How to Diagnose IMS Connect Performance Problems

Jim Martin, Fundi Software
Suzie Wendler, IBM

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Agenda

- Define the challenges
- Investigate the IMS Connect Environment
- Review the roles of the products and tools within the IMS Connect space
- Investigate how to use these tools and techniques to report and analyze performance at the IMS Connect boundary

IMS Connect Today

- TCPIP Server for IMS Transactions
  - Provides Socket based connections
  - Provides conversion/translation for TCPIP clients
  - Leverages the IMS OTMA capability
- Widely used in production environments
  - Capable of high transaction volumes
  - Scalable
- Supports
  - User-written partner applications
  - IMS clients - Integration Suite of capabilities
  - Vendor applications

IMS Connect Performance Considerations

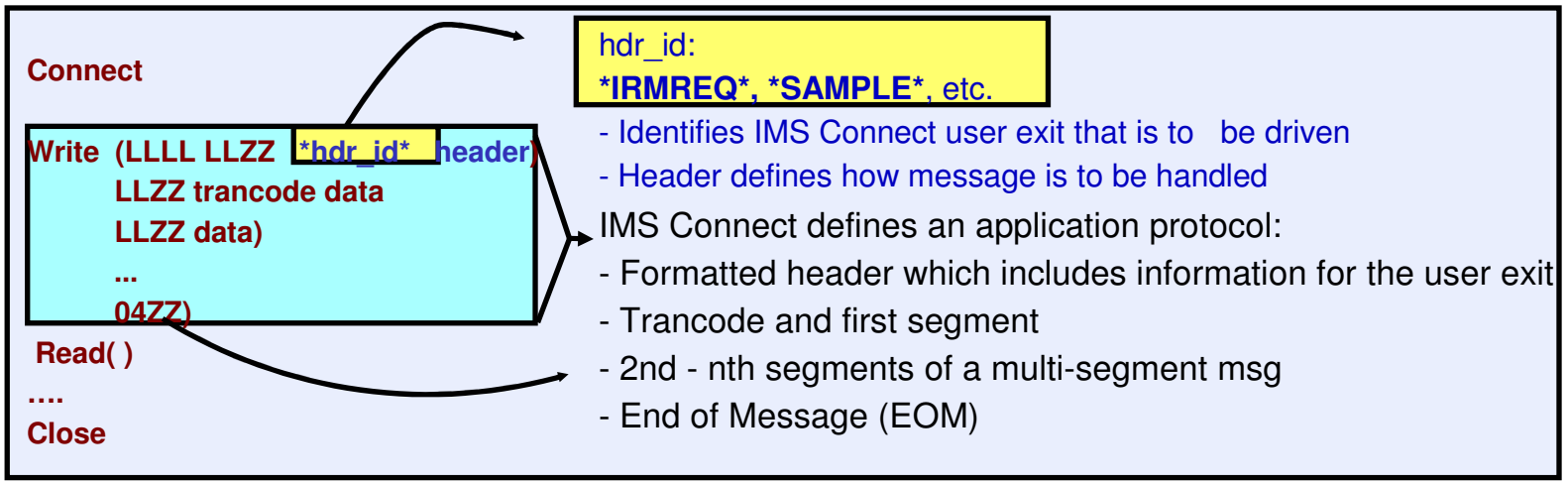
- Possible bottlenecks can occur as a result of:
  - Network connection
  - Application error
  - Application design
    - Not understanding the interaction with IMS Connect and IMS
  - IMS Connect configuration
  - IMS
  - …

First Things First

- Design considerations
  - IMS Connect supports a direction connection application model:
    - Natively synchronous (connection-oriented), supports asynchronous (connectionless)
      - Direct correlation between input and output
    - Potential issues with program-to-program switches when spawning multiple transactions
    - Designing for failure:
      - Determine what to do if connection is unavailable
      - Understand IMS actions
      - Detect error codes - TCP/IP, IMS Connect, IMS

Basic Considerations

- Input Messages:
  - LLLL = Length of msg including all data segments and the EOM
  - Specifications in the header control the interaction with IMS Connect
    - Commit mode
    - Synchronization levels – None or Confirm
  - Verb set defines synchronous/asynchronous interaction



Basic Considerations …

- Input Messages …

Sending just one write with all the data improves performance over multiple writes

- To prevent multiple writes from causing performance problems with IMS Connect, make sure the IMS Connect PORT statement specifies NODELAYACKS

Problem symptom – erratic elongation of response time

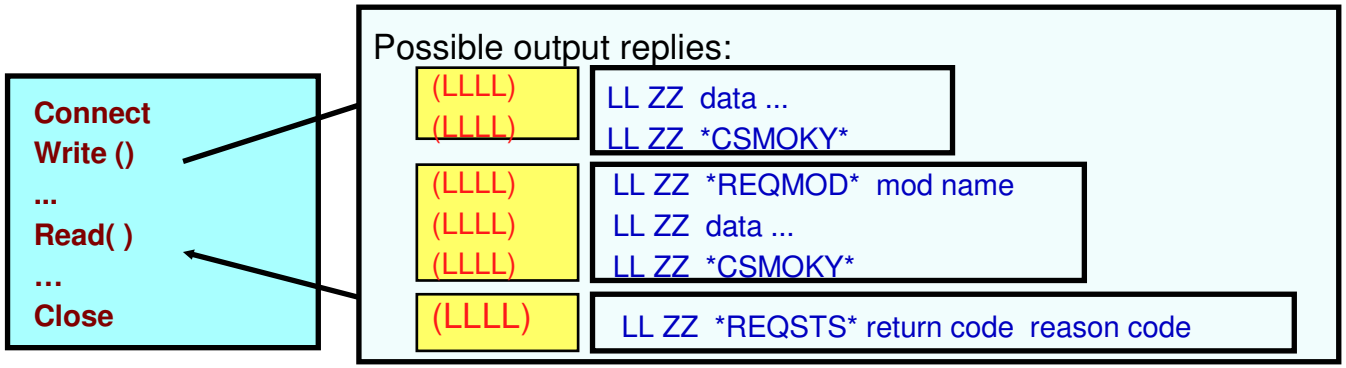
Sending data incorrectly can cause erratic behavior

- Invalid header
- Amount of data that does not match the length field or has no EOM indicator

Problem symptom – possible hang on the socket

Basic Considerations …

- Output Messages:



  - Replies from IMS Connect can be
    - IMS application output messages
    - DFSxxxxx messages
    - Messages from IMS Connect that carry special headers
      - CSMOKY, REQSTS, REQMOD

The remote application should be designed to understand the output replies that are possible based on the interactions with IMS

Basic Considerations …

- Output Messages – ACK/NAK
  - Some output messages from IMS Connect require an ACK/NAK message
    - Sync level=confirm, Send-then-commit (CM1) output replies
    - All Commit-then-send (CM0) output messages
    - Some DFSxxxxx error messages
      - Table 47 in the IMS Connect Guide and Reference

Application design in ACK/NAK situations affects the use of the socket
- Application should issue a READ after an ACK/NAK to determine when the socket is free for reuse

Problem symptom – possible hang on the socket and DUPCLNT

Basic Considerations …

- Timing out
  - How long should a process wait?
    - What action should be taken when a timeout occurs?
  - Setting timeout values
    - IMS Connect - timeout value in the configuration
    - IMS Connect client program - timer value in header
    - Remote client environment

If specifying long wait values, check out the TCP/IP values for:
KEEPALIVEOPTIONS or INTERVAL
- allows TCP/IP to maintain a connection that can be inactive for long periods of time

Problem symptom – connection keeps timing out before the timeout value expires

The Bottom Line

- Successful connectivity is the first step
- Designing for failure is the second step
- The next set of steps
  - Stabilize the production environment
    - Performance monitoring
    - Problem determination
    - Reporting and auditing

The Next Set of Steps

- Major Issue
  - IMS Connect is a black box
    - Performance Monitoring is difficult or impossible
    - Problem determination especially in real time is difficult at best
      - TCP/IP packet traces
      - IMS Connect Dump
      - HWS Recorder trace
      - IMS Connect internal traces

- An easier solution …

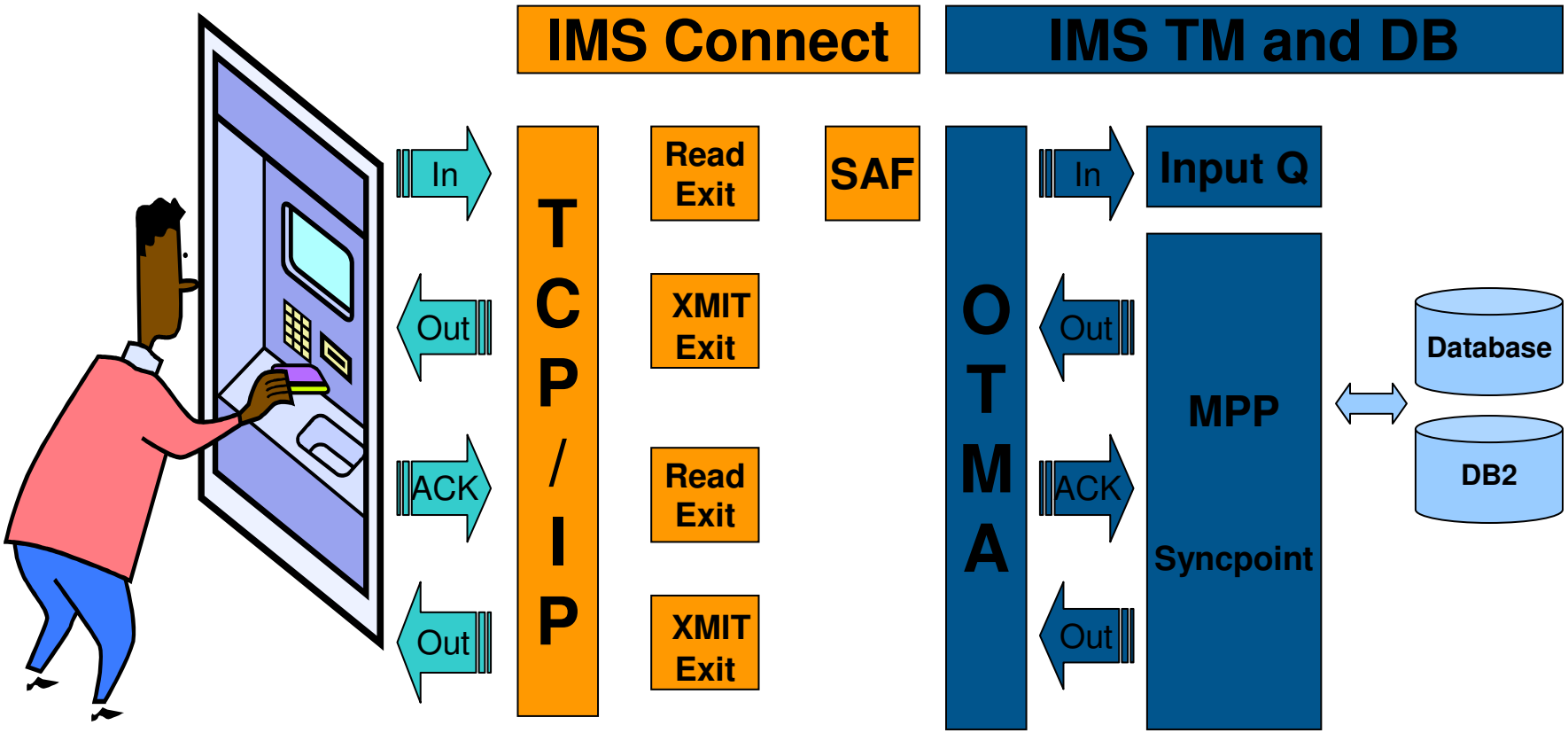
Tools Used For Performance Monitoring and reporting

- IMS Connect Extensions
  - Provides instrumentation data used for performance reporting
- IMS Performance Analyzer
  - Provides numerous reports using IMS Connect Extensions instrumentation data
  - Merges IMS and IMS Connect instrumentation data for reporting

Tools Used For Analysis

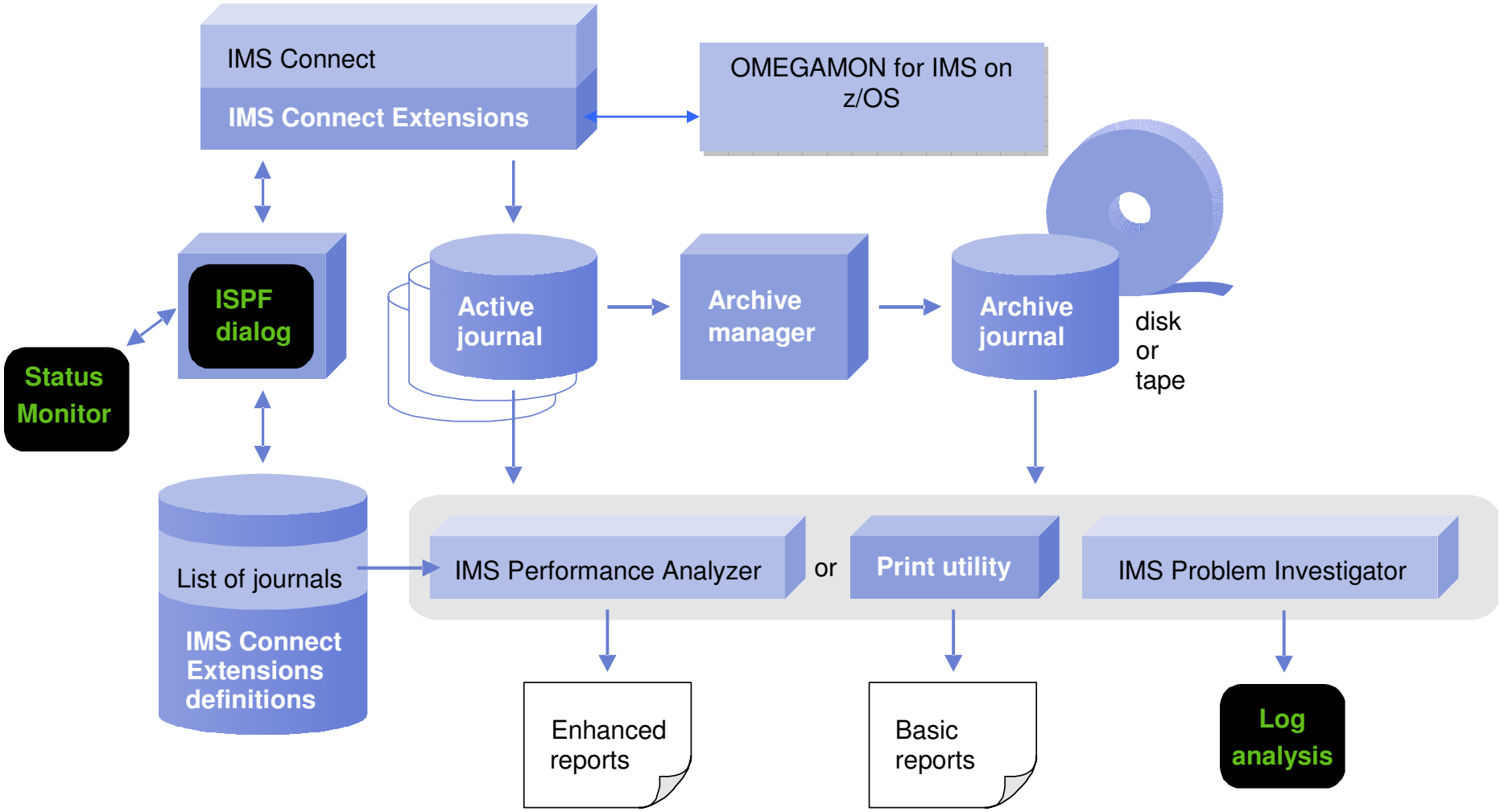
- IMS Problem Investigator
  - Provides detailed analysis of IMS and IMS Connect Extensions instrumentation data
- OMEGAMON™ for IMS Connect
  - Provides real-time IMS Connect response information

Connect Transaction Lifecycle



Commit Mode=1 and SYNCLEVEL=CONFIRM requires Client ACK for application syncpoint to proceed!

Event collection and reporting



Status Monitor: Connect Statistics

Global view of activity across IMS Connect system, by system or port

```
File  Menu  Form  Help
                        Status Monitor - System Overview          Row 1 of 12
Command ===> _____________________________________________ Scroll ===> CSR

Interval . . . 3  1. 20 Seconds   3. 01-15 Minutes   5. 31-45 Minutes   7. Hour
                  2. Minute       4. 16-30 Minutes   6. 46-60 Minutes

  12.41.45          Input     Input     Input     Input Accepted      ACK
                  Message    Length    Length     Bytes  Message  Message
  Name     Type     Total     Total       Max   Per Sec   %Total    Total
  -------- ---- -------- -------- -------- -------- -------- --------
  PAPI04   HWS       240    24640       120    27.38     100%      120
  IMD3     DS          0        0         0     0.00       0%        0
  IMD4     DS        240    24640       120    27.38     100%      120
  I9DV     DS          0        0         0     0.00       0%        0
  HWSJAVA0 EXIT        0        0         0     0.00       0%        0
  HWSSMPL0 EXIT      240    24640       120    27.38     100%      120
  HWSSMPL1 EXIT        0        0         0     0.00       0%        0
  HWSIMSO1 EXIT        0        0         0     0.00       0%        0
  HWSIMSO0 EXIT        0        0         0     0.00       0%        0
```

INPUT	Input Messages
RTPIPE	Resume TPIPEs
SENDONLY	Send Only Messages
SENTERR	Sent Unsuccessful
SENTOK	Sent Successful
ACCEPTED	Accepted Messages
REJECTED	Rejected Messages
ROUTED	Routed Messages
ACK	ACK Count
NAK	NAK Count
DEALLOC	DEALLOC Count
RETURNED	Returned Messages
REJEXER	Rejected by EXER
REJSEC	Rejected by security
REJPACE	Rejected by pacing
REJROUTE	Rejected by routing
REQUEST	Message requests
IGNORE	Messages ignored

Display historical information for the following definition types:

HWS IMS Connect system
Exit User Exits
DG Datastore Groups
DS Datastores

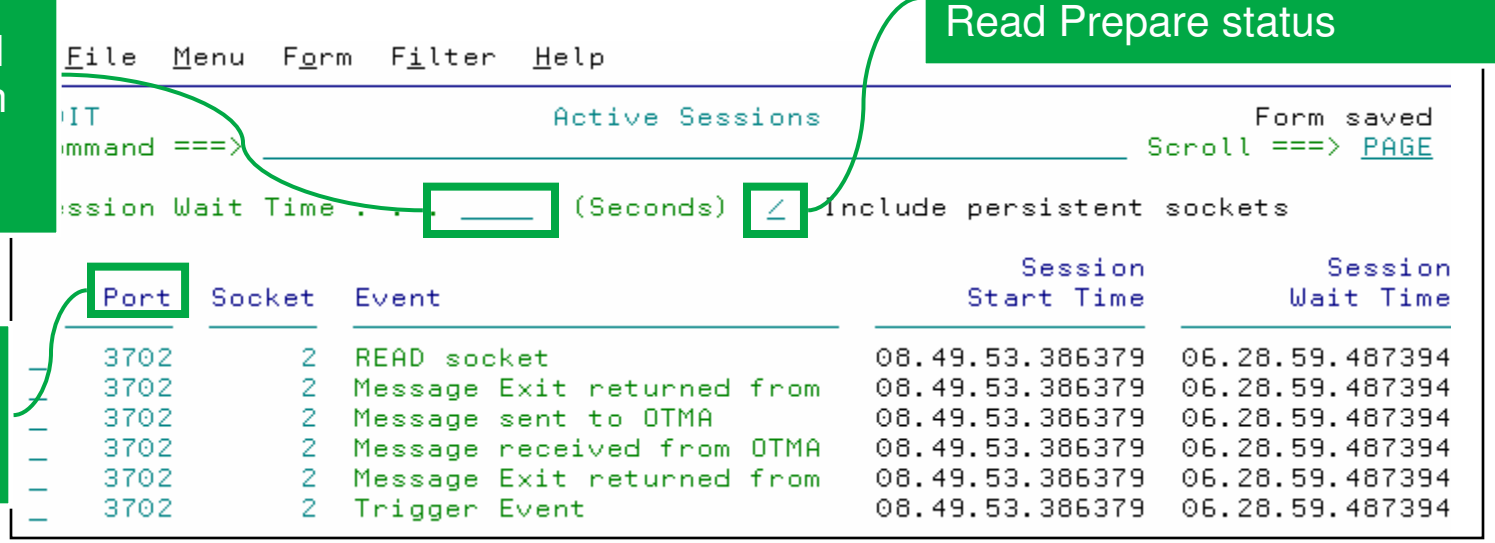
Active sessions

- View a snapshot of all active sessions
- Identify sessions with long wait times
- Use filters to select sessions based on conditions
- Use forms to customize the display

Client ID
TranCode
User ID
Port
Socket
Event
Session Start Time
Session Wait Time
Original Datastore
Target Datastore

Filter sessions displayed by time in current status

Show or hide persistent sockets in Read Prepare status



Sort by any column

Status view

- View details based on the state of the session.
- Identify the predicted socket state
- List up to the last 30 events for the session

```
File  Menu  Help
                        Active Sessions - Session Status          Row 1 of 39
Command ===> _____________________________________________ Scroll ===> PAGE

IMS Connect:
  Port  . . . . . : 3702       Socket . . . . . : 2
  Event Key . . . . . : BD8498373138B162
  Session Start Time  . : 2005-08-26 08.49.53.386379
  Last Trace Time . . . : 2005-08-26 08.49.53.793750
  Session wait time . . : 06.28.59.487394

READ exit:
  Return Code . . . . . : 0          Reason Code  . . . : 00
  Transaction . . . . . : PART       User ID  . . . . . : CMW
  Override LTERM name . :            Exit name  . . . . : HWSSMPL0
  Original Datastore  . : IMD3       Target Datastore . : IMD3
  Client ID . . . . . : TRNBS001
  Family  . . . . . : 2              Port . . . . . : 1136
  IP address  . . . . . : 172.17.69.87

WRITE/EXER exit:
  Return Code . . . . . : 0          Reason Code  . . . : 00

Predicted socket status:
  P006 - Waiting to send output to remote client

Event Record Trace:
  Event=3E, Message Exit returned from READ, XMIT or EXER
  Event=3D, Message Exit entered for READ, XMIT or EXER
  Event=42, Message received from OTMA
  Event=41, Message sent to OTMA
  Event=3E, Message Exit returned from READ, XMIT or EXER
  Event=3D, Message Exit entered for READ, XMIT or EXER
  Event=49, READ socket
  Event=3C, Prepare READ socket
```

View the predicted socket state

Trace of last 30 events

Performance reporting: IMS PA Connect reports

- **Transaction transit reports**
  - Transit Analysis: Summarized Connect activity
  - Transit Log: Detailed information for every Connect transaction
  - Transit Extract: Export data to DB2 or spreadsheet
- **Resource usage**
  - Port Usage: Measure Port usage for over-utilization
  - Resume Tpipe: Monitor Resume Tpipe activity
  - ACK/NAK: Summarize transaction success and failure
  - Exception Events: See why transactions are failing
- **Trace reports**
  - Trace transaction events: Track individual transaction events

IMS PA V3: Transit analysis report

Total response time

Input

IMS internal response time

Output

IMS Performance Analyzer 3.3
IMS Connect Transit Analysis - HWSPROD1

From 21Apr2004 16.30.00.05 To 21Apr2004 16.40.00.09 Page 6

TranCode	Message Count		Response Time	Input Pre-OTMA	Input READ Sock	Input READ Ex	Input SAF	-Process- OTMA	Output Confirm	Output Post-OTMA	Output XMIT Ex	Rate /Sec	Time Outs	NAK
BALANCE	197	Avg	278.488	257.268	252.434	4.496	0.000	19.520	0.000	1.699	0.119	1	2	0
		80%	278.488	257.268	252.434	4.496	0.000	19.520	0.000	1.699	0.119			
DEPOSIT	67	Avg	247.674	226.997	222.267	4.395	0.000	18.934	0.000	1.742	0.118	1	0	0
		80%	247.674	226.997	222.267	4.395	0.000	18.934	0.000	1.742	0.118			
LOGON	123	Avg	388.525	314.452	297.292	7.614	8.853	67.305	0.000	6.767	0.162	1	0	21
		80%	392.847	319.171	302.458	7.614	9.005	81.317	0.000	11.736	0.203			
ORDER	265	Avg	357.142	275.655	262.408	6.964	5.809	73.930	0.000	7.556	0.144	1	3	0
		80%	457.589	310.779	297.228	7.556	6.343	152.839	0.000	13.602	0.201			
WITHDRAW	85	Avg	273.333	249.026	238.302	5.147	5.130	21.257	0.000	3.049	0.117	1	1	0
		80%	285.266	260.648	249.320	6.316	6.514	22.614	0.000	4.277	0.124			
Total	737	Avg	594.986	344.789	339.349	0.438	0.131	182.667	15.630	51.899	0.180	1	1	7
		80%	997.382	535.249	527.124	1.544	0.905	387.900	221.726	141.791	0.928			

Combined Transit analysis report

IMS Performance Analyzer 4.1

Combined IMS and Connect Summary

COMBSUMM Printed at 11:15:00 04May2006 Data from 11.16.33 18Apr2006 to 12.04.17 18Apr2006

Connect Input

OTMA response time

IMS internal response time

Trancode	Tran Count	CON Resp Time	Avg Input Time	Avg ReadSock In Time	Avg ReadExit Time	Avg SAF Call Time	Avg OTMAproc Time	IMS Resp Time	. . .
BALANCE	14	57	0	0	0	0	51	28	
DEPOSIT	432	540	0	0	0	0	539	522	
ORDER	1458	202	5	5	0	0	17	16	
WITHDRAW	16	3035	214	214	0	0	605	332	

Connect response time

IMS transit breakdown and resource usage

. . .	Avg InputQ Time	Avg Process Time	Avg OutputQ Time	Avg Total Time	Avg CPU Time	Avg DB Call Count	. . .
	5	54	0	60	3	2	
	6	7	4203	4216	2	1	
	8	213	17528	17749	1	1	
	8	291	2251	2549	3	1	

Connect Output

. . .	Avg Confirm Time	Avg Output Time	Avg XmitExit Time
	6	0	0
	0	1	0
	179	0	0
	249	1967	0

- Combined IMS Connect and IMS log metrics
- Design a Form to include required information only
- No restriction on report page width
- Export to CSV or DB2 as an alternative to reporting

Combined Connect Trace

```
                                        IMS Performance Analyzer 4.1

                                      Trace from 18Apr2006 12.03.10.59

Start/+Relative    Elapsed  ID Description                    Information
12.03.10.594975    *Start*  3C Prepare Read Socket            Key=BEAC39B678481101 Depth=3 Port=3101 Sock=4
    +0.000040        0.040  49 Read Socket                    Port=3101 Sock=4
    +0.000054        0.013  3D READ Message Exit called       Exit=HWSSMPL0
    +0.000090        0.035  3E READ Message Exit returned     RC=00 RSN=00 IP=172.17.69.25 DSTarg=I9DE TC=ATMWDRAW
                                                              Commit Mode=1 Synch Level=NONE Socket Type=Transaction
    +0.000208        0.117  41 Message sent to OTMA           TPipe=3101 MSG=Transaction

    +0.000845        0.636  01 Input Message                  Org=I9DE/BEAC39B6792B1340 Proc=I9DE/BEAC39B6792B1340
                                                         0000 'ATMWDRAW ACCOUNT=456-212-122 AMOUNT=$1000.000'
    +0.006000        5.154  35 DL/I Enqueue Message           Org=I9DE/BEAC39B6792B1340 Proc=I9DE/BEAC39B6792B1340
    +0.008977        2.977  31 DL/I GU from Message Queue     Org=I9DE/BEAC39B6792B1340 Proc=I9DE/BEAC39B6792B1340 PST=0003
    +0.012825        3.847  03 Output Message                 Org=I9DE/BEAC39B6792B1340 Proc=I9DE/BEAC39B67C169661
                                                         0000 'WITHDRAW SUCCESSFUL, BALANCE=$3456.12'
    +0.012835        0.010  35 DL/I Enqueue Message           Org=I9DE/BEAC39B6792B1340 Proc=I9DE/BEAC39B67C169661 PST=0003
    +0.014799        1.963  37 Syncpoint                      Org=I9DE/BEAC39B6792B1340 Proc=I9DE/BEAC39B6792B1340
    +0.017404        2.605  33 Free Message                   Org=I9DE/BEAC39B6792B1340 Proc=I9DE/BEAC39B67C169661
    +0.020768        3.364  03 Output Message                 Org=I9DE/BEAC39B6792B1340 Proc=I9DE/BEAC39B67C169661
    +0.020775        0.006  31 DL/I GU from Message Queue     Org=I9DE/BEAC39B6792B1340 Proc=I9DE/BEAC39B67C169661 PST=0002
    +0.159380      138.605  33 Free Message                   Org=I9DE/BEAC39B6792B1340 Proc=I9DE/BEAC39B6792B1340

    +2.031977 1.872.596     42 Message received from OTMA    TPipe=3101 MSG=Data Sense=0000
    +2.035409        3.432  42 Message received from OTMA    TPipe=3101 MSG=Commit Conf CONFIRM=Committed Sense=0000
    +2.035542        0.133  3D XMIT Message Exit called       Exit=HWSSMPL0
    +2.035584        0.041  3E XMIT Message Exit return       RC=00 RSN=00
    +2.035707        0.122  4A Write Socket                   Port=3101 Sock=4
    +2.035737        0.030  0C Begin Close Socket             Port=3101 Sock=4
    +2.035842        0.105  0D End Close Socket               Port=3101 Sock=4
    +2.035865        0.022  48 Trigger event                  Trigger=CLOSE
```

Start of Connect Transaction

IMS log data merged to show IMS transaction

End of Connect Transaction

Form-based reporting

- Tailor transaction transit reporting to meet your specific requirements
- IMS Log and Connect transit reports, including combined reports
- Choose from any of the 20 supplied samples…

Form-based reporting

```
                                  Report Forms                    Row 1 to 20 of 20
Command ===> ____________________________________________________ Scroll ===> PAGE

Report Forms Data Set  . . : JCH.IMSPA.FORM3

/   Name     Type                Description                  Changed        ID
_  BADRESP  SUMMARY Bad Transaction Response Time     2006/06/09 00:00 IMSPA
_  COMBLIST LIST    Combined IMS and Connect List     2006/06/09 00:00 IMSPA
_  COMBSUMM SUMMARY Combined IMS and Connect Summary  2006/06/09 00:00 IMSPA
_  COMPLVL  SUMMARY Transaction Completion Summary    2006/06/09 00:00 IMSPA
_  CONNACK  SUMMARY Connect ACK/NAK Summary           2006/06/09 00:00 IMSPA
_  CONNLIST LIST    Connect Transit Log               2006/06/09 00:00 IMSPA
_  CONNPLEX SUMMARY Connect PLEX Usage Summary        2006/06/09 00:00 IMSPA
_  CONNTCOD SUMMARY Connect Analysis by Trancode      2006/06/09 00:00 IMSPA
_  CPUHIGH  SUMMARY High CPU Usage Transactions       2006/06/09 00:00 IMSPA
_  DASH     SUMMARY Transaction Dashboard             2006/06/09 00:00 IMSPA
_  MSGLEN   SUMMARY Message Length Analysis           2006/06/09 00:00 IMSPA
_  QTYPE    SUMMARY Queue-type Summary                2006/06/09 00:00 IMSPA
_  SMQLIST  LIST    SMQ Transaction Transit Log       2006/06/09 00:00 IMSPA
_  SMQTCOD  SUMMARY SMQ Transaction Analysis          2006/06/09 00:00 IMSPA
_  TRANCLAS SUMMARY Transit Analysis by Class         2006/06/09 00:00 IMSPA
_  TRANINTV SUMMARY Interval Transaction Analysis     2006/06/09 00:00 IMSPA
_  TRANLIST LIST    Transaction Transit Log           2006/06/09 00:00 IMSPA
_  TRANPRTY SUMMARY Transit Analysis by Priority      2006/06/09 00:00 IMSPA
_  TRANRESU SUMMARY Transaction Resource Usage        2006/06/09 00:00 IMSPA
_  TRANTCOD SUMMARY Transit Analysis by Trancode      2006/06/09 00:00 IMSPA
```

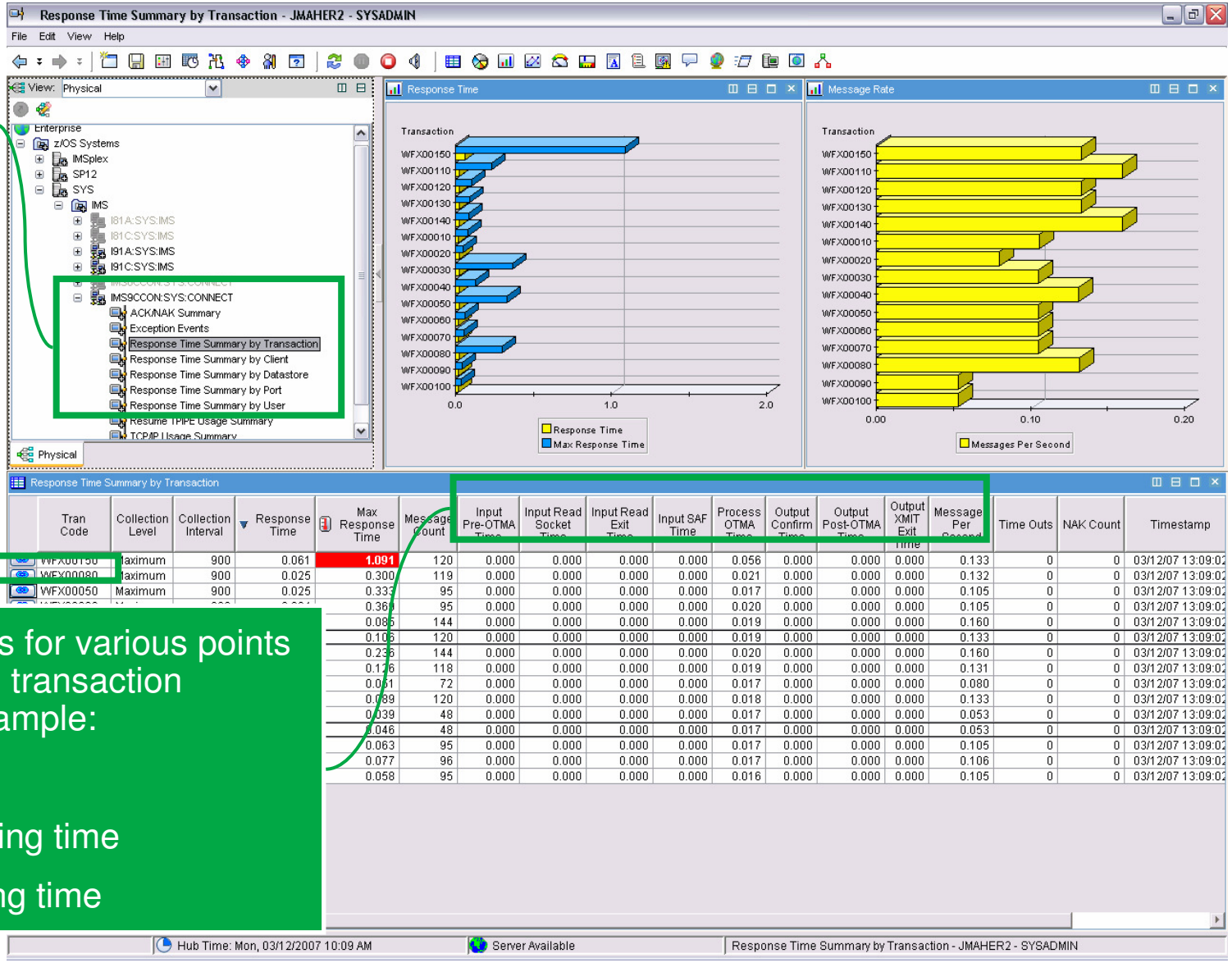
OMEGAMON™ for IMS Connect

- First Real-time monitoring tool for IMS Connect
  - Uses Connect Extensions Publisher API
  - Obtains IMS Connect event records via the API

Response Time Summary by Transaction

Summarize by DS, User ID, Port, and Client ID

Click for details on each message



Response times for various points in the life of the transaction appear. For example:

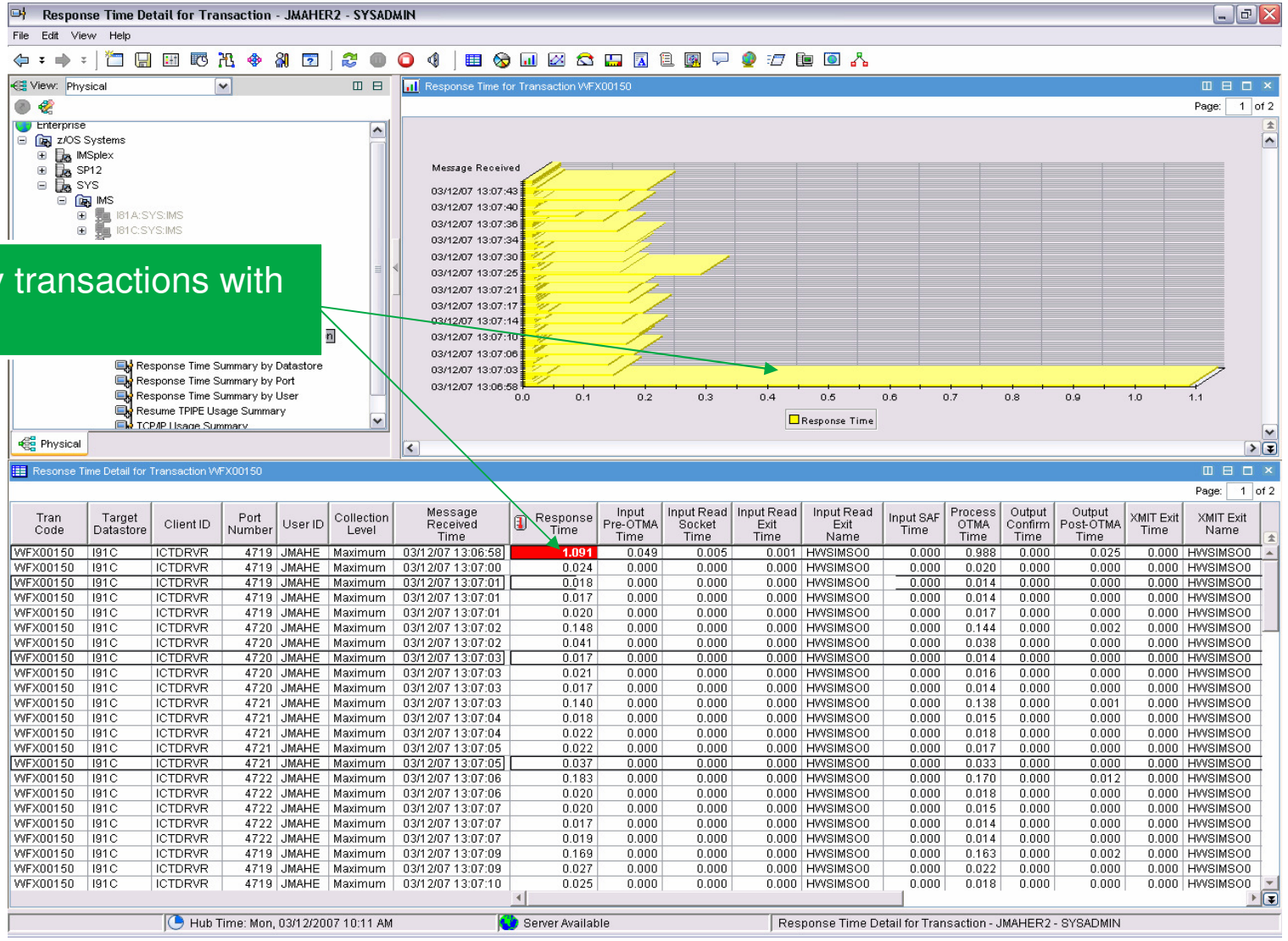
Read-Exit time

OTMA processing time

XMIT processing time

Response Time Detail

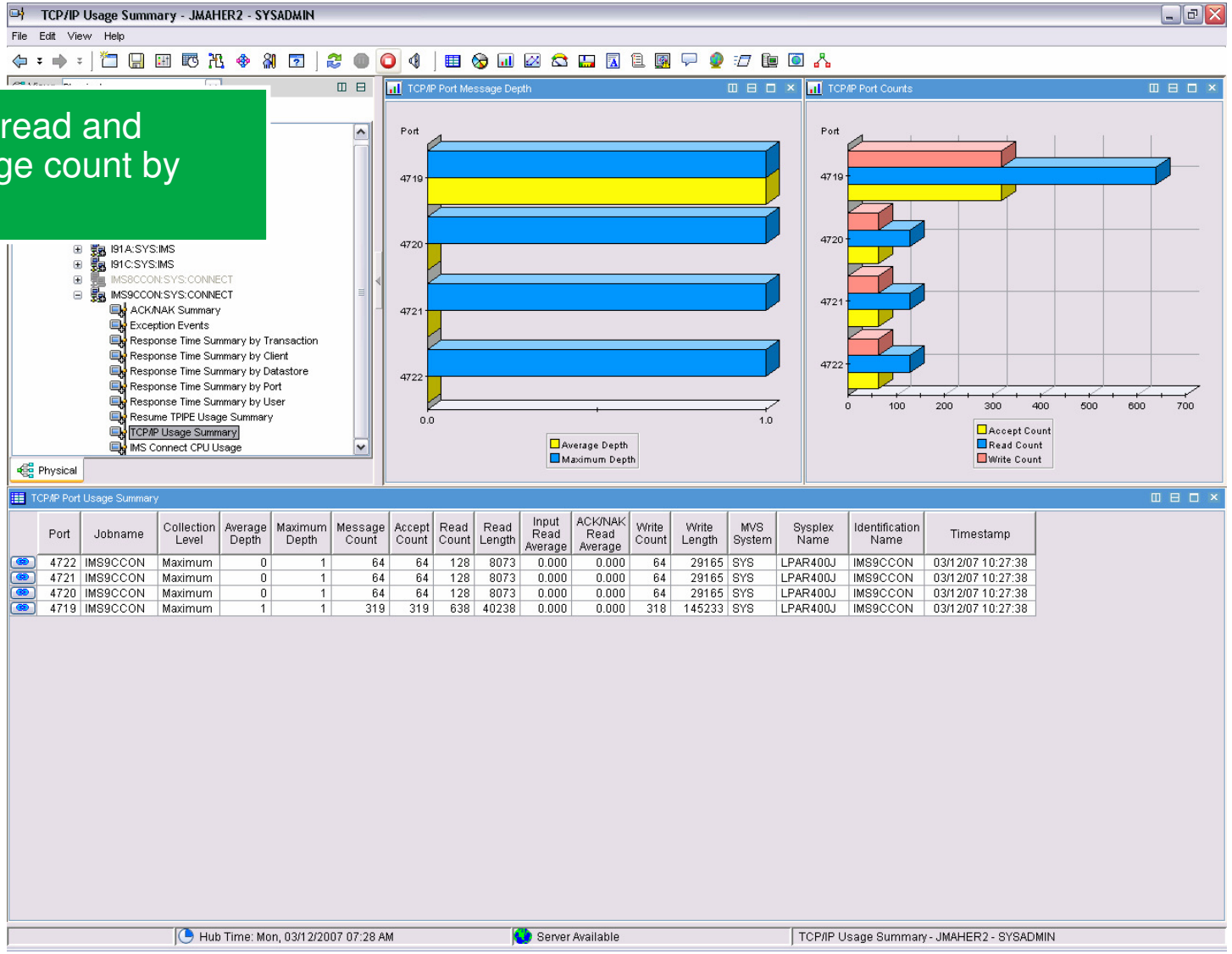
Instantly identify transactions with long delays



Tran Code	Target Datastore	Client ID	Port Number	User ID	Collection Level	Message Received Time	Response Time	Input Pre-OTMA Time	Input Read Socket Time	Input Read Exit Time	Input Read Exit Name	Input SAF Time	Process OTMA Time	Output Confirm Time	Output Post-OTMA Time	XMIT Exit Time	XMIT Exit Name
WFX00150	I91C	ICTDRVR	4719	JMAHE	Maximum	03/12/07 13:06:58	1.091	0.049	0.005	0.001	HWSIMSO0	0.000	0.988	0.000	0.025	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4719	JMAHE	Maximum	03/12/07 13:07:00	0.024	0.000	0.000	0.000	HWSIMSO0	0.000	0.020	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4719	JMAHE	Maximum	03/12/07 13:07:01	0.018	0.000	0.000	0.000	HWSIMSO0	0.000	0.014	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4719	JMAHE	Maximum	03/12/07 13:07:01	0.017	0.000	0.000	0.000	HWSIMSO0	0.000	0.014	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4719	JMAHE	Maximum	03/12/07 13:07:01	0.020	0.000	0.000	0.000	HWSIMSO0	0.000	0.017	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4720	JMAHE	Maximum	03/12/07 13:07:02	0.148	0.000	0.000	0.000	HWSIMSO0	0.000	0.144	0.000	0.002	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4720	JMAHE	Maximum	03/12/07 13:07:02	0.041	0.000	0.000	0.000	HWSIMSO0	0.000	0.038	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4720	JMAHE	Maximum	03/12/07 13:07:03	0.017	0.000	0.000	0.000	HWSIMSO0	0.000	0.014	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4720	JMAHE	Maximum	03/12/07 13:07:03	0.021	0.000	0.000	0.000	HWSIMSO0	0.000	0.016	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4720	JMAHE	Maximum	03/12/07 13:07:03	0.017	0.000	0.000	0.000	HWSIMSO0	0.000	0.014	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4721	JMAHE	Maximum	03/12/07 13:07:03	0.140	0.000	0.000	0.000	HWSIMSO0	0.000	0.138	0.000	0.001	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4721	JMAHE	Maximum	03/12/07 13:07:04	0.018	0.000	0.000	0.000	HWSIMSO0	0.000	0.015	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4721	JMAHE	Maximum	03/12/07 13:07:04	0.022	0.000	0.000	0.000	HWSIMSO0	0.000	0.018	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4721	JMAHE	Maximum	03/12/07 13:07:05	0.022	0.000	0.000	0.000	HWSIMSO0	0.000	0.017	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4721	JMAHE	Maximum	03/12/07 13:07:05	0.037	0.000	0.000	0.000	HWSIMSO0	0.000	0.033	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4722	JMAHE	Maximum	03/12/07 13:07:06	0.183	0.000	0.000	0.000	HWSIMSO0	0.000	0.170	0.000	0.012	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4722	JMAHE	Maximum	03/12/07 13:07:06	0.020	0.000	0.000	0.000	HWSIMSO0	0.000	0.018	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4722	JMAHE	Maximum	03/12/07 13:07:07	0.020	0.000	0.000	0.000	HWSIMSO0	0.000	0.015	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4722	JMAHE	Maximum	03/12/07 13:07:07	0.017	0.000	0.000	0.000	HWSIMSO0	0.000	0.014	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4722	JMAHE	Maximum	03/12/07 13:07:07	0.019	0.000	0.000	0.000	HWSIMSO0	0.000	0.014	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4719	JMAHE	Maximum	03/12/07 13:07:09	0.169	0.000	0.000	0.000	HWSIMSO0	0.000	0.163	0.000	0.002	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4719	JMAHE	Maximum	03/12/07 13:07:09	0.027	0.000	0.000	0.000	HWSIMSO0	0.000	0.022	0.000	0.000	0.000	HWSIMSO0
WFX00150	I91C	ICTDRVR	4719	JMAHE	Maximum	03/12/07 13:07:10	0.025	0.000	0.000	0.000	HWSIMSO0	0.000	0.018	0.000	0.000	0.000	HWSIMSO0

TCP/IP Usage Summary

Arrival rates, bytes read and written, and message count by port.

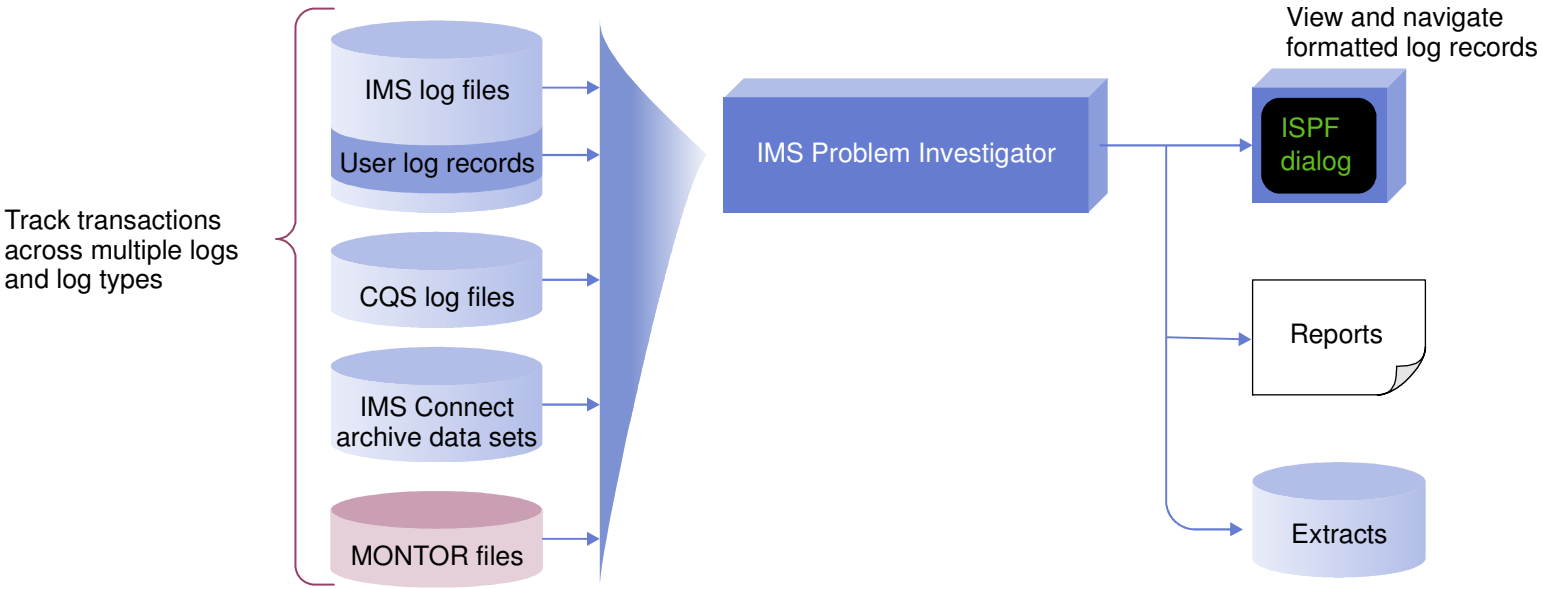


Port	Jobname	Collection Level	Average Depth	Maximum Depth	Message Count	Accept Count	Read Count	Read Length	Input Read Average	ACK/NAK Read Average	Write Count	Write Length	MVS System	Sysplex Name	Identification Name	Timestamp
4722	IMS9CCON	Maximum	0	1	64	64	128	8073	0.000	0.000	64	29165	SYS	LPAR400J	IMS9CCON	03/12/07 10:27:38
4721	IMS9CCON	Maximum	0	1	64	64	128	8073	0.000	0.000	64	29165	SYS	LPAR400J	IMS9CCON	03/12/07 10:27:38
4720	IMS9CCON	Maximum	0	1	64	64	128	8073	0.000	0.000	64	29165	SYS	LPAR400J	IMS9CCON	03/12/07 10:27:38
4719	IMS9CCON	Maximum	1	1	319	319	638	40238	0.000	0.000	318	145233	SYS	LPAR400J	IMS9CCON	03/12/07 10:27:38

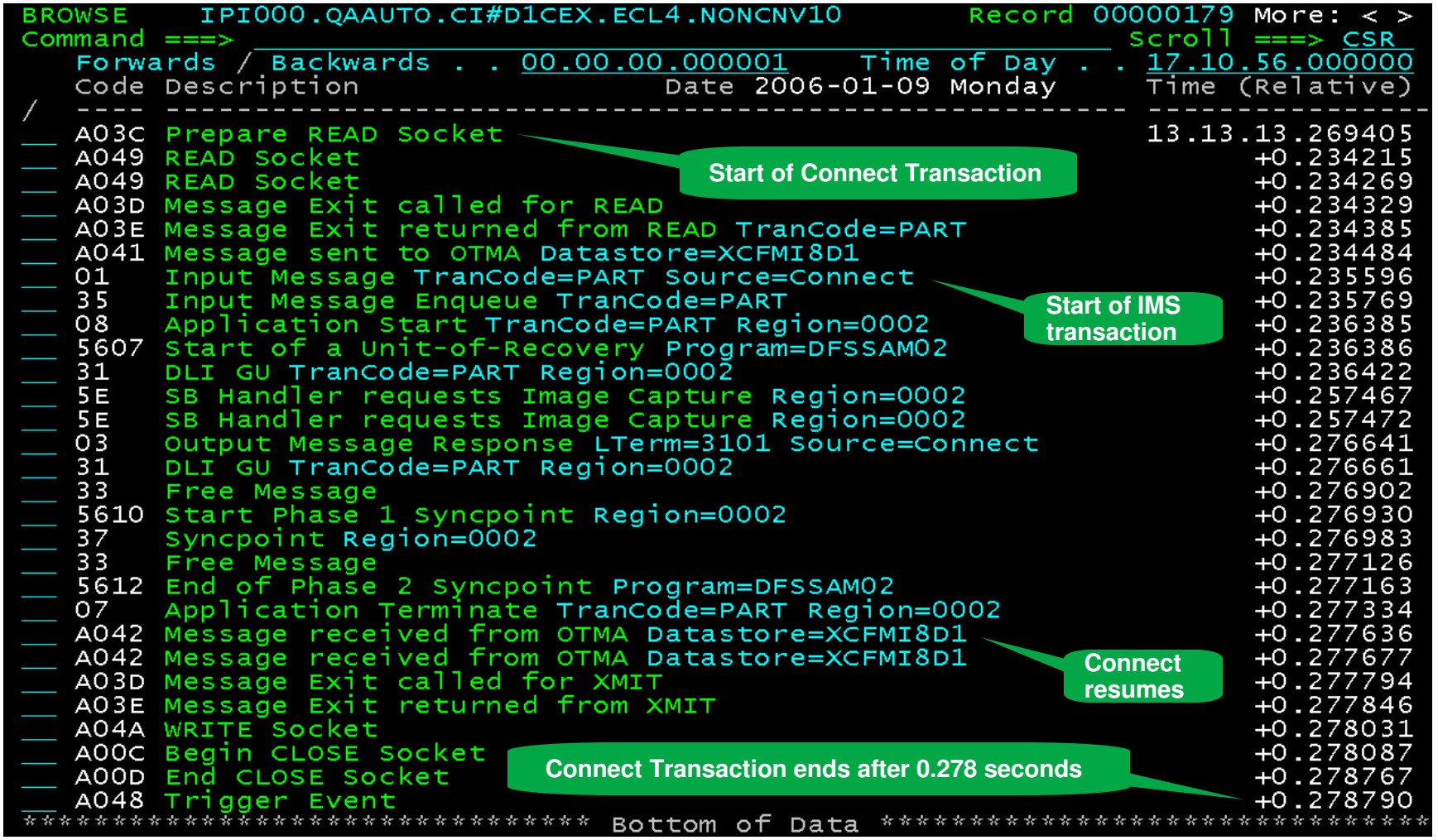
IMS PI Overview

- Analyze IMS problems from the various IMS data sources using the advanced features of IMS PI
- Merge IMS Log and Monitor, CQS and IMS Connect data for the complete end-to-end picture
- ISPF dialog with powerful record formatting and navigation aids
  - Relative and elapsed times between events
    - Allows evaluation of key performance components for IMS Connect and IMS

IMS PI Data Sources



Interactive problem determination



Record display

1. Compact mode showing time of day

```
BROWSE    WORKS00.IMSPI.I9DF.SLDS                          Record 00000208 More: < >
Command ===>                                                Scroll ===> CSR
   Forwards / Backwards . . 00.00.00.000001    Time of Day . . 17.10.56.000000
   Code Description                    Date 2006-03-16 Thursday   Time (Local)
/  ---- ------------------------------------------------------- ----------------
__ 01   Input Message TranCode=CEXTNONC                          17.11.22.028553
__ 31   DLI GU TranCode=CEXTNONC Region=0001                     17.11.22.028563
__ 5616 Start of protected UOW Region=0001                       17.11.22.028826
__ 08   Application Start TranCode=CEXTNONC Region=0002          17.11.22.029431
__ 5607 Start of a Unit-of-Recovery Program=CEXTPGM              17.11.22.029432
__ 5612 End of Phase 2 Syncpoint                                 17.11.22.030726
__ 07   Application Terminate TranCode=CEXTNONC Region=0002      17.11.22.030736
__ 5E   SB Handler requests Image Capture Region=0002           17.11.22.030761
__ 5E   SB Handler requests Image Capture Region=0002           17.11.22.030762
__ 0901 SB Summary Statistics for PST                           17.11.22.030765
__ 5E   SB Handler requests Image Capture Region=0001           17.11.22.031942
__ 5E   SB Handler requests Image Capture Region=0001           17.11.22.031944
__ 50   Database Update Database=DI21PART Region=0001           17.11.22.035442
```

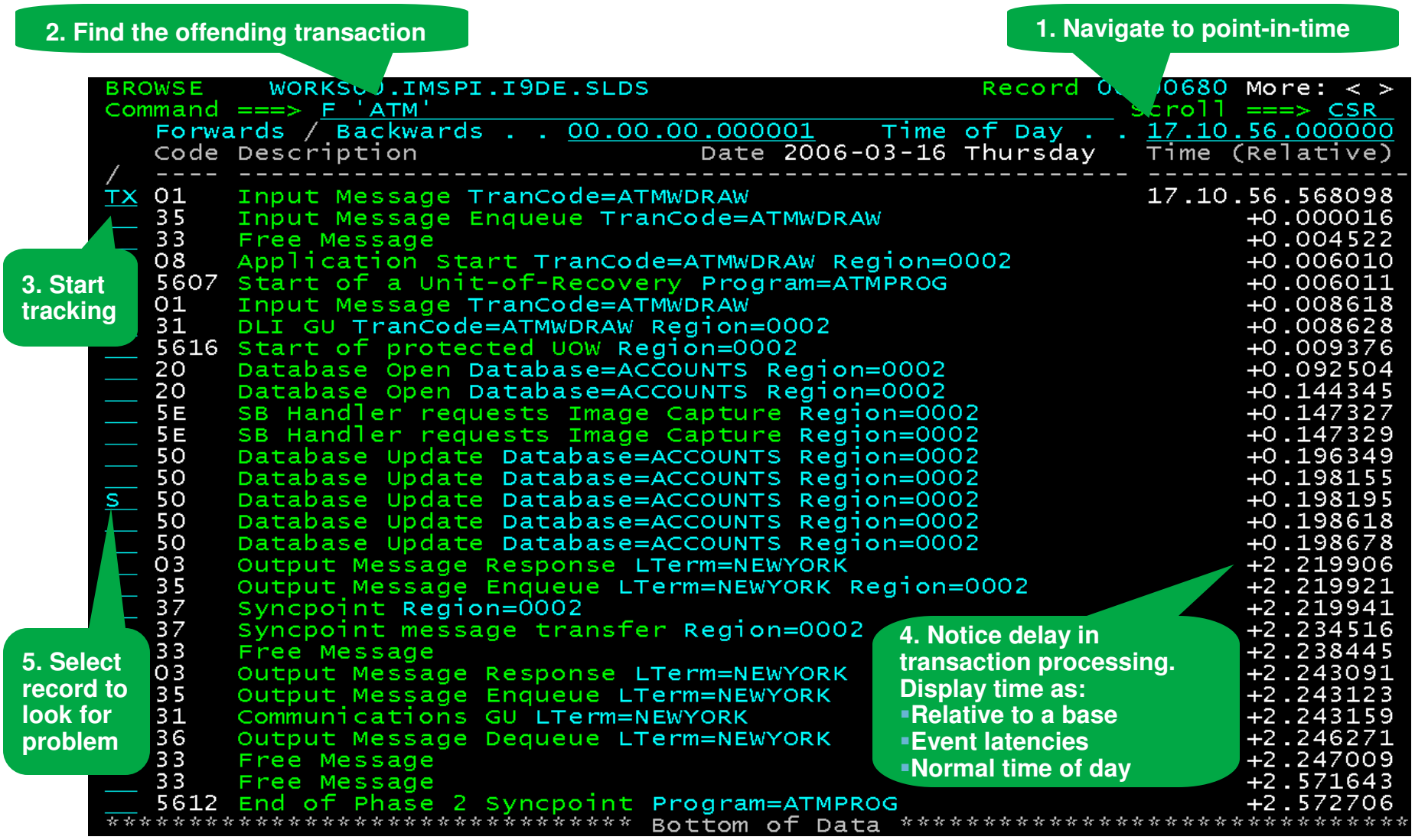
2. Expanded mode showing more information and time

```
   Code Description                    Date 2006-03-16 Thursday   Time (Local)
/  ---- ------------------------------------------------------- ----------------
__ 01   Input Message                                            17.11.22.028553
        UTC=17.11.22.018766 TranCode=CEXTNONC Userid=FUNTRM46 LTerm=FUNTRM46
        Terminal=SCOTCP46 OrgUOWID=I9DE/BE83010D0EB91341
   ------------------------------------------------------------------------------
```

3. Expanded mode showing LSN instead of time

```
   Code Description                    Date 2006-03-16 Thursday   LSN
/  ---- ------------------------------------------------------- ----------------
__ 01   Input Message                                            00000000000000D0
        UTC=17.11.22.018766 TranCode=CEXTNONC Userid=FUNTRM46 LTerm=FUNTRM46
        Terminal=SCOTCP46 OrgUOWID=I9DE/BE83010D0EB91341
   ------------------------------------------------------------------------------
```

Use F10/F11 to switch modes


2. Find the offending transaction
1. Navigate to point-in-time
3. Start tracking
5. Select record to look for problem
4. Notice delay in transaction processing. Display time as:
Relative to a base
Event latencies
Normal time of day
BROWSE WORKSOO.IMSPI.I9DE.SLDS Record 0 0680 More: < >
Command ===> F 'ATM' Scroll ===> CSR
Forwards / Backwards . . 00.00.00.000001 Time of Day . . 17.10.56.000000
Code Description Date 2006-03-16 Thursday Time (Relative)
TX 01 Input Message TranCode=ATMWDRAW 17.10.56.568098
35 Input Message Enqueue TranCode=ATMWDRAW +0.000016
33 Free Message +0.004522
08 Application Start TranCode=ATMWDRAW Region=0002 +0.006010
5607 Start of a Unit-of-Recovery Program=ATMPROG +0.006011
01 Input Message TranCode=ATMWDRAW +0.008618
31 DLI GU TranCode=ATMWDRAW Region=0002 +0.008628
5616 Start of protected UOW Region=0002 +0.009376
20 Database Open Database=ACCOUNTS Region=0002 +0.092504
20 Database Open Database=ACCOUNTS Region=0002 +0.144345
5E SB Handler requests Image Capture Region=0002 +0.147327
5E SB Handler requests Image Capture Region=0002 +0.147329
50 Database Update Database=ACCOUNTS Region=0002 +0.196349
50 Database Update Database=ACCOUNTS Region=0002 +0.198155
S 50 Database Update Database=ACCOUNTS Region=0002 +0.198195
50 Database Update Database=ACCOUNTS Region=0002 +0.198618
50 Database Update Database=ACCOUNTS Region=0002 +0.198678
03 Output Message Response LTerm=NEWYORK +2.219906
35 Output Message Enqueue LTerm=NEWYORK Region=0002 +2.219921
37 Syncpoint Region=0002 +2.219941
37 Syncpoint message transfer Region=0002 +2.234516
33 Free Message +2.238445
03 Output Message Response LTerm=NEWYORK +2.243091
35 Output Message Enqueue LTerm=NEWYORK +2.243123
31 Communications GU LTerm=NEWYORK +2.243159
36 Output Message Dequeue LTerm=NEWYORK +2.246271
33 Free Message +2.247009
33 Free Message +2.571643
5612 End of Phase 2 Syncpoint Program=ATMPROG +2.572706
Bottom of Data

Merged Log and Monitor

Transaction arrives and put onto the shared queue

Transaction on back-end

DLI database call starts

Database open

VSAM IWAIT

IRLM IWAIT

Database updates logged

Output message issued and sent back to front-end

Output message received and transaction completes

```
01   Input Message TranCode=ATMWDRAW                          17.10.56.568098
35   Input Message Enqueue TranCode=ATMWDRAW                          0.000016
0702 CQSPUT COMMIT request completed                                  0.000085
4E15 Scheduling IWAIT end Region=0002                                 0.005487
08   Application Start TranCode=ATMWDRAW Region=0002                  0.000420
5607 Start of a Unit-of-Recovery Program=ATMPROG                      0.000000
4E64 DLA30 start Database=I/O PCB Region=0002                         0.000002
0801 CQSREAD request completed                                        0.000427
01   Input Message TranCode=ATMWDRAW                                  0.002177
31   DLI GU TranCode=ATMWDRAW Region=0002                             0.000009
4E65 DLA30 end Region=0002 SC='  '                                    0.000130
4E42 Transaction Originator TranCode=ATMWDRAW Region=0002             0.000001
4E11 MPP Scheduling end TranCode=ATMWDRAW Region=0002                 0.000006
5616 Start of protected UOW Region=0002                               0.000609
4E60 DLI Call start Region=0002                                       0.000007
4E62 DLA00 start Database=ACCOUNTS Region=0002 Func=GU                0.000021
4E66 PI/IRLM ENQ IWAIT start Database=ACCOUNTS Region=0002            0.000189
4E67 PI/IRLM ENQ IWAIT end Region=0002                                0.000554
4E24 VSAM IWAIT start Database=ACCOUNTS Region=0002                   0.062948
4E25 VSAM IWAIT end Region=0002                                       0.000606
20   Database Open Database=ACCOUNTS Region=0002                      0.000030
5E   SB Handler requests Image Capture Region=0002                    0.002982
5E   SB Handler requests Image Capture Region=0002                    0.000001
4E24 VSAM IWAIT start Database=ACCOUNTS Region=0002                   0.000993
4E25 VSAM IWAIT end Region=0002                                       0.000724
4E24 VSAM IWAIT start Database=ACCOUNTS Region=0002                   0.000265
4E25 VSAM IWAIT end Region=0002                                       0.000603
4E66 PI/IRLM ENQ IWAIT start Database=ACCOUNTS Region=0002            0.000076
4E67 PI/IRLM ENQ IWAIT end Region=0002                                0.001880
4E63 DLA00 end Region=0002 Seg=ACNTINFO SC='   '                      0.000030
4E61 DLI Call end Region=0002                                         0.000016
50   Database Update Database=ACCOUNTS Region=0002                    0.000023
50   Database Update Database=ACCOUNTS Region=0002                    0.000059
03   Output Message Response LTerm=NEWYORK                            0.001673
35   Output Message Enqueue LTerm=NEWYORK Region=0002                 0.000015
37   Syncpoint Region=0002                                            0.000019
37   Syncpoint message transfer Region=0002                           0.014575
0702 CQSPUT COMMIT request completed                                  0.000080
0801 CQSREAD request completed                                        0.006750
03   Output Message Response LTerm=NEWYORK                            0.001744
35   Output Message Enqueue LTerm=NEWYORK                             0.000032
31   Communications GU LTerm=NEWYORK                                  0.000035
36   Output Message Dequeue LTerm=NEWYORK                             0.003112
5612 End of Phase 2 Syncpoint Program=ATMPROG                         0.326434
4E65 DLA30 end Region=0002 SC='QC'                                    0.002015
4E61 DLI Call end Region=0002                                         0.000003
```

Long elapsed time

View the Formatted Record

Every IMS Log record type (including Traces) is formatted

```
  File  Menu  Help
BROWSE     IPIX.IMS610.
Command ===>                                                  Scroll ===> CSR
******************************** Top of data ********************************
+0004  Code... 01    IMS Message
+0A3A  STCK... B233C2A4649A3506      LSN.... 00000000056CF420
       Date... 1999-05-06 Thursday   Time... 07.54.18.076579

+0000  MSGLRLL.... 0A4A          MSGLRZZ.... 0000        MSGLCODE... 01
+0005  MSGFLAGS... D1            MSGDFLG2... 81          MSGFPADL... 94
+0008  MSGMDRRN... 080000ED      MSGRDRRN... 080000ED    MSGPRFLL... 0264
+0012  MSGCSW..... 00            MSGDFLG3... 00
+0014  MSGUOW..... Unit of Work (UOW) - Tracking
+0014  MSGORGID... 'IMW1    '   MSGORGTK... B233C2A464942D06
+0024  MSGPROID... 'IMW1    '   MSGPROTK... B233C2A464942D06
+0034  MSGUFLG1... 00            MSGUFLG2... 00
+0036  MSGRSQTY... 00            MSGDOFS.... 0000        MSGDRBN.... 00000000

+0040  MSGSSEGM... Message Prefix System Segment; Item ID = 81
+0040  MSGSILL.... 0040          MSGSIID.... 81          MSGCFLG1... 00
+0044  MSGCFLG2... C8            MSGCFLG3... 00          MSGCQSF1... 00
+0047  MSGCQSF2... 00
+0048  MSGPTERM... Full Physical Input Terminal ID
+0048  MSGILINE... 00000000      MSGITERM... 00000000
+0050  MSGTISEQ... 0000          MSGPREFO...          0  MSGPREFI...          0
+0056  MSGSETS.... 00            MSGRES01... 00          MSGRECCT...          0
+0060  MSGIDSTN... FDFFFFFF1D8AF460
+0068  MSGODSTN... 'TASTO75N'    MSGIHSQN... 0000000000000000
+0078  MSGFMTNM... '        '

+0080  MSGEPHDR... Extended Prefix System Segment; Item ID = 86
```

Summary

- IMS Connect no longer needs to be a mystery in terms of performance
- High degree of performance information available
  - Batch via IMS Connect Extensions and IMS Performance Analyzer
  - Real-time via OMEGAMON for IMS Connect

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