSTEM HAS EXCEEDED THE THRESHOLD FOR STORAGE USE IN WORK FILE DATABASE database-name FOR object-type. THRESHOLD=percentage PERCENT. TOTAL STORAGE CONFIGURED=total-storage KB.

1.1 DB2 messages captured by Automation (MainView) and coupled actions (cont)

➤ Actions :

- e-mail to group mailbox (daily handled by BOB)
- automatic creation of an incident ticket in a tool called ServiceNow.

The ticket gets assigned to our group (daily handled by BOB)



<input type="checkbox"/>		INC3608298	DB2	DSNI053I -	DSNISGNS THE DB2 SUBSYST ...
<input type="checkbox"/>		INC3616527	DB2	DSNI053I -	DSNISGNS THE DB2 SUBSYST ...

- automatic RED alert on systemconsoles so operators can beep who's on call + automatic incident creation.

1.2 Daily operation jobs (ICs, reorgs, runstats, SMF data,...)

- Link between job scheduler TWS and ServiceNow.
- If job fails, automatic incident creation + assignment by our operators of ControlTower (24/7)
- For us no knowledge of TWS needed

Note : only 1 place (SNow) to look for incidents on failed jobs, messages,...

1.3 Automation of stop/start DB2 subsystems

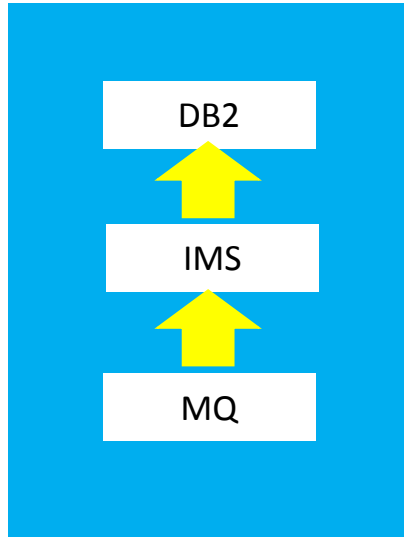
- Automation of stop/start of DB2 subsystems and monitoring their status with a tool called TOM
 - Uniform commands for our operators
 - i.e. “TOM STOP DB2MSTR”
 - Automated STOP MODE(FORCE) of DB2 after 10 minutes because of threads/consuming CPU/IO :
 - “DB2-AUTO-STOP ACP1 : ER IS NOG CPU-GEbruIK OP ACPT VOOR ACP1MSTR”
 - “DB2-AUTO-STOP ACP1 : ER IS NOG IO-BEWEGING OP ACPT VOOR ACP1MSTR”
 - Status :
 - TOM UNSUSPEND ACP1MSTR
 - F MVTOM,CMD ACTIVATE O('ACPT.ACP1MSTR')
 - CK1005I Command: CMD ACTIVATE O('ACPT.ACP1MSTR')
 - CK2015I ACTIVATE O('ACPT.ACP1MSTR')
 - OD2300I User USER01 requested ACTIVATE of OBJECT ACPT.ACP1MSTR
 - OD2320I Object ACPT.ACP1MSTR activated under TOM control

1.4 Automation of switching workload

For Datasharing systems 24/7 : Switching workload between DB2s on other LPARs in case of technical releases (applying maintenance, upgrades,...) (in house written code)

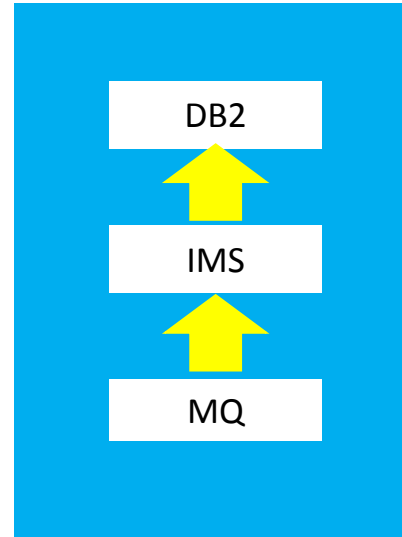
1.4 Automation of switching workload

LPAR1



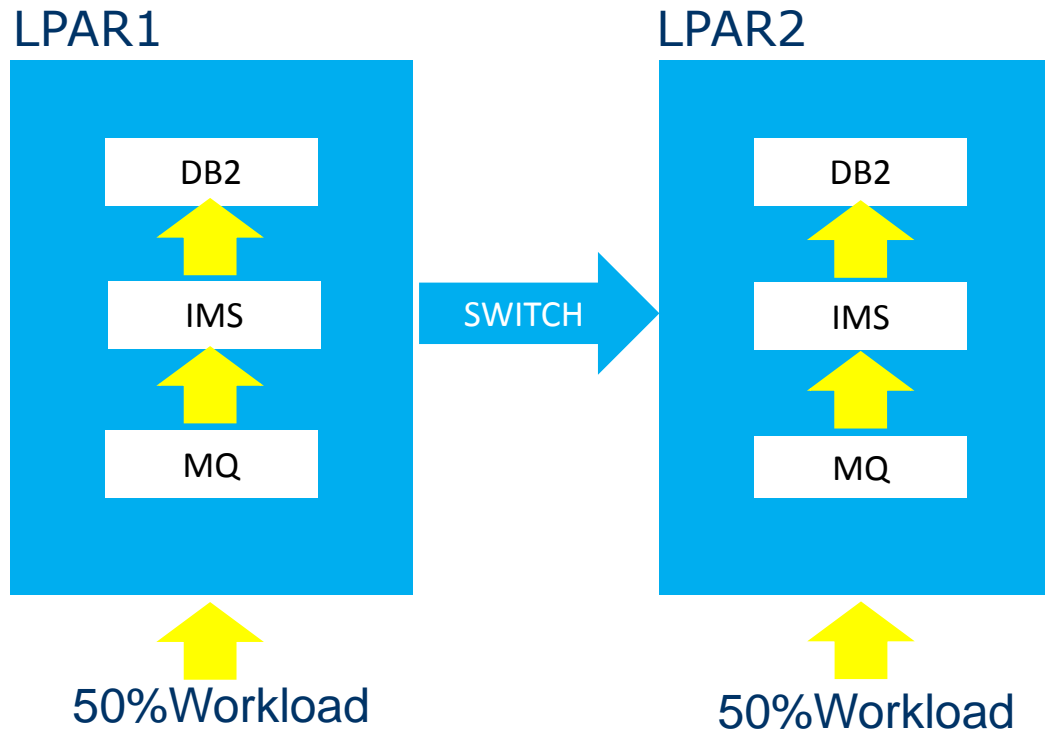
50%Workload

LPAR2



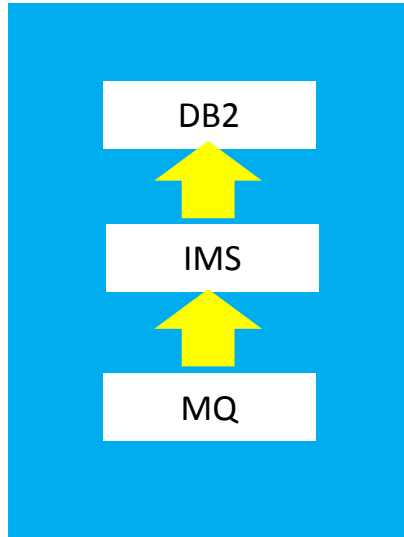
50%Workload

1.4 Automation of switching workload

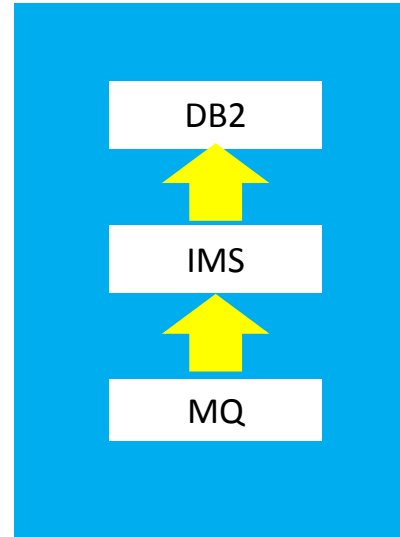


1.4 Automation of switching workload

LPAR1



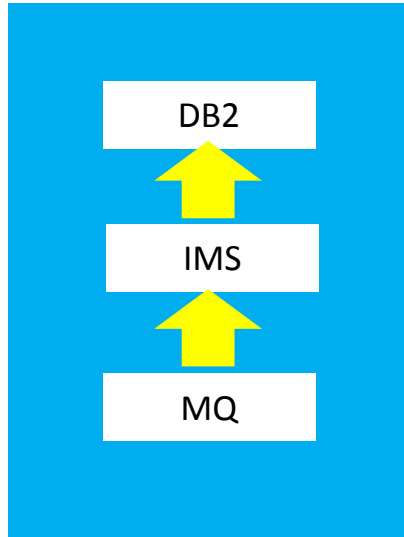
LPAR2



100%Workload

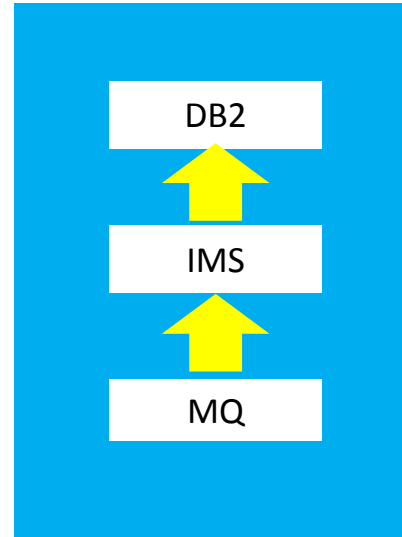
1.4 Automation of switching workload

LPAR1



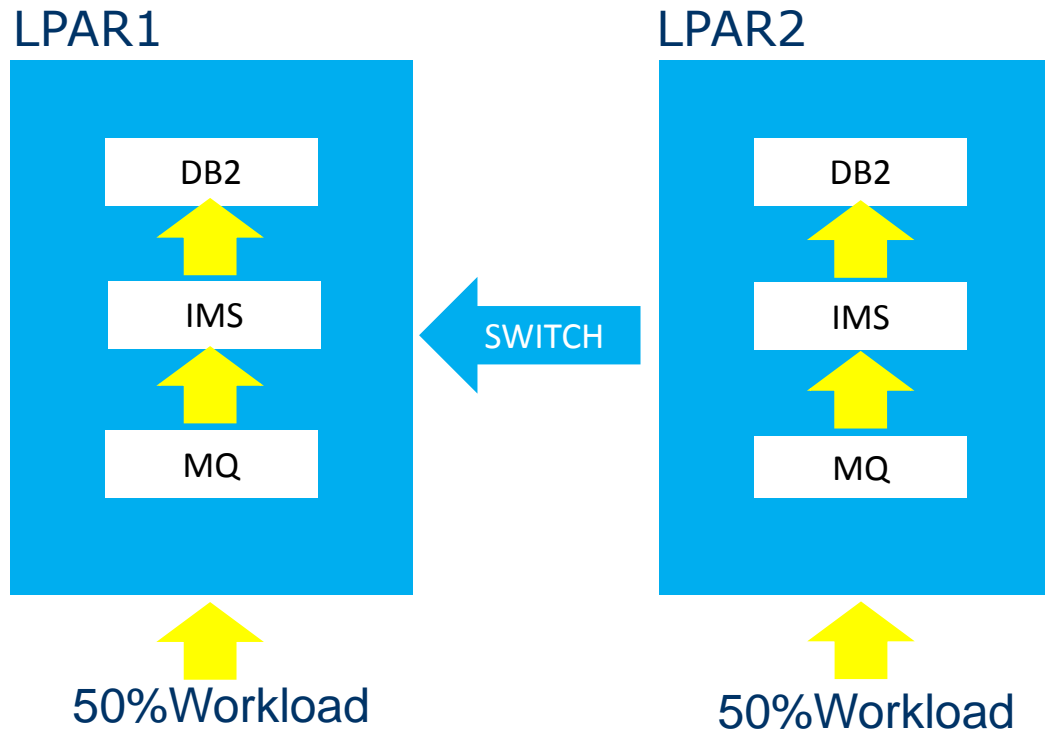
Stop/start

LPAR2



100%Workload

1.4 Automation of switching workload



Agenda

2 Health checks

2.1 Monitoring subsystems

2.2 'Daily check for DB2'

2.3 Health checks

2.4 Daily Eval Report

2.1 Monitoring subsystems

Note : DB2 System engineers monitor the DB2 Subsystems, DBAs/Developers monitor the applications

- Based on SMF data and values of following KPIs :
 - SYSTEM paging for DB2 READ's en WRITE's
 - LOG Buffer Activity
 - EDM pool
 - BufferPool threshold
 - Log rate activity
- => If exceptions : mail on day+1 to global mailbox (BOB)

2.2 “Daily check for DB2”

- Based on a scan of the SYSLOG for DSNX-messages
- In house written by Systems group
- Output is a mail with an excel attached
- Follow up by BOB

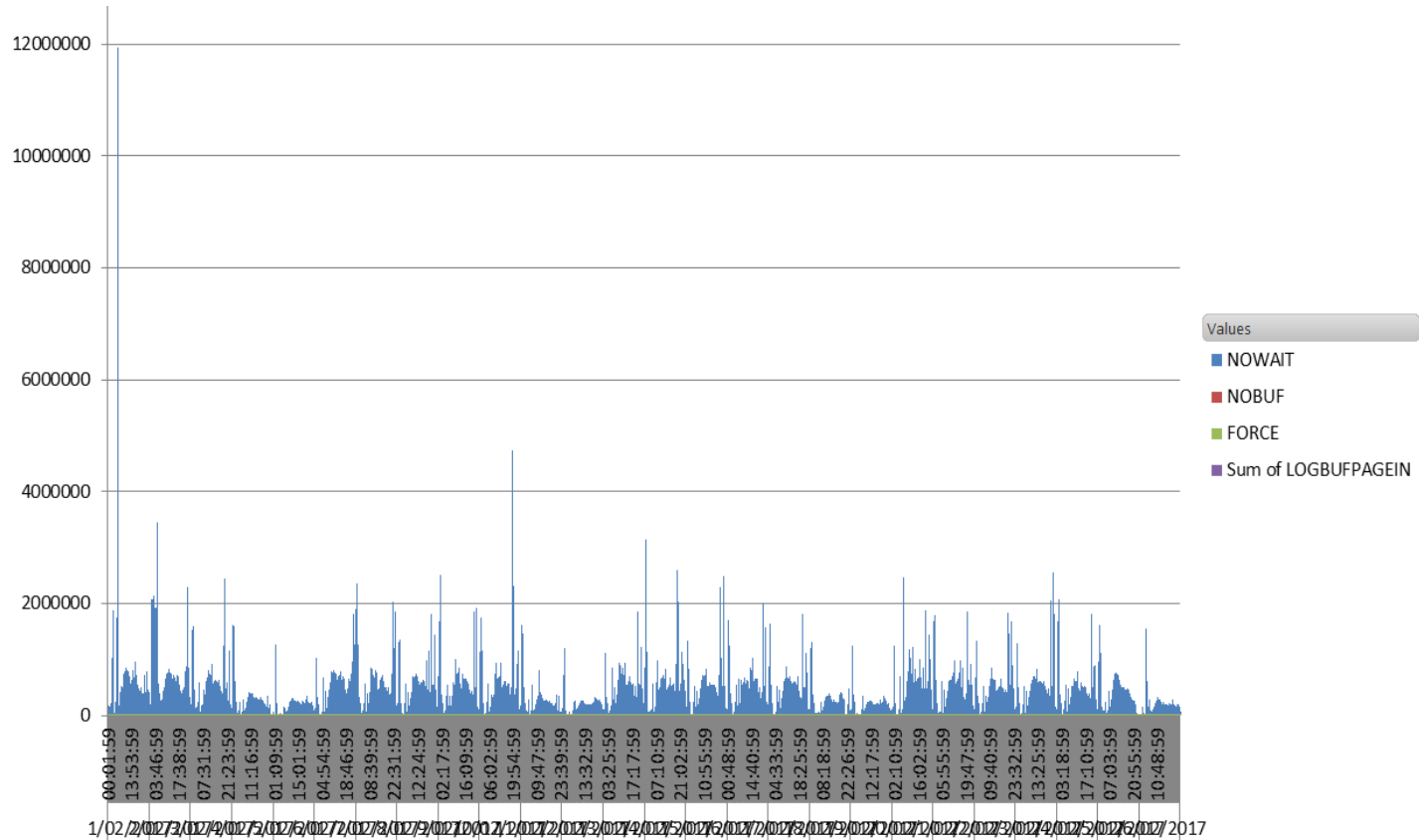
Example

sysplex	zuil	plat- form	system	msgid	sev / type	date	time	text
NOTPPLEX	T	C	Test1	DSNX881I	4	15/03/2017	12:57:16	17074 12:57:16.49 STC38848 DSNX881I -TEST1 20 W 83033
NOTPPLEX	T	C	Test1	DSNX881I	4	15/03/2017	12:57:16	17074 12:57:16.49 STC38848 DSNX881I -TEST1 20 W 83033
NOTPPLEX	T	C	Test1	DSNX881I	4	15/03/2017	13:00:36	17074 13:00:36.67 STC38848 DSNX881I -TEST1 20 W 83034
NOTPPLEX	T	C	Test1	DSNX881I	4	15/03/2017	13:00:36	17074 13:00:36.67 STC38848 DSNX881I -TEST1 20 W 83034
NOTPPLEX	K	C	ACPT1	DSNX870I	4	15/03/2017	14:13:32	17074 14:13:32.78 STC61819 DSNX870I -ACPT1 DSNX8EKG ACCELERATOR IDAA13A IS NOT ONLINE
NOTPPLEX	K	C	ACPT1	DSNX871I	4	15/03/2017	14:26:59	17074 14:26:59.18 STC64835 DSNX871I -ACPT1 DSNX8EKG ACCELERATOR IDAA13A IS ONLINE
PRODPLEX	P	C	Warehouse	DSNX881I	4	15/03/2017	0:14:50	17074 00:14:50.94 STC20159 DSNX881I -WH1 2001 W 13270
PRODPLEX	P	C	Warehouse	DSNX881I	4	15/03/2017	2:14:54	17074 02:14:54.31 STC20159 DSNX881I -WH1 2001 W 13271
PRODPLEX	P	C	Warehouse	DSNX881I	4	15/03/2017	4:14:57	17074 04:14:57.56 STC20159 DSNX881I -WH1 2001 W 13272
PRODPLEX	P	C	Warehouse	DSNX881I	4	15/03/2017	6:15:00	17074 06:15:00.44 STC20159 DSNX881I -WH1 2001 W 13273
PRODPLEX	P	C	Warehouse	DSNX881I	4	15/03/2017	8:14:43	17074 08:14:43.82 STC20159 DSNX881I -WH1 2001 W 13274

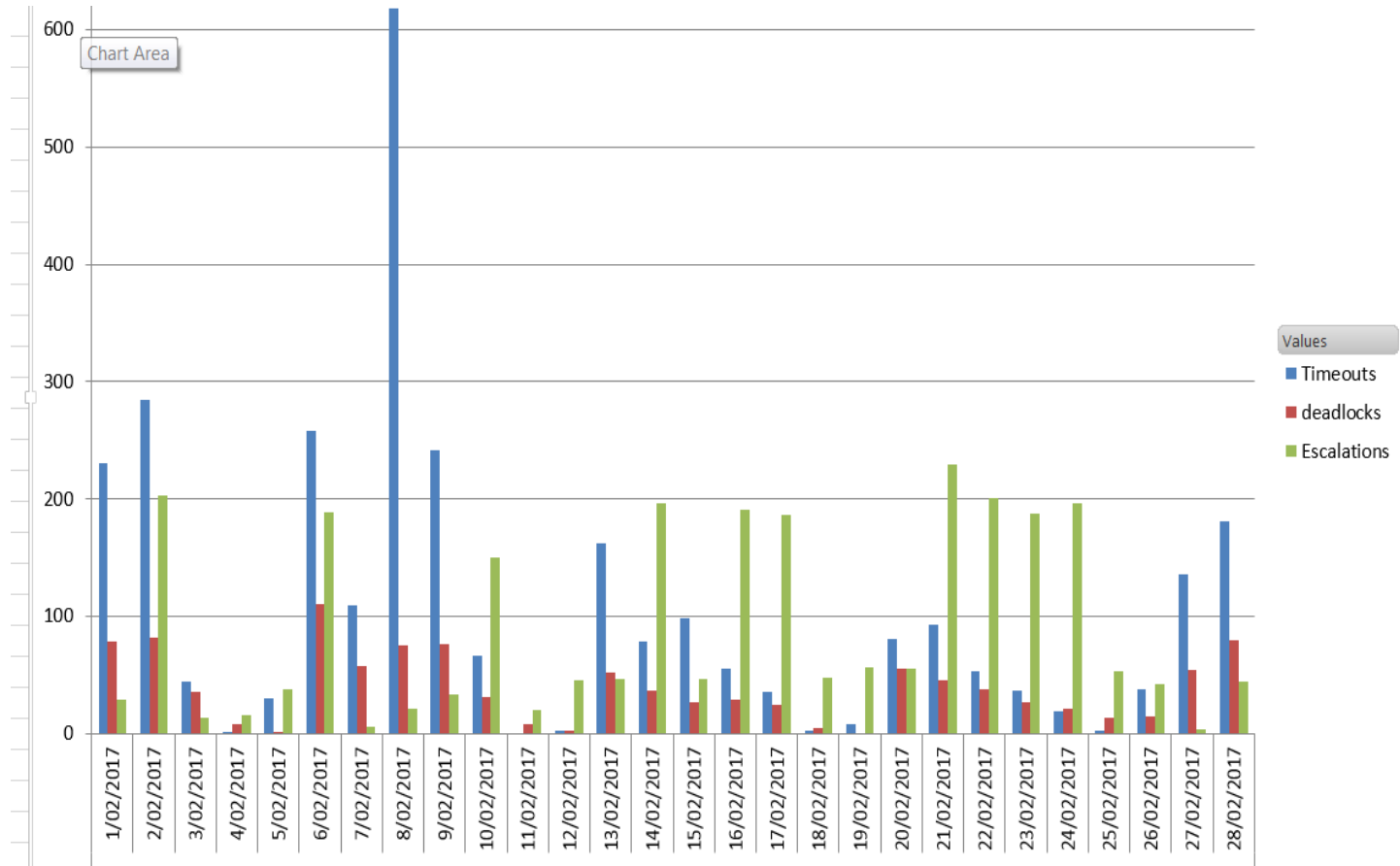
2.3 Health checks

- A series of excel spreadsheets to look for 'trends'
- Excels contain SQL queries on SMF-tables
- Run monthly and used to tune DB2 subsystems
 - Trend BP Hit Ratio
 - Trend DB2 System Paging Activity
 - Trend General CPU usage
 - Trend Log Buffer Activity
 - Trend Number of Threads
 - Trend Read IOs
 - Trend Number of Deadlocks/Timeouts
 - ...

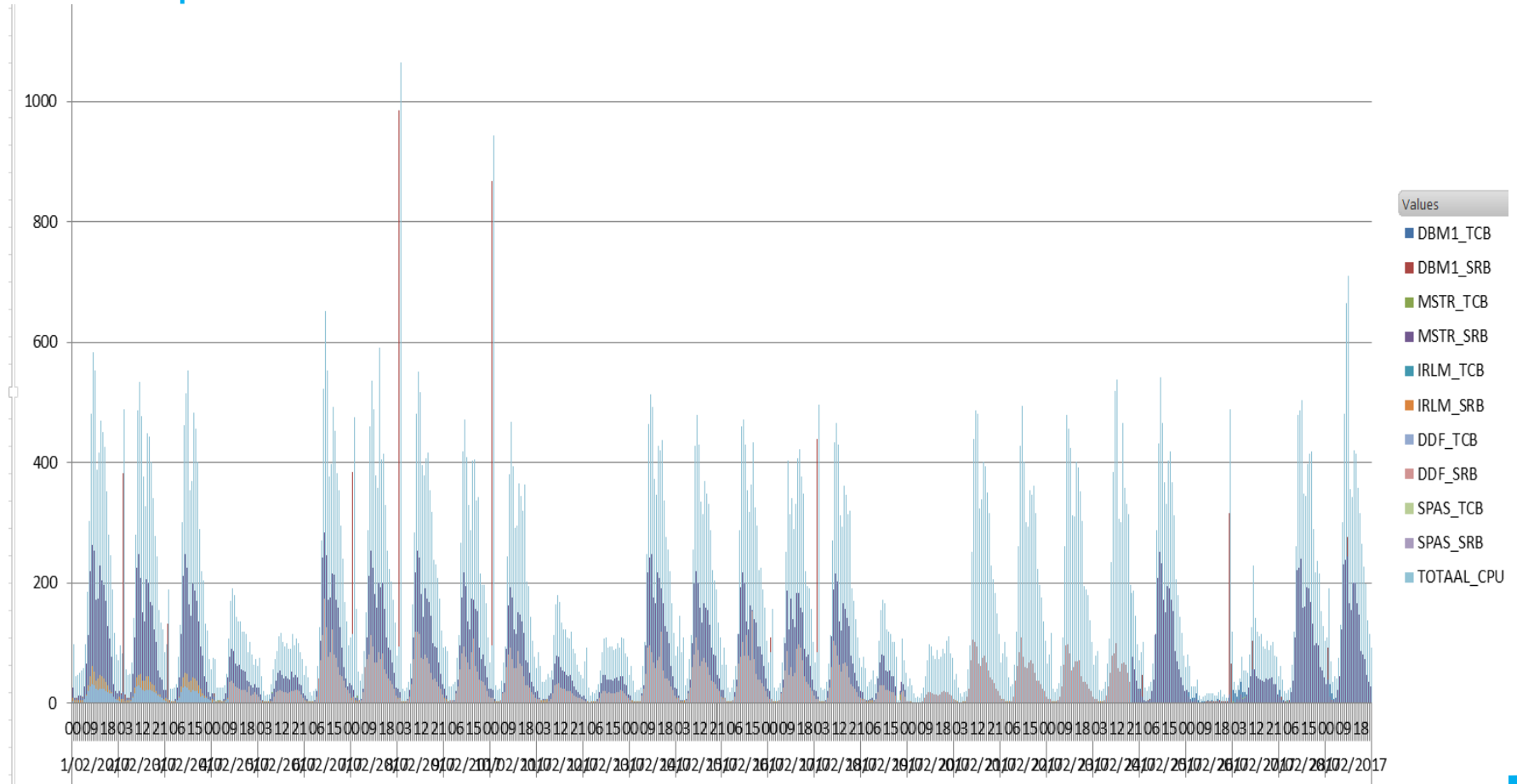
2.3 Health checks : example : log buffer activity feb. 2017



2.3 Health checks : example : deadlocks/TO/Escal.



2.3 Health checks : example : General CPU usage 1 prod-DB2 feb. 2017



2.4 Daily Eval Report for DBAs and Development

- A 3270 application (in house developed)
- Input : Apptune, SMF accounting , IMS IMF, IFCIDs 172/196
- Day-1 info
- Based on thresholds / KPIs defined by our DBAs
- Data per subsystem code (= a group of applications)
- Purpose is to give input to developers to tune applications

2.4 Daily Eval Report for DBAs and Development : example

```
-----  
                        EVAL rapport  
-----  
Deelsysteem :          Datum(dd/mm/jjjj) van: 16/03/2017  
                        Datum(dd/mm/jjjj) tot: 16/03/2017  
Keuze : 9              Zuil (A/P) : P  
-----  
                        ACC          PRD  
                        =====  
ABENDS :  
  1 - USER ABENDS  
  2 - U0240 ABENDS  
  3 - PSEUDO ABENDS  
  4 - SYSTEM ABENDS  
PERFORMANCE BATCH :  
  5 - DB2 COMMITS > 10 SEC AND UPDATE  
  6 - > 10 MILJOEN CALLS PER RUN  
  7 - GETPAGES PER PLAN > 50 MILJ  
  8 - GETPAGES PER PACKAGE > 500000  
  9 - GETPAGES PER PLAN,PACKAGE,STMT > 2500  
 10 - SQL CALLS MET GEM > 1 SEC CPU / CALL  
PERFORMANCE ONLINE :  
 11 - > 15000 CALLS PER RUN  
 12 - GETPAGES PER PLAN > 30000  
 13 - GETPAGES PER PACKAGE > 3000  
 14 - GETPAGES PER PLAN,PACKAGE,STMT > 2500  
 15 - SQL CALLS MET GEM > 1 SEC CPU / CALL  
LOCKING :  
 16 - DEADLOCK / TIMEOUTS >= 10  
 17 - LOCKESCALATIE  
EVAL WEEKOVERZICHT :  
 18 - ACCESS PADEN - EXECUTION TIMES
```


2.4 Daily Eval Report for DBAs and Development : example

```

PERFORMANCE BATCH : GETPAGES PER PLAN, PACKAGE, STMT > 2500
+++++

```

DEEL			AT				
SYS CD	PLAN NM	PROG NM	SYS ID	SECT NR	STMT NR	GETPAGES STMT	UITV DT
SY1	PLA45	PLA45	PRD1	1	1776	992,777	16/03/2017
	PLAA6	PLAA6	PRD1	5	6370	834,919	16/03/2017
	PLAF3	PLAF3	PRD1	1	9408	119,537	16/03/2017
	PLAGB	PLAGB	PRD1	9	25143	29,293	16/03/2017
	PLAA6	PLAA6	PRD1	3	6303	20,972	16/03/2017
	PLAA6	PLAA6	PRD1	2	6263	20,972	16/03/2017

Agenda

3 KPIs

3.1 Reorg and Runstats

3.2 Statistics gathered

3.1 Reorgs and Runstats

- Our reorgs and runstats are 'triggered' :
 - We run queries on RTS data
 - For reorgs a weekly selection of objects (on Sunday)
 - Reorgs run during the week spread over 40 jobs per subsystem (20 for TS, 20 for IX, max 5 in //)
 - Runstats run daily when triggered
 - Objects in Exclude list are skipped
 - Note : most critical objects are excluded from weekly reorg. They are done during so called RACs where an small outage is allowed. But under investigation to be 'always on'

3.1 Reorgs and Runstats (cont)

- Triggers for Online reorgs:
 - Percentage Clustering
 - Percentage relocated row
 - Percentage non-optimal leafs
 - Percentage Unclustered inserts
 - Percentage pseudo deleted RID's
 - Size of objects
 - Number of index levels
 - Percentage compression
 - Number of partitions for PBG TS
 - Totalrows not filled
 - Percentage deleted data
 - Percentage desorganised for LOB TS
 - Mass deletes for LOB TS

3.1 Reorgs and Runstats (cont)

- Triggers for runstats:
 - Percentage changed data
 - Time since last runstats

3.2 Statistics gathered

- SMF-Apptune-IMS-.... records as input for a browser based application

Systems - Mainframe applications

- Applications Trend Reporting
 - Toppers
 - [Batch programs](#)
 - [Online programs](#)
 - [Batch jobs](#)
 - Detailed reporting
 - [Batch programs](#)
 - [Online programs](#)
 - [Batch jobs](#)
 - [Packages](#)
 - [Plans](#)
 - Exceptions
 - [by domain](#)
 - [by system manager](#)
 - [EUC reporting](#)
 - [Evolution](#)
- [IMS transactions by distribution channel](#)
- [Trendinfo IMS Distribution channels](#)
- Application & System Tuning
 - [Exception Overview](#)
 - [Temp.excluded exceptions](#)
 - Detailed data-exceptions
 - [IMS](#)
 - [DB2](#)
 - [JOB](#)
- [Trends per system manager \(Batch/Online/Storage\)](#)
- [IMS performance statistics](#)
- [DB2 Application Performance Statistics](#)
- [Workload distribution TWS-jobs](#)
- [WLM-reporting](#)
- [CAS/GL](#)
- [BHI/REK/VER Check-lists](#)

3.2 Statistics gathered (cont)

- SMF Type 101 records as input for Accounting-tb in our warehouse DB2 :
 - Detailed accounting data
 - Gathered daily for each pillar (Dev, Acpt, Prod)
 - Kept for 10 days in our warehouse DB2

3.2 Statistics gathered (cont)

- SMF records as input for statistics TB DMRPR.DMRSTAT :
 - Detailed statistics data (also DDF, buffers)
 - Gathered daily for each pillar (Dev, Acpt, Prod)
 - Kept for 2 years in our warehouse DB2

3.2 Statistics gathered (cont)

- Stats on SQL and application performance :
 - Online SQL monitor, panel driven
 - @KBC 2 hour intervals
 - one collector STC per LPAR
 - different log datasets per DB2 subsystem
 - Filters to reduce amount of data : no monitoring for certain plans, only dyn SQL for SAS and QMF,...
 - Stats gathered on statements, objects and workload on daily basis and written to tables (per pillar) :
 - Global info, wrap around, 1 partition/day for 16 days
 - Info per day, kept for 13 months
 - Info per month, kept for 13 months
 - EXPLAIN functionality in the tool

3.2 Statistics gathered (cont)

- Final remark : tons of data but valuable to tune our 24/7 bank-insurance subsystems and applications :
 - after RAC (Release of Application Changes) with implementing of new table structures and new/changed applications data can be compared
 - Trend reporting
 - Capacity planning
 - ...

Any
questions ?