Analyzing CICS Transactions in a Mixed Environment

Jim Martin

US Representative, Fundi Software

1:30 PM. Wednesday, 14 March 2012

Session 10523

Agenda

Introduction
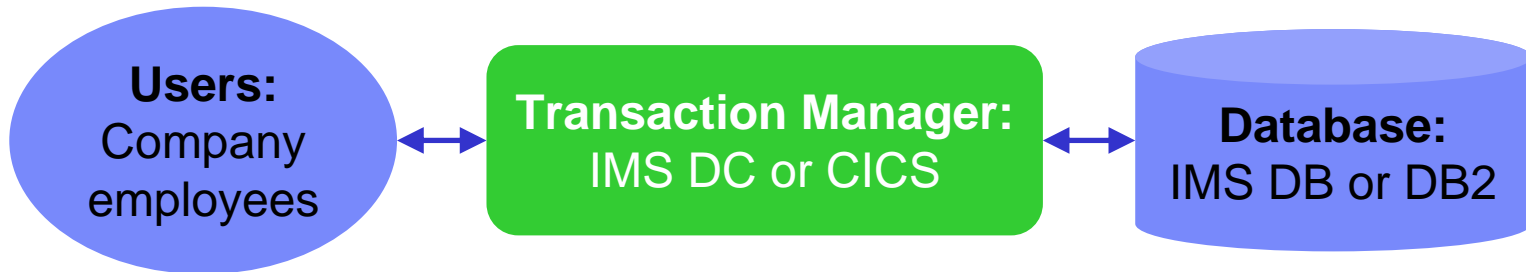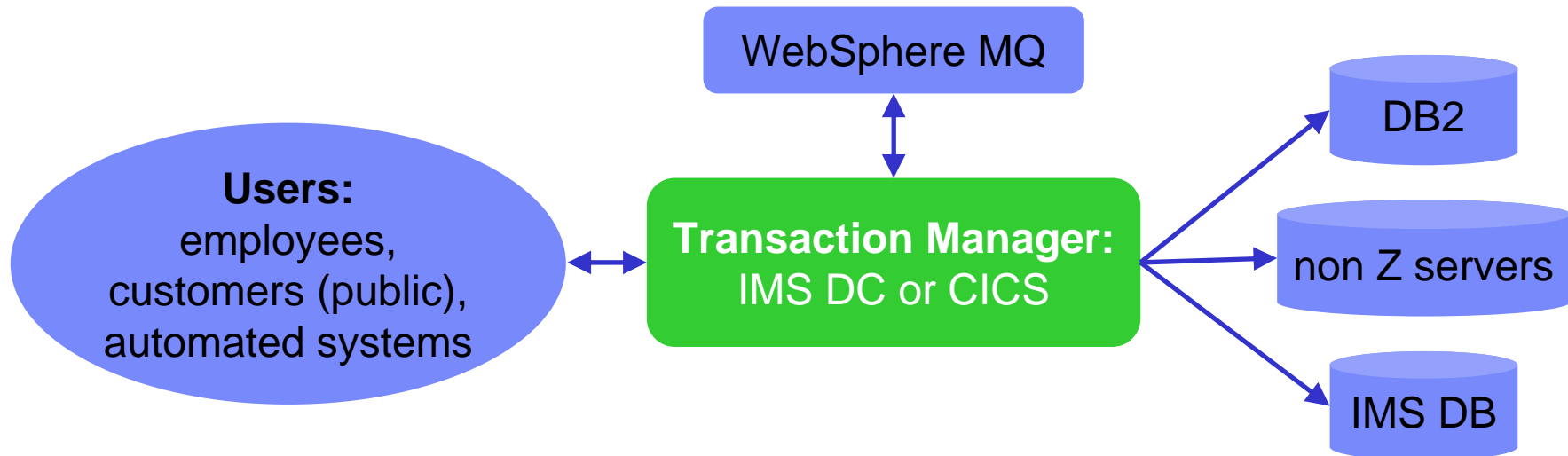
Overview of the ISPF dialog

Scenario: CICS MRO problem

Batch SMF and OPERLOG reports

It's all about evolution

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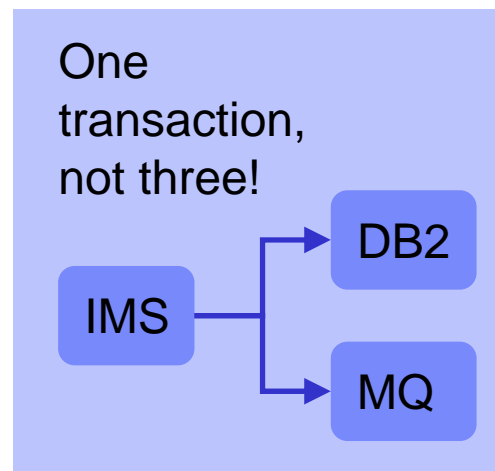

2011: users are customers; data is complex, often distributed

Analysis tools have not kept pace

There are many tools to help analyze *individual* transaction environments on System z:

| CICS Performance Analyzer | IMS Performance Analyzer | DB2 Performance Manager | *Many others...* |

CICS **IMS** **DB2**

One transaction, not four!

CICS → IMS
CICS → DB2
CICS → MQ

One transaction, not three!

IMS → DB2
IMS → MQ
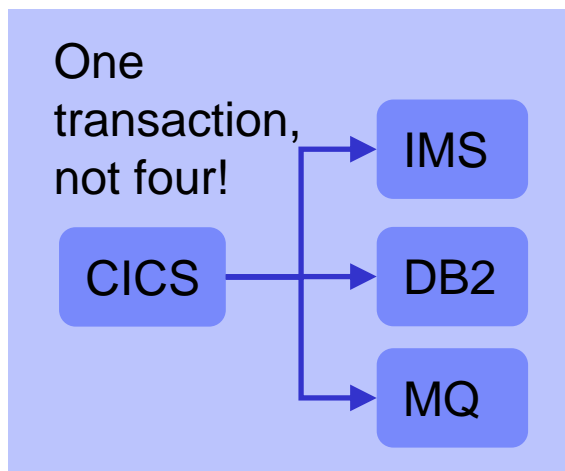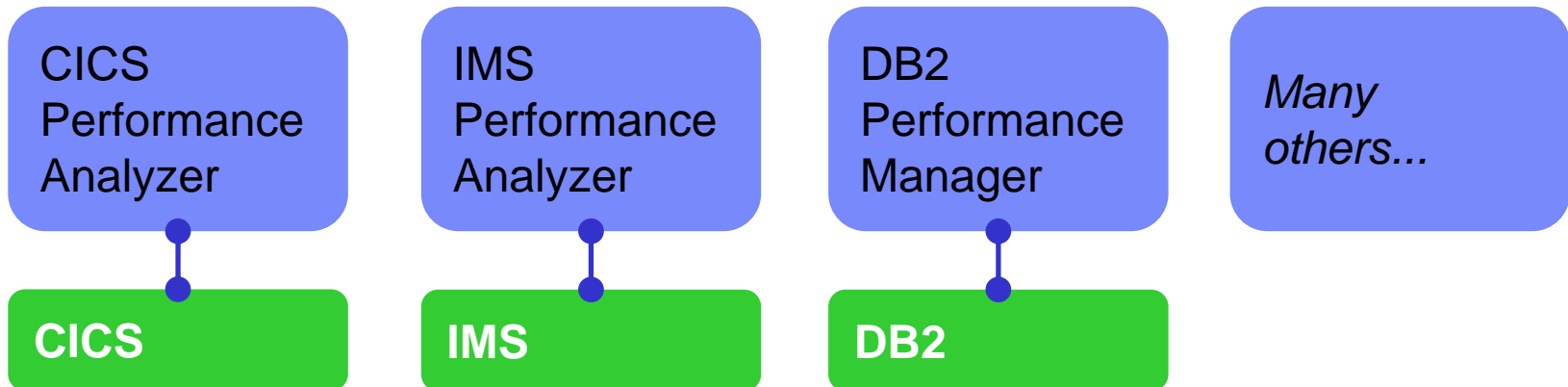
Each tool is well-suited to its environment, but you often need a subject matter expert to use each tool

Product overview

- A transaction analysis framework for System z

  - Not transaction manager specific

  - Leverages current IBM tools for transaction analysis

- Not IMS or CICS specific, but first release provides more synergy with the existing tools for those transaction managers

- Automates collection of data needed for problem analysis

- Provides a session manager to manage problem analysis through its lifecycle

- In this presentation, it might look like the Workbench is IMS or CICS centric but that is not the case

  - The tools for IMS and CICS are the first to be engaged

Product goals

- Enable higher productivity by lower skilled staff.

- Automate trivial tasks commonly needed for problem determination.

  - Data acquisition – get the data needed for problem analysis

  - Reporting – basic reporting without tool specific knowledge

  - Autonomics - automated transaction analysis

- Allow the "first responder" to determine the most likely source of the problem.

  - Give the receiving expert confidence in the assignment

- Allow for "deep dive" problem determination via synergy with other IBM tools

  - Create a "common" approach to transaction problem resolution

  - Increase the degree and ease of collaboration in problem resolution

Supported logs

IMS log

IMS transaction index

IMS monitor and DB monitor

IMS Connect event data

CQS log stream
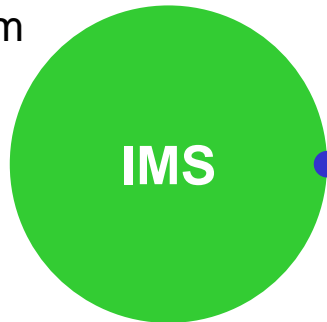
Selected SMF record types (in either log streams or data sets)

OPERLOG (log stream)

CMF performance (SMF)

z/OS

IMS

CICS

Transaction Analysis Workbench

DB2
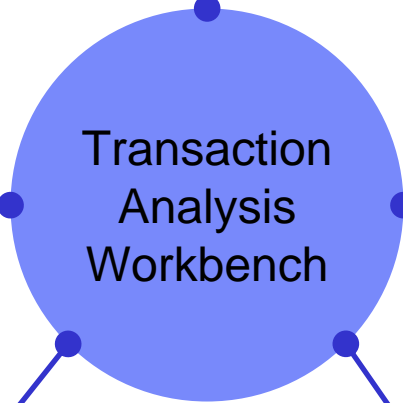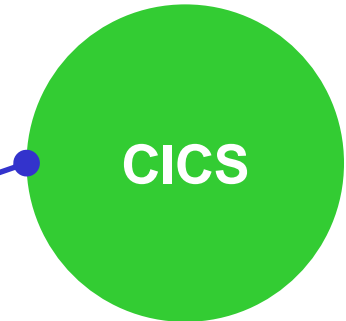
WebSphere

DB2 log

Accounting (SMF)

Performance (SMF)
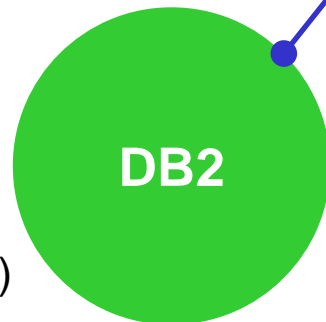
WebSphere MQ log extract

Statistics (SMF)

Accounting (SMF)
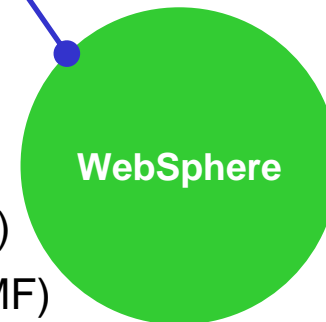
Session manager (ISPF dialog)

- Session manager approach to problem management:

  - Register the problem

  - Locate the files required to diagnose the problem: IMS, DB2, CICS, SMF, OPERLOG etc.

  - Resume from where you left off, or from a previous save-point

  - Write reminder notes and information as you go

  - Re-assign the problem to the appropriate subject-matter expert

  - Use PI-style interactive analysis to look at related logs and other subsystem events via SMF, OPERLOG etc.

  - Run reports that are specific to the problem

Functions
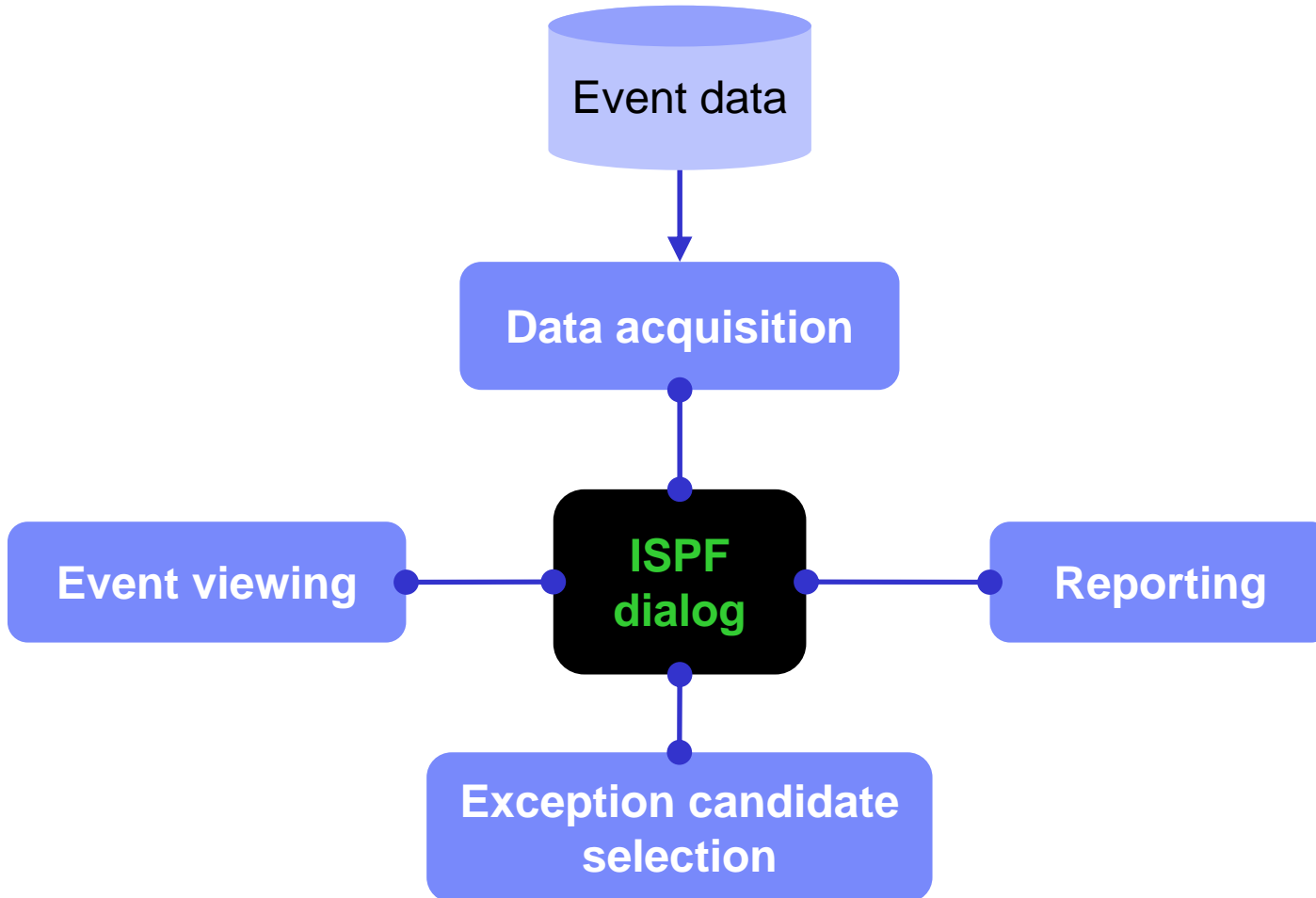
Scenario: CICS MRO problem

- On the following slides, we present an example scenario: a user has reported a long response time in a CICS transaction

- The analysis is divided into two parts:

   1. The **first responder** registers the problem in the Workbench session manager, collects the log files, and then runs some preliminary batch reports to attempt to identify the cause of the problem

   2. The **specialist** 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

Register the problem details

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

 Key  . . . . . : 00000030
 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 Manager

```
  File  Help
_____
                              Session 00000030
Option ===>  _____

Summary . . . : CICS MRO w/ VSAM, DB2 and IMS

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

1. Locate the files required for problem analysis

```
                            Locate and Manage Log Files            Row 1 to 5 of 5
 Command ===> _____    Scroll ===> CSR

 Select an option to add log files to the session then press Enter
 2  1. Manually specify the log files required for analysis
    2. Run automated file selection to locate the required log files

 Automated File Selection:            — Locate Files Interval ——
    System . . . _____  +            YYYY-MM-DD  HH.MM.SS.TH
    Type . . . . _____  +      From  2012-02-24  20.40.00.00
                                  To    2012-02-24  21.00.00.00

 Log Files:
                                               —— System —— File
 /         Data Set Name                       Name    Type    Type
 X_____  FTS1.WEEKLY.SMF.G0456V00             FTS1    IMAGE   SMF
 _____  JIM.CICS.DBCTL.INDEX                 IMSP    IMS     IDX
 _____  IMSP.SLDS.D12055.T2049325.V16        IMSP    IMS     LOG
 _____  DB2P.ARCLOG1.A0000083                DB2P    DB2     LOG
 *************************** Bottom of data ***************************
```

2. Extract diagnostic data for problem analysis

```
                              Extract Request
Command ===> _____

Select an option then press Enter
1   1. Extract records from the log file using filtering criteria
    2. Create a transaction index (IMS log files only)

Extract records from : FTS1.WEEKLY.SMF.G0456V00
Extract Data Set . . . 'JIM.CICS.CMF.MRO.EXTRACT'

Filtering Criteria:                  ——— Extract Interval ———
 Filter . . . 6E13      +            YYYY-MM-DD  HH.MM.SS.TH
                              From  2012-02-24  22.45.00.00
                              To    2012-02-24  23.00.00.00
```

```
//JIMX      JOB ,NOTIFY=&SYSUID,CLASS=A
//EXTRACT   EXEC PGM=FUWBATCH
//SYSPRINT DD   SYSOUT=*
//SMFINOO1 DD   DISP=SHR,DSN=FTS1.WEEKLY.SMF(O)
//EXTRACT   DD   DISP=NEW,DSN=JIM.CICS.CMF.MRO.EXTRACT
//SYSIN     DD   *
FROM(2012-02-24-22.45) TO(2012-02-24-23.00)
EXTRACT CICS-DBCTL OUTPUT(EXTRACT)
CODE(CMF,6E13)
COND RESPONSE GT 2.O
/*
```

3. Extracted data now available for diagnosis

```
                    Locate and Manage Log Files          Row 1 to 5 of 5
Command ===> _____   Scroll ===> CSR

Select an option to add log files to the session then press Enter
2   1. Manually specify the log files required for analysis
    2. Run automated file selection to locate the required log files

Automated File Selection:          -- Locate Files Interval --
  System . . . _____  +          YYYY-MM-DD   HH.MM.SS.TH
  Type . . . . _____  +    From  2012-02-24   20.40.00.00
                               To    2012-02-24   21.00.00.00
Log Files:
                                            --- System --- File
/         Data Set Name                     Name     Type   Type
D_____  FTS1.WEEKLY.SMF.G0456V00          FTS1     IMAGE  SMF
S_____  JIM.CICS.CMF.MRO.EXTRACT          CICSPLEX CICS   CMF
_____  JIM.CICS.DBCTL.INDEX              IMSP     IMS    IDX
_____  IMSP.SLDS.D12055.T2049325.V16     IMSP     IMS    LOG
_____  DB2P.ARCLOG1.A0000083             DB2P     DB2    LOG
**************************** Bottom of data ****************************
```

Reporting using IMS PA and CICS PA

```
              Reporting - CICS Transaction Analysis

                                          —————— Report Interval ——————
Type of analysis:                                YYYY-MM-DD  HH.MM.SS.TH
/   Individual transaction detail         From  2012-02-24  20:45
/   Transaction statistical summary       To    2012-02-24  21:00

Focus of transaction analysis:
/   Response and CPU usage       /   VSAM files     /   Virtual storage
/   VSAM files                   /   DB2            /   IMS DBCTL

SMF File . . 'JIM.CICS.CMF.MRO.EXTRACT'                        +
```

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

Locating the problem transaction

1. Start a filter to look for CICS transactions

```
VIEW                              Filter                    Row 1 of 1 More: < >

Filter . . BADPARTS  +     Description . . PART trans w/ long response time

/ Log Code + Exc Description
S CMF 6E13        CICS Transaction
***************************** Bottom of data *****************************
```

2. Specify filter conditions to narrow down the search

```
                              Conditions                    Row 1 to 2 of 2

/  Field Name +                        Oper Value +
_  TRAN                                EQ   'PART'
_  RESPONSE                            GT   2.0
***************************** Bottom of data *****************************
```

3. Display is reduced to problem candidate list

```
BROWSE    JIM.CICS.CMF.MRO.EXTRACT                Record 00000020 More: < >
   Slice . . Duration _____      Date  2012-02-24    Time  20.40.38.002499
   Code Description  < 00.00.00.000000 >  2012-02-24 Friday   Time (LOCAL)
/  ---- -------------------------------------------------------- ----------------
__  6E13 CICS Transaction TranCode=PART Task=122 Resp=2.019223  20.44.58.297560
__  6E13 CICS Transaction TranCode=PART Task=274 Abend=AEIV      20.55.24.768251
TX 6E13 CICS Transaction TranCode=PART Task=286 Resp=2.141418   20.57.15.950542
__  6E13 CICS Transaction TranCode=PART Task=288 Resp=2.003727  20.57.34.335989
***************************** Bottom of Data *****************************
```

CICS transaction with 4 MRO subtasks

```
BROWSE     JIM.CICS.CMF.MRO.EXTRACT                    Record 00000216 More: < >
Command ===> _____              Scroll ===> CSR
   Slice . . Duration  15.00.00      Date  2012-02-24      Time  20.46.04.986507
   Code Description  < _____ >  2012-02-24 Friday      Time (Relative)
/  ----                                                          ---------------
G  TAG  CICS Tran=PART Task=286 has the long response time      20.57.15.950542
TX 6E13 CICS Transaction                                        20.57.15.950542
        TranCode=PART Program=PARTMENU Userid=JIM Terminal=NY Task=286
        ACCT=FTS3.SC0TCP22.2C5958F82B96 Resp=2.251886 CPU=0.002323
        -----------------------------------------------------------------------
__ 6E13 CICS Transaction                                            +0.001969
        TranCode=CSMI Program=PARTEXEC   Task=72
        ACCT=FTS3.SC0TCP22.2C5958F82B96  Resp=2.241418 CPU=0.002990
        -----------------------------------------------------------------------
__ 6E13 CICS Transaction                                            +0.003165
        TranCode=CSMI Program=PARTFILE   Task=82
        ACCT=FTS3.SC0TCP22.2C5958F82B96  Resp=2.236072 CPU=0.003273 FC=4
        -----------------------------------------------------------------------
__ 6E13 CICS Transaction                                            +0.018608
        TranCode=CSMI Program=PARTIMS    Task=60
        ACCT=FTS3.SC0TCP22.2C5958F82B96  Resp=2.225775 CPU=0.004406
        RecToken=CICSDIMS/C92C5958FCB44261 PSB=PARTSDB            IMS=12
        -----------------------------------------------------------------------
__ 6E13 CICS Transaction                                            +1.262832
        TranCode=CSMI Program=PARTDB2    Task=57
        ACCT=FTS3.SC0TCP22.2C5958F82B96  Resp=0.988344 CPU=0.014637 DB2=12
        -----------------------------------------------------------------------
***************************** Bottom of Data *****************************
```

Tracking displays all the events associated with the transaction – noise is removed

CICS transaction details

```
BROWSE      JIM.CICS.CMF.MRO.EXTRACT                 Record 00000216 Line 00000000
Command ===> _____     Scroll ===> CSR
Form    ===> MY6E13   +     Use Form in Filter             Format ===> STD
******************************** Top of data ********************************
+0005  Code... 6E13  CICS Transaction
+00B2  STCK... C92C5958F81CE043      LSN.... 00000000000000D8
       Date... 2012-02-24 Friday    Time... 20.57.15.950542.016

+009E  DFHTASK.... Task Control
+009E  Tran....... 'PART'        SC......... 'TO..'
+0856  Dispatch... 0.004109/6    UserCPU.... 0.002323/6
+086E  Suspend.... 2.117776/26   TaskNo..... +286
+00E2  NETName.... 'FTS3.SC0TCP22'            NETUOWID... 2C5958F82B960001
+087A  DispWait... 0.000051/5    Prty....... +1
+0132  Brdg....... 00000000      Disp1Dly... 0.000062
+0A7E  RMIelap.... 0.000018/3    RMISusp.... 0
+0B92  QRModDly... 0.000051/5    QRDisp..... 0.004109/6    QRCPU.... 0.002323/6

       DFHCICS.... CICS task information
+00B2  Start.. 20.57.15.950542   Stop.. 20.57.18.202428   Response... 2.251886

       DFHRMI..... Resource Manager (RMI)
+0B06  RMITotal... 2.104618/26
+0B12  RMIDB2..... 1.062417/14   RMIDBCTL... 1.041290/12   RMIMQ...... 0
```

Select any record (CICS, IMS, DB2, MQ, and others) to see it neatly formatted

Overall perspective

```
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=FUWFWIR               +0.019642
__ 08   Application Start TranCode=CSMI Program=DFHTWM04         +0.019642
__ 50   Database Update Database=DI21PART Region=0001            +0.034078
__ 50   Database Update Database=DI21PART Region=0001            +1.265202
__ 6E13 CICS Transaction TranCode=CSMI Task=57  DB2=14           +1.262832
__ 66   DB2 Performance 072 Create thread entry                 +1.264293
. . .
__ 66   DB2 Performance 061 SQL update                          +1.272195
__ 0020 DB2 Unit of Recovery Control - Begin UR                 +1.272609
__ 0020 DB2 Update In-Place in a Data Page                      +1.272625
__ 66   DB2 Performance 058 SQL call completion                 +1.272673
__ 0010 DB2 Savepoint                                           +1.273665
__ 66   DB2 Performance 021 Lock detail                         +1.274140
__ 0020 DB2 Delete from a Data Page                             +1.274209
. . .
__ 0020 DB2 Insert into a Data Page                             +2.175537
__ 66   DB2 Performance 058 SQL call completion                 +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 DB2 Unit of Recovery Control - 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
__ 66   DB2 Performance 070 Begin commit phase 2                +2.244799
__ 0020 DB2 Unit of Recovery Control - Begin Commit Phase 2     +2.245105
__ 5612 Syncpoint End of Phase 2 Program=DFHTWM04 Region=0001   +2.245664
. . .
__ 0020 DB2 Unit of Recovery Control - End Commit Phase 2       +2.248257
__ 65   DB2 Accounting 003 Source=CICS                          +2.249216
__ 66   DB2 Performance 075 Terminate thread exit               +2.250783
******************************* Bottom of Data ********************************
```

CICS CMF

IMS log

DB2 Log & Trace

Coordinated Syncpoint

IMS perspective

```
BROWSE     FTS1.WEEKLY.SMF.G0456V00 +              Record 00028179 More: < >
Command ===> _____      Scroll ===> CSR
   Slice . . Duration  00.15.00     Date  2012-02-24    Time  20.45.00.000000
   Code Description  < 00.00.00.000000 >  2012-02-24 Friday    Time (Relative)
/  ----  ---------------------------------------------------------  ----------------
__ 6E13 CICS Transaction TranCode=PART 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             +0.003165
__ 6E13 CICS Transaction TranCode=CSMI Task=60   IMS=12           +0.018608
   --------------------------------------------------------------------------
__ CA01 Transaction                                               +0.019642
        TranCode=CSMI Program=PARTIMS  LTerm=CICSDIMS
         IMSID=IMSP RecToken=CICSDIMS/C92C5958FCB44261
        RegTyp=DBC DBCalls=10 FPCalls=5  CPU=0.002172 Process=0.123315
   --------------------------------------------------------------------------
__ 08   Application Start TranCode=CSMI Program=PARTIMS          +0.019642
__ 5607 Start of UOR Program=PARTIMS                             +0.019643
__ 50   Database Update Database=PARTSDB                         +0.034078
__ 50   Database Update Database=PARTSDB                         +1.265202    <--
__ 6E13 CICS Transaction TranCode=CSMI Task=57                   +1.272832
__ 5610 Syncpoint Start of Phase 1                               +2.178900    <--
__ 5950 FP Database Update Database=PARTSDBF                      +2.188921
__ 5611 Syncpoint End of Phase 1                                 +2.216836
__ 3730 Syncpoint End of Phase 1                                 +2.242026
__ 5937 FP Syncpoint Program=PARTIMS                             +2.242924
__ 56FA Transaction Statistics                                   +2.242963
__ 07   Application Terminate                                    +2.243907
__ 5612 Syncpoint End of Phase 2 Program=PARTIMS                 +2.245664
**************************** Bottom of Data ****************************
```

DB2 perspective 1 – DB2 log and accounting

```
BROWSE     FTS1.WEEKLY.SMF.G0456V00 +                Record 00028179 More: < >
Command ===> _____        Scroll ===> CSR
   Slice . . Duration  00.15.00      Date   2012-02-24    Time  20.45.00.000000
   Code Description  < 00.00.00.000000 >  2012-02-24 Friday    Time (Relative)
/  ---- ----------------------------------------------------------- ---------------
__ 6E13 CICS Transaction TranCode=PART Task=286              20.57.15.950542
__ 6E13 CICS Transaction TranCode=CSMI Task=72                     +0.001969
__ 6E13 CICS Transaction TranCode=CSMI Task=82                     +0.003165
__ 6E13 CICS Transaction TranCode=CSMI Task=60                     +0.018608
__ 6E13 CICS Transaction TranCode=CSMI Task=57   DB2=14            +1.262832
__ 0020 DB2 Unit of Recovery Control - Begin UR                    +1.272609
__ 0020 DB2 Update In-Place in a Data Page                         +1.272625
__ 0010 DB2 Savepoint                                              +1.273665
__ 0020 DB2 Delete from a Data Page                                +1.274209
__ 0020 DB2 Insert into a Data Page                                +2.175537
__ 0020 DB2 Unit of Recovery Control - End Commit Phase 1          +2.242817
__ 0020 DB2 Unit of Recovery Control - Begin Commit Phase 2        +2.245105
__ 0020 DB2 Unit of Recovery Control - End Commit Phase 2          +2.248257
        URID=0000A54E30DA
   -----------------------------------------------------------------------------
__ 65    DB2 Accounting 239       CLASS 7,8                         +2.349146
         ACCT=FTS3.SC0TCP22.2C5958F82B96 Source=CICS
         LUWID=FTS3/DB2PLU/C92C59590561/0001
   -----------------------------------------------------------------------------
__ 65    DB2 Accounting 003       CLASS 1,2,3                       +2.349216
         CPU1=00.010299 CPU2=00.007918 I/O3=00.000000
         ACCT=FTS3.SC0TCP22.2C5958F82B96 Source=CICS
         GtPgRq=8 SyPgUp=3 Suspnd=0 DeadLk=0 TimOut=0 MxPgLk=1
         Sel=0 Ins=1 Upd=1 Del=1 LUWID=FTS3/DB2PLU/C92C59590561/0001
   -----------------------------------------------------------------------------
******************************* Bottom of Data *******************************
```

DB2 table update from DB2 log

```
BROWSE       DSNDB2A.DBA3.ARCLG1.A0000083           Record 00000794 Line 00000000
Command ===> _____   Scroll ===> CSR
Form    ===>           +      Use Form in Filter           Format ===> STD
******************************** Top of data ********************************
+0004  Code... 0020  DB2 Update In-Place in a Data Page
+001E  STCK... C92C59AD95F50000      LSN.... 00000000A54E78F3
       Date... 2012-02-24 Friday    Time... 20.58.44.677456.000

+0000  LRHLL...... 0058        LRHRTYPE... 0600        LRHSTYPE... 0001
+0008  LRHRMID.... 0E          LRHFLAGS... 80
+000A  LRHURID.... 0000A54E7863                        LRHUNLSN... 0000A54E7863
+001E  LRHLRSN.... C92C59AD95F5                        LRHMEMID... 0003

+0026  LRHDBHDR... Database identification
+0027  LRHDBID.... 0110        LRHPSID.... 0002        LRHDFLAG... 41

+0038  LRHUPDTH... Update information
       LRHDDESC... 'Partial user row update'
       LRHVARNO... +9          LRHUFLAG... C0

+0042  LRHREDOD... Redo Data
       +0000  F2404D40 40405D40                    *BALANCE=$200    *
+004A  LRHUNDOD... Undo Data
       +0000  F1404D40 40405D40                    *BALANCE=$100    *
****************************** End of data ******************************
```

DB2 perspective 2 – DB2 performance trace

```
BROWSE     FTS1.WEEKLY.SMF.G0456V00 +              Record 00027543 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)
/  ----  ---------------------------------------------------      ----------------
__  6E13 CICS Transaction                                              +1.262832
        TranCode=CSMI Program=PARTDB2   LTerm=FUWFWAR
        Terminal=AR1 RecToken=FUWFWDR/C92C595905174403 Task=57
        ACCT=FTS3.SC0TCP22.2C5958F82B96 Resp=0.988344 CPU=0.014637 DB2=14
        ------------------------------------------------------------
__  66   DB2 Performance 072 Create thread entry SSID=DB2P            +1.264293
__  66   DB2 Performance 021 Lock detail                              +1.264857
__  66   DB2 Performance 112 Successful plan allocation(allied)       +1.265228
__  66   DB2 Performance 177 Successful package allocation            +1.255701
__  66   DB2 Performance 065 SQL open cursor                          +1.266018
__  66   DB2 Performance 058 SQL call completion                      +1.266129
__  66   DB2 Performance 059 SQL fetch                                +1.266705
__  66   DB2 Performance 044 IRLM suspend entry                       +1.267471
__  66   DB2 Performance 093 Suspend                                  +1.267525
__  66   DB2 Performance 094 Resume                                   +2.177735
__  66   DB2 Performance 045 IRLM suspend exit                        +2.177790
__  66   DB2 Performance 021 Lock detail                              +2.177836
__  66   DB2 Performance 021 Lock detail                              +2.177907
__  66   DB2 Performance 058 SQL call completion                      +2.177996
. . .
__  66   DB2 Performance 075 Terminate thread exit                    +2.250783
************************************ Bottom of Data ****************************
```

Complete problem history including personal notes

```
                                      History                      Row 1 to 4 of 4
Command ===> _____      Scroll ===> CSR

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

/   Type        Description                          Changed              ID
_   TAG         Personal savepoint for JIM           2012-02-29 11.19.03  JIM
_   SMF         SMF report                           2012-02-29 08.37.46  LEVEL1
_   CICS        CICSPA report                        2012-02-28 16.57.18  LEVEL1
S   TAG         CICS TRAN=PART long response time 2012-02-28 16.13.33  JIM
**************************** Bottom of data ****************************
```

```
EDIT                              Notepad                      Columns 00001 00072
Command ===> _____      Scroll ===> CSR
****** **************************** Top of Data ****************************
000001 CICS TOR TRAN=PART TASK=286 has the long response time
000002
000003 I have had a look at the problem, observations are:
000004 1. MRO to AOR CSMI TASK=72 – called FOR, IMS and DB2 - problem below
000005 2. MRO to FOR CSMI TASK=82 - VSAM file requests are OK, no delay
000006 3. DPL to IMS CSMI TASK=60 - 12 DLI calls, application delay – problem
000007 4. DPL to DB2 CSMI TASK=47 - 14 SQL calls , long delay - problem
000008
'''''' Please investigate the problem using your IMS and DB2 tool kits :-)
****** **************************** Bottom of Data ****************************
```

Overview of the ISPF dialog: ad-hoc log files

```
   File   Menu   Edit   Help
 _____
                          Process Log Files          Row 1 of 14 More: < >
 Command ===> _____  Scroll ===> PAGE

 Select a Log File to browse.            IMS Release 111 +     Zone LOCAL

 /         Log File                              Rel + Filter + Zone
 _____   * CICS DBCTL DEADLOCK PROBLEM 12 APRIL 2011  ___   _____  _____
 _____   'FUNDID.SMF.D110328.TESTING.FULL'           ___   _____  _____
 _____   'IBB1.SLDSP.IBB1.D11087.T1557493.V21'       111   08        _____
 _____   'DSNDB2A.DBA3.ARCLG1.A0000022'              ___   _____  _____

 _____   * SUPPORTED LOG STREAMS                     ___   _____  _____
 _____   CQS:IBDE.CQS.EMHL.LOGOFFLD                  ___   _____  _____
 s         SMF:IFASMF.FTS1.SMF.MAN1                     ___   1E        _____
 _____   OPERLOG:SYSPLEX.OPERLOG                     ___   _____  _____

 _____   * OTHER LOG STREAMS INC. RRS AND CICS JOURNAL ___  _____  _____
 _____   OTHER:ATR.FTS1PLEX.RM.DATA                  ___   _____  _____
 _____   OTHER:STC@CICS.CCVQ41D2.DFHLOG              ___   _____  _____
 _____   'IBDH.VB10.OLP00'                           ___   _____  _____
 ***************************** Bottom of data *********************************
```

Option 4 **Process** offers an IMS PI-like list of ad-hoc files, enabling you to simply enter a data set or log stream name, and then browse its records...

Overview of the ISPF dialog: ad-hoc log files

```
    File   Mode   Filter   Time   Labels   Options   Help
 _____
 BROWSE     SMF:IFASMF.FTS1.SMF.MAN1                    Record 00000001 More: < >
 Command ===> _____   Scroll ===> PAGE
    Slice . . Duration _____        Date   2011-03-04      Time  13.38.47.760000
    Code Description  < 00.05.00.000000 >  2011-03-04 Friday   Time (LOCAL)
 / ----- ------------------------------------------------------  ----------------
 __  1E   Job Step Total TranCode=RXRR2IX5                        13.38.47.760000
 __  1E   Job Step Termination Delta TranCode=RXRR2IX5            13.38.47.920000
 __  1E   Job Step Total TranCode=RXRR2IX5                        13.38.47.920000
 __  1E   Job Step Termination Delta TranCode=RX0O301             13.38.48.290000
 __  1E   Job Step Total TranCode=RX0O301                         13.38.48.300000
 __  1E   Job Step Termination Delta TranCode=RXRR2IX4            13.38.48.550000
 __  1E   Job Step Total TranCode=RXRR2IX4                        13.38.48.550000
 __  1E   Job Step Termination Delta TranCode=DVP5IPI             13.38.48.600000
 __  1E   Job Step Total TranCode=DVP5IPI                         13.38.48.610000
 __  1E   Job Step Termination Delta TranCode=RXRR2IX4            13.38.48.910000
 __  1E   Job Step Total TranCode=RXRR2IX4                        13.38.48.910000
 __  1E   Job Step Termination Delta TranCode=DVP5IPI             13.38.49.040000
 __  1E   Job Step Total TranCode=DVP5IPI                         13.38.49.040000
 __  1E   Job Step Termination Delta TranCode=RXRR2IX4            13.38.49.080000
 __  1E   Job Step Total TranCode=RXRR2IX4                        13.38.49.090000
 __  1E   Job Step Termination Delta TranCode=RX0O301             13.38.49.150000
 __  1E   Job Step Total TranCode=RX0O301                         13.38.49.160000
```

...for example, these are SMF 30 (x1E) address space accounting records in an SMF log stream. However, for a more structured approach, Workbench introduces sessions.

SMF reports

- System events or constraints can affect transaction processing

- Workbench provides reports for selected SMF record types, specifically aimed at identifying performance-related issues

System-related:

- ➢ SMF 30: Address Space activity; including CICS, IMS, DB2

- ➢ RMF 70-1: CPU usage
- ➢ RMF 76: Page data sets
- ➢ RMF 78-2: Virtual Storage

- ➢ SMF 64: VSAM data set I/O

Subsystem-related:

- ➢ SMF 33-2: APPC conversations
- ➢ SMF 88-1: System Logger

- ➢ SMF 101: DB2 accounting
- ➢ SMF 116: WebSphere MQ

SMF 30: Address Space Activity report

```
----------Interval------------- System               ---------- CPU ----------
Start Date/Time   Duration Type  Name  Jobname  Comp      TCB         SRB   %CPU

2011-03-04 15:37:01  00:01 STE   MVS1  IMSCTL1  0004   0.445357   0.023205  15.1
2011-03-04 15:37:01  00:01 STT   MVS1  IMSCTL2  0004   0.445357   0.023205  15.0
2011-03-04 15:37:06  00:01 STE   MVS1  IMSCTL3  0004   0.404175   0.011985  19.3
2011-03-04 15:37:06  00:01 STT   MVS1  IMSCTL4  0004   0.404175   0.011985  19.2
2011-03-04 15:43:24  00:01 STE   MVS1  IMSCTL5  0004   0.904357   0.046920  18.9
2011-03-04 15:43:24  00:01 STT   MVS1  IMSVTL6  0004   0.904357   0.046920  18.9
2011-03-04 15:44:05  00:01 INT   MVS2  CICSPR1  0000   7.966200   0.241357  15.2
2011-03-04 15:44:58  00:01 INT   MVS2  CICSPR2  0000   0.141780   0.004335  11.2
```

At regular intervals, every address space can be monitored for unusual spikes (or lulls) in system-related resource consumption including CPU and I/O.

```
EXCPs  ----Storage-----  -Paging/Sec-
/Sec   <16M  >16M 64bit  In Out Swap

 477    1M    11M    0M   0   0    0
 476    1M    11M    0M   0   0    0
 309    1M    11M    0M   0   0    0
 309    1M    11M    0M   0   0    0
 590    1M    11M    0M   0   0    0
 589    1M    11M    0M   0   0    0
 140    4M  1366M    0M   0   0    0
 100    0M    12M    0M   0   0    0
```

SMF 33-2: APPC/MVS Conversation List report

```
                  Local                Partner
Start Time        LU Name   Direction  UserId        Job Name  SyncLvl

18:16:47.624543   MVSLU02   Outbound                 TWM#RBAT  Syncpt
                  ** Partner ** TPname=IADGEXP_PROFILE

18:16:47.796620   IADGAPPC  Inbound                  IADGMPPA  Syncpt
                  *** Local *** TPname=IADGEXP_PROFILE
```

APPC requests processed on z/OS are logged to SMF. These requests may end up being processed by an IMS or CICS transaction.

A breakdown of processing inside MVS can identify bottlenecks and other performance related issues.

```
----------- Time -----------   ------ Bytes ------
 InputQ    Process      Total  Received        Sent

          .324737     .324737        68          83


.166232   .154551     .320783        83          68
```

SMF 64: VSAM Data Set report

```
                                                --Splits--
Close Date Time    Data set name                CA   CI  Ext

2011-02-02 16:00:01 FUNDIP.OME.FTS1MVS.RKM2EDS3.DATA    5   17   1
2011-02-02 16:00:01 FUNDIP.OME.FTS1MVS.RKM2EDS3.INDEX   0    5   1
2011-02-02 16:00:01 FUNDIP.OME.FTS1MVS.RKM2EDS3.DATA    5   18   1
2011-02-02 16:00:01 FUNDIP.OME.FTS1MVS.RKM2EDS3.INDEX   0    5   1
2011-02-02 16:00:32 FUNDIP.OME.FTS1MVS.RKM2EDS3.DATA    5   19   1
2011-02-02 16:00:32 FUNDIP.OME.FTS1MVS.RKM2EDS3.INDEX   0    5   1
2011-02-02 16:00:55 FUNDIP.ANF.QUEUE.DATA               0    0   1
2011-02-02 16:00:55 FUNDIP.ANF.QUEUE.INDEX              0    0   1
```

VSAM data sets are commonly used as databases in IMS and CICS.

As these data sets are re-opened (or extend), information about their I/O activity and general health (splits) is available.

EXCPs	Get	Upd	Del	Ins	LSR	CF	DASD
3322	13	1	0	1314	0	0	0
1796	0	259	0	0	0	0	0
3378	13	1	0	1340	0	0	0
1850	0	261	0	0	0	0	0
3436	13	1	0	1353	0	0	0
1902	0	275	0	0	0	0	0
3754685	23K	8658	4353	1602	0	0	0
3739616	13	0	0	0	0	0	0

(Header: -------Calls------- / -RLS Activity-)

SMF 70-1: RMF Processor Activity report

```
- Interval Start --    System      - %CPU Busy -         IO
  Date        Time     Name         LPAR     MVS       Rate

2010-08-17 23:45:00    FTS1        68.75    87.42      2282.4
                       FTS2         4.07     4.50         9.4
                       FTS3         4.03     4.39        12.6

2010-08-18 00:00:00    FTS1        61.15    72.16      1934.8
                       FTS2         4.15     4.72         8.4
                       FTS3         3.88     4.41        11.7
```

CPU constraints are one of the most common causes of a slowdown in performance, and often has flow-on effects including contention.

CPU Busy and *IO Rate* are the classical system performance indicators.

Look for spikes that might indicate a slowdown.

```
----------- Number of Address Spaces -----------
---- In ---   -In Ready-   -Out Ready-   -Out Wait-
 Avg   Max    Avg   Max    Avg    Max    Avg    Max
 151   156     7    86      0      1      0      0
  77    80     1    15      0      0      0      0
  69    72     1     9      0      0      0      0
```

Out Ready identifies the number of address spaces waiting for dispatching on the CPU

SMF 75: RMF Page Data Set Activity report

```
Date: 2010-08-17  Time: 23:45:00  SID: FTS1

Page      -------- Slots Used -------    %   Bad    In    Trans  Number  Pages
Type      Alloc   Min   Max   Avg  Full  Slots  Use   Time   I/O Req Xferd VIO

PLPA      44999  20078 20078 20078  45%    0     0     0      0      0
Common    89999   3129  3129  3129   3%    0     0     0      0      0
Local     1080K   101K  101K  101K   9%    0     0     0     10     10   Y
Local     1080K   102K  102K  102K   9%    0     0     0     10     10   Y
Local     1080K   103K  103K  103K  10%    0     0     0      6      6   Y
Local     1080K   109K  109K  109K  10%    0     0     0     13     13   Y
```

With the advent of large amounts of cheaper memory, Page data set performance is often less of a problem today, but none the less should be monitored occasionally for constraints.

```
Data Set Name

FUNDI1.FTS1.PAGE.PLPA
FUNDI1.FTS1.PAGE.COMMON
FUNDI1.FTS1.PAGE.LOCAL1
FUNDI1.FTS1.PAGE.LOCAL2
FUNDI1.FTS1.PAGE.LOCAL3
FUNDI1.FTS1.PAGE.LOCAL4
```

SMF 78-2: RMF Virtual Storage Activity report

```
- Interval Start -- System                  ---------------------- Usage ----------
Date       Time      Name    Type    Size       Min Time              Max Time

2010-06-13 23:45:00  FTS1    CSA     3364K     612K 23:44:59.60     612K 23:44:59.60
                             ECSA     384M     131M 23:44:59.60     131M 23:48:49.24
                             SQA     1744K     444K 23:44:59.60     444K 23:44:59.60
                             ESQA   47772K   22120K 23:47:19.06   22212K 23:44:59.60

                     FTS2    CSA     3364K     376K 23:44:59.60     376K 23:44:59.60
```

IMS and CICS still use large amounts of CSA and ECSA for common storage. In the event that storage cannot be obtained, subsystems can stop or worse.

```
------------
   Avg    Pct

  612K   18.2
  131M   34.1
  444K   25.5
22177K   46.4

  376K   11.2
```

SMF 79-15: IRLM Long Lock Detection report

Time	Cycle Number	Entry Type	IMS ID	Trancode	PSBname	PST	Reg Typ	Duration	Max Locks
08:51:47.440	25853771	Wait	ISA2	CI1CSAC3	PCM0F0	49		11.534336	0
08:51:47.440	25853771	Block	ISA3	CI1ESAE1	PCM0F0	127		111.149056	44
08:54:36.250	25854107	Wait	ISA3	CI1ESAE5	PCM0F0	102		11.534336	0
08:54:36.250	25854107	Block	ISA4	CI1FSAF3	PCM0F0	40		98.566144	44
15:25:31.580	25900783	Wait	ISA1	CI1ASAA2	PRE0F0	90		11.534336	26
15:25:31.580	25900783	Block	ISA1	CI1ASAA1	PSA0F0	60		11.534336	2

IMS database locks that are held by transactions for an extended period (several seconds) are logged to SMF; and can be analyzed to determine if there is an application problem.

Recovery Token	Resource	CICS Task
CI1CSAC3/C5BF632F08B62783	HNMTRM01	00088603
CI1ESAE1/C5BF62D0456F8085		00036462
CI1ESAE5/C5BF63D077B36503	HNMTRM01	00088040
CI1FSAF3/C5BF637DEF1A2001		00032398
CI1ASAA2/C5BFBB316C472003	SHSECN08	00013029
CI1ASAA1/C5BFBB3166E1F584		00048273

SMF 88-1: System Logger Log Stream Summary report

```
Logstream name            MVSID   Structure name      Group
STC@CICS.CICSPR1.DFHLOG    FTS1    *DASDONLY*
               ----------- IXGWRITES ----------

                                                    Bytes
                                                  Writn to
                           Total      Average       Interim
              Count        Bytes      Bytes        Storage
              --------     --------   --------     --------
Total         29862        19177K     642          122692K
Rate(/Sec)    0            5                        35
Minimum       0            0                        0
Maximum       1322         862741                   5480448
```

CICS and IMS both rely on log streams for critical services; including message handling and journaling.

Problems can be avoided by monitoring their I/O and offload activity.

```
            First interval start   Last interval stop    Total Interval
            14:30:00.00  3/04/2011  16:00:00.00  4/14/2011    0985:30:00
            ---------------- DELETIONS -----------------
   Count       Count       Bytes       Bytes
   With        Without     After       Int Stor
   DASD        DASD        Offload     w/o DASD
   Write       Write       w. DASD     Write
   --------    --------    --------    --------
   24950       4075        102547K     16691K
   0           0           29          5
   0           0           0           0
   1685        839         7032832     3436544
```

SMF 101: DB2 Thread Accounting Summary report

All transactions that use DB2 cut accounting records that show how DB2 performed in the application and across into DB2.

```
DB2     Plan        ---------- Connection ----------   Thread
SSID    Name        Name     Type                       Count

DB3A    CEXTPGM     IADG     IMS MPP                        68
```

```
                                                Start: 2010-06-24 15:27:39
                                                End:   2010-06-24 16:44:00
Class1: Thread Time    Avg: Elapsed=70.43305  CPU= .011006   Interval:        01:16:20
                       Max: Elapsed=2045.732  CPU= .013724   Rate/sec:            < 1
Class2: In-DB2 Time    Avg: Elapsed= .015108  CPU= .006035
                       Max: Elapsed= .033537  CPU= .008234
Class3: Suspend Time   Avg: Total  = .008709  I/O= .000000  Lock/Latch= .002404  Other= .006305
                       Max: Total  = .017377  I/O= .000000  Lock/Latch= .007199  Other= .010178
Buffer Manager Summary Avg: GtPgRq=      7.0  SyPgUp=      3.0
                       Max: GtPgRq=        7  SyPgUp=        3
Locking Summary        Avg: Suspnd=       .0  DeadLk=       .0  TmeOut=      .0  MxPgLk=    1.0
                       Max: Suspnd=        0  DeadLk=        0  TmeOut=       0  MxPgLk=      1
SQL DML Query/Update   Avg: Sel=       .0  Ins=      1.0  Upd=      1.0  Del=      1.0
                       Max: Sel=        0  Ins=        1  Upd=        1  Del=        1
SQL DML 'Other'        Avg: Des=       .0  Pre=       .0  Ope=      1.0  Fet=      9.0  Clo=     1.0
                       Max: Des=        0  Pre=        0  Ope=        1  Fet=        9  Clo=       1
```

SMF 116: WebSphere MQ Accounting reports

```
MQACCT4  Printed at 10:50:30  2/03/2011  Data from 09:00:40 03/03/2010 to 09:59:52 03/03/2010


SSID: SYSB  Type: CICS     Name: CICSSYSP  Tran: TRTI     Threads:        2
  Other     Avg Count               6.0  Avg Elapsed    0.000116  Avg CPU     0.000112

  In-MQ Time (Total)     Elapsed:  0.000233   CPU:   0.000224
  In-MQ Time (Average)   Elapsed:  0.000116   CPU:   0.000112

SSID: SYSB  Type: CICS     Name: CICSSYSP  Tran: TRTL     Threads:        4

  In-MQ Time (Total)     Elapsed:        0   CPU:        0
  In-MQ Time (Average)   Elapsed:        0   CPU:        0

  Queue: APPLICATION_A_REQUEST
  QType: LOCAL    IType: NONE        GDisp: Q_MGR    QCount:        4

              Count     Elapsed      CPU      Susp Elp  JnlWrt Elp  PS Req's  PS Rd Elp  Ex
            _____  _____  _____  _____  _____  _____  _____  __
    OPEN       15.0   0.000019   0.000009
    CLOSE      15.0   0.000002   0.000002
    INQ        15.0   0.000009   0.000008

  In-MQ Time (Total)     Elapsed:  0.001861   CPU:  0.001222
  In-MQ Time (Average)   Elapsed:  0.000465   CPU:  0.000305
```

Detailed MQ accounting can be requested to show the impact of MQ on transaction performance.

OPERLOG report: JCL

```
   File   Edit   Edit_Settings   Menu   Utilities   Compilers   Test   Help
 ───────────────────────────────────────────────────────────────────────────
 VIEW        FUW110.WTWM.REPORTS(OPERLOG) - 01.03           Columns 00001 00072
 Command ===> _____        Scroll ===> CSR
 ****** *************************** Top of Data ****************************
 000001 //OPERLOG  JOB ,CLASS=A,NOTIFY=&SYSUID
 000002 /*JOBPARM SYSAFF=FTS1
 000003 //FUWBATCH EXEC PGM=FUWBATCH
 000004 //STEPLIB  DD  DISP=SHR,DSN=FUW.SFUWLINK
 000005 //SYSPRINT DD  SYSOUT=*
 000006 //SYSIN    DD  *
 000007 LOGSTREAM OPERLOG:SYSPLEX.OPERLOG
 000008 START 2011-04-06-08.40.00.00   STOP 2011-04-06-09.00.00.00
 000009 REPORT OPERLOG
 000010 CODE(OPERLOG)
 000011 COND TEXT(2) EQ 'DFS'
 000012 COND TEXT(*) EQ 'BACKOUT'
 000013 /*
 ****** *************************** Bottom of Data ************************
```

Note the LOGSTREAM command in the SYSIN data set, identifying the input log stream.
The COND statements filter the reported OPERLOG records.

OPERLOG report: output

```
FTS3     2011096 08.41.42.57 STC36951  DFS2484I JOBNAME=IBB1#ARC
                                         GENERATED BY LOG AUTOMATIC ARCHIVING IBB1
FTS2     2011096 08.41.48.71 STC37128  DFS058I 08:41:48 START COMMAND IN PROGRESS    ICDZ
FTS2     2011096 08.41.49.80 STC37128  DFS551I IFP  REGION ICDZIFP1 STARTED
                                         ID=00001 TIME=0841  ICDZ
FTS2     2011096 08.41.49.89 STC37128  DFS551I MESSAGE REGION ICDZMPP1 STARTED
                                         ID=00002 TIME=0841 CLASS=001,000,000,000 ICDZ
FTS2     2011096 08.41.52.04 STC37128  DFS551I IFP  REGION ICDZIFP3 STARTED
                                         ID=00003 TIME=0841  ICDZ
FTS3     2011096 08.47.36.05 STC36951  DFS554A FUWTCIC  00002 FUWTCIC  DFHTWM04(3)
                                         000,0777   2011/096  8:47:36
                                         RTKN=FUWTCIC C79459EA853EFB03 IBB1
FTS3     2011096 08.47.51.05 STC36951  DFS968I  DBD=DI21PART WITHIN PSB=DFHTWM04
                                         SUCCESSFULLY BACKED OUT IBB1
FTS3     2011096 08.47.51.05 STC36951  DFS980I BACKOUT PROCESSING HAS ENDED FOR DFHTWM04 IBB1
```

From the previous JCL request, it is simple to identify the IMS subsystem messages associated with the transaction failure.

Summary: Transaction Analysis Workbench

- Companion to the popular IMS and CICS Performance Analyzer tools, allowing systems programmers to look outside of IMS and CICS for the source of problems

- Exploits the wealth of system performance and activity information available in SMF, OPERLOG, and event traces

- Allows medium-skilled analysts to perform expert analysis of their enterprise

More information

- IBM DB2 and IMS Tools website:
  www.ibm.com/software/data/db2imstools/

- IBM Transaction Analysis Workbench for z/OS:
  www.ibm.com/software/data/db2imstools/imstools/trans-analysis/

- Jim Martin, US Representative, Fundi Software:
  jim_martin@fundi.com.au