When Bad Things Happen to Good Transactions

Analyzing Transaction Problems on System z

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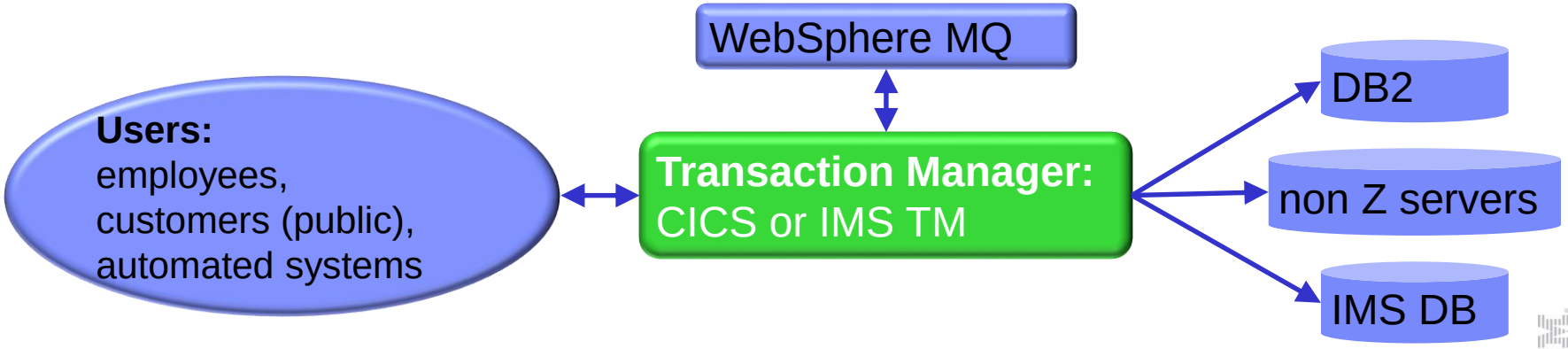
Agenda

- The big picture of modern z/OS transactions
- Common questions asked when analyzing transactions
- IBM Transaction Analysis Workbench for z – Version 1.2
- Problem Scenario: IMS/DB2
- Mobile Workloads and Big Data using Workbench

The big picture of modern z/OS transactions

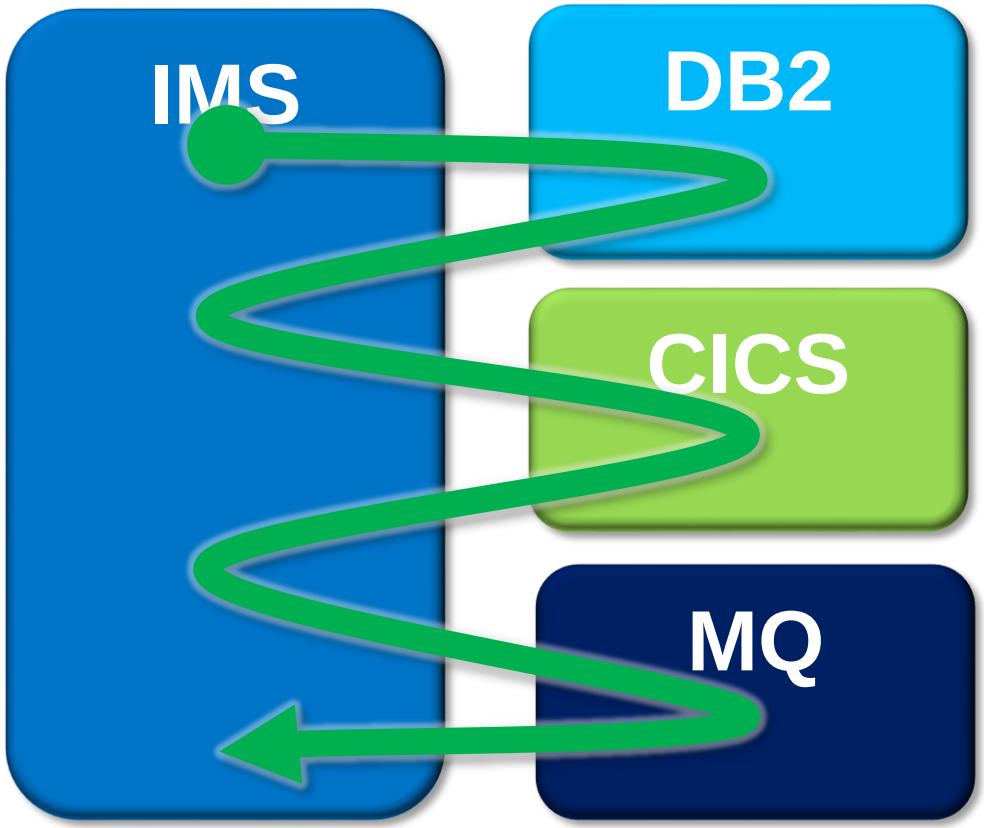
1980s application:
in-house users only; **simple** data, single data store

Today:
users are customers; data is **complex, heterogeneous**, often distributed



Why are performance issues difficult to identify?

- Today's complex transaction workloads may span multiple subsystems
- Each subsystem has its own instrumentation data; data collection can be difficult
- Complex environments increase number of possible points of failure



Where is the problem in my z/OS transaction?

Common questions asked:

- Who's fault is it anyway?
  - Is a subsystem responsible?
  - Is z/OS the culprit?
- What instrumentation data is required for problem determination?
  - What is available?
  - Where/how is it collected?
  - Do I have access?
- How is this problem assignment determined today?
  - Who is the best person to work on this problem?

IBM Transaction Analysis Workbench for z/OS v1.2

- A tool for cross-subsystem problem analysis:
  - Locates and extracts instrumentation data
  - User specified exceptions identify poor transaction performance
  - Provides a view of end-to-end transaction life cycle activity
  - Assists in better assignment of problems to the correct group

Workbench: Components

- ISPF dialog:
  - Used for systems definitions, interactive problem analysis and configuring batch workloads
- Batch Interface:
  - Performs automated file selection, report analysis, and data preparation for other platforms.
- Eclipse GUI Interface:
  - Allows first responders, application development teams, and other non-expert users to gather and perform basic diagnostics on the instrumentation data

Workbench: Instrumentation data sources

IMS	CICS	DB2	**WebSphere** MQ, App Server	z/OS
IMS log and trace	CMF performance class (SMF 110)	DB2 log	MQ log extract	SMF
IMS monitor	CICS trace (DFHAUXT or GTF)	DB2 accounting	MQ statistics (SMF 115-1, -2)	OPERLOG
CQS log stream		DB2 performance trace (IFCIDs)	MQ accounting (SMF 116)	
IMS Connect event data (collected by IMS Connect Extensions)		Near Term History (collected by OMEGAMON XE for DB2)	WAS request activity performance statistics (SMF 120-9)	
OMEGAMON ATF				
IRLM long lock detection (SMF 79-15)				

Scenario: IMS DB2 problem

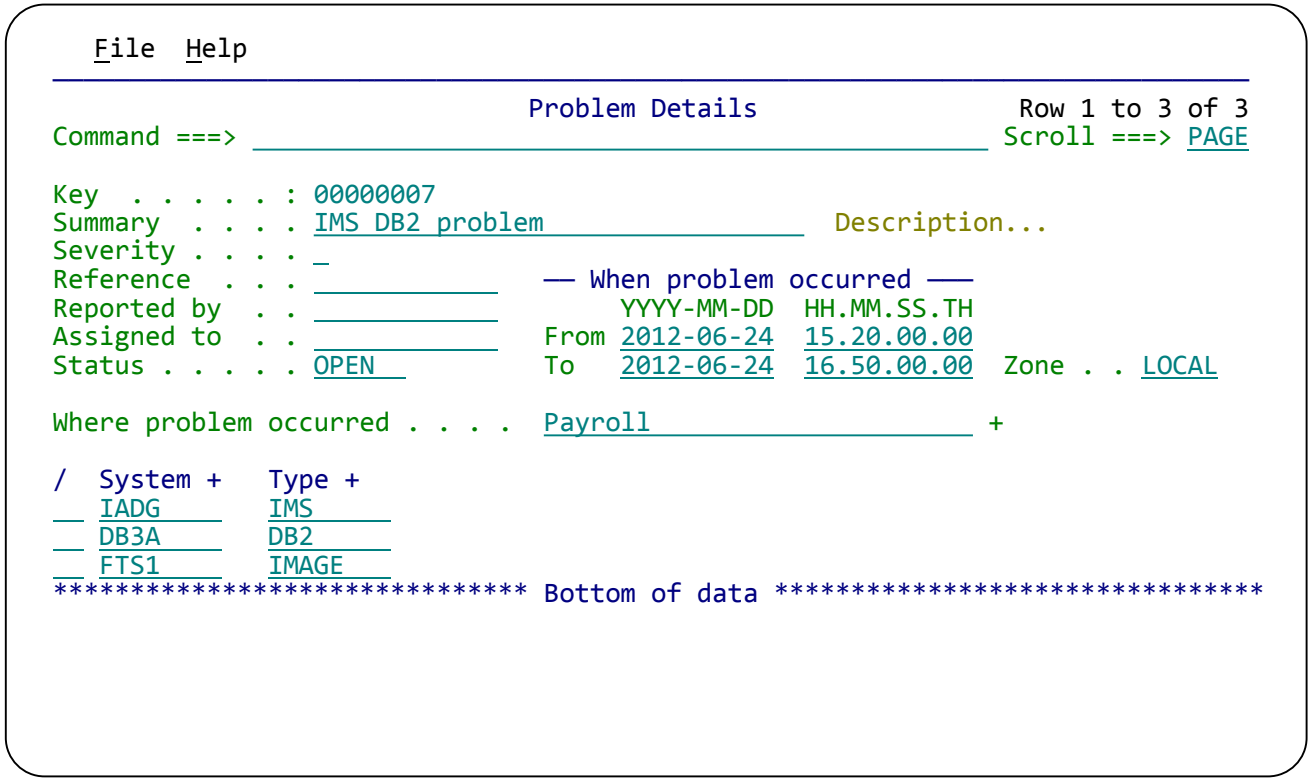
On the following slides, we present an example scenario: a user has reported a long transaction response time for an IMS transaction performing DB2 updates

The analysis is divided into two parts:

- The first responder:
  - Registers the problem in the Workbench session manager and collects the log files
  - Follows a process orientated script to assign problem to initial expert

- The subject-matter expert performs a “deep dive” on the problem: reviewing the reports, and using interactive analysis to identify the specific log records for the cause of the problem

Creating a session



Create a session (main menu ► option 1 **Sessions ► NEW**).
Select the environment where the problem occurred. This populates the system list.

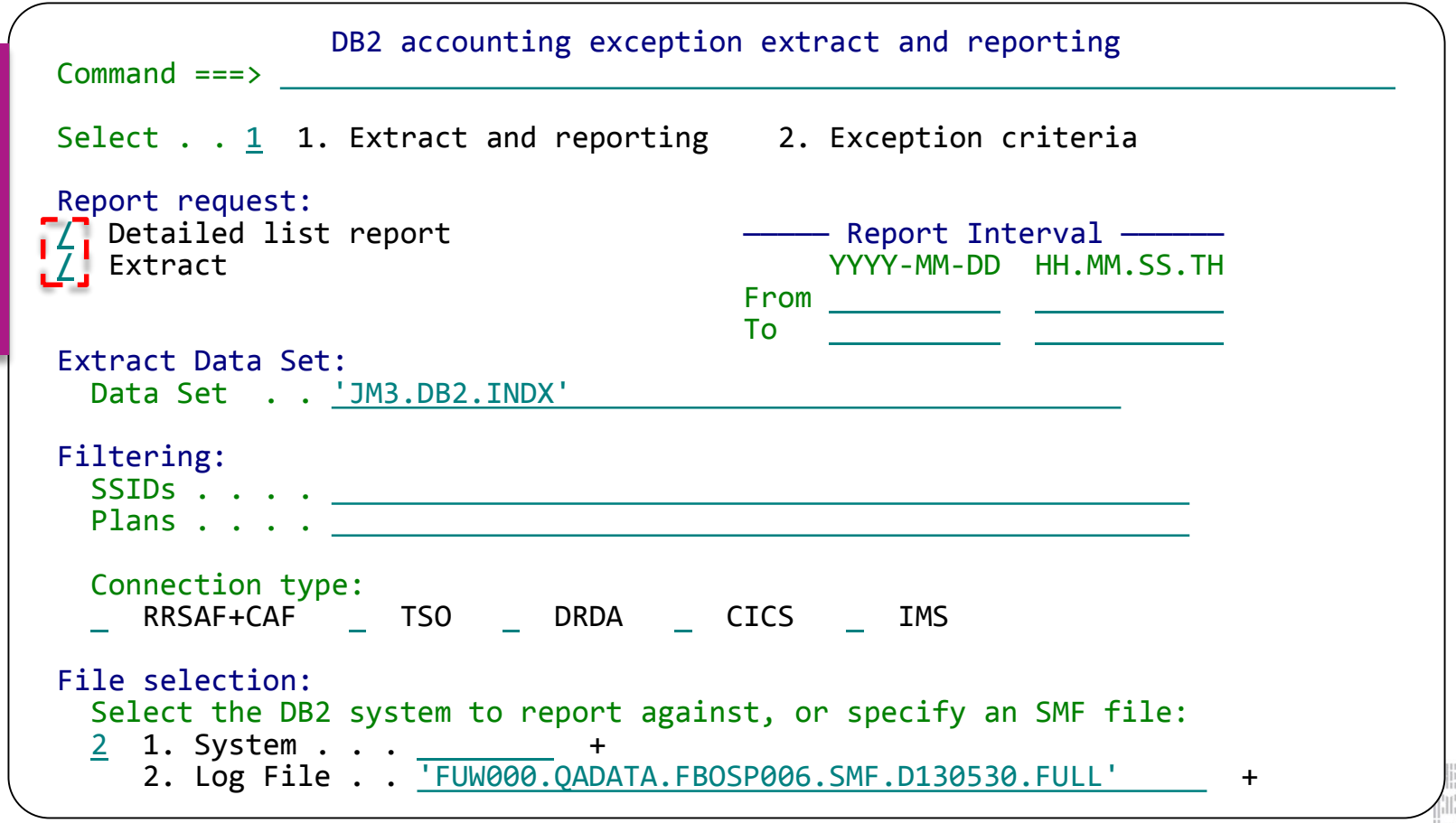
Executing a Workflow

```
                                    Tasks                          Row 1 to 8 of 8
Command ===> ____________________________________________________ Scroll ===> PAGE

 NEW   Create a new task
 AUTO  Create file selection and extract tasks
 SCHED Schedule all the tasks (or select required tasks only)

/  Task Status      Description
__    1  DONE        DB2 log file selection for DBA6
__    2  DONE        SMF file selection for DBA6
__    3  DONE        IMS log file selection for IDDG
__    4  DONE        Create the DB2 transaction index
__    5  DONE        Create the IMS transaction index
__    6  CC 0000     IMS transaction and system analysis report
__    7  CC 0000     Create CSV extract file for IDDG
__    8  CC 0000     Create CSV extract file for DBA6

****************************** Bottom of data ********************************
```

Workflows allow first responders to run tasks individually or schedule all the tasks to run serially.

Building a DB2 Exception Candidate Index and Report

Detailed List report or Exception Index Extract available



DB2X: Specify exception thresholds

```
Response and CPU time:                                    /  Apportion rollup
  Response time  . . 0.5        (0.000001-99 seconds)
  CPU class 1  . . . 0.1
  In-DB2 elapsed . . 0.2
  CPU class 2  . . . 0.05
  Database I/O . . . 0.05
  Lock suspend . . . 0.05

Stored Procedure:
  Elapsed  . . . . . 0.1        (0.000001-99 seconds)
  CPU  . . . . . . . 0.05

Row activity:
  Fetched  . . . . . 1000       (0 to 999999)
  Inserted . . . . . 100
  Updated  . . . . . 100
  Deleted  . . . . . 100

Locking:
  Deadlocks  . . . . 1          (0 to 999999)
  Suspends . . . . . 20
  Timeouts . . . . . 1
  Lock requests  . . 50

Buffering:
  Get pages  . . . . 50         (0 to 999999)
  Update pages . . . 30

Logging:
  Log records  . . . 100        (0 to 999999)

Abnormal conditions:
  Abort  . . . . . . 1          (1=check for condition)
  Check pending  . . 1
```

DB2 threads that exceed one of more of these thresholds are considered exceptions

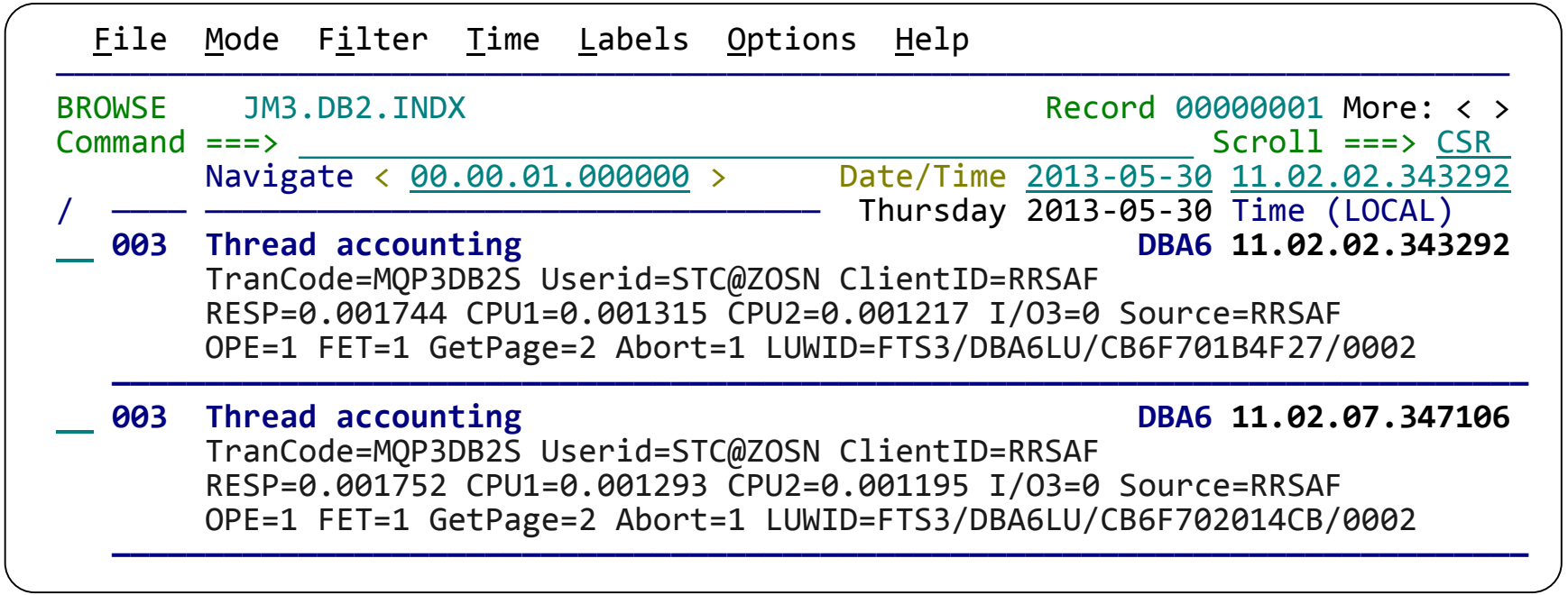
List report of DB2 exceptions

For each exception that was triggered, the thread and exception details are listed

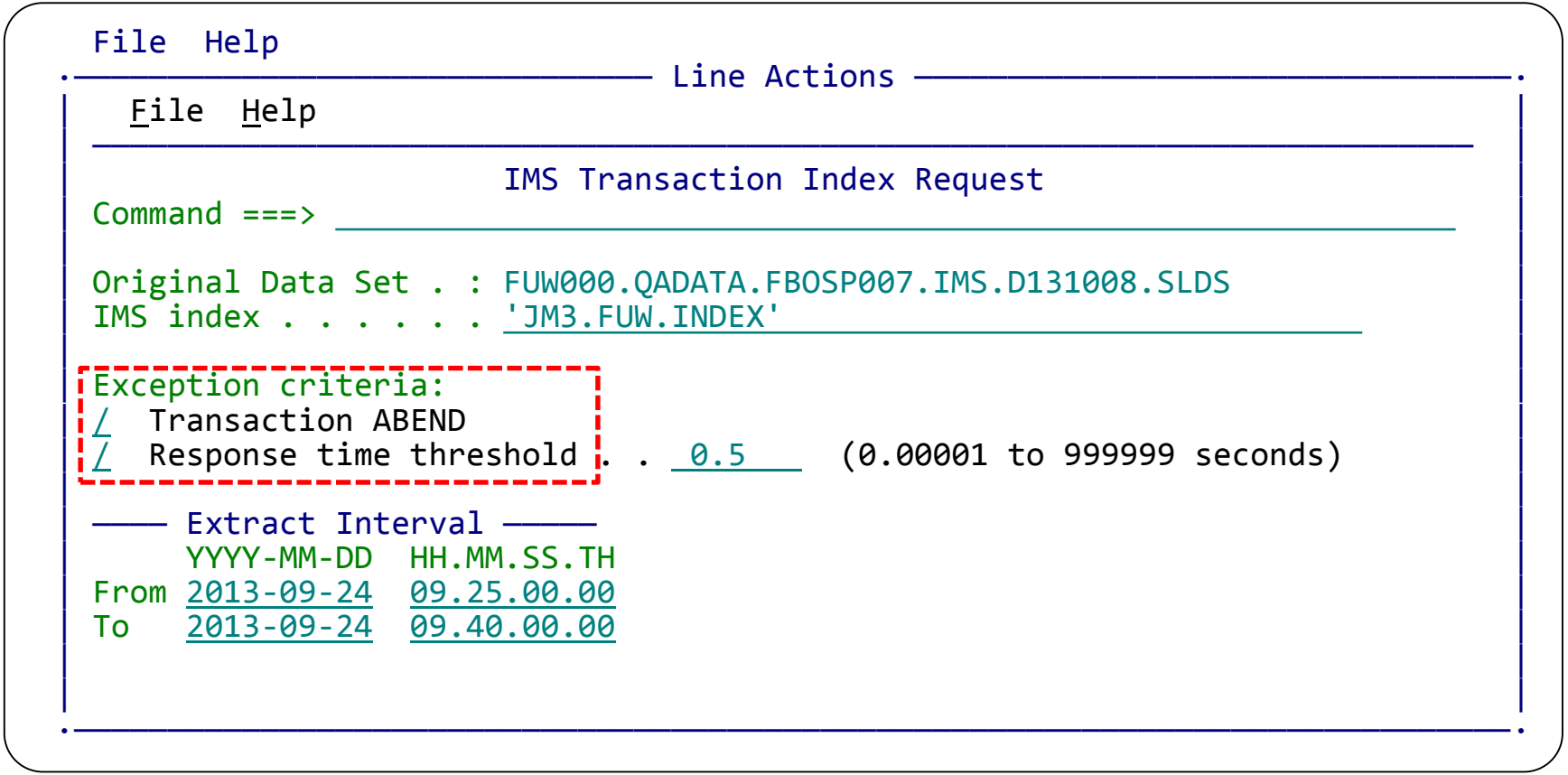
V1R2M0 2014-02-20 Thursday DB2 Exception List Page 1

SSID	Correlation	Connect	Plan	Auth id	Time	Exception		Threshold	LUWID
DBA4	MQP1DB2SRV02	RRSAF	CSQ5L710	STC@ZOSN	10:02:04.512982	Abort	1	1	FTS1/DBA4LU/CCBDD2D0C2CD/0002
DBP4	AXSSIGNO	DB2CALL	PTS46	PROTEUS	10:02:07.263130	Response	1.402972	0.5	FTS1/DBP4LU/CCBDD2D20BE5/0005
DBP4	AXSSIGNO	DB2CALL	PTS46	PROTEUS	10:02:07.263130	Class 1 CPU	0.387519	0.1	FTS1/DBP4LU/CCBDD2D20BE5/0005
DBP4	AXSSIGNO	DB2CALL	PTS46	PROTEUS	10:02:07.263130	Rows fetched	6329	1000	FTS1/DBP4LU/CCBDD2D20BE5/0005
DBP4	AXSSIGNO	DB2CALL	PTS46	PROTEUS	10:02:07.263130	Lock requests	267	50	FTS1/DBP4LU/CCBDD2D20BE5/0005
DBP4	AXSSIGNO	DB2CALL	PTS46	PROTEUS	10:02:07.263130	Get pages	2264	50	FTS1/DBP4LU/CCBDD2D20BE5/0005
DBP4	AXSSIGNO	DB2CALL	PTS46	PROTEUS	10:02:07.263130	Update pages	483	30	FTS1/DBP4LU/CCBDD2D20BE5/0005
DBP4	AXSSIGNO	DB2CALL	PTS46	PROTEUS	10:02:07.263130	Log records	574	100	FTS1/DBP4LU/CCBDD2D20BE5/0005
DBP4	MXMSCHD	DB2CALL	DSNREXX	MXM	10:08:44.907535	Get pages	2668	50	FTS1/DBP4LU/CCBDD44E91C7/0002
DBP4	MXMSCHD	DB2CALL	DSNREXX	MXM	10:08:46.466276	Get pages	2668	50	FTS1/DBP4LU/CCBDD4500BE1/0002
DBA4	MQP1DB2SRV02	RRSAF	CSQ5L710	STC@ZOSN	10:10:04.877879	Abort	1	1	FTS1/DBA4LU/CCBDD49ADF64/0002
DBP4	AXS#GENE	DB2CALL	PTS46	PROTEUS	10:10:05.766411	Response	1.338092	0.5	FTS1/DBP4LU/CCBDD49A71E6/0011
DBP4	AXS#GENE	DB2CALL	PTS46	PROTEUS	10:10:05.766411	Class 1 CPU	0.361788	0.1	FTS1/DBP4LU/CCBDD49A71E6/0011
DBP4	AXS#GENE	DB2CALL	PTS46	PROTEUS	10:10:05.766411	Lock requests	135	50	FTS1/DBP4LU/CCBDD49A71E6/0011
DBP4	AXS#GENE	DB2CALL	PTS46	PROTEUS	10:10:05.766411	Get pages	223	50	FTS1/DBP4LU/CCBDD49A71E6/0011
DBP4	AXS#GENE	DB2CALL	PTS46	PROTEUS	10:10:05.766411	Update pages	72	30	FTS1/DBP4LU/CCBDD49A71E6/0011

Exception Candidate DB2 Transaction Index



Building an IMS Exception Candidate Index

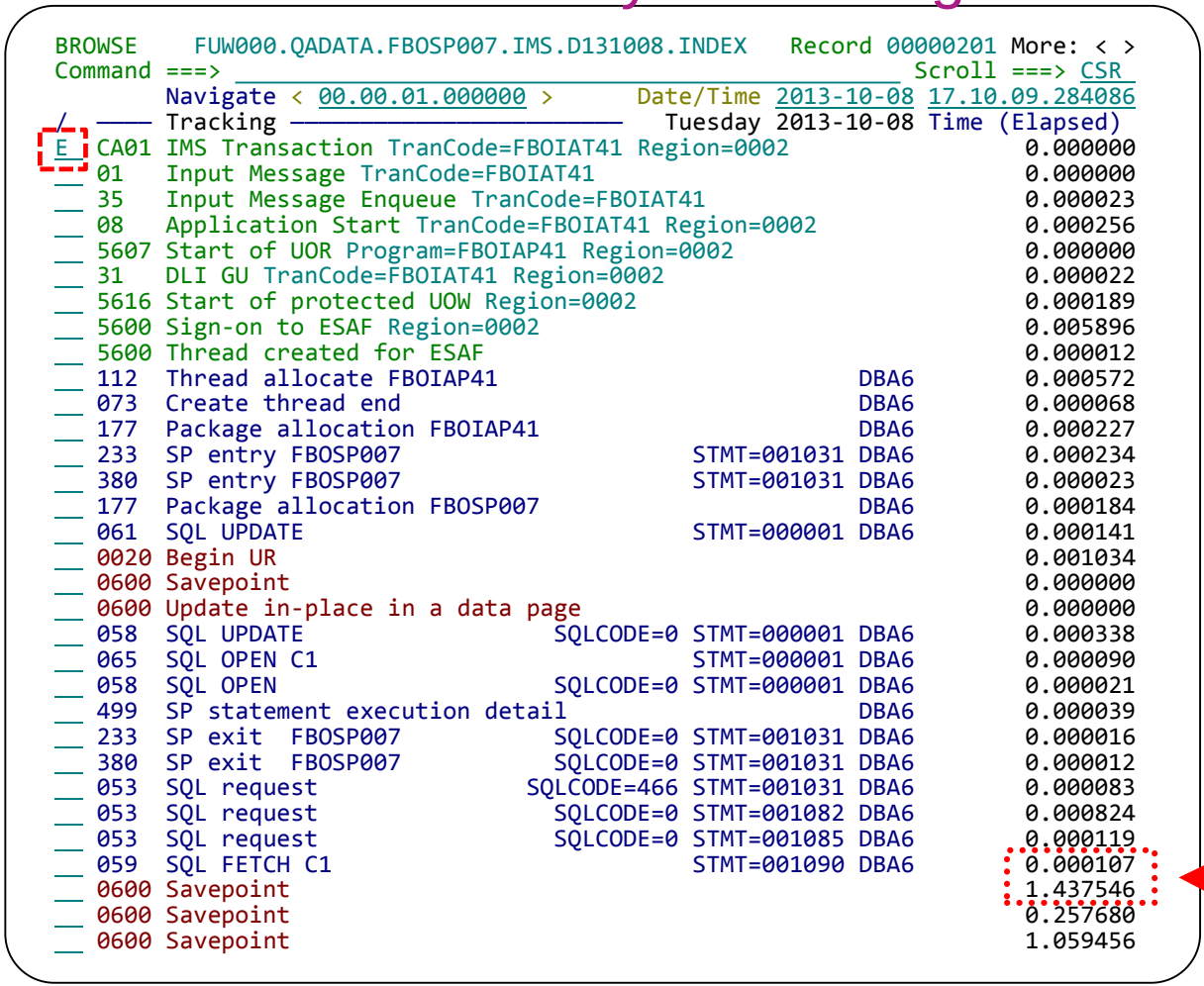


Subject-matter expert: Exception candidate investigation

```
BROWSE    FUW000.QADATA.FBOSP007.IMS.D131008.INDEX   Record 00000201 More: < >
Command ===> ____________________________________________ Scroll ===> CSR
        Navigate < 00.00.01.000000 >      Date/Time 2013-10-08 17.10.09.284086
/  ——— Filtering ————————————————————   Tuesday 2013-10-08 LSN
_____________________________________________________________________________
TX CA01 IMS Transaction                                      IMS-000000000021
        UTC=17.10.09.284078 TranCode=FBOIAT41 Program=FBOIAP41 Userid=FUNTRM10
        LTerm=FUNTRM10 Terminal=SC0TCP10 Region=0002
        OrgUOWID=IDDG/CC1476B6713CB884 IMSRel=131
        RecToken=IDDG/0000000400000000
        CPU=45.699549 InputQ=0.000309 Process=72.612278 OutputQ=0.000356
        TotalTm=72.612943 RegTyp=MPP
_____________________________________________________________________________
__ CA01 IMS Transaction                                      IMS-000000000025
        UTC=17.15.19.060177 TranCode=FBOIAT41 Program=FBOIAP41 Userid=FUNTRM10
        LTerm=FUNTRM10 Terminal=SC0TCP10 Region=0002
        OrgUOWID=IDDG/CC1477DDDE2AF104 IMSRel=131
        RecToken=IDDG/0000000600000000
        CPU=11.512388 InputQ=0.000354 Process=18.105197 OutputQ=0.000039
        TotalTm=18.105590 RegTyp=MPP
_____________________________________________________________________________
```

This display has been filtered to show **IMS x'CA01' Exception index records** with excessive processing times. Use TX line command to show records related to a transaction

IMS/DB2 Transaction life cycle investigation



```
BROWSE    FUW000.QADATA.FBOSP007.IMS.D131008.INDEX   Record 00000201 More: < >
Command ===> ____________________________________________________ Scroll ===> CSR
        Navigate < 00.00.01.000000 >      Date/Time 2013-10-08 17.10.09.284086
/ ____ Tracking ____________________________  Tuesday 2013-10-08 Time (Elapsed)
E CA01 IMS Transaction TranCode=FBOIAT41 Region=0002                    0.000000
__ 01   Input Message TranCode=FBOIAT41                                 0.000000
__ 35   Input Message Enqueue TranCode=FBOIAT41                         0.000023
__ 08   Application Start TranCode=FBOIAT41 Region=0002                 0.000256
__ 5607 Start of UOR Program=FBOIAP41 Region=0002                       0.000000
__ 31   DLI GU TranCode=FBOIAT41 Region=0002                            0.000022
__ 5616 Start of protected UOW Region=0002                              0.000189
__ 5600 Sign-on to ESAF Region=0002                                     0.005896
__ 5600 Thread created for ESAF                                         0.000012
__ 112  Thread allocate FBOIAP41                          DBA6          0.000572
__ 073  Create thread end                                 DBA6          0.000068
__ 177  Package allocation FBOIAP41                       DBA6          0.000227
__ 233  SP entry FBOSP007                  STMT=001031    DBA6          0.000234
__ 380  SP entry FBOSP007                  STMT=001031    DBA6          0.000023
__ 177  Package allocation FBOSP007                       DBA6          0.000184
__ 061  SQL UPDATE                         STMT=000001    DBA6          0.000141
__ 0020 Begin UR                                                        0.001034
__ 0600 Savepoint                                                       0.000000
__ 0600 Update in-place in a data page                                  0.000000
__ 058  SQL UPDATE                SQLCODE=0 STMT=000001    DBA6          0.000338
__ 065  SQL OPEN C1                         STMT=000001    DBA6          0.000090
__ 058  SQL OPEN                  SQLCODE=0 STMT=000001    DBA6          0.000021
__ 499  SP statement execution detail                     DBA6          0.000039
__ 233  SP exit  FBOSP007         SQLCODE=0 STMT=001031    DBA6          0.000016
__ 380  SP exit  FBOSP007         SQLCODE=0 STMT=001031    DBA6          0.000012
__ 053  SQL request             SQLCODE=466 STMT=001031    DBA6          0.000083
__ 053  SQL request               SQLCODE=0 STMT=001082    DBA6          0.000824
__ 053  SQL request               SQLCODE=0 STMT=001085    DBA6          0.000119
__ 059  SQL FETCH C1                        STMT=001090    DBA6          0.000107
__ 0600 Savepoint                                                       1.437546
__ 0600 Savepoint                                                       0.257680
__ 0600 Savepoint                                                       1.059456
```

1. Start tracking a transaction (here, a IMS transaction)
2. See the transaction life cycle events from the related logs (here, an IMS Index and log, SMF file, and a DB2 log), merged together with no preparation required
3. Notice the jump in elapsed time
4. In this case, the problem was caused by an inefficient table scan initiated by a DB2 stored procedure.

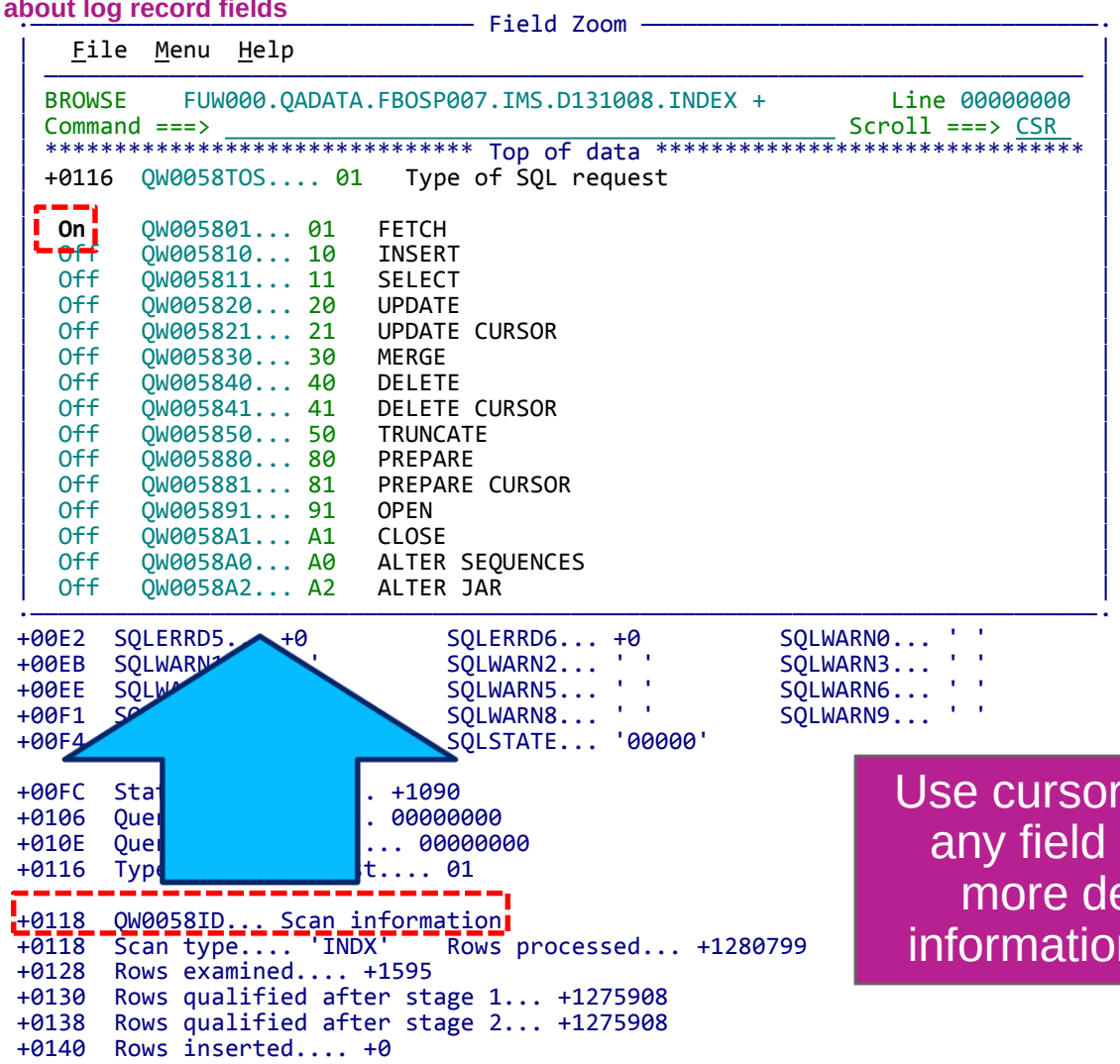
   A drill down of the DB2 trace was able to determine this.

Detail DB2 event data view using forms view

```
+029C  Code... 058   SQL FETCH                    SQLCODE=0 STMT=001090 DBA6
+02A8  STCK... CC1476FBAF617906      LSN.... 0000000000000049
       Date... 2013-10-08 Tuesday    Time... 17.11.21.890327.563

+0000  SM102LEN... 03A6        SM102FLG... 1E          SM102RTY... 66
+0006  SM102TME... 005E6C9D    SM102DTE... 0113281F    SM102SID... 'FTS3'
+0012  SM102SSI... 'DBA6'      SM102STF... 0000

+0034  QW0058..... IFCID data
       Package
+0034  Location... 'DB2ALOC'   Collection ID.... 'FUNBOX'
+0056  Package name... 'FBOSP007'
+0068  Consistency token.... 19718A5F136E9A24

+0072  SQLCA...... SQL communication area (SQLCA)
+0072  SQLCAID.... 'SQLCA    '  SQLCABC.... +136        SQLCODE.... +0
+0082  SQLERRML... +0           SQLERRM.... '          '
+00CA  SQLERRP.... 'DSN     '   SQLERRD1... +0          SQLERRD2... +0
+00DA  SQLERRD3... +0           SQLERRD4... +4294967295
+00E2  SQLERRD5... +0           SQLERRD6... +0          SQLWARN0... ' '
+00EB  SQLWARN1... ' '          SQLWARN2... ' '         SQLWARN3... ' '
+00EE  SQLWARN4... ' '          SQLWARN5... ' '         SQLWARN6... ' '
+00F1  SQLWARN7... ' '          SQLWARN8... ' '         SQLWARN9... ' '
+00F4  SQLWARNA... ' '          SQLSTATE... '00000'

+00FC  Statement number.. +1090
+0106  Query command ID... 00000000
+010E  Query instance ID.... 00000000
+0116  Type of SQL request.... 01

+0118  QW0058ID... Scan information
+0118  Scan type.... 'INDX'    Rows processed... +1280799
+0128  Rows examined.... +1595
+0130  Rows qualified after stage 1... +1275908
+0138  Rows qualified after stage 2... +1275908
+0140  Rows inserted.... +0
```

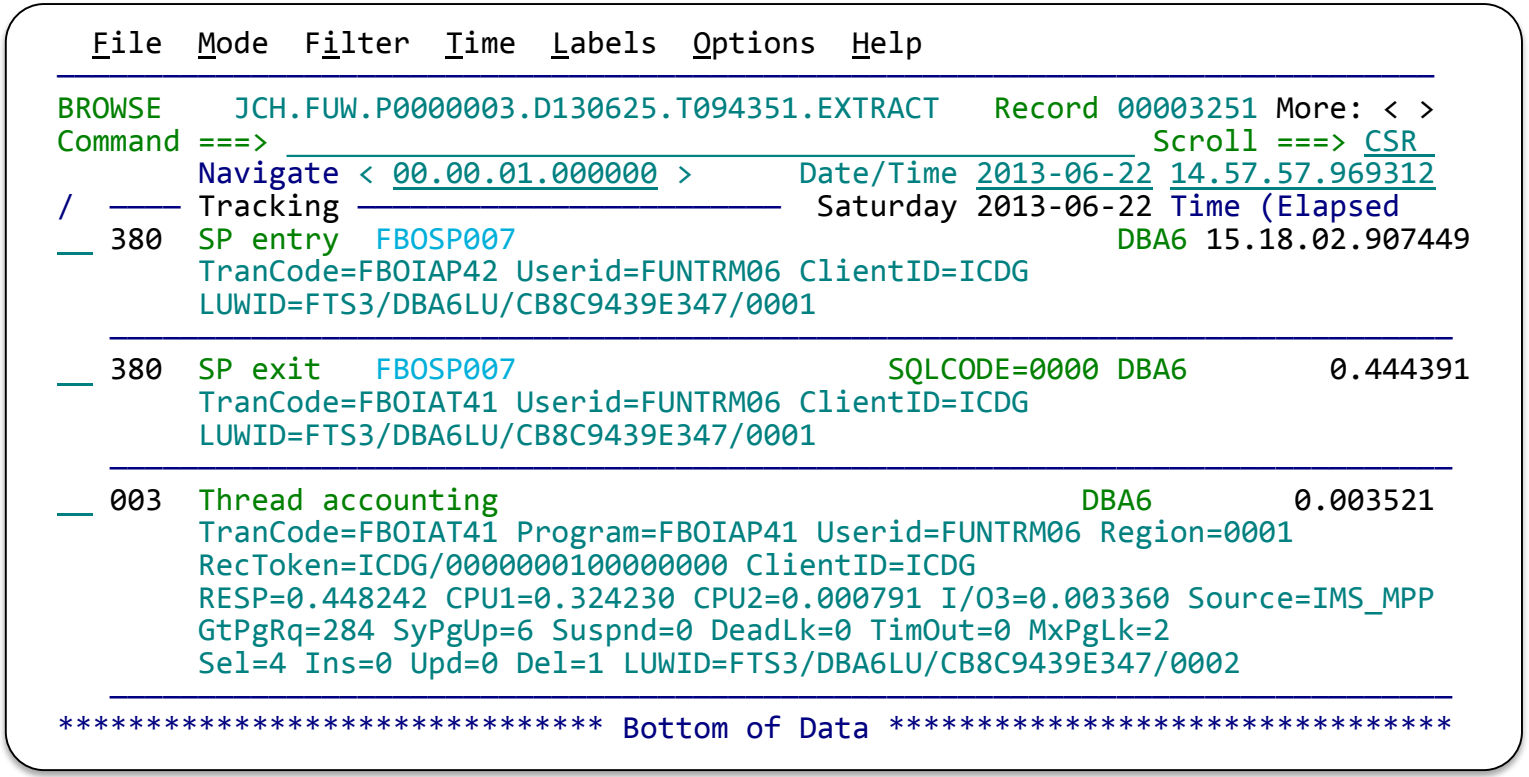
Program statement number 1090 caused an index scan that processed 1,280,799 rows in the table

Zoom to see more detail about log record fields



Use cursor to select any field and get more detailed information or help

Life cycle events: expanded summary view



Scroll right to show the records in expanded view with elapsed or relative times:
Elapsed – time between log record events
Relative – time since start of transaction (or other selected event)

Identifying events for review by other SMEs

```
  File  Mode  Filter  Time  Labels  Options  Help
BROWSE    IMPOT01.SESSION7.TRANIX +                  Record 00005399 More: < >
Command ===> _____________________________________________ Scroll ===> CSR
   Slice . . Duration  00.05.00     Date  2012-06-24     Time  16.25.44.803974
   Code Description  < 00.05.00.000000 >  2012-06-24 Thursday  Time (Relative)
/  ---- ------------------------------------------------------ ----------------
__ CA01 Transaction                                            16.33.33.575325
        UTC=17.10.09.284078 TranCode=FBOIAT41 Program=FBOIAP41 Userid=FUNTRM10
        LTerm=FUNTRM10 Terminal=SC0TCP10 Region=0002
        OrgUOWID=IDDG/CC1476B6713CB884 IMSRel=131
        RecToken=IDDG/0000000400000000
        CPU=45.699549 InputQ=0.000309 Process=72.612278 OutputQ=0.000356
        TotalTm=72.612943 RegTyp=MPP
   ---------------------------------------------------------------------------
__ TAG      DB2 transaction with long response time                +0.021122
   ---------------------------------------------------------------------------
G_ 0020 DB2 Unit of Recovery Control - Begin UR                    +0.021122
        Userid=FUNTRM10 IMSID=IDDG URID=00002A4010EA
        LUWID=FTS3/DB3ALU/C62D2CB46A5A/0001
   ---------------------------------------------------------------------------
__ 0020 DB2 Update In-Place in a Data Page                         +0.021138
        DBID=0105 PSID=0002 URID=00002A4010EA
   ---------------------------------------------------------------------------
```

A DB2 expert can now use the DB2 Log Analysis Tool to investigate the associated DB2 table updates, based on the transaction's URID

Correlate **URID** with **DB2 Log Analysis** tool for deep dive analysis.
Enter **G** to "tag" (bookmark) this DB2 record to quickly return to it.

DB2 Expert Help using DB2 Log Analysis Tool

```
RECORD IDENTIFIER: 1

ACTION DATE       TIME     TABLE OWNER  TABLE NAME                URID
------ ---------- -------- ------------ ------------------------- ------------
INSERT 2012-06-24 16.33.34 JOHN         HR                        00002A4010EA

DATABASE TABLESPACE DBID  PSID  OBID  AUTHID   PLAN     CONNTYPE LRSN
-------- ---------- ----- ----- ----- -------- -------- -------- ------------
HR_DB    HR_SPACE   00456 00002 00003 FUNTRM10 HR_PLAN  IMS      C62D2CB46CB3

MEMID CORRID       CONNID   LUW=NETID/LUNAME/UNIQUE/COMMIT      PAGE/RID
----- ------------ -------- ----------------------------------- -----------
00000 0004MQATPGM  IMS      FTS3    /DB3ALU  /C62D2CB46A5A/0001 00000002/02

ROW STATUS  EMP_ID EMP_NAME   EMP_PHONE       EMP_YEAR   EMP_SALARY
----------- ------ ---------- --------------- ---------- ----------
CURRENT     +330   JIM MARTIN 475-712-9508    2009-06-24 +0041000.00
POST-CHANGE +330   JIM MARTIN 475-712-9508    2009-06-24 +0042000.00
```

URID field correlated from Workbench allows expert to leverage his subsystem specific tools for **Deep-Dive** investigation

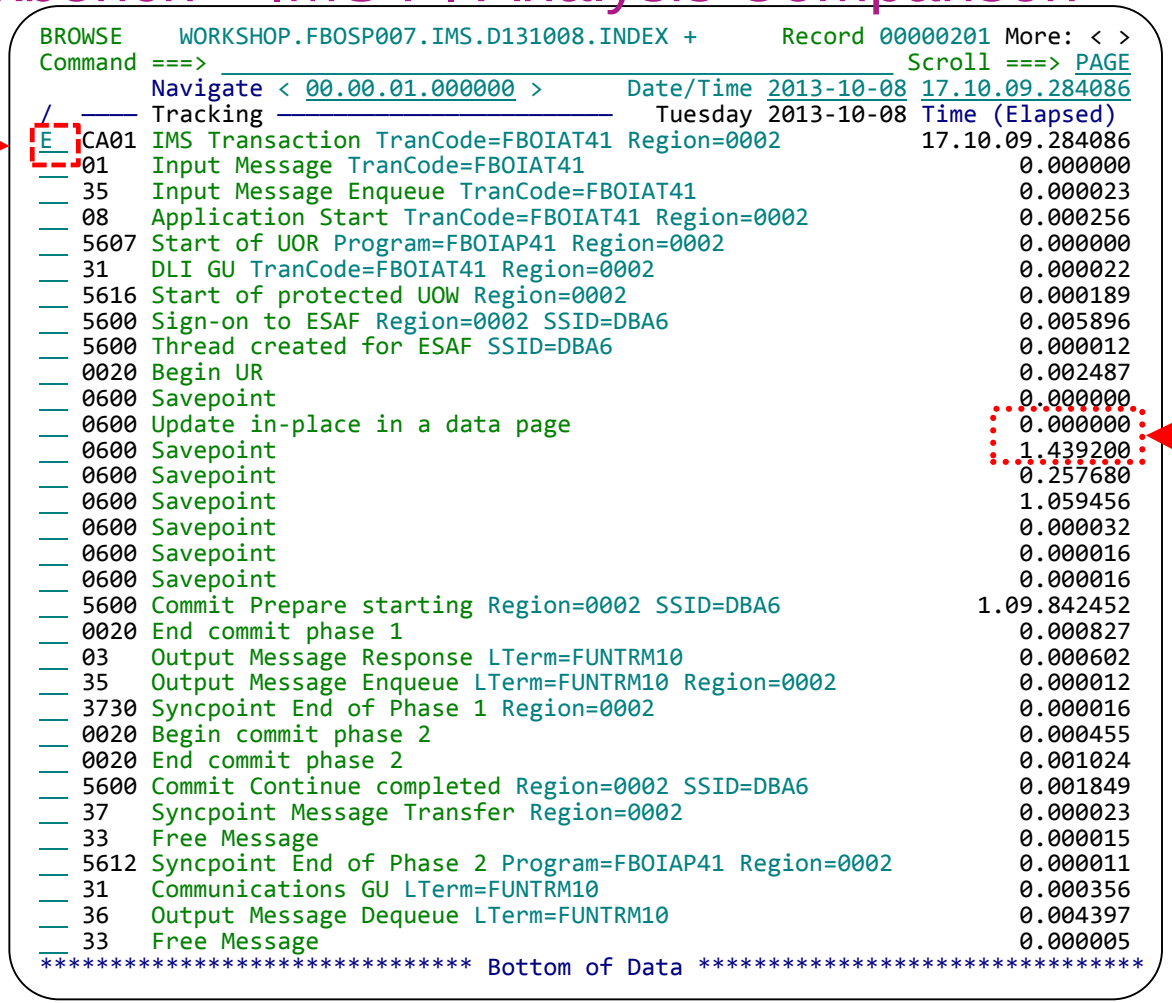
Investigative History

```
  File  Help
──────────────────────────────────────────────────────────────────────────────
                                  History                        Row 1 to 1 of 1
Command ===> ____________________________________________________ Scroll ===> PAGE

Select a history item or use the NEW command to create a new note.

/  Type      Description
_  JOB       IMS transaction and system analysis report
_  TAG       Personal savepoint for JM3
_  TAG       DB2 transaction with long response time
_  JOB       DB2 log analysis report
****************************** Bottom of data ********************************
```

Problem analysis history:

- Keep analysis notes for yourself or to share with other SMEs
- Use Tags to quickly resume analysis sessions, or to identify points in transaction lifecycle which may require further investigation.

Workbench – IMS PI Analysis Comparison



```
BROWSE    WORKSHOP.FBOSP007.IMS.D131008.INDEX +      Record 00000201 More: < >
Command ===> ____________________________________________ Scroll ===> PAGE
        Navigate < 00.00.01.000000 >      Date/Time 2013-10-08 17.10.09.284086
/ ____ Tracking ____________________________   Tuesday 2013-10-08 Time (Elapsed)
E  CA01 IMS Transaction TranCode=FBOIAT41 Region=0002          17.10.09.284086
__ 01   Input Message TranCode=FBOIAT41                              0.000000
__ 35   Input Message Enqueue TranCode=FBOIAT41                      0.000023
__ 08   Application Start TranCode=FBOIAT41 Region=0002              0.000256
__ 5607 Start of UOR Program=FBOIAP41 Region=0002                    0.000000
__ 31   DLI GU TranCode=FBOIAT41 Region=0002                         0.000022
__ 5616 Start of protected UOW Region=0002                           0.000189
__ 5600 Sign-on to ESAF Region=0002 SSID=DBA6                        0.005896
__ 5600 Thread created for ESAF SSID=DBA6                            0.000012
__ 0020 Begin UR                                                     0.002487
__ 0600 Savepoint                                                    0.000000
__ 0600 Update in-place in a data page                               0.000000
__ 0600 Savepoint                                                    1.439200
__ 0600 Savepoint                                                    0.257680
__ 0600 Savepoint                                                    1.059456
__ 0600 Savepoint                                                    0.000032
__ 0600 Savepoint                                                    0.000016
__ 0600 Savepoint                                                    0.000016
__ 5600 Commit Prepare starting Region=0002 SSID=DBA6              1.09.842452
__ 0020 End commit phase 1                                           0.000827
__ 03   Output Message Response LTerm=FUNTRM10                       0.000602
__ 35   Output Message Enqueue LTerm=FUNTRM10 Region=0002            0.000012
__ 3730 Syncpoint End of Phase 1 Region=0002                         0.000016
__ 0020 Begin commit phase 2                                         0.000455
__ 0020 End commit phase 2                                           0.001024
__ 5600 Commit Continue completed Region=0002 SSID=DBA6              0.001849
__ 37   Syncpoint Message Transfer Region=0002                       0.000023
__ 33   Free Message                                                 0.000015
__ 5612 Syncpoint End of Phase 2 Program=FBOIAP41 Region=0002        0.000011
__ 31   Communications GU LTerm=FUNTRM10                             0.000356
__ 36   Output Message Dequeue LTerm=FUNTRM10                        0.004397
__ 33   Free Message                                                 0.000005
****************************** Bottom of Data ********************************
```

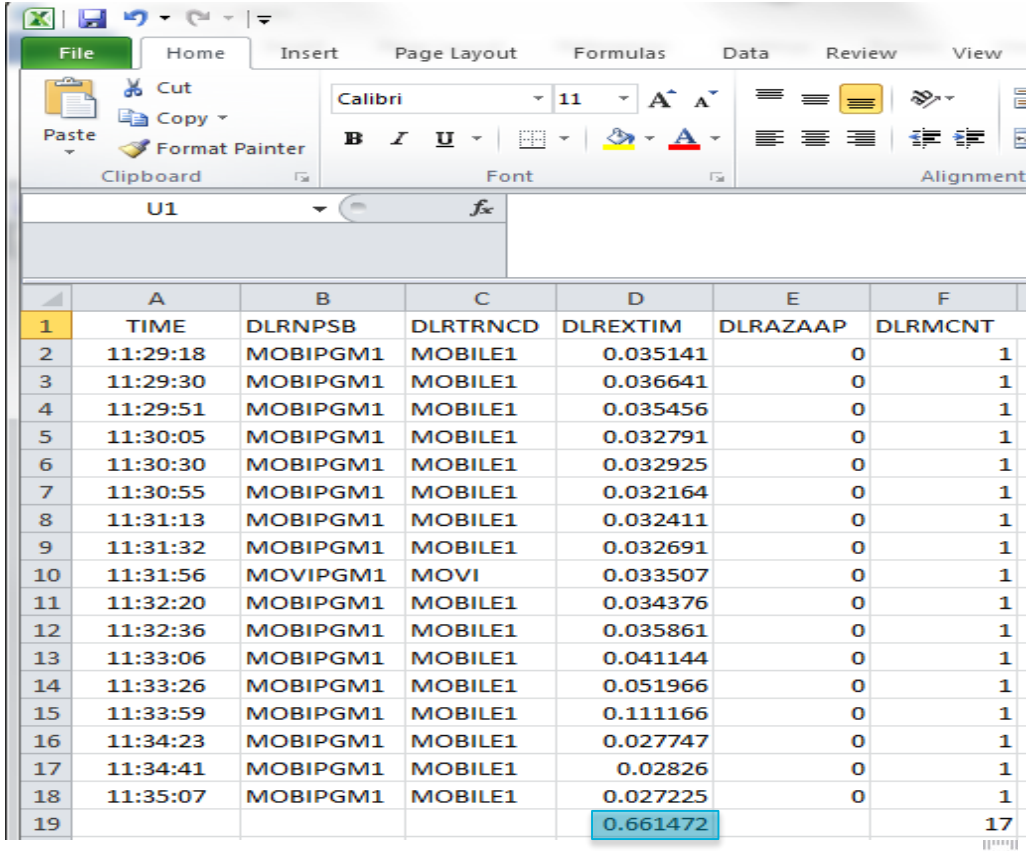
1. Tracking the identical IMS/DB2 transaction using IMS Problem Investigator.
2. We still notice the jump in elapsed time in this frame but have no information about what was really happening in DB2.
3. We know from using workbench that this problem was caused by an inefficient table scan initiated by a DB2 stored procedure, but would we have been able to determine that with the information presented by IMS Problem Investigator?

Problem resolution: end of scenario

- The cause of the IMS transaction problem has been narrowed down to a slowdown in DB2
- Sufficient information about the DB2 update activity has been collected and can be passed on to the DB2 DBA for further investigation
- Automatically locates log files for the problem time range
  - SMF
  - IMS log
  - DB2 log
- A common problem analysis approach:
  - First responders collect data and perform initial analysis
  - SMEs in different areas see the big picture and work towards problem resolution

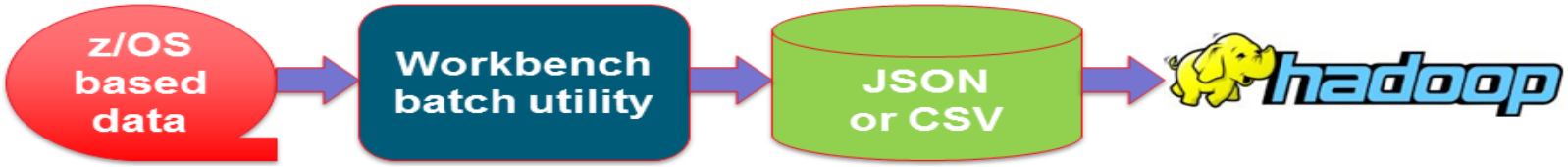
Mobile Workload Pricing using TAW

TAW provides a CSV file containing selected (mobile, for example) transaction CPU usage information. The CSV can then assist you to measure your mobile workload for [IBM Mobile Workload Pricing for z/OS](#).



	A	B	C	D	E	F
1	TIME	DLRNPSB	DLRTRNCD	DLREXTIM	DLRAZAAP	DLRMCNT
2	11:29:18	MOBIPGM1	MOBILE1	0.035141	0	1
3	11:29:30	MOBIPGM1	MOBILE1	0.036641	0	1
4	11:29:51	MOBIPGM1	MOBILE1	0.035456	0	1
5	11:30:05	MOBIPGM1	MOBILE1	0.032791	0	1
6	11:30:30	MOBIPGM1	MOBILE1	0.032925	0	1
7	11:30:55	MOBIPGM1	MOBILE1	0.032164	0	1
8	11:31:13	MOBIPGM1	MOBILE1	0.032411	0	1
9	11:31:32	MOBIPGM1	MOBILE1	0.032691	0	1
10	11:31:56	MOVIPGM1	MOVI	0.033507	0	1
11	11:32:20	MOBIPGM1	MOBILE1	0.034376	0	1
12	11:32:36	MOBIPGM1	MOBILE1	0.035861	0	1
13	11:33:06	MOBIPGM1	MOBILE1	0.041144	0	1
14	11:33:26	MOBIPGM1	MOBILE1	0.051966	0	1
15	11:33:59	MOBIPGM1	MOBILE1	0.111166	0	1
16	11:34:23	MOBIPGM1	MOBILE1	0.027747	0	1
17	11:34:41	MOBIPGM1	MOBILE1	0.02826	0	1
18	11:35:07	MOBIPGM1	MOBILE1	0.027225	0	1
19				0.661472		17

BigData and IT analytics using Transaction Analysis Workbench



- Most z/OS based performance instrumentation can be loaded quickly and easily into HADOOP; including SMF, CICS, DB2, IMS, WebSphere MQ, WebSphere Application Server
- Supports InfoSphere BigInsights and Cloudera
- CSV can be written directly into zFS file system
  - ASCII format; compatible with the requirements of the HADOOP UPLOAD
  - Use NFS or FTP to facilitate scheduled and automated upload into HDFS
- ISPF dialog provides the “BigData” option to assist you in the setup of jobs to collect the required data and generate the necessary CSVs
- The CSV process generates additional output to assist in the take-up:
  - HCatalog - table abstraction and a storage abstraction system that makes it easy for multiple tools to interact with the same underlying data
  - Schema – DDL to create a DB2 table
  - JSON metadata – describes all the fields in the table by name, with their attributes, as well as a detailed description

Workbench and Big Data – Possible Future

```
                                Big Data menu
Command ===> ____________________________________________________________

Enter SUB to create and edit JCL.

Big data engine . . 1  1. Hadoop   2. Elasticsearch ELK

Record types:
_  CICS CMF performance class                      (SMF 110)
_  DB2 accounting                                  (SMF 101)
_  DB2 system statistics IFCID 001                 (SMF 100)
_  Address space accounting class 1                (SMF 30)
_  WebSphere MQ accounting class 1                 (SMF 116)
_  WebSphere Application Server inbound requests   (SMF 120.9)
_  IMS Transaction Index                           (IMS log)

Input files:
  SMF  . . . . ____________________________________________
  IMS log  . . ____________________________________________

Output to  . . 1  1. Data sets  2. z/OS UNIX files

Output data sets:
  CSV  . . . . ____________________________________________
  Metadata . . ____________________________________________

z/OS UNIX output files:
  HOME . . . . ____________________________________________ >
  CSV  . . . . ____________________________________________ >
  Metadata . . ____________________________________________ >

Final destination:
  Location . . ____________________________________________ >

Log forwarding using the Co:Z toolkit:
  Target . . . ____________________________________________
```

IBM InfoSphere BigInsights: BigSheets

- CICS-DB2 transactions with performance metrics from both subsystems

IBM InfoSphere BigInsights Quick Start Edition *(for Non-Production Environment)*

Welcome biadmin | Log out | About | Help

Welcome | Dashboard | Cluster Status | Files | Applications | Application Status | BigSheets

Workbooks > View Results

FUNBOX-1/child

Edit | Delete | Add chart | FUNBOX-1/CM... > FUNBOX-1/child : | Build new workbook

Ready

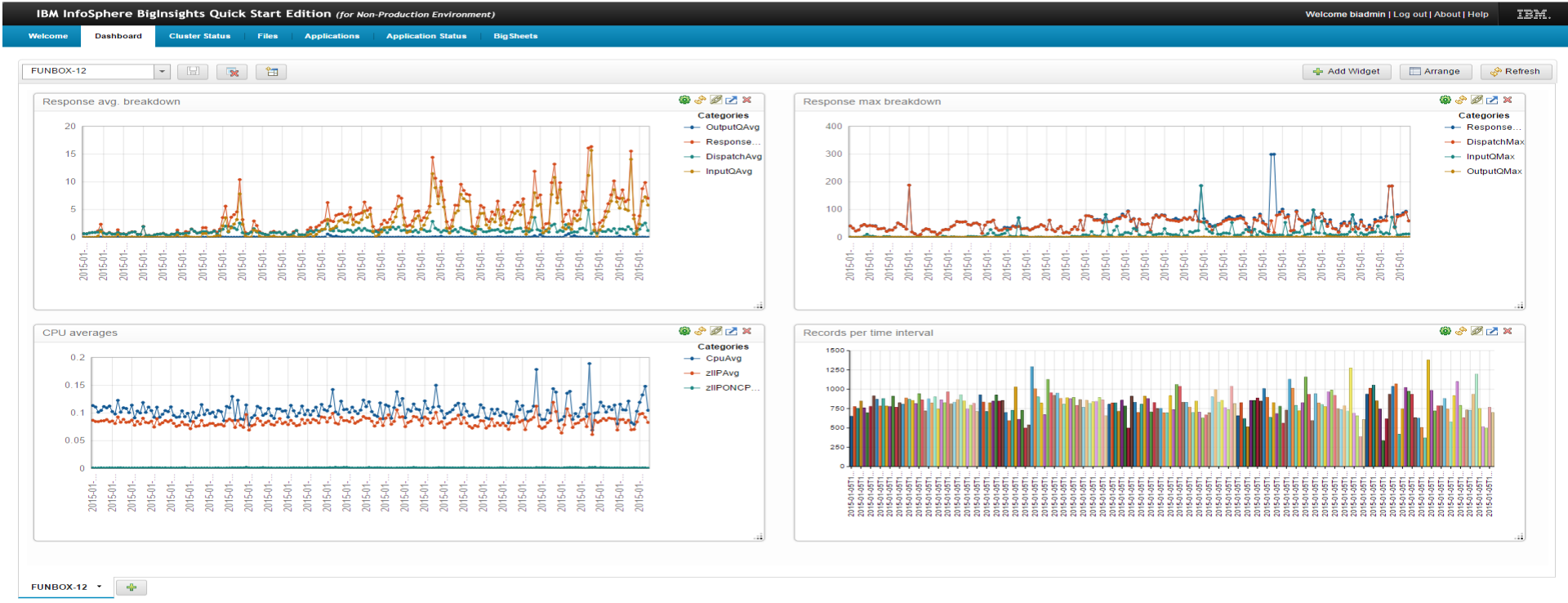
Refresh | Fit column(s) | Create Table | Export data | Run | Stop | 100%

	Time	Tran	CICS_Time	DB2_Time	Total_Time	CICS_over_DB2
1	2013-05-30 11:03:01.674	FB66	0.0116	3.6814	3.6931	0.0031
2	2013-05-30 11:03:21.625	FB66	0.0072	1.8377	1.8449	0.0039
3	2013-05-30 11:03:34.109	FB66	0.0070	1.8447	1.8518	0.0038
4	2013-05-30 11:03:41.587	FB66	0.0164	5.4990	5.5155	0.0029
5	2013-05-30 11:04:09.401	FB66	0.0070	1.8332	1.8402	0.0038
6	2013-05-30 11:04:19.849	FB66	0.0068	1.8468	1.8537	0.0037
7	2013-05-30 11:04:30.041	FB66	0.0070	1.8313	1.8383	0.0038
8	2013-05-30 11:04:37.404	FB66	0.0071	1.8374	1.8445	0.0038
9	2013-05-30 11:04:48.120	FB66	0.0070	1.8309	1.8379	0.0038
10	2013-05-30 11:04:56.615	FB66	0.0068	1.8330	1.8398	0.0037
11	2013-05-30 11:05:09.111	FB66	0.0109	3.6707	3.6816	0.0029
12	2013-05-30 11:05:23.455	FB66	0.0071	1.8262	1.8334	0.0039
13	2013-05-30 11:05:34.250	FB66	0.0070	1.8342	1.8412	0.0038
14	2013-05-30 11:05:41.495	FB66	0.0070	1.8402	1.8472	0.0038
15	2013-05-30 11:05:52.184	FB66	0.0069	1.8427	1.8496	0.0037
16	2013-05-30 11:06:02.395	FB66	0.0069	1.8227	1.8296	0.0038
17	2013-05-30 11:06:08.873	FB66	0.0068	1.8376	1.8445	0.0037
18	2013-05-30 11:06:21.721	FB66	0.0069	1.8433	1.8503	0.0037
19	2013-05-30 11:06:37.943	FB66	0.0067	1.8356	1.8423	0.0036
20	2013-05-30 11:06:54.983	FB66	0.0069	1.8361	1.8430	0.0037
21	2013-05-30 11:07:05.063	FB66	0.0068	1.8311	1.8380	0.0037
22	2013-05-30 11:07:18.551	FB66	0.0069	1.8392	1.8461	0.0037
23	2013-05-30 11:07:32.263	FB66	0.0068	1.8396	1.8465	0.0037
24	2013-05-30 11:07:43.511	FB66	0.0068	1.8423	1.8491	0.0036
25	2013-05-30 11:07:58.717	FB66	0.0068	1.8338	1.8407	0.0037
26	2013-05-30 11:08:09.448	FB66	0.0070	1.8335	1.8406	0.0038
27	2013-05-30 11:08:21.191	FB66	0.0069	1.8510	1.8579	0.0037
28	2013-05-30 11:08:36.904	FB66	0.0070	1.8308	1.8378	0.0038
29	2013-05-30 11:08:48.393	FB66	0.0068	1.8257	1.8326	0.0037
30	2013-05-30 11:08:58.503	FB66	0.0067	1.8329	1.8397	0.0036
31	2013-05-30 11:09:07.661	FB66	0.0071	1.8340	1.8411	0.0038
32	2013-05-30 11:09:22.824	FB66	0.0071	1.8346	1.8417	0.0038
33	2013-05-30 11:09:32.249	FB66	0.0069	1.8379	1.8449	0.0037

Add chart | Result | Time | Showing all 35 rows | Prev | Next

IBM InfoSphere BigInsights: Dashboard

- This dashboard monitors the performance of transactions that were processed in WebSphere Application Server for z/OS
- Response time, CPU time and transaction through-put are all monitored from a single screen
- The data is sourced from SMF 102.9 – every transaction that runs in WebSphere Application




Questions?

More information

- IBM Transaction Analysis Workbench for z/OS: www.ibm.com/software/data/db2imstools/imstools/trans-analysis/
- James Martin, US Representative, Fundi Software: james_martin@fundi.com.au
- Jim Martin, US Representative, Fundi Software

  jim_martin@fundi.com.au