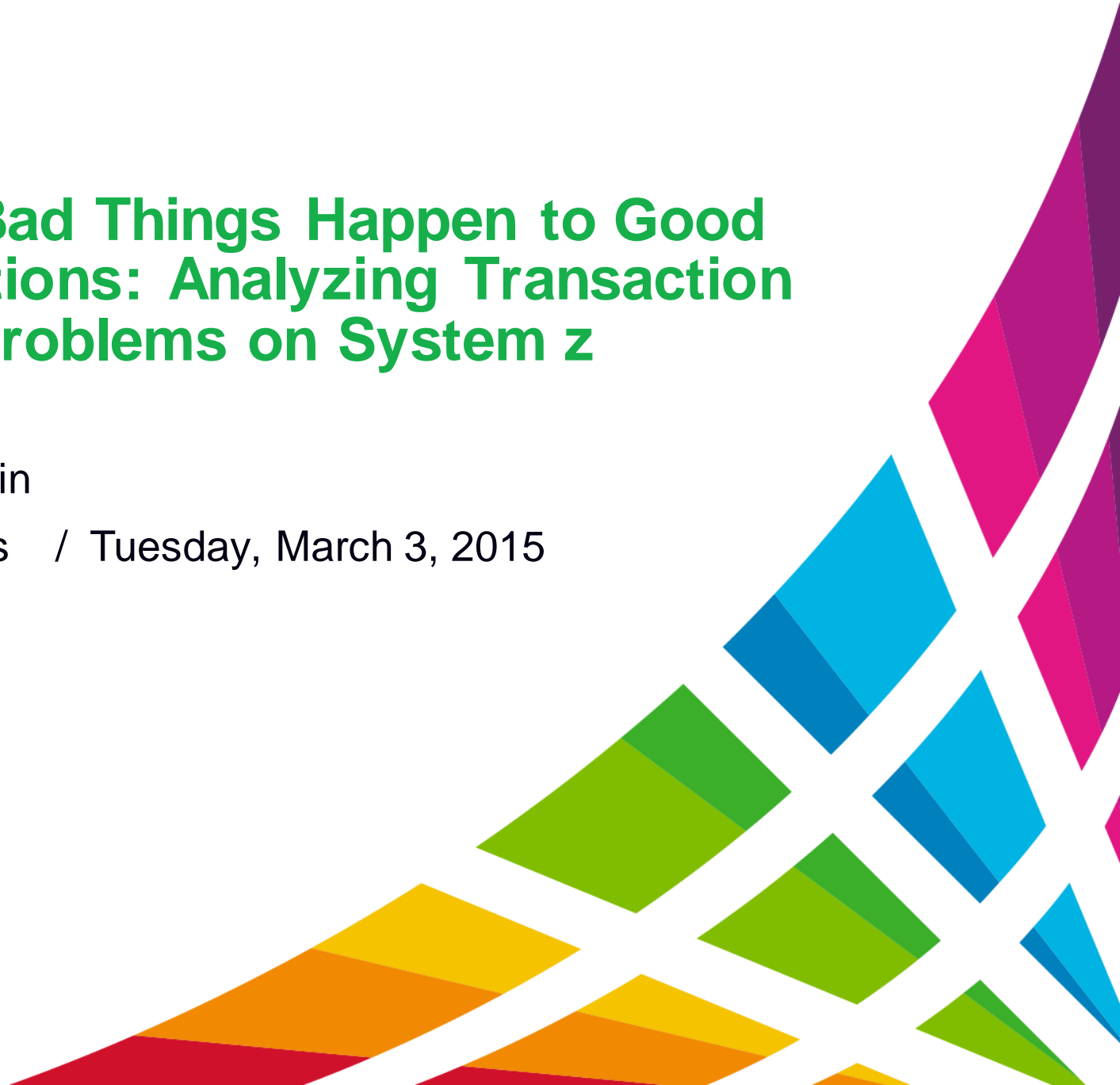


When Bad Things Happen to Good Transactions: Analyzing Transaction Problems on System z

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Ezriel Gross / Tuesday, March 3, 2015



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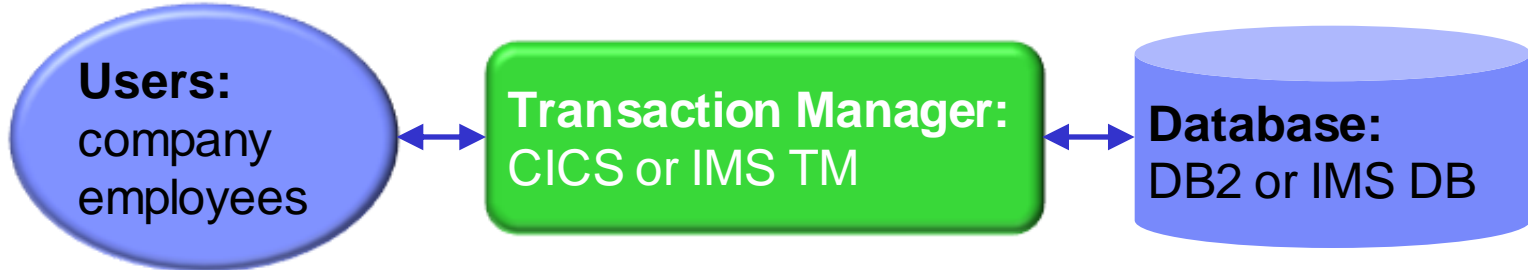
Agenda

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

The big picture of modern z/OS transactions

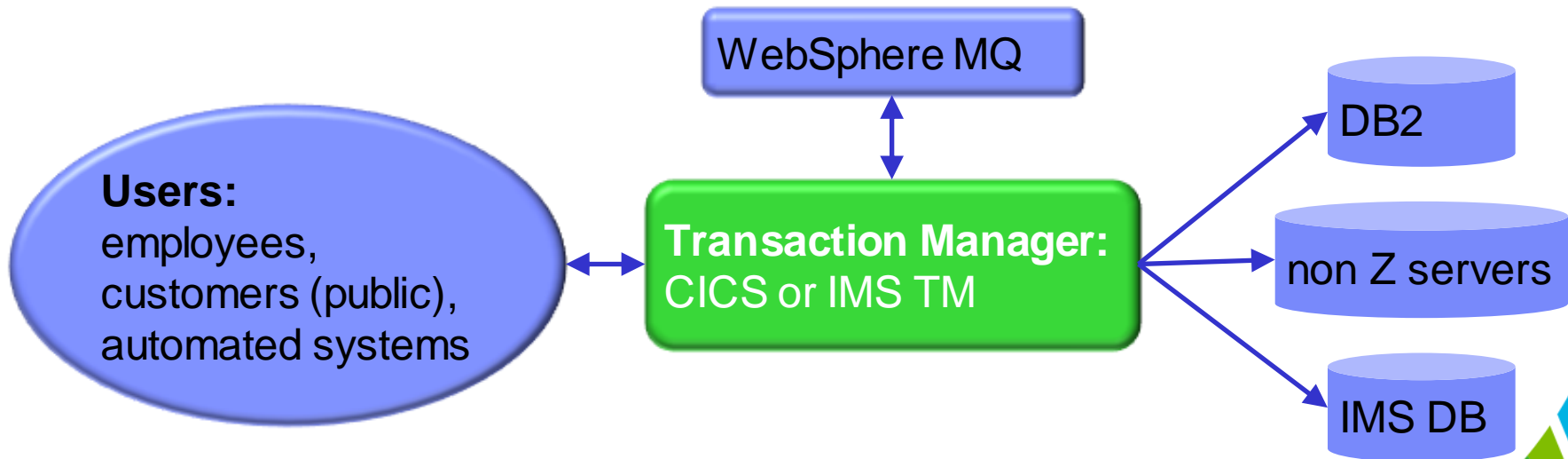
1980s application:

in-house users only; **simple** data, single data store



Today:

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

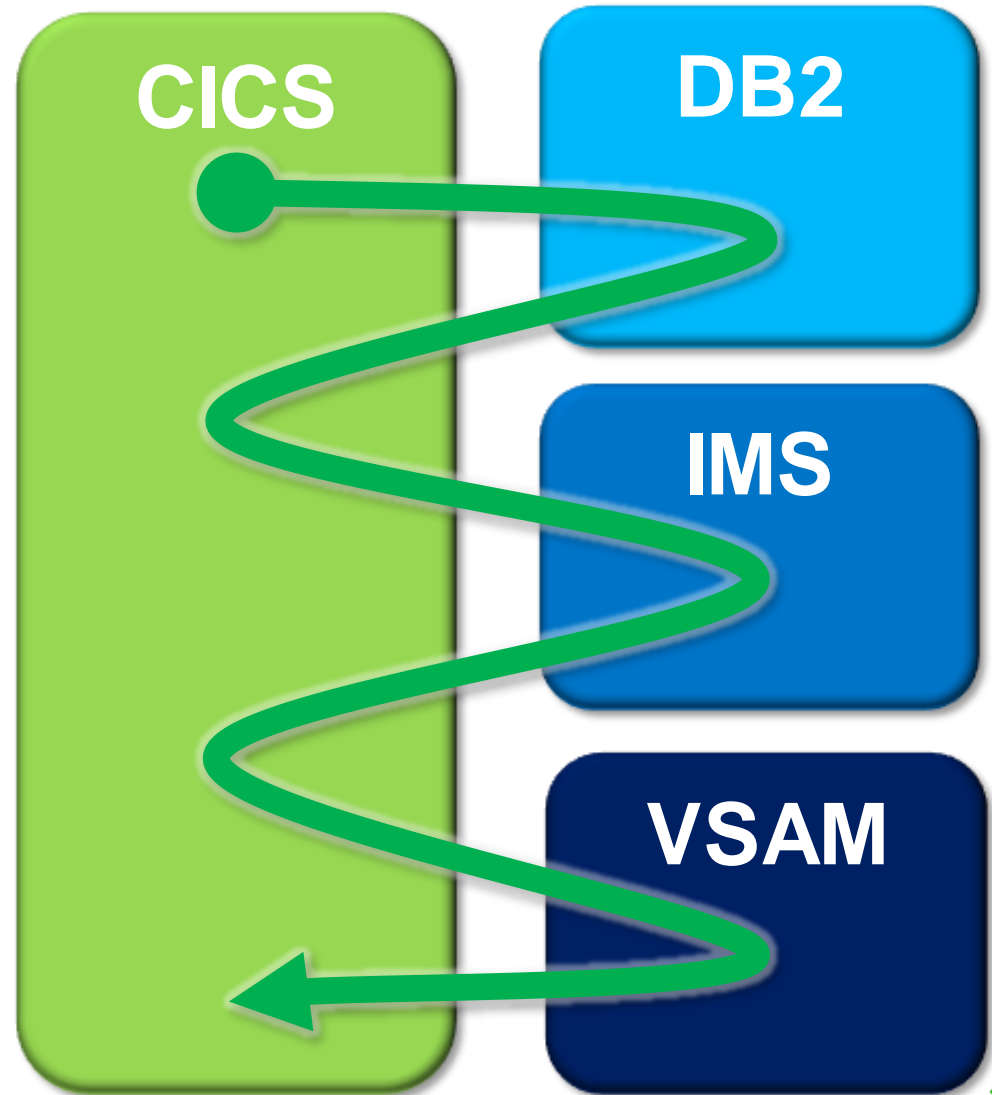


Where is the problem in my z/OS transaction?

- Common questions asked:
 - Who's fault is it anyway?
 - Is a subsystem responsible?
 - IMS, DB2, CICS, WebSphere MQ, etc.
 - Is z/OS the culprit?
 - What instrumentation data is required for problem determination?
 - What is available?
 - Where/how is it collected?
 - Is it accessible?
 - Who is the best person to work on this problem?
 - How is this determined today?

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



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)				



Workbench: Session Manager (ISPF and GUI)

- Problem analysis information maintained using Workbench repository:
 - Problem registration details
 - Workflows and session templates
 - Extracted subsystem and z/OS instrumentation data
 - Reports run
 - Interactive analysis sessions (**ISPF only**)
 - Notes
 - Analysis history (**ISPF only**)

Workbench Session Manager – collaborative workspace

1. Register problem details (ISPF or GUI)
2. Workflow contains all the tasks to be performed (ISPF or GUI)
3. Files contains the list of log files for this problem (ISPF or GUI)

Session 00000021

Option ==> _____

Description : CICS MRO w/ VSAM, DB2 and IMS

1	Register	Update the problem registration details
2	Workflow	Perform the diagnostic tasks
3	Files	Locate and manage the log files required for diagnosis
4	Reporting	Run batch reports
5	Investigate	Perform interactive log file analysis
6	History	Review the problem history

4. Reporting for CICS, IMS, DB2, SMF, and OPERLOG (ISPF only)
5. Investigate provides interactive problem determination (ISPF only)
6. History has written notes and jobs history for problem (ISPF only)

Session: Details

1. What is the problem? Including short and long descriptions
2. When and where did the problem occur? Important for log selection!
3. Who is going to fix it?

```
File Help
-----
                                Problem Details                                Row 1 to 7 of 7
Command ===> _____ Scroll ===> PAGE

Key . . . . . : 00000021
Summary . . . . : CICS MRO w/ VSAM, DB2 and IMS Description...
Severity . . . . : 2
Reference . . . . : TICKET-9102 — When problem occurred —
Reported by . . : John YYYY-MM-DD HH.MM.SS.TH
Assigned to . . : Jim From 2012-02-24 20.40.00.00
Status . . . . . : OPEN To 2012-02-24 21.00.00.00 Zone . . LOCAL

Systems where problem occurred (maximum of 32):

/ System + Type +
— FTS1 IMAGE
— CICSPLEX CICS
— CICSTOR CICS
— CICSAOR CICS
— CICSDOR CICS
— IMSP IMS
— DB2P DB2
***** Bottom of data *****
```



Session: Workflow

1. Contains tasks – batch jobs and instructions
2. Batch jobs can locate log files, create extracts and transaction indexes, run reports
3. Can be predefined with a “template” set up by the expert
4. All jobs run under the session create a new task
5. Batch job output is saved and can be viewed here

```
File Help
-----
Command ===> _____ Tasks Row 1 to 18 of 18
                               Scroll ===> CSR

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 Select SMF files for IMAGE system FTS1
-- 2 DONE Select SMF files for CICS system CICSTOR
-- 3 DONE Select SMF files for CICS system CICSAOR
-- 4 DONE Select SMF files for CICS system CICSDOR
-- 5 DONE Select log files for IMS system IMSP
-- 6 DONE Select SMF files for DB2 system DB2P
-- 7 DONE Select log files for DB2 system DB2P
-- 8 DONE Create SMF extract for CICS system CICSTOR
-- 9 DONE Create SMF extract for CICS system CICSAOR
-- 10 DONE Create SMF extract for CICS system CICSDOR
-- 11 DONE Create log extract for IMS system IMSP
-- 12 DONE Create SMF extract for DB2 system DB2P
-- 13 DONE Create log extract for DB2 system DB2P
-- 14 DONE Create index for IMS systems
-- 15 DONE Create index for CICS systems
-- 16 DONE CICS Performance Analyzer report
-- 17 CC 0004 CICS Tran Summary - Response & CPU
-- 18 CC 0000 IMS Tran Summary - Response & CPU
***** Bottom of data *****
```

Session: Files

1. All log files and other data sets associated with the problem are registered here
2. Files can be automatically located - IMS, DB2 and SMF
3. Manually enter other types of log files
4. Supports all data set types and log streams

```
File Help
-----
Locate and Manage Log Files          Row 1 of 7 More: < >
Command ==> _____ Scroll ==> CSR

NEW Insert a new log file.
AUTO Run automated file selection to locate log files.

Log Files:

/ Exc Data Set Name                System Name  Type  File Type
-----
   JM3.SMF.EXTRACT                 FTS1       IMAGE SMF
   JM3.CICS.CMF.MRO.EXTRACT        CICSplex   CICS  SMF
   JM3.CICS.DBCTL.INDEX            IMSP       IMS   LOG
   IBB1.SLDSP.IBB1.D12055.T2049325.V16 IMSP       IMS   LOG
   DSNDB2A.DBA3.ARCLG1.A0000083    DB2P      DB2   LOG
***** Bottom of data *****
```



Session: Reporting

1. IMS Performance Analyzer – selected reports only
2. CICS Performance Analyzer – selected reports only

Reporting

Option ==> _____

Select a reporting option then press Enter.

- | | | |
|---|------------|--|
| 1 | IMS | Transaction and system analysis using IMS PA |
| 2 | CICS | Transaction and system analysis using CICS PA |
| 3 | CICS-DBCTL | Combined CICS and IMS analysis of transactions |
| 4 | SMF | z/OS and subsystem analysis |
| 5 | DB2 | DB2 accounting exception analysis |
| 6 | OPERLOG | Sysplex operations log (SYSLOG) |

3. CICS-DBCTL – end-to-end from CICS into IMS
4. DB2 – exception reporting and extract
5. OPERLOG – MVS operations log (SYSLOG)



Reporting using CICS PA or IMS PA

CICS Performance Analyzer

Performance Transaction summary: Response time and CPU

Tran	#Tasks	Avg Response Time	Max Response Time	>0.5 Response Time	Avg Dispatch Time	Avg User CPU Time	Avg Suspend Time	Max Suspend Time	Avg Dispwait Time	Avg FC wait Time	Avg DB2SQLwt Time	Avg IMS wait Time
CSMI	55	2.3161	34.3956	21.82%	.0293	.0065	4.2868	34.3071	.0004	.0020	.0180	.0114
PART	25	2.1760	43.5463	20.00%	.0098	.0064	5.1662	43.5337	.0035	.0000	.0000	.0000
Total	236	2.1215	43.5463	31.36%	.0114	.0032	2.1101	43.5337	.0030	.0005	.0042	.0027

IMS Performance Analyzer

Transaction summary: Response & CPU

APPLID	Tran	Tran Count	Avg Process Time	Max Process Time	>1.0 Process Time	Avg CPU Time	Max CPU Time	Avg DB Get Count	Avg DB Updat Count	Avg FP Get Count	Avg FP Updat Count
CICSIMS	CSMI	89129	0.086663	5.065890	23.21%	0.001693	1.278172	4	6	2	3

Workbench exception processing

Exception: a transaction that matches specific *exception criteria*, such as long response time or an abend

Terabytes of instrumentation data

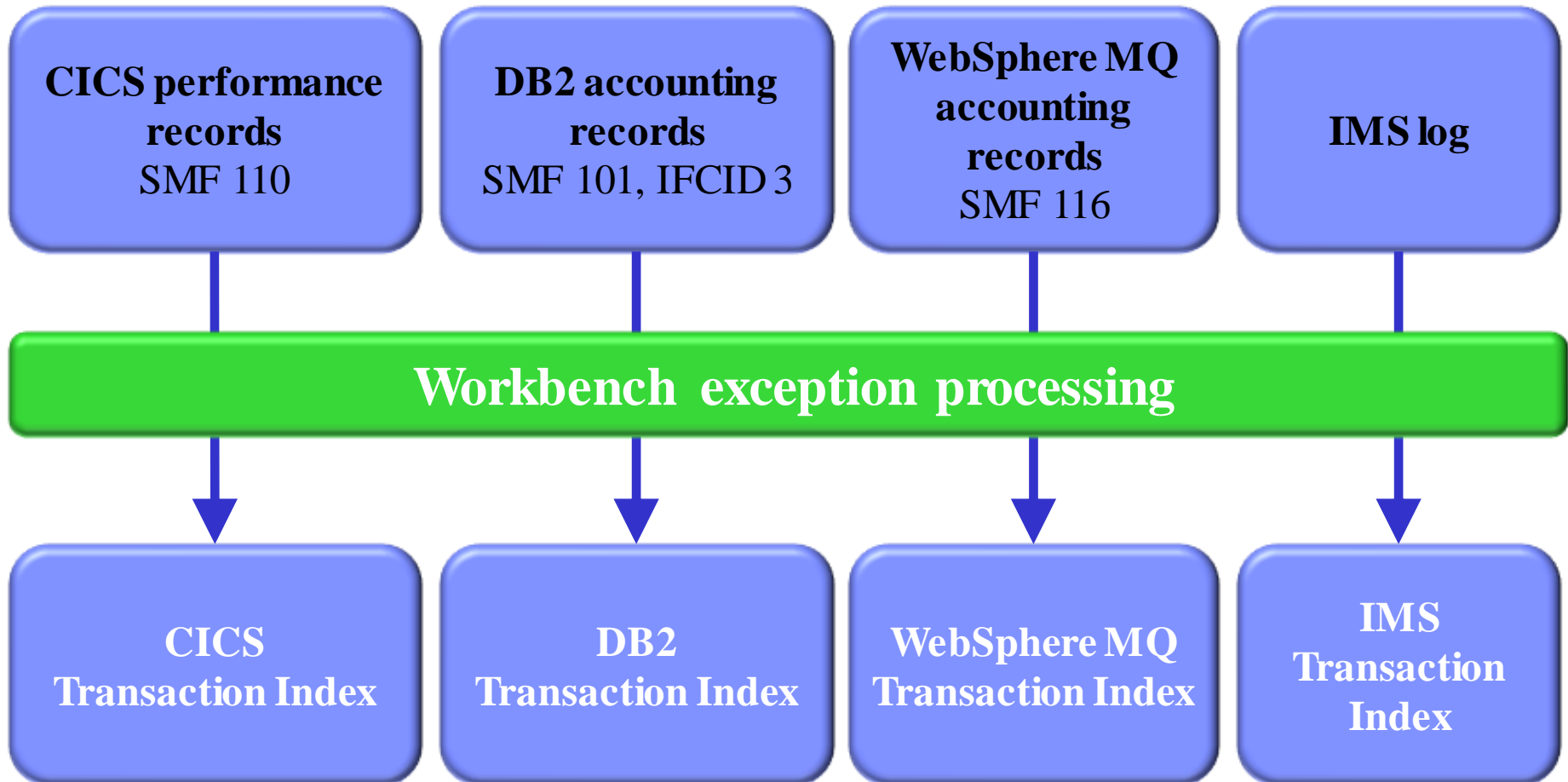
z/OS batch process that efficiently crawls data for exceptions

Workbench

Exception
Transaction
index

Reporting and interactive analysis on reduced data

Workbench Transaction Index processing



1. Transaction indexes are created by the workbench (a session workflow will create them)
2. They are used to identify all the transaction and UOR workloads in IMS, DB2 and CICS
3. The transaction index is a special extract - one record per transaction in time sequence
4. Contain summarized performance and resource usage information
5. Can be filtered to include exception transactions only
6. Can be used for reporting and to identify problem transactions

CICS Exception Transaction Index via ISPF

File Help

Line Actions

File Help

SMF Transaction Index Request

Command ==>

Original Data Set . : JCH.CICS.CMF.MRO.EXTRACT

/ CICS index 'JM3.DBCLT.EXCEP.INDEX'

- DB2 accounting . .

- MQ accounting . .

Exception criteria:

/ Transaction ABEND (CICS only)

/ Response time threshold . . 0.5 (0.00001 to 999999 seconds)

Extract Interval

YYYY-MM-DD HH.MM.SS.TH

From 2012-02-24 20.40.00.00

To 2012-02-24 21.00.00.00

Exception Candidate CICS Transaction Index

```
File  Mode  Filter  Time  Labels  Options  Help
-----
BROWSE  JM3.CICS.DBCTL.EXCEP.INDEX  Record 00000001 More: < >
Command ===> Scroll ===> CSR
Navigate < 00.00.01.000000 > Date/Time 2012-02-24 20.45.15.289374
/ _____ Friday 2012-02-24 LSN
6E13 CICS Transaction CMF-000000000001
TranCode=MROU Program=TWM$MROT Userid=TWM LTerm=SC0TCP22 Terminal=CP22
RecToken=FUFWTR/C92C56A9B17F1881 Resp=15 986901 CPU=0.027538
ACCT=FTS3.SC0TCP22.2C56A9B17F18 Task=156 Abend=AEIV
```

**Quickly Identify
Transactions
performing
outside exception
criteria**

Exception Index was created to show **CICS Transactions (x'6E13')** records that have Abended.

Session: Investigate

1. Session log files are merged in time sequence
2. Often log files are very large. Use time slicing to process required time period only – very quick!

```
Investigate                                     Row 1 of 5 More: < >
Command ==> _____ Scroll ==> CSR

_____ Time Slice (ON) _____
Time      Date      Duration  Zone  Filter +
HH.MM.SS.thmiju  YYYY-MM-DD  HH.MM.SS
20.40.38.002499 2012-02-24 00.17.55 LOCAL _____

/
S_____ Type  Data Set Name                                     Coverage
_____ SMF    JCH.SMF.EXTRACT                                 PARTIAL
_____ CMF    JCH.CICS.CMF.MRO.EXTRACT                       COMPLETE
_____ IMS   JM3.CICS.DBCTL.INDEX                            PARTIAL
_____ IMS   IBB1.SLDSP.IBB1.D12055.T2049325.V16            PARTIAL
_____ DB2   DSNDB2A.DBA3.ARCLG1.A0000083                   PARTIAL
***** Bottom of data *****
```

3. Select all or some of the files only
4. See coverage information for time slice specified



Overall perspective: MRO Transaction Lifecycle with Relative Times

CICS CMF

IMS log

DB2 Log & Trace

Coordinated Syncpoint

```

BROWSE      JCH.SMF.EXTRACT +                      Record 00028179 More: < >
Command ==>                                     Scroll ==> CSR
Slice . . Duration      Date 2012-02-24      Time 20.40.38.002499
Code Description < 00.00.00.000000 > 2012-02-24 Friday      Time (Relative)
/-----/
TX 6E13 CICS Transaction TranCode=MROU Task=286 TOR           20.57.15.950542
   6E13 CICS Transaction TranCode=CSMI Task=72 AOR              +0.001969
   6E13 CICS Transaction TranCode=CSMI Task=82 FC=4             +0.018608
   6E13 CICS Transaction TranCode=CSMI Task=60 IMS=12           +0.018608
   CA01 Transaction Program=DFHTWM04 LTerm=FUFWIR              +0.019642
   08 Application Start TranCode=CSMI Program=DFHTWM04         +0.019642
   5050 Database REPL Database=DI21PART Region=0001           +0.034078
   5050 Database DLET Database=DI21PART Region=0001           +1.265202
   6E13 CICS Transaction TranCode=CSMI Task=57 DB2=14          +1.262832
   072 Create thread start                                     DBA3 +1.264293
. . .
   061 SQL UPDATE CURSOR C1                                  STMT=000354 DBA3 +1.272195
   0020 Begin UR                                             +1.272609
   0600 DB2 Update In-Place in a Data Page                    +1.272625
   058 SQL call completion                                  SQLCODE=0 STMT=000354 DBA3 +1.272673
   0600 DB2 Savepoint                                       +1.273665
   021 Lock detail                                           DBA3 +1.274140
   0600 Delete from a Data Page                               +1.274209
. . .
   0600 Insert into a Data Page                               +2.175537
   058 SQL call completion                                  SQL=0STMT=000433 DBA3 +2.175602
   5610 Syncpoint Start of Phase 1 Region=0001                +2.178900
   5950 FP Database Update Database=IVPDB3 Region=0001        +2.178921
   5611 Syncpoint End of Phase 1 Region=0001                  +2.226836
   0020 End Commit Phase 1                                    +2.232817
   3730 Syncpoint End of Phase 1 Region=0001                  +2.242026
   5937 FP Syncpoint Program=DFHTWM04 Region=0001             +2.242924
   56FA Transaction Statistics Region=0001                    +2.242963
   07 Application Terminate Region=0001                       +2.243907
   070 Commit phase 2 start                                   DBA3 +2.244799
   0020 Begin Commit Phase 2                                  +2.245105
   5612 Syncpoint End of Phase 2 Program=DFHTWM04 Region=0001 +2.245664
. . .
   0020 End Commit Phase 2                                    +2.248257
   003 DB2 Accounting 003 Source=CICS                          +2.249216
   075 Terminate thread end                                   DBA3 +2.250783
***** Bottom of Data *****

```

Session: History

1. Keep analysis notes for yourself or to share with other SMEs
2. Quickly resume analysis sessions using Tag feature

```
History Row 1 to 11 of 11
Command ==> _____ Scroll ==> CSR

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

/ Type      Description
- TAG      Personal savepoint for JM3
- JOB      CICS Tran Summary - Response & CPU
- JOB      IMS Tran Summaru - Response & CPU
- TAG      Personal savepoint for Jim Martin
- TAG      CICS transaction #286 HELP ME!!
***** Bottom of data *****
```

3. Also use Tags to identify points in transaction lifecycle which may require further investigation.
4. Allows for collaborative problem analysis.





CICS Trace Analysis

Deep-Dive Investigation using CICS Trace

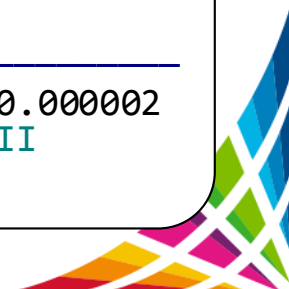
- The CICS trace (either DFHAUXT or GTF) can be used as a diagnostic data source to identify where CICS transaction delays occur
 - Individual transactions can be tracked; including along side CMF and the DB2 trace if required
- EXEC CICS and SQL calls can be analyzed in detail
- Trace events are displayed in the same familiar format as IPCS. However all the standard workbench formatting and navigation features apply, making the CICS trace more accessible
 - The entire contents on the trace entry can be displayed
 - Elapsed time delays are easily identified
- When GTF is collecting both the CICS and DB2 traces, then you will see both in the display



Application call detail

- 1. Use tracking to display only those events associated with the problem transaction
- 2. Scroll through the application calls to see where any long delays occurred

```
BROWSE      JCH.AUXG                               Record 00000001 More: < >
Command ==> _____ Scroll ==> CSR
Navigate < 00.00.01.000000 >      Date/Time 2015-02-11 21.05.22.199441
/ _____ Tracking _____ Wednesday 2015-02-11 Time (Elapsed)
1 TX AP E160 EXEC ENTRY LINK PROGRAM('MQBANK')      85171 21.05.22.199441
   CHANNEL('MQ-CHANNEL') COBOLII STMT_#(03828)
-----
AP 1940 APLI ENTRY START_PROGRAM PROGRAM(MQBANK)    85171      0.000141
   CEDF_STATUS(CEDF) EXECUTION_SET(FULLAPI) ENVIRONMENT_TYPE(EXEC)
   SYNCONRETURN(NO) LANGUAGE_BLOCK(1DA0353C) COMMAREA(00021302 , 9B02C6B0)
-----
AP E160 EXEC ENTRY GET_CONTAINER('MQ-WORK-AREA')    85171      0.000016
   INTO(AT X'23FE52F0') FLENGTH(32767) COBOLII STMT_#(00160)
-----
AP E161 EXEC EXIT GET_CONTAINER('MQ-WORK-AREA')     85171      0.000011
   INTO(AT X'23FE52F0') FLENGTH(32767) COBOLII STMT_#(00160)
-----
AP E160 EXEC ENTRY PUT_CONTAINER('MQ-WORK-AREA')    85171      0.354026
   CHANNEL('MQ-CHANNEL') FROM(AT X'23FE52F0') FLENGTH(32767) COBOLII
   STMT_#(00528)
-----
AP E161 EXEC EXIT PUT_CONTAINER('MQ-WORK-AREA')     85171      0.000014
   CHANNEL('MQ-CHANNEL') FROM(AT X'23FE52F0') FLENGTH(32767) COBOLII
   STMT_#(00528)
-----
AP E160 EXEC ENTRY PUT_CONTAINER('MQ-DATA-AREA')    85171      0.000002
   CHANNEL('MQ-CHANNEL') FROM(AT X'24700008') FLENGTH(2148) COBOLII
   STMT_#(00541)
```



CICS-DB2 transaction replay with trace

```

BROWSE      MY.BAD.CICS.DB2.XACT      Record 00000001 More: < >
Command ==>                               Scroll ==> CSR
Navigate < 00.00.01.000000 >      Date/Time 2013-10-08 15.28.01.407051
Filtering _____      Tuesday 2013-10-08 Time (Elapsed)
1 6E13 CICS Transaction      15.28.01.407051
TranCode=FBOX Program=FBOCCP01 Userid=TWM LTerm=SC0TCP07 Terminal=CP07
RecToken=FUWTCIC/CC145FE27199CC84 Resp=1.686043 CPU=0.007469 DB2=2
ACCT=FTS3.SC0TCP07.145FE27199CC Task=249

___ AP 0100 USER  EVENT USER-EXIT-PROGRAM-ENTRY      00249 0.077862
___ AP 2520 ERM  ENTRY COBOL-APPLICATION-CALL-TO-TRUE( 00249 0.000001
      DSNCSQL )
___ DS 0002 DSAT  ENTRY CHANGE_MODE 3 00249 0.000003
      00000008
___ DS 0003 DSAT  EXIT  CHANGE_MODE/OK 00249 0.000043
___ AP 2522 ERM  EVENT PASSING-CONTROL-TO-OPENAPI-TRUE 00249 0.000003
      (DSNCSQL )
___ AP 3180 D2EX1 ENTRY APPLICATION 4 00249 0.000001
      REQUEST EXEC SQL CALL STATEMENT
___ AP 3250 D2D2  ENTRY DB2_API_CALL 00249 0.000006
      225E4358
___ AP 326C D2D2  EVENT ABOUT_TO_ISSUE_DB2_API_REQUEST 00249 0.000011
___ AP 326D D2D2  EVENT RETURN_FROM_DB2_API_REQUEST 00249 1.602778
___ AP 3251 D2D2  EXIT  DB2_API_CALL/OK 00249 0.000025
___ AP 3181 D2EX1 EXIT  APPLICATION-REQUEST 00249 0.000019
      SQLCODE 0 RETURNED ON EXEC SQL CALL STATEMENT
___ AP 2523 ERM  EVENT REGAINING-CONTROL-FROM-OPENAPI- 00249 0.000028
      TRUE(DSNCSQL )
___ DS 0002 DSAT  ENTRY CHANGE_MODE 00249 0.000011
      00000001
___ DS 0003 DSAT  EXIT  CHANGE_MODE/OK 00249 0.000127
___ AP 2521 ERM  EXIT  COBOL-APPLICATION-CALL-TO-TRUE( 00249 0.000003
      DSNCSQL )
___ 003 Thread accounting      DBA6 0.003547
TranCode=FBOX Userid=TWM ClientID=FUWTCIC
RESP=1.607763 CPU1=0.001412 CPU2=0.000969 I/O3=0
ACCT=FTS3.SC0TCP07.145FE27199CC Source=CICS SEL=1 UPD=1 CAL=1
LogRecs=6 GetPage=14616 UpdPage=1 MaxLock=2
LUWID=FTS3/DBA6LU/CC145FE748D3/0002
***** Bottom of Data *****

```

1. CICS transaction shows long response time; but only two DB2 calls issued
2. Transaction (task id 249) issues a DB2 call
3. Mode switch from QR to L8
4. EXEC SQL request is a CALL to a Stored Procedure
5. DB2 takes 1.6 seconds to respond; CICS can only wait
6. DB2 accounting confirms the long response time, with the only clue being the excessive GetPage count. The DB2 trace confirms that this is caused by a table scan.

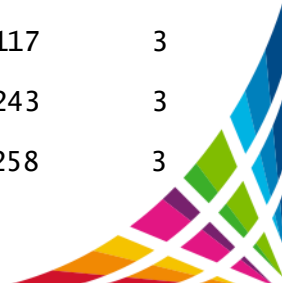


List of transactions batch report

One line per transaction shows the breakdown of response time into its constituent components: Application processing, EXEC CICS, EXEC SQL, EXEC DLI and syncpoint.

Use the ISPF dialog or batch trace to obtain a more detailed drill down of a poor performing transaction

----	2014-05-30	Tran	Program	Userid	TaskNo	Response	SyncTime	--APPL--	---EXEC CICS----	----EXEC SQL----	
11.03.01.674583	MENU	MENUPGM1	TONY	673	13.203473	0.002563	0.003277	6.888614	116	6.310280	5
11.03.21.625670	MENU	MENUPGM1	TONY	675	3.040745	0.002589	0.001862	0.016044	63	3.021377	3
11.03.34.109714	MENU	MENUPGM1	TONY	677	3.025561	0.002717	0.001908	0.003416	63	3.018757	3
11.03.41.587541	MENU	MENUPGM1	TONY	679	19.441418	0.010744	0.004735	9.939777	169	9.494987	7
11.04.09.401905	MENU	MENUPGM1	TONY	681	3.010018	0.002356	0.002107	0.003718	63	3.003115	3
11.04.19.849607	MENU	MENUPGM1	TONY	683	3.047110	0.002502	0.001801	0.003690	63	3.040181	3
11.04.30.041429	MENU	MENUPGM1	TONY	685	3.037615	0.002956	0.002014	0.003611	63	3.030569	3
11.04.37.404134	MENU	MENUPGM1	TONY	687	3.408803	0.002388	0.002312	0.003931	63	3.401387	3
11.04.48.120039	MENU	MENUPGM1	TONY	689	3.014745	0.002967	0.002027	0.003739	63	3.007527	3
11.04.56.615558	MENU	MENUPGM1	TONY	691	3.085321	0.002502	0.001929	0.003721	63	3.078352	3
11.05.09.111860	MENU	MENUPGM1	TONY	693	10.037665	0.003005	0.003348	3.435576	116	6.597059	5
11.05.23.455150	MENU	MENUPGM1	TONY	695	2.963219	0.003212	0.001876	0.003723	63	2.956117	3
11.05.34.250374	MENU	MENUPGM1	TONY	697	3.053035	0.002665	0.002118	0.003696	63	3.045243	3
11.05.41.495384	MENU	MENUPGM1	TONY	699	3.034837	0.002680	0.002097	0.004055	63	3.027258	3



CLCS Trace report

The Trace report shows the significant application events in the lifecycle of each transaction, in particular the EXEC calls and the application processing time between the calls. Transaction response time is broken down in two ways.

1. The event start time relative to the start of the transaction appears on the left hand side
2. The event elapsed time appears on the right hand side
3. The active program is displayed. When the transaction links to another program then the new program name is reported until it returns
4. The statement number will help you locate the position of interest in your program

Time	Program	Event	Elapsed
21.05.22.158271	BANK	ATTACH TRAN=BANK TASK=85171	
+0.000750	BANK	(1)	0.000750
+0.000993	BANK	HANDLE ABEND PROGRAM('ABNDPGM') COBOLII STMT_#(02028)	0.000007
+0.001001	BANK	(2)	0.000001
+0.001002	BANK	RETRIEVE INTO('CLAIMS.MQINPUT.INV013 BANKING') LENGTH(684) COBOLII STMT_#(02037)	0.000013
+0.001015	BANK	(3)	0.000055
+0.001071	BANK	ENQ RESOURCE('CLAIMS.MQINPUT.INV013') LENGTH(21) MAXLIFETIME(233) NOSUSPEND COBOLII STMT_#(02072)	0.000008
+0.035945	BANK	SYNCPPOINT COBOLII STMT_#(02198)	0.005159
+0.041104	BANK	(36)	0.000048
+0.041153	BANK	PUT CONTAINER('MQ-WORK-AREA') CHANNEL('MQ-PROD') FROM(AT X'23FCF890') FLENGTH(32767) COBOLII STMT_#(03807)	0.000015
+0.041168	BANK	(37)	0.000001
+0.041170	BANK	LINK PROGRAM('MQSEND') CHANNEL('MQ-PROD') COBOLII STMT_#(03828)	0.000141
+0.041322	MQSEND	(38)	0.000016
+0.041339	MQSEND	GET CONTAINER('MQ-WORK-AREA') INTO(AT X'23FE52F0') FLENGTH(32767) COBOLII STMT_#(00160)	0.000011
+0.041350	MQSEND	(39)	0.000002
+0.041352	MQSEND	GETMAIN SET(X'24700008') FLENGTH(307360) INITIMG(X'40') COBOLII STMT_#(00180)	0.000027
+0.041380	MQSEND	(40)	0.354026 ***
+0.395407	MQSEND	PUT CONTAINER('MQ-WORK-AREA') CHANNEL('MQ-PROD') FROM(AT X'23FE52F0') FLENGTH(32767) COBOLII STMT_#(00528)	0.000014
+0.395421	MQSEND	(41)	0.000002
+0.395424	MQSEND	PUT CONTAINER('MQ-DATA-AREA') CHANNEL('MQ-PROD') FROM(AT X'24700008') FLENGTH(2148) COBOLII STMT_#(00541)	0.000021
+1.062302	BANK	END OF TRANSACTION	0.000000



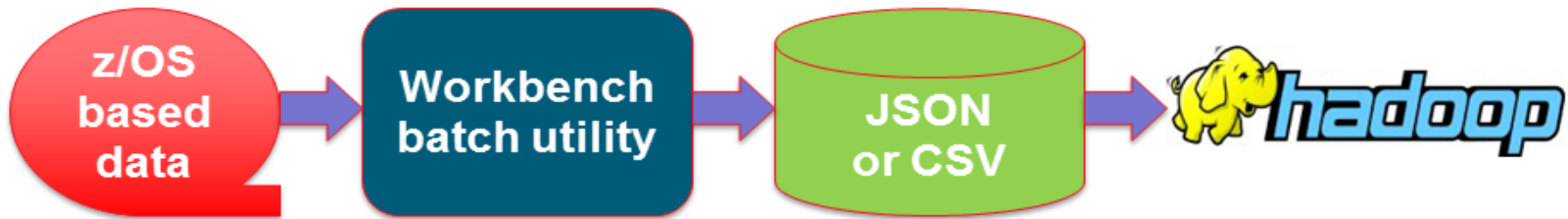
Mobile Workloads and Big Data

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	DLRNPBSB	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

IBM InfoSphere BigInsights: BigSheets

- CICS-DB2 transactions with performance metrics from both subsystems

Workbooks > View Results

FUNBOX-1/child

Funbox-1/CM... > FUNBOX-1/child: Build new workbook

	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



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 Server

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

Welcome biadmin | Log out | About | Help

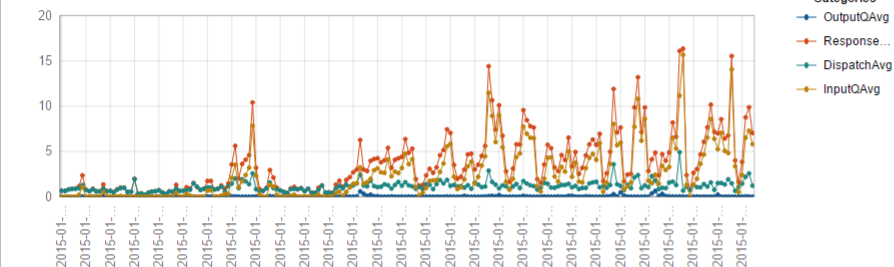


Welcome Dashboard Cluster Status Files Applications Application Status BigSheets

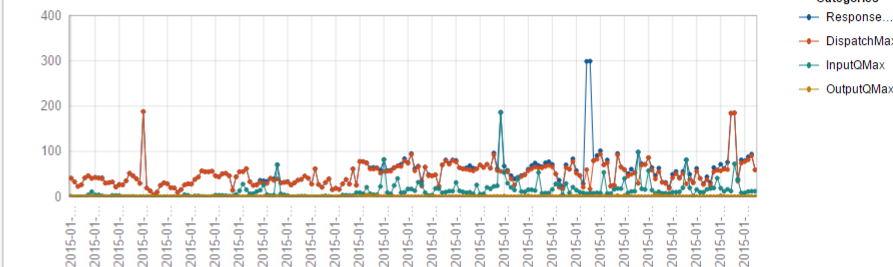
FUNBOX-12

Add Widget Arrange Refresh

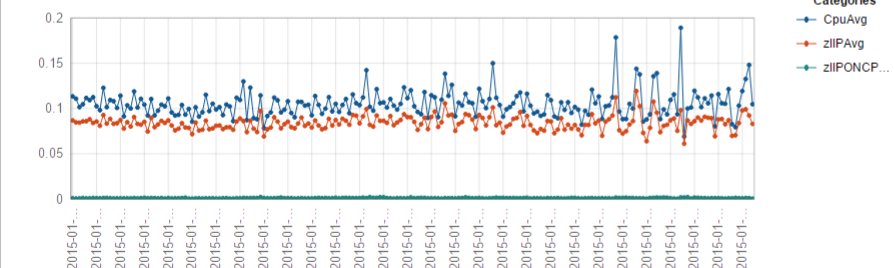
Response avg. breakdown



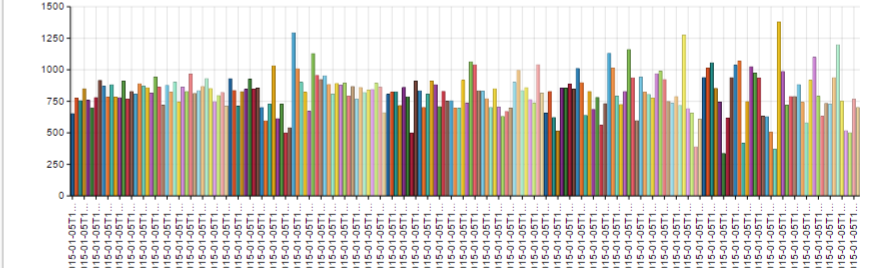
Response max breakdown



CPU averages



Records per time interval



FUNBOX-12



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
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