Mining Your IMS Instrumentation Data

Identify and Resolve Problems Faster and Easier

IBM

IMS **Tools**

for z/OS

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Agenda - Typical Challenges

- The IMS log – what am I collecting?
- Do I need to start collecting 56FA TRANSTAT records for more accurate CPU time, DB IO counts and times, OSAM/VSAM read/write counts, and ESAF call counts?
- What is the transaction index and how can it help me?
- Looking at IMS Database update activity – what are my busiest databases?
- IMS Sync callout – what is the impact on overall transaction response time?
- BMPs – what IMS databases are they using? What is CPU time per checkpoint interval?
- IMS Program Switching….how can I trace their flow using the IMS log?
- What if I use IMS and DB2? What updates to DB2 did my IMS transaction do?
- What if I have a CICS-DBCTL environment? How do I investigate CICS response time problems in IMS?
- What is the impact of syncpoint processing – how long are my transactions talking to syncpoint, and what is the cause of the delays?
- How can I measure Transaction response time? Which Trans are using the most time?
- How can I analyze my Shared Queues environment? Are transactions being effectively scheduled, including the impact of local-first?
- How can I make the log available to everyone by removing sensitive data? What is the IMS SCRUB Utility?
- How can I identify resources (transactions, programs, and databases) that are no longer being used? How can I use IMS system checkpoint records to identify unused resources

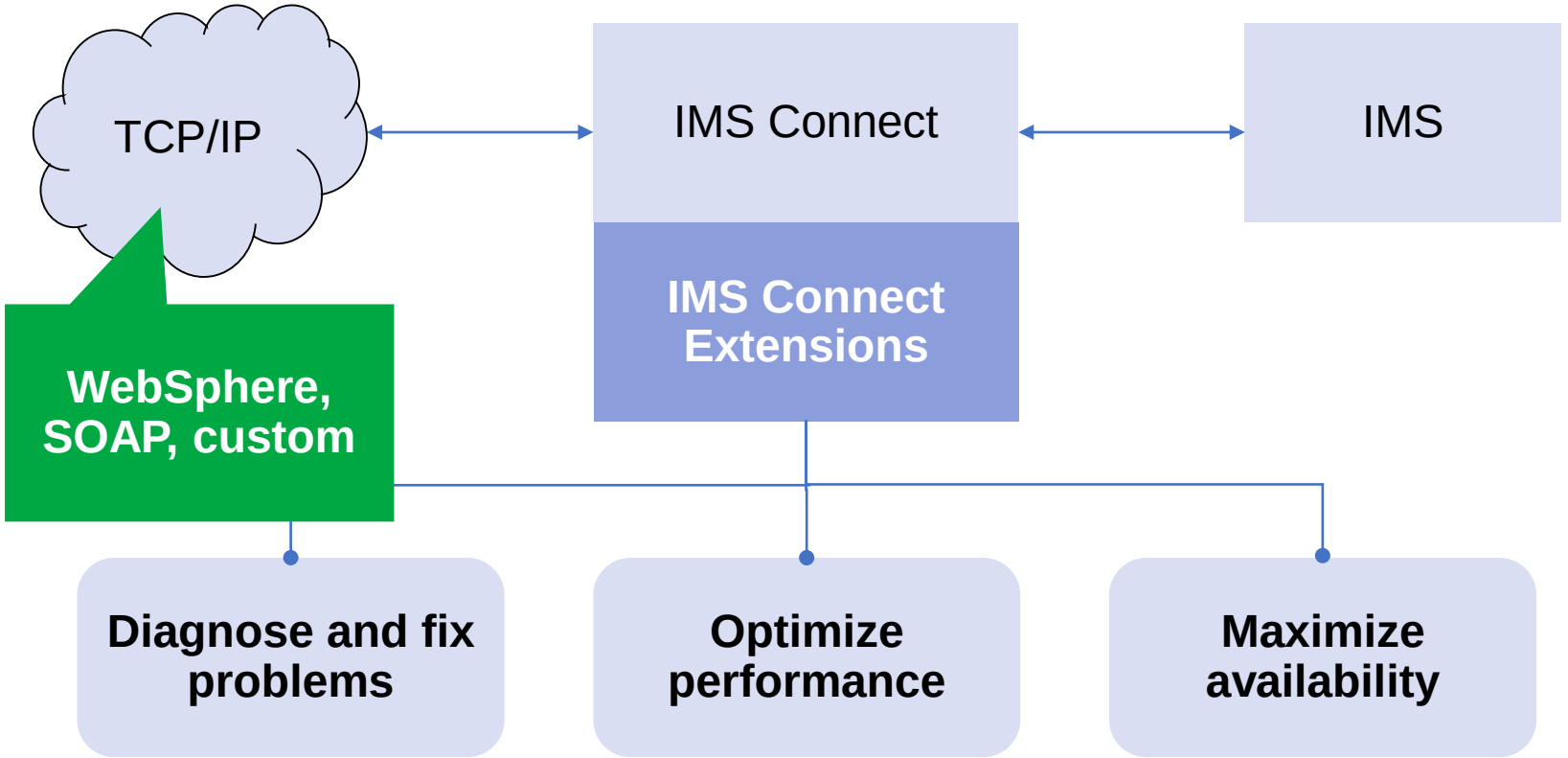
Are there tools available to help me?

Are There IMS Tools That Can Help Me?

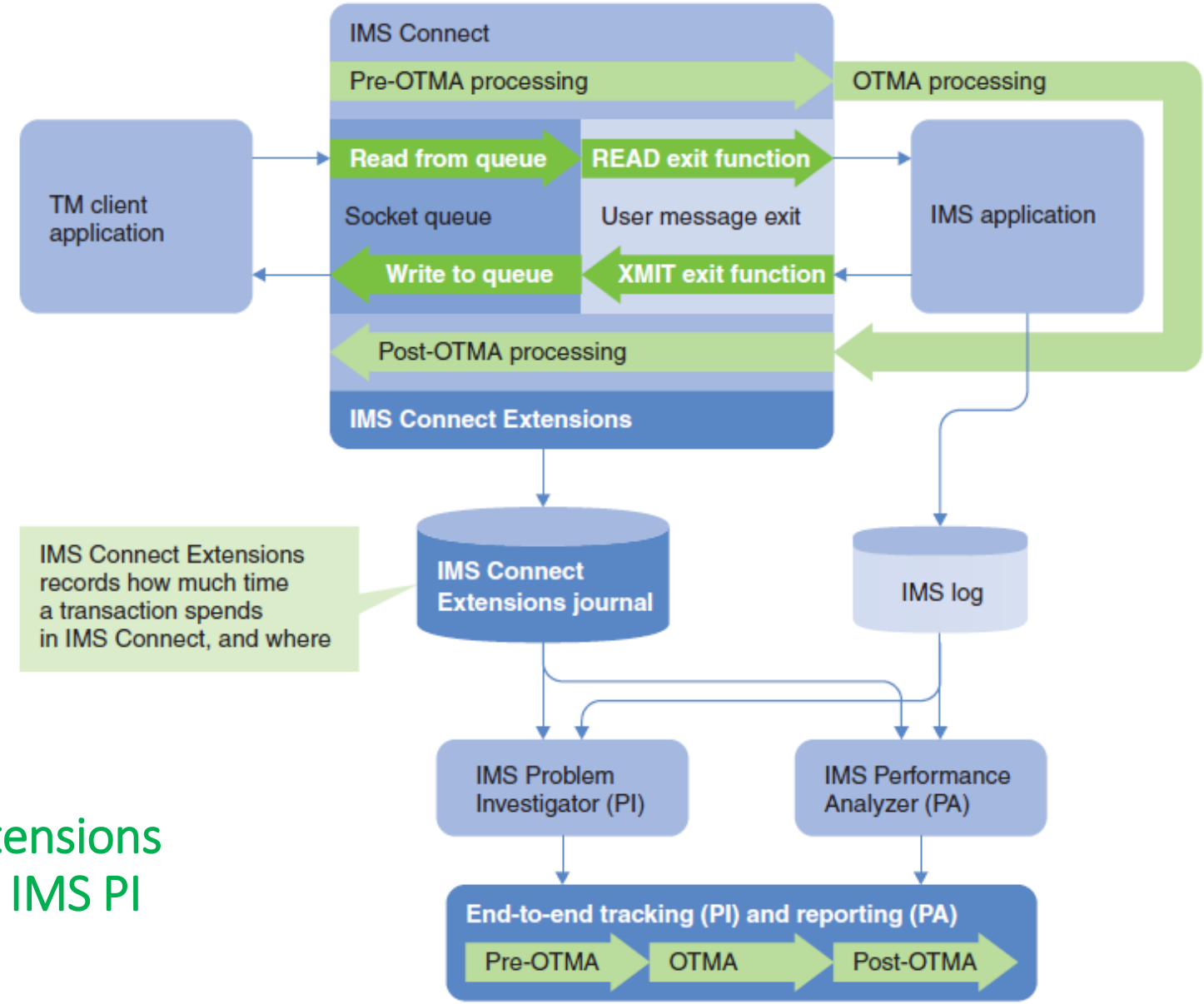
- Several IMS tools that can help us do this today
  - This presentation focused on IMS Tools offered by IBM
  - Navigating the IMS log and other diagnostic data sources to answer questions associated with common problem scenarios
- We will use:
  - IBM IMS Connect Extensions for z/OS
  - IBM IMS Performance Analyzer for z/OS (PA)
  - IBM IMS Problem Investigator for z/OS (PI)
  - IBM Transaction Analysis Workbench for z/OS (TAW)
- Addresses several challenges listed on previous page
  - Not all discussed due to time

Did we miss your pain point?
Just let us know and we'll update the presentation

IMS Connect Extensions at a Glance

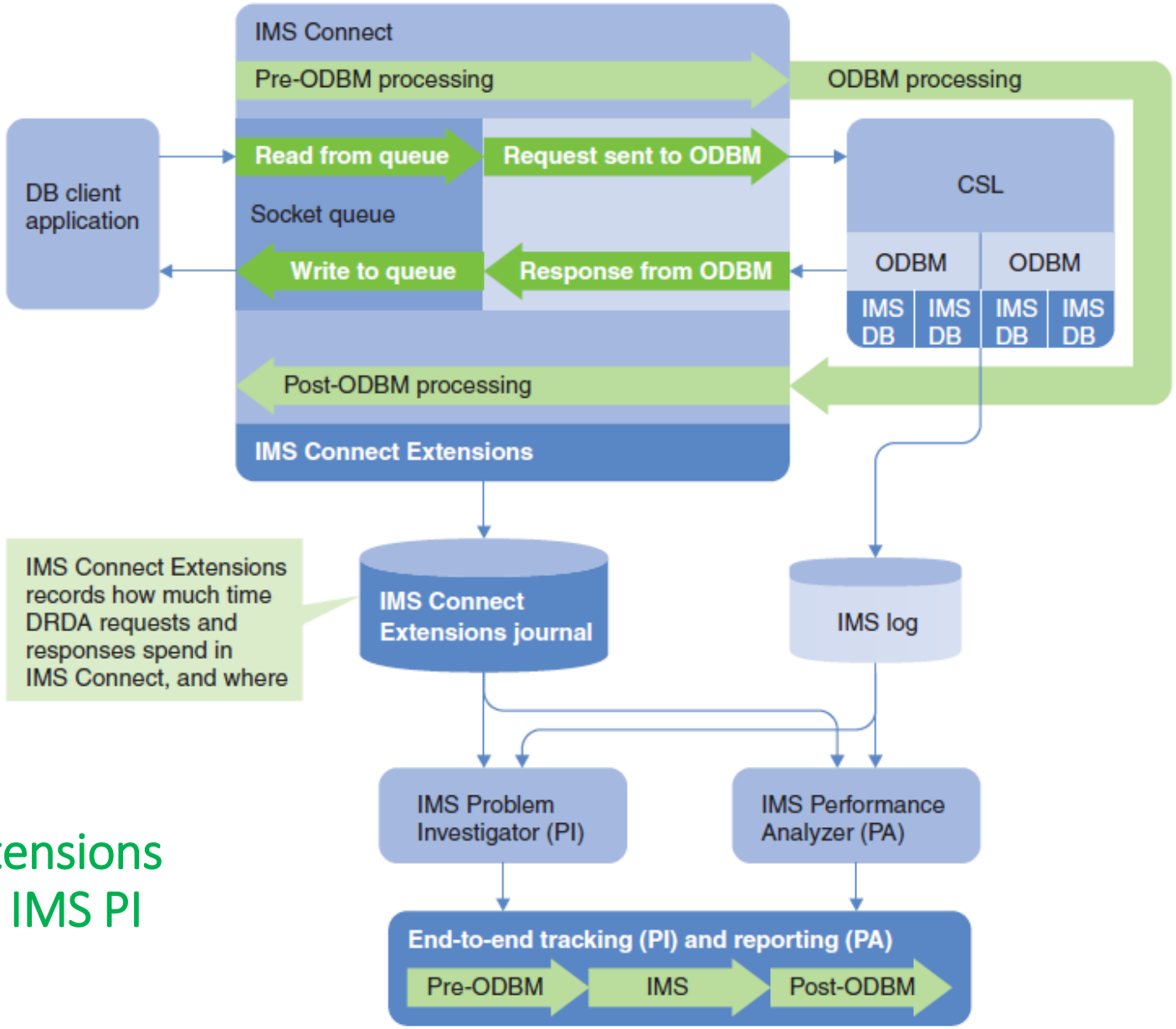


OTMA Workloads



IMS Connect Extensions with IMS PA and IMS PI

Open Database Workloads



IMS Connect Extensions with IMS PA and IMS PI

IBM IMS Tools

IMS Performance Analyzer for z/OS

- Accepts input from the IMS Log, Monitor, Connect, and OMEGAMON TRF data
- Delivers end-to-end transit analysis for all types of transaction workloads, including shared-queues, by merging sysplex log files
- Delivers end-to-end IMS Connect and IMS Log reporting
  - Provides a complete picture of the life-cycle of transactions as they pass through Connect and into IMS
- Provides an ISPF dialog and batch commands to best manage reporting requirements across your entire IMS enterprise
- Offers DBRC Log selection for quick and easy log report requests
- Report Forms allow user defined templates for customized content
- Comprehensive IMS monitor reporting including Fast Path
- Measure usage and availability of databases, programs, regions, buffers and queues
  - Message and other internal queues
- User-defined performance thresholds allow you to set goals and report exceptions
- A history of transaction performance can be maintained in Transaction History Files
- Report critical performance information -- from high-level management summaries to detailed traces for in-depth analysis
- Analyzes the impact of IMS Connect on transaction performance

LOGINFO – What am I Collecting in My IMS Log?

- Provides a quick recap of the type and volume of records in the IMS log
- This report is always produced when you run IMS PA and PI

V4R3M0 IMS Performance Analyzer - Log Information

Log data From 2014-06-29 14:58:00.941667 To 2014-06-29 15:12:39.354269 Duration 14:38.412602

	In								
Code	Count	MCNT	Recs/Sec	Ave len	Max Len	Byte/Sec	MB	%	
01 IN	21,342		24	1,725	3,240	41,942	36.8	6.3	IMS Message
INPUT	15,072		17	1,727	3,240	29,655	26.0	4.5	Input message
MSC FE	134		0	1,032	1,912	157	0.1	0.0	MSC front end
MSC BE	3,418		3	1,193	3,240	4,644	4.0	0.7	MSC back end
01 OUT	291		0	1,410	3,157	467	0.4	0.1	IMS Message
MSC FE	149		0	1,486	2,325	252	0.2	0.0	MSC front end
MSG SWI	142		0	1,331	3,157	215	0.1	0.0	Message switch
03 IN	97,160		110	2,176	3,240	240,902	211.5	36.2	IMS Message
INPUT	25,643		29	1,218	3,240	35,597	31.2	5.3	Program switch
MSC FE	7,661		8	3,235	3,240	28,234	24.7	4.2	MSC front end
MSC BE	11,236		12	807	3,240	10,337	9.0	1.6	MSC back end
CONT	52,620		59	2,782	3,240	166,731	146.3	25.0	Continuation
03 OUT	15,257		17	2,081	3,240	36,166	31.7	5.4	IMS Message
OUTPUT	14,603		16	2,138	3,240	35,568	31.2	5.3	Output message
MSC BE	137		0	1,749	2,672	272	0.2	0.0	MSC back end
MSG SWI	517		0	551	800	324	0.2	0.0	Message switch
07	41,039	50,985	46	456	456	21,314	18.7	3.2	Program schedule end
MPP	32,753	34,446	37	456	456	17,010	14.9	2.6	MPP
QUICK	8,190	16,463	9	456	456	4,253	3.7	0.6	MPP quick reschedule
FALSE	12	0	0	456	456	6	0.0	0.0	MPP false schedule
BMP	15	0	0	456	456	7	0.0	0.0	BMP
ABEND	69	76	0	456	456	35	0.0	0.0	ABEND
08	41,040		46	148	148	6,917	6.0	1.0	Program schedule
MPP	32,835		37	148	148	5,534	4.8	0.8	MPP
QUICK	8,190		9	148	148	1,380	1.2	0.2	MPP quick reschedule
BMP	15		0	148	148	2	0.0	0.0	BMP

56FA – Transaction Accounting Statistics

- TRANSTAT=YES cuts type x'56FA' transaction accounting statistics records at transaction-end and BMP-checkpoint
- Overcomes the limitations of type x'07' which is cut at program schedule termination and often accumulates statistics for many transactions
- Without 56FA you cannot get accurate transaction CPU time or other useful transaction-level details

```
Code... 56FA  Transaction Statistics

STCK... CBFC740BD90293A4      LSN.... 000000001C254F89
Date... 2014-06-23 Monday     Time... 14.58.01.912361.227

JOBNAME.... 'IMSPMSG1'  PROGRAM.... 'BANKING'   TRAN....... 'BANK2'

CPU........ 0.009593

DBIO....... 0.068882    LockWait... 0.000544    IOcalls.... +15

VSAMread... +7          VSAMwrite.. +2
OSAMread... +6          OSAMwrite.. +1

ESAFcalls.. +12
```

IMS Transaction Index – Full or Exceptions

All the accumulated information from the IMS log about each transaction is condensed into a single transaction index record (created by IMS PA).

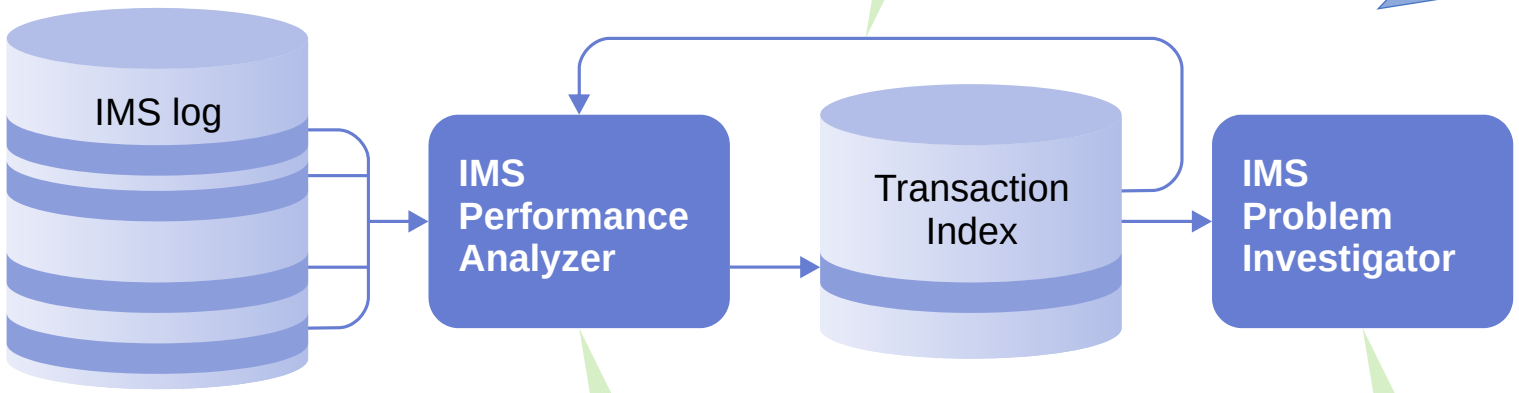
Use the transaction index as input into:

- IMS PA reporting - Instead of re-processing large SLDS log files
- IMS PI analysis - To enable more intelligent problem detection

"Inflight" is now available for continuous log processing without missing a beat.

- Can be for exceptions only

Save processing time by using Transaction Index as input to IMS PA instead of IMS log



IMS PA batch job condenses all IMS log records for one IMS transaction into one Transaction Index record

Transaction Index contains performance information (such as response time) derived from IMS log fields, enabling more intelligent filtering and analysis in IMS PI

IMS Transaction Index Record – IMS PA and PI

```
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
   ------------------------------------------------------------------------
__ 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
   ------------------------------------------------------------------------
```

IMS x’CA01’ index records – Created by IMS Performance Analyzer, index records contain all of the performance metrics of your IMS Transactions in one record. These can be used for input for Transit Reports in IMS Performance Analyzer or as a Tracking Index in IMS Problem Investigator.

Distributions and Service Levels

- Once you have an index (or straight from the log) you can start to get answers:
  - Ensure transactions are performing according to management-defined service levels
  - User-defined thresholds, for example - <0.1, 01 to 0.5, >0.5 seconds etc.
  - Report as either a percentage (of all transactions) or as a count

Response Time Distribution

Trancode	Tran Count	Min Total IMS Time	Avg Total IMS Time	Max Total IMS Time	<0.01 Total IMS Time	<0.05 Total IMS Time	<0.10 Total IMS Time	<0.20 Total IMS Time	<0.50 Total IMS Time	>=0.50 Total IMS Time	>=0.50 Total IMS Time
BALANCE	89	0.045362	0.119435	1.493757	1.12%	31.46%	85.39%	91.01%	93.26%	6.74%	6
LOGON	92	0.028291	0.158065	1.667653	1.09%	31.52%	72.83%	85.87%	93.48%	6.52%	6
ORDER	95	0.017040	0.117309	0.833115	0.00%	35.79%	80.00%	86.32%	94.74%	5.26%	5
PAY	936	0.004527	0.019000	0.358372	33.76%	94.87%	98.18%	99.47%	100.00%	0.00%	0
STOCK	98	0.025835	0.103145	0.812622	0.00%	29.59%	83.67%	89.80%	95.92%	4.08%	4
TRANSFER	78	0.015636	0.118776	0.765933	0.00%	44.87%	78.21%	80.77%	96.15%	3.85%	3
WITHDRAW	105	0.026213	0.110366	1.556585	0.00%	29.52%	75.24%	89.52%	96.19%	3.81%	4

Service Level dictates that 95% of transactions must have response time less than 0.5 seconds, then…
PAY, STOCK, TRANSFER, WITHDRAW do meet the required level of service – OK
BALANCE, LOGON, ORDER do not meet the required level of service – Fail

Syncpoint – How is it Impacting Response Time?

- Are you using external subsystems and DASD mirroring?
- These might affect the time it takes for your transactions to commit:
  - Total syncpoint time
  - Phase 1
  - Phase 2
  - Phase 2 attributable to Fast Path database only
  - OTHREAD time to complete (asynchronous – not part of SYNCPT)

Syncpoint analysis

Trancode	Count	Process Time	CPU Time	DB Calls	Syncpt Time	Phase 1 Time	Phase 2 Time	Phase 2 FP Time	OTHREAD Time
BANK1	18	0.041045	0.006635	8	0.014769	0.000030	0.014739	0.014739	0.000980
BANK2	26	0.051985	0.005922	8	0.000071	0.000032	0.000039	0.000039	0.001107
BANK3	280	0.048873	0.004889	23	0.000038	0.000018	0.000019	0.000019	0.001203
ORDERS	299	0.044485	0.004687	23	0.000034	0.000017	0.000017	0.000017	0.001200
MOBILE1	316	0.040288	0.004833	23	0.000789	0.000019	0.000771	0.000028	0.000789
MOBILE2	307	0.057567	0.004862	23	0.000037	0.000018	0.000019	0.000019	0.001195
MOBILE3	282	0.033802	0.004694	23	0.000036	0.000019	0.000016	0.000016	0.001191
WEBORDER	19	0.039227	0.007359	9	0.000076	0.000034	0.000043	0.000043	0.001057
STOCK1	21	0.036017	0.006329	9	0.000070	0.000031	0.000039	0.000039	0.001034
STOCK2	15	0.299056	0.020897	21	0.000053	0.000036	0.000016	0.000016	0.000983
STOCK3	16	0.372236	0.020957	21	0.000056	0.000039	0.000017	0.000017	0.001064
Total	18,243	0.089237	0.010805	11	0.000116	0.000027	0.009074	0.000012	0.001106

Shared Queues ☺Local-first and False Scheduling☹

1. IMS workload broken down by queue type:
   - GLOBAL – shared queues where transactions came in on another system
   - LOCAL – shared queues where transactions came in on this system
   - LOCALF – local-first where shared queue was bypassed

Shared queues transaction performance

IMS ID	Queue Type	Tran Count	Avg InputQ Time	Avg Process Time	Avg OutputQ Time	Avg Total Time	>1.0 InputQ Time	>1.0 Process Time	Avg CPU Time	Max CPU Time	>0.1 CPU Time
IMS1	GLOBAL	493	0.152755	0.353057	0.111123	0.613036	4.26%	11.76%	0.018737	0.199393	5.77%
IMS1	LOCAL	222	0.164432	0.567554	0.000162	0.732051	4.05%	21.62%	0.028475	0.199393	7.37%
IMS1	LOCALF	8701	0.003339	0.056002	0.208816	0.249786	0.10%	0.92%	0.007174	15.15835	0.32%
IMS2	GLOBAL	472	0.157556	0.432707	0.000675	0.590806	4.45%	15.89%	0.023619	0.236885	6.86%
IMS2	LOCAL	224	0.234427	0.457905	0.000130	0.692367	7.14%	16.52%	0.022103	0.208415	5.58%
IMS2	LOCALF	8131	0.002857	0.065651	0.190159	0.242889	0.00%	0.97%	0.012947	31.13607	0.47%
Total		18243	0.015950	0.089237	0.186943	0.276655	0.42%	2.07%	0.010805	31.13607	0.87%

Shared Queues ☺Local-first and False Scheduling☹

2. False schedule and WFI analysis:

Region overview

MPP Total	CPU	Sched	Trans	******* DLI Calls ******* DB	DC	Other	WFI SUBQ6	Quick
Total	181858	4636	16842	178088	41165	24530	41556K	6279
/Sched	39	1.0	3.6	38.4	8.9	5.3	8963	1.4
/Tran	10	0.3	1.0	10.6	2.4	1.5	2467	
/Minute	30309	772.7	2807.0	29681.3	6860.8	4088.3	6926016	1046.5
% Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

**** Schedule Distribution ****			
	=0	=1	>1
Sched	1408	2131	1097
Tran	0	2365	14477
Tr/Sch	0	1	13
Sc/Min	234.7	355.2	182.8
%Sched	30.37	45.97	23.66

BMPs – Checkpoints, Database and ESAF

1. Syncpoint – are checkpoints being taken frequently enough?
2. Database – what is being updated and checkpointed?

Database XREF

Program	BMP CHKP ID	Start Time	CPU Time	Process Time	DB Gets	DB Upds	Database Name	Access Method
NITERUN	NITECP1	21.30.23.310271	0.232909	1.315058	1332	157	CUSTOMER	ESDS
							PAYMENTS	DEDB
							ORDERS	CHKP
							STOCK	CHKP
							WIDGETS	CHKP
NITERUN	NITECP2	21.30.24.657028	0.314702	1.403829	1465	264	CUSTOMER	ESDS
							PAYMENTS	DEDB
							ORDERS	CHKP
							STOCK	CHKP
							WIDGETS	CHKP

3. Subsystem – what is being accessed?

ESAF XREF

Program	BMP CHKP ID	Start Time	CPU Time	Process Time	ESAF Calls	ESAF Name	SYNCPOINT Time
NITERUN	NITECP1	21.30.23.310271	0.232909	1.315058	57	DB2P	0.026114
						MQP1	0.003612
NITERUN	NITECP2	21.30.24.657028	0.314702	1.403829	65	DB2P	0.010984
						MQP1	0.004757

Database Update Activity

1. For each database, shows the programs that updated it, and how often
2. Shows DLI call and physical I/O statistics

Database Update Activity-IMSA

Database	Program	Proc	5050 Total		Updates	ISRT	DLET	REPL	ROLx	New Block	Free Space	5052 Insert	5051 Problem	20 Open/ 24 Error
ORDERS	ONLINE	APPL	2,135	DLI	2,135	2,135	0	0	0			0	0	0
				I/O	1,582	540	0	1,042		13	540			0
	MOBILE	APPL	720	DLI	720	720	0	0	0			0	0	0
				I/O	537	179	0	358		4	179			0
	Total	APPL	2,855	DLI	3,609	3,593	16	0	0			0	0	0
				I/O	2,677	901	0	1,776		27	905			0

Does not show DB performance, you need to run the monitor for that.

Information may be enough to tell you where to focus your DB analysis and maintenance efforts.

Other reports will show transaction database I/O latencies, but not per database.

Program Switch – Following the Trail of Transactions

IMS Performance Analyzer
Program Switch List

Org LTERM	IMS Tran Start	Parent Trancode	Trancode	Prog Swit#	InputQ Time	PgmSwtch Time	Process Time	OutputQ Time
NEWYORK	14.58.02.023922		BANK0001	0	0.004688	-	0.009277	-
	14.58.02.037859	BANK0001	BANK0010	1	0.000150	0.000137	1.065917	-
	14.58.03.102187	BANK0010	BANK0011	2	0.001114	0.001093	0.762127	-
	14.58.03.861171	BANK0011	BANK0012	3	0.004557	0.004535	0.586579	-
	14.58.04.449915	BANK0012	BANK0013	4	0.003350	0.003330	0.458266	-
	14.58.04.909175	BANK0013	BANK0014	5	0.101360	0.101341	0.428108	-
	14.58.05.435875	BANK0014	BANK0015	6	0.312120	0.312099	0.754851	0.000000

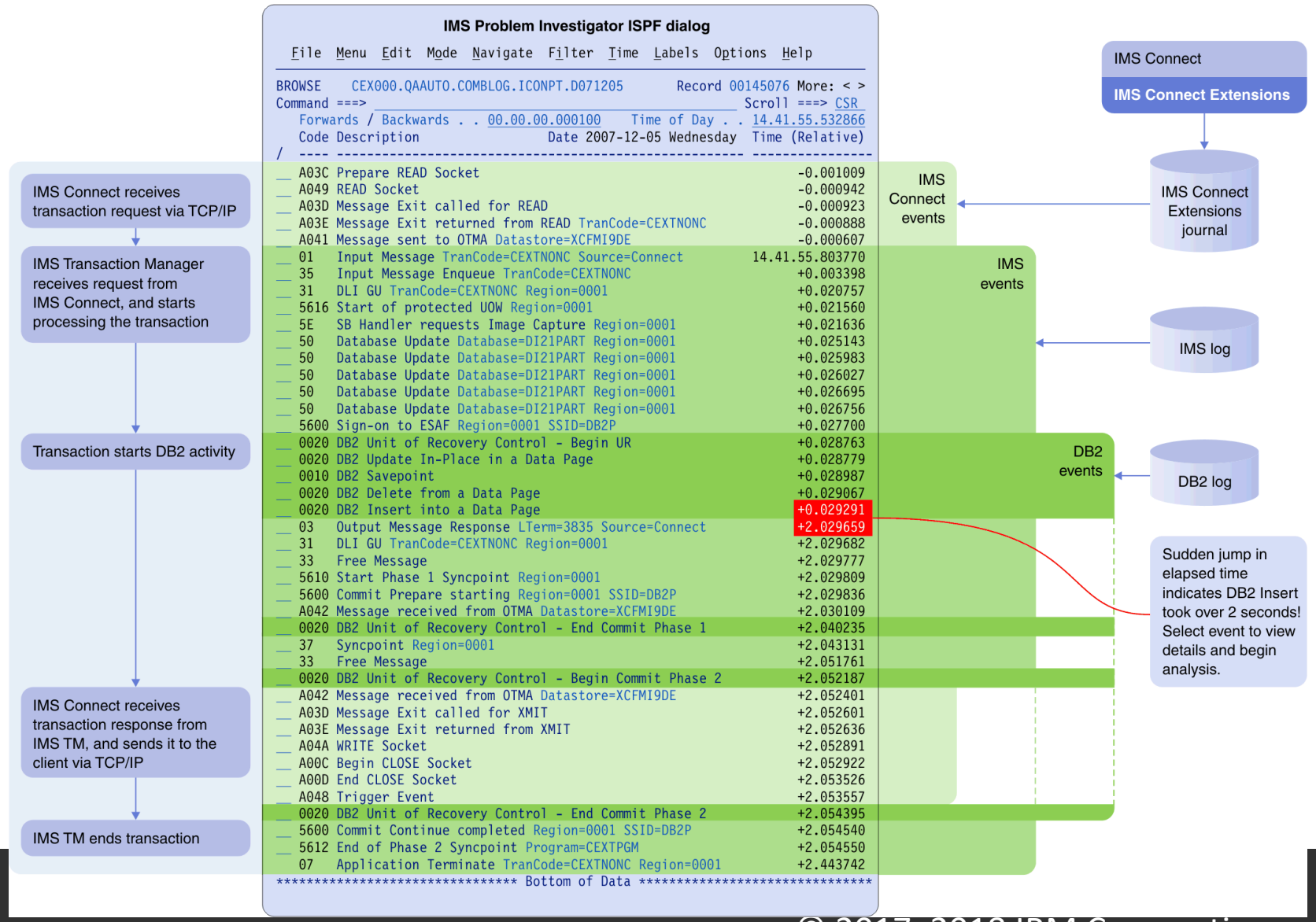
Transaction BANK0001 originated from lterm NEWYORK at 14.58.02.023922
It switched to trancode BANK0010
Trancode BANK0010 then switched to BANK0011
Four (4) further switches to Trancode BANK0015 completed the sequence
The overall transaction response time is always reported against the originating transaction – 4.467306 seconds – from when the originating transaction arrived on the message queue to when a response was sent back to the terminal
The last transaction in the sequence responded back to the terminal – you can tell because it has an output queue time
Notice the long switch times for the last 2 transactions – this contributed to almost 0.5 seconds of the response time

Total IMS Time	IMS Resp Time	CPU Time
0.013965	4.467306	0.000737
1.066054	-	0.014046
0.763220	-	0.015807
0.591114	-	0.015897
0.461596	-	0.014347
0.529449	-	0.013495
1.066950	-	0.028735

What Does IMS Problem Investigator Do?

- Log file selection and extraction
  - Explicitly select log files you want to browse or automatically select and extract data from multiple data sources
    - Type the name of the log file and start browsing it
    - Select logs from specific IMS and IMS Connect systems
    - Request log data for a time period
    - Request log data matching filtering criteria
    - Get log data from a group of systems in a single extract or CSV file
    - Use time slicing to analyze large log files more expediently
- Log file merge and navigation
  - To ease log file navigation, users can:
    - Process records from multiple files, merged in time sequence
    - Go to an exact point of time in a log file with microsecond precision
    - Navigate forwards and backwards in the record using time increments
    - Set labels to remember positions within a file
    - Merge multiple files to process as a single file
    - Find particular character strings

Merge Instrumentation and Track Transaction Lifecycles



IBM IMS Tools

Expand Records - Get More Detailed Information

```
BROWSE    CEX000.QADATA.REDBOOK.DRDAT110.ICON.D1003  Record 00000033 More: < >
Command ===> _____                                        Scroll ===> CSR
   Forwards / Backwards . . HH.MM.SS.THMIJU
   Code Description                    Date 2014
/  ---- ------------------------------------
__ 003C Prepare READ Socket
__ 0049 READ Socket
__ 005B DRDA 200C OPNQRY-Open Query
__ 0049 READ Socket
__ 0049 READ Socket
__ 005B DRDA CC05 DLIFUNC-DL/I function
__ 0049 READ Socket
__ 0049 READ Socket
__ 005B DRDA CC01 INAIB-AIB data
__ 0049 READ Socket
__ 0049 READ Socket
__ 005B DRDA CC04 RTRVFLD-Field client wants
__ 0049 READ Socket
__ 0049 READ Socket
S  005B DRDA CC06 SSALIST-List of segr
__ 00AA ODBM Trace: Message sent to OD
__ 0069 Message sent to ODBM
__ 00AA ODBM Trace: Message received f
__ 006A Message received from ODBM
__ 005C DRDA 2205 OPNQRYRM-Open Query
__ 004A WRITE Socket
__ 0048 Trigger Event for ODBMMSG
__ 004A WRITE Socket
__ 0048 Trigger Event for ODBMMSG
__ 003C Prepare READ Socket
__ 0049 READ Socket
__ 005B DRDA 2006 CNTQRY-Continue Quer
__ 00AA ODBM Trace: Message sent to OD
__ 0069 Message sent to ODBM
__ 00AA ODBM Trace: Message received f
__ 006A Message received from ODBM
S  005C DRDA 241B QRYDTA-Query Answer
__ 004A WRITE Socket
__ 0048 Trigger Event for ODBMMSG
```

```
+0018  CERE_5B_VAR_CODEPOINT..... CC06

+001A  DSSHDR..... DSS header for DDM command
+001A  DSSlen..... +29          DDMID..... D0          FormatID... 03
+001D  Type....... 03           RQSCRR..... 0001

+0020  Object..... CC06 SSALIST-List of segment search argument
+0020  Length..... +23          CP......... CC06

+0024  Object..... C905 SSACOUNT-Number of segment search arguments
+0024  Length..... +6           CP......... C905        Data....... 0001

+002A  Object..... C906 SSA-Segment search argument
+002A  Length..... +13          CP......... C906
+002E  Data....... 'DEALER   '
```

```
+0018  CERE_5C_VAR_CODEPOINT..... 241B

+001A  DSSHDR..... DSS header for DDM command
+001A  DSSlen..... +119         DDMID..... D0          FormatID... 03
+001D  Type....... 03           RQSCRR..... 0001

+0020  Object..... 241B QRYDTA-Query Answer Set Data
+0020  Length..... +113         CP......... 241B
+0024  AIB........ aibStream
+0024  AIBflag.... 00            AIBused.... +61         AIBretc.... 00000000
+002D  AIBreas.... 00000000      AIBerrc.... 00000000
+0035  DBPCB...... dbpcbStream
+0035  DBPflag.... 00            DBflag..... 00
+0037  DBname..... 'AUTOLDB '   SL......... '01'        SC......... '  '
+0043  Segment.... 'DEALER  '   KFBAflag... 00          KFBAlen.... +4
+0050  KFBA....... '1234'
+0054  IOarea..... IO area
      +0000  F1F2F3F4 E2C1D540 D1D6E2C5 40C6D6D9   *1234SAN JOSE FOR*
      +0010  C4404040 40404040 40404040 40404040   *D               *
      +0020  4040E2C1 D540D1D6 E2C54040 F9F5F7F7   *  SAN JOSE  9577*
      +0030  F760F3F3 F3F3F7F7 F7F4F4F4 F4         *7-33337774444   *
```

IMS PI: Interactive Investigation Synchronous Callout

```
  File  Menu  Edit  Mode  Navigate  Filter  Time  Labels  Options  Help
BROWSE    IPI000.QADATA.JASDEEP2.VB10.IM01001        Record 00000057 More: < >
Command ===> _____________________________________________ Scroll ===> PAGE
   Forwards / Backwards . . HH.MM.SS.THMIJU    Time of Day . . HH.MM.SS.THMIJU
   Code Description                Date 2011-04-20 Wednesday  Time (Relative)
/  ---- Search limit reached (+5000) ------------------------ ---------------
__ 01   Input Message TranCode=SMQLG                           01.19.00.003853
__ 35   Input Message Enqueue TranCode=SMQLG                         +0.000001
__ 31   DLI GU TranCode=SMQLG Region=0006                           +0.000057
__ 6701 YOUT Sync callout message sent                              +0.000125
__ 6701 YACK Received ACK                                           +0.000618
__ 6701 YRSP Sync callout response received                         +0.201386
__ 03   Output Message Response LTerm=OTM00001                      +0.201420
__ 35   Output Message Enqueue LTerm=OTM00001 Region=0006           +0.201422
__ 37   Syncpoint Region=0006                                       +0.201424
__ 37   Syncpoint message transfer Region=0006                      +0.201425
__ 33   Free Message                                               +0.201428
__ 5612 End of Phase 2 Syncpoint Program=PSBLG Region=0006          +0.201431
__ 31   Communications GU LTerm=OTM00001                            +0.201440
__ 36   Output Message Dequeue LTerm=OTM00001                       +0.203894
__ 33   Free Message                                               +0.203895
__ 07   Application Terminate TranCode=SMQLG Region=0006            +0.220357
******************************** Bottom of Data ********************************
```

Delay due to sync callout

IMS PI Transaction Tracking: Program Switch

```
BROWSE    IMSP.D110627.T102346.SLDS1                    Record 00000778 More: < >
Command ===> ____________________________________________ Scroll ===> PAGE
   Forwards / Backwards . . HH.MM.SS.THMIJU    Time of Day . . HH.MM.SS.THMIJU
   Code Description                  Date 2011-06-27 Monday     Time (Relative)
/  ---- ------------------------------------------------------ ----------------
__ 01   Input Message TranCode=ORDER001 Source=Connect Level=0 14.58.01.757247
__ 35   Input Message Enqueue TranCode=ORDER001                      +0.000004
__ 08   Application Start TranCode=ORDER001 Region=0001              +0.000123
__ 5607 Start of UOR Program=ORDERP01 Region=0001                    +0.000123
__ 31   DLI GU TranCode=ORDER001 Region=0001                         +0.000129
__ 5616 Start of protected UOW Region=0001                           +0.000337
__ 50   Database Update Database=ORDERSDB Region=0001                +0.002744
__ 50   Database Update Database=ORDERSDB Region=0001                +0.015338
__ 5610 Start Phase 1 Syncpoint Region=0001                          +0.015440
__ 03   Input Message TranCode=ORDER002 Source=Connect Level=1 input +0.019162
__ 35   Input Message Enqueue TranCode=ORDER002 Region=0001          +0.019166
__ 37   Syncpoint Region=0001                                       +0.019175
__ 5600 Commit found no work to do Region=0001 SSID=DB2P             +0.019201
__ 5612 End of Phase 2 Syncpoint Program=ORDERP01 Region=0001        +0.019204
__ 56FA Transaction Statistics TranCode=ORDER001 Region=0001        +0.019205
---------------------- End of T1, Start of T2 -------------------------------
```

continued on next slide...

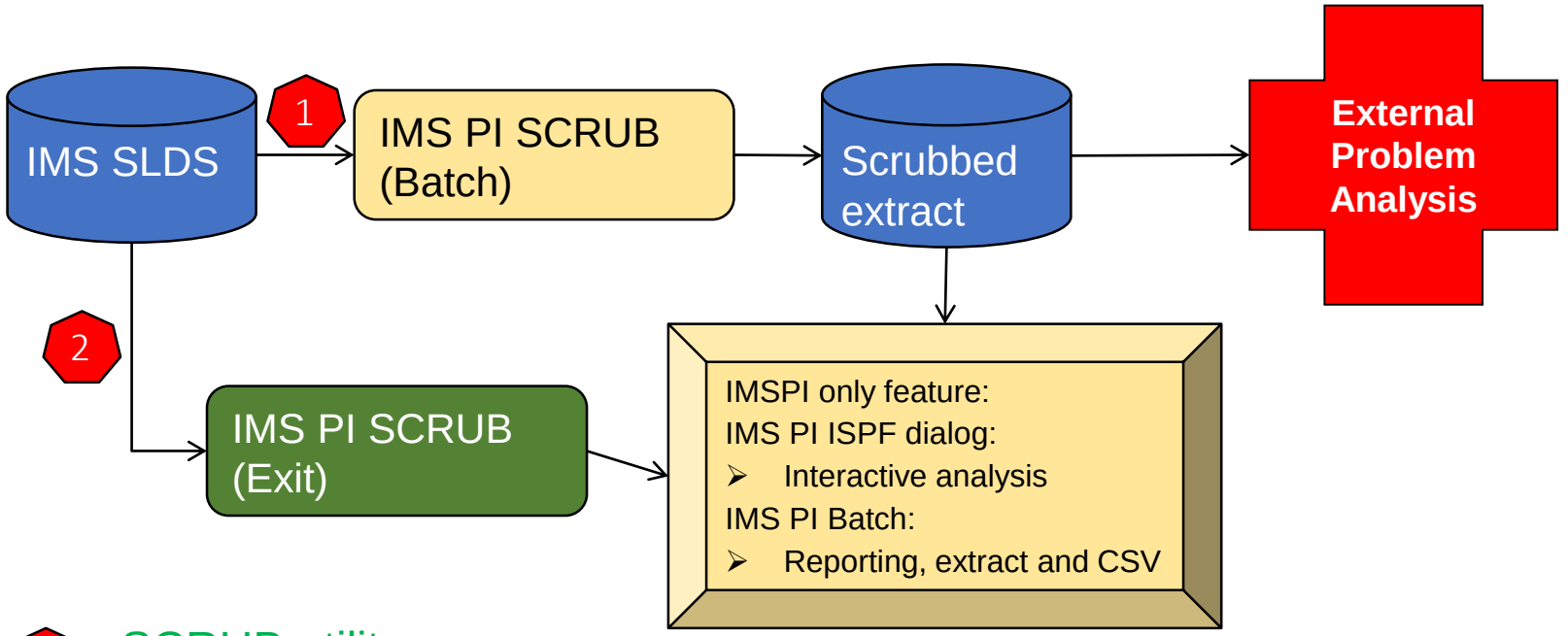
To get this display, we entered **TX** (track transaction) next to the 01 record for the originating transaction that we are interested in. TX tracks the entire transaction, including program switches.

...continued from previous slide

```
---------------------- End of T1, Start of T2 -------------------------------
__ 08   Application Start TranCode=ORDER002 Region=0002                +0.019368
__ 5607 Start of UOR Program=ORDERP02 Region=0002                      +0.019368
__ 31   DLI GU TranCode=ORDER002 Region=0002                           +0.019375
__ 5616 Start of protected UOW Region=0002                             +0.019597
__ 07   Application Terminate TranCode=ORDER001 Region=0001            +0.020689
__ 50   Database Update Database=ORDERSDB Region=0002                  +0.020795
__ 50   Database Update Database=ORDERSDB Region=0002                  +0.022390
__ 5610 Start Phase 1 Syncpoint Region=0002                            +0.022619
__ 03   Input Message TranCode=ORDER003 Source=Connect Level=2 input   +0.027125
__ 35   Input Message Enqueue TranCode=ORDER003 Region=0002            +0.027129
__ 37   Syncpoint Region=0002                                          +0.027137
__ 5612 End of Phase 2 Syncpoint Program=ORDERP02 Region=0002          +0.027162
__ 56FA Transaction Statistics TranCode=ORDER002 Region=0002           +0.027162
---------------------- End of T2, Start of T3 -------------------------------
__ 08   Application Start TranCode=ORDER003 Region=0003                +0.027520
__ 5607 Start of UOR Program=ORDERP03 Region=0003                      +0.027520
__ 31   DLI GU TranCode=ORDER003 Region=0003                           +0.027529
__ 5616 Start of protected UOW Region=0003                             +0.027857
__ 07   Application Terminate TranCode=ORDER002 Region=0002            +0.028133
__ 50   Database Update Database=ORDERSDB Region=0003                  +0.028834
__ 50   Database Update Database=ORDERSDB Region=0003                  +0.032497
__ 03   Output Message Response LTerm=NYC1 Source=Connect              +0.032524
__ 31   Message GU for APPC LTerm=NYC1                                 +0.032563
__ 5610 Start Phase 1 Syncpoint Region=0003                            +0.032643
__ 37   Syncpoint Region=0003                                          +0.037484
__ 5600 Commit found no work to do Region=0003 SSID=DB2P               +0.037520
__ 5612 End of Phase 2 Syncpoint Program=ORDERP03 Region=0003          +0.037523
__ 56FA Transaction Statistics TranCode=ORDER003 Region=0003           +0.037524
__ 07   Application Terminate TranCode=ORDER003 Region=0003            +0.038184
```

To isolate a single unit of recovery within the program switch sequence, enter **TU** (track UOR) next to a related record.

SCRUB – Addressing Privacy Issues



1 SCRUB utility:

1. Systems Programmer creates a copy of the original SLDS with confidential data scrubbed
2. The scrubbed extract data set is made available to all IMS PI users – data set to <<CLEARED>>
3. 100% secure – user has no access to confidential data

2 SCRUB exit (ALZUAUTH) – IMSPI only:

1. All IMS PI users have access to the original (un-scrubbed) SLDS
2. All IMS PI ISPF dialog and batch services scrub the log records prior to display or reporting
3. Not secure – other utilities such as ISPF browse or DFSERA10 will display the confidential data

SYSGEN Clean-up – Removing Unused Definitions

Uses checkpoint records:

4004=Transactions, 4006=Databases, 4007=Programs`

```
Start of checkpoint interval Date=2014-06-26 Thursday Time=17.51.31

DDIR     DDIROPEN DDIRDA CHKWOPN DDIRGOPN Used?
-------- -------- ------ ------- -------- -----
ACCOUNTS 40       20     00      00       YES
BANKING  00       00     00      00       NO
ORDERS   00       00     00      00       NO
STOCK    40       20     00      00       YES
```

DDIR	Database name
DDIROPEN	At least one DCB is opened
DDIRDA	DMB has been dynamically allocated
CHKWOPN	DB was open
DDIRGOPN	GBLSTATUS = OPEN
Used?	YES – at least one of the above is set, DB is in use or has been used
	NO – none of the above are set, DB has not been used

Why an IMS Problem Investigator User Might Consider *Transaction Analysis Workbench*

Additional Benefits of Using TAW Over IMS PI

- View transaction events across all the subsystems
- Merge data sources, including SMF, for IMS, DB2, CICS, MQ, and MVS
- Stand Alone Reporting for DB2, CICS-DBCTL, and MVS
- Leverage IMS Performance Analyzer and CICS Performance Analyzer for IMS and CICS Reporting
- Create and use Workflows, and save them as Templates
- Automated File Selection for multiple Subsystem Instrumentation data
- Instrumentation data is collected, put into PDS datasets, and associated with a Problem Session until deleted
- Analysis History allows user to resume investigative sessions from last point in analysis
- IT Analytics for z/OS Operations (On or Off Host)

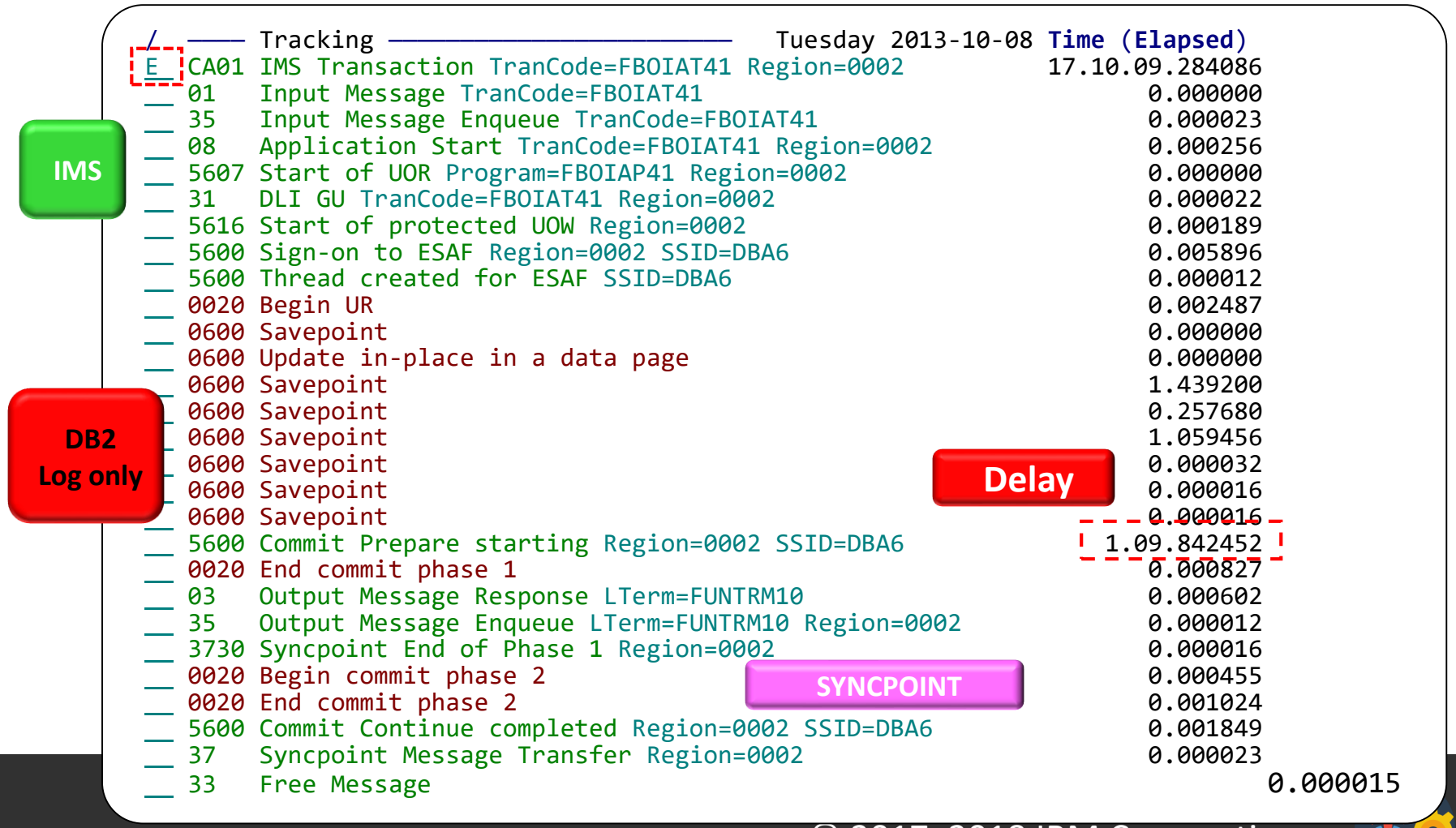
Broad, Deep Coverage of Log Types

IMS	CICS	DB2	MQ, WAS	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	VSAM forward recovery and autojournaling log streams	DB2 performance trace (IFCIDs)	MQ accounting (SMF 116)	z/OS Connect (SMF 120-11)
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)				

All supported log types can be treated and processed in a consistent way: format, interpret, relate, select, reduce, ETL

IMS PI: IMS to DB2 Transaction – What Did It Do?

1. **IMS transaction starts with an Index record (CA01)**
2. **IMS log (green), and DB2 log (RED) events are shown**
3. **Transaction calls a DB2 stored procedure which issues SQL calls, but no call results are shown because IFCID trace and SMF records are not know to IMSPI**



TAW: IMS to DB2 Transaction – What Did It Do?

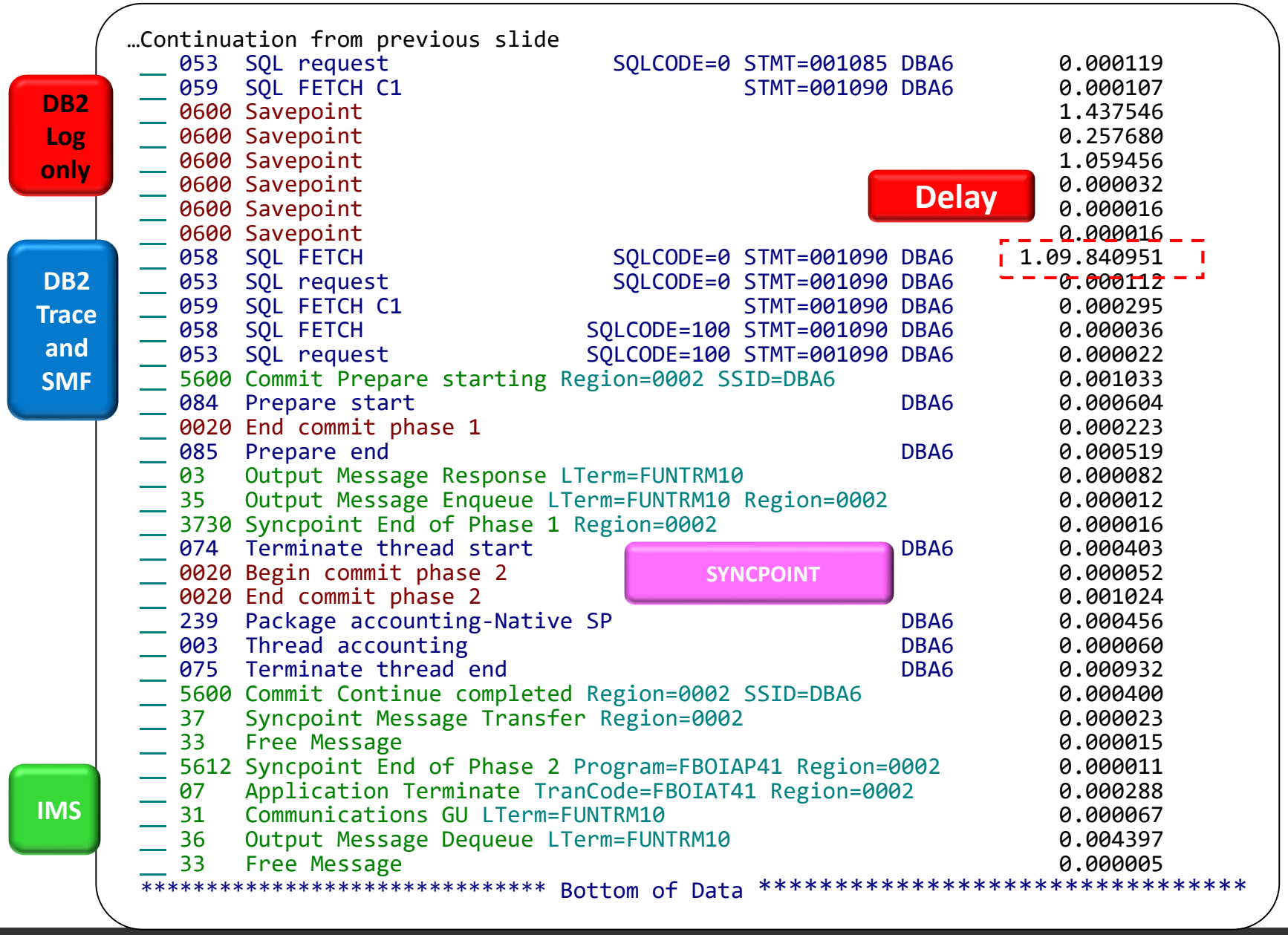
1. **IMS transaction starts with an Index record (CA01)**
2. **IMS log (green), DB2 trace (BLUE) and DB2 log (RED) events are shown**
3. **Transaction calls a DB2 stored procedure which issues SQL calls, call results are shown**

IMS

DB2 Trace and SMF

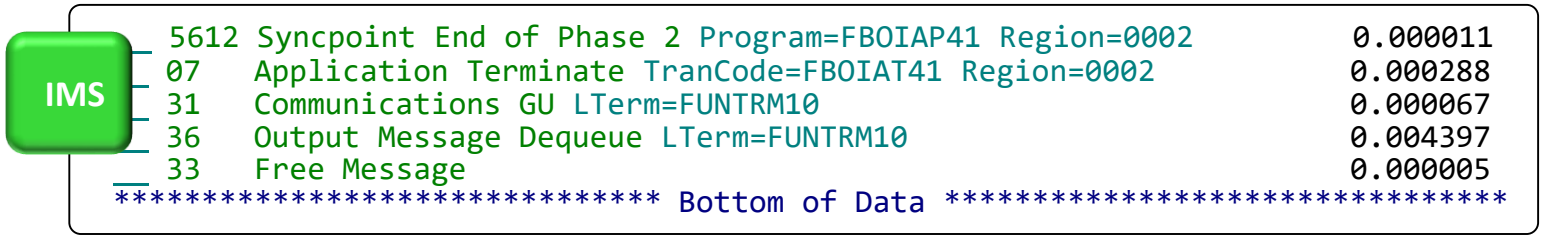
DB2 Log only

```
        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
    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
```



IBM IMS Tools

Continued from previous slide

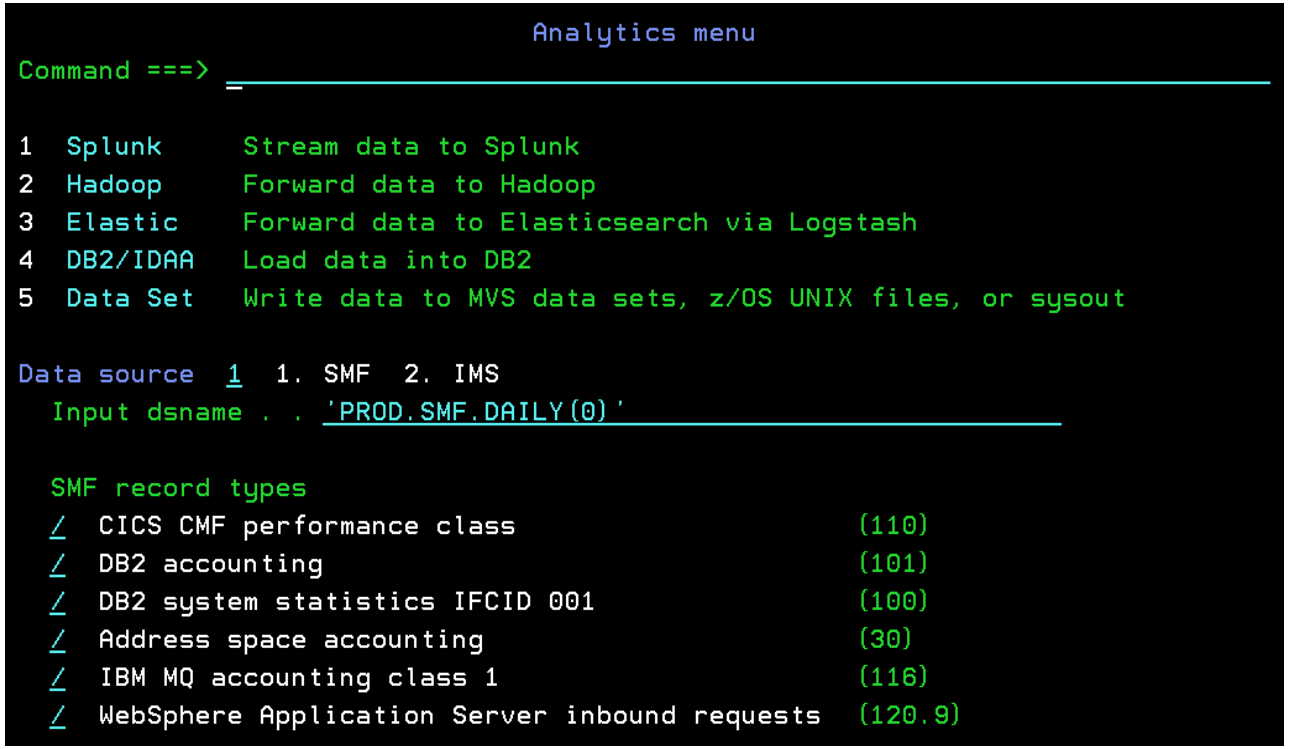


Analytics for z/OS Operations

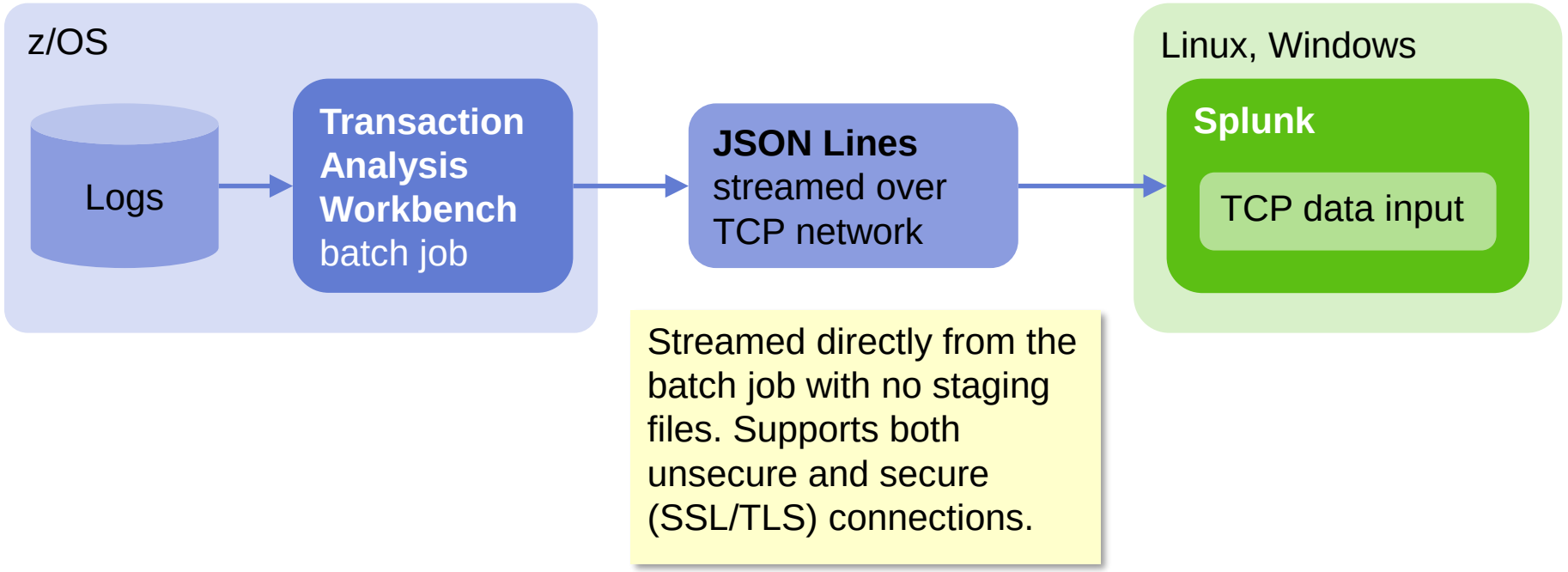
- Big data tooling provides an opportunity to take analysis to the next level
  - Perform analyses that were previously infeasible
  - Valuable new insights into system performance and security
- Standardized and unified approach to all operational analysis
- Combining z/OS operational data with data from other platforms
- Reduced cost of analysis and storage making long term historical trend analysis cost effective
- Off host
  - Splunk
  - Elastic (ELK stack – Elasticsearch, Logstash, Kibana)
  - Hadoop
  - Spreadsheets, for example MS Excel
- On platform
  - DB2 and IDAA

TAW Analytics Feature

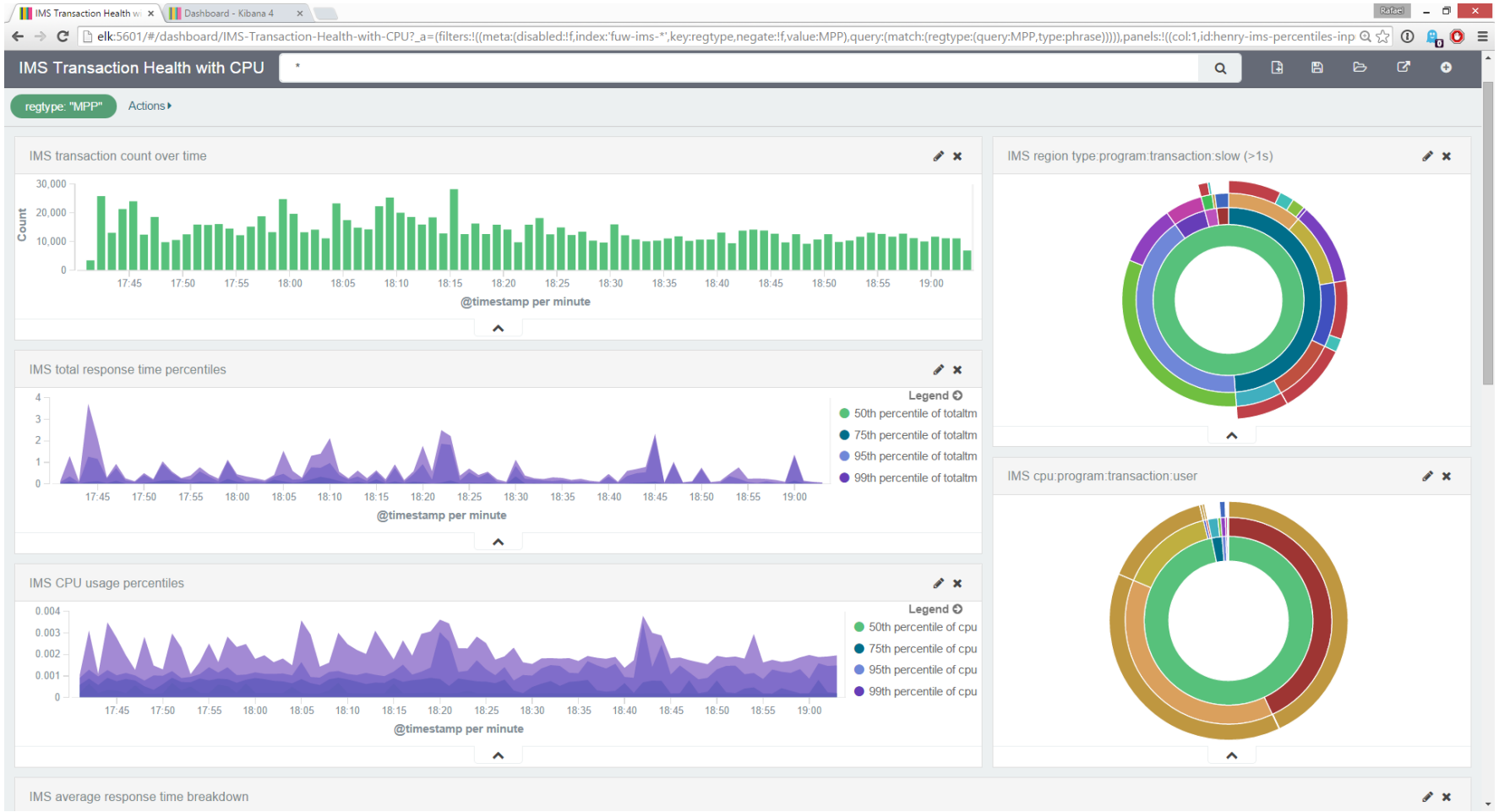
- The Workbench's primary function is classic problem determination using log and traces; now complemented with an ETL (Extract, Transform and Load) feature
- Prepares all supported data sources for external analysis such as analytics, including the IMS log and SMF
- ISPF dialog to assist in creating end-to-end ETL JCL for both off and on host analytics
- Dialog has a subset of common SMF record types, many more are supported
  - Let us know if you need additional record types
- JSON or CSV
- DB2 process fully automated
  - DDL to create tables
  - DB2 load statements



Streaming JSON Lines over TCP to Splunk

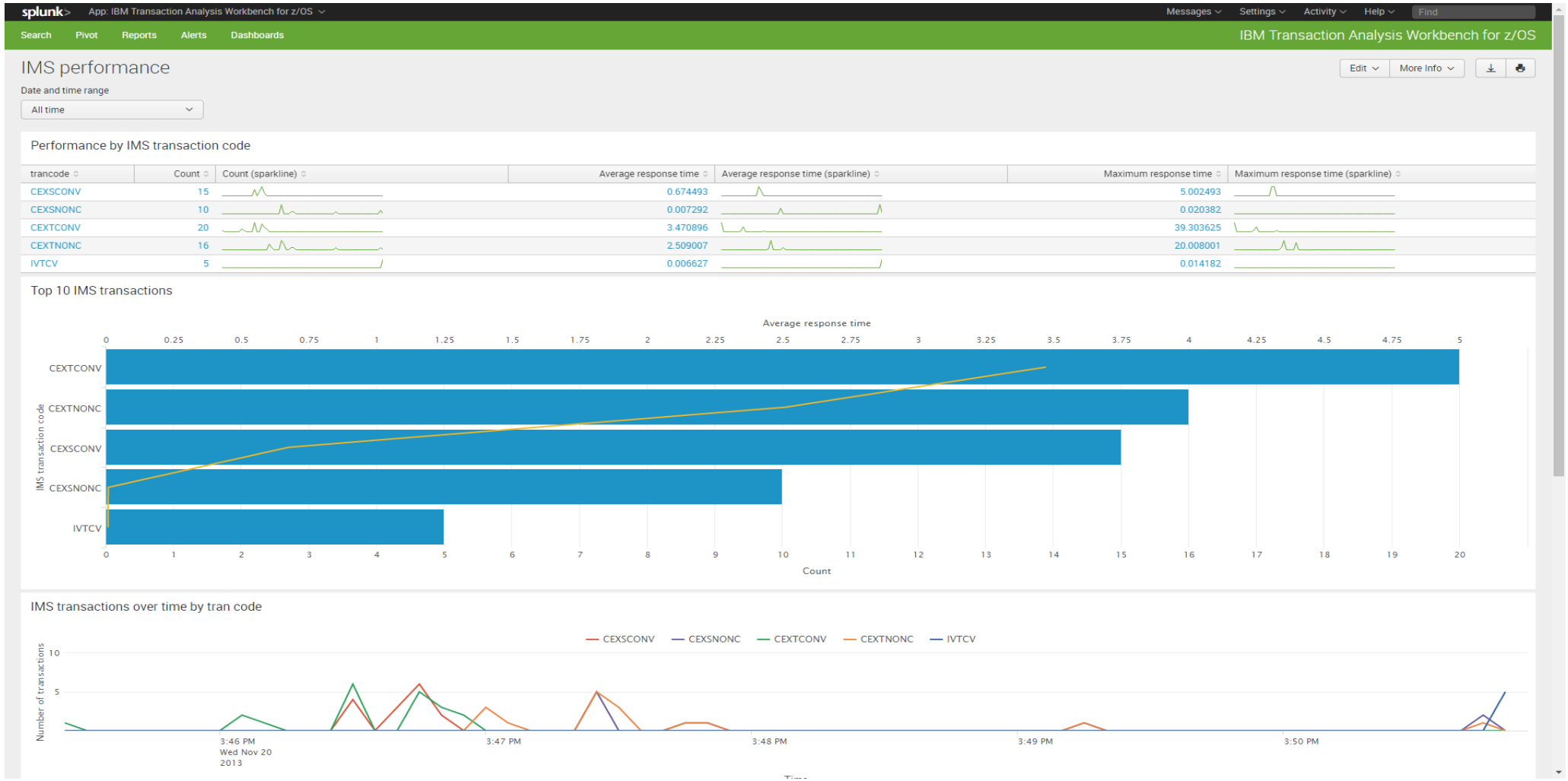


Elasticsearch, Logstash, Kibana (ELK stack)



We use Logstash to feed data into Elasticsearch and view in Kibana (all open source)

Splunk: IMS and Connect Combined Dashboard



IBM IMS Tools

More Information

- IBM IMS Connect Extensions for z/OS
  http://www.ibm.com/us-en/marketplace/ims-connect-extensions-for-zos
- IBM IMS Performance Analyzer for z/OS
  http://www.ibm.com/us-en/marketplace/ims-performance-analyzer-for-zos
- IBM IMS Problem Investigator for z/OS
  http://www.ibm.com/us-en/marketplace/ims-problem-investigator-for-zos
- IBM Transaction Analysis Workbench for z/OS
  http://www.ibm.com/us-en/marketplace/transaction-analysis-workbench-for-z

धन्यवाद

Hindi

多謝

감사합니다

Korean

Спасибо

Ndzi khense ngopfu

Tsonga

Gracias

Spanish

Thank You

English

شكراً

Obrigado

Brazilian Portuguese

Grazie

Italian

Danke

German

多谢

Merci

French

Ke a leboha

Tswana

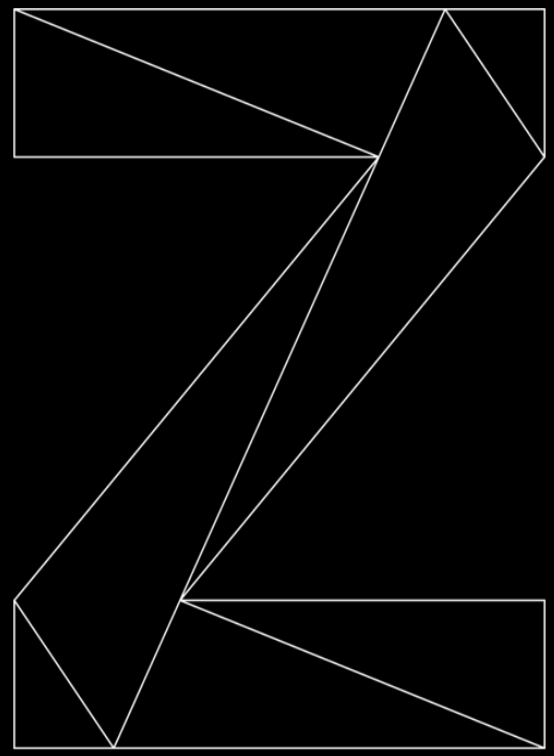
நன்றி

Tamil

ありがとうございました

ขอบคุณ

Thai



IBM