



IBM Software Group

Understanding The Impact Of The Network On z/OS Performance

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Session 10680

Tuesday 9:30 AM

Tivoli software



Agenda

- Introduction
- Looking at the application time line
- Examples of mainframe/network interaction
- Analysis scenario using commonly available commands
- Optimization examples
- Defining a consistent monitoring strategy

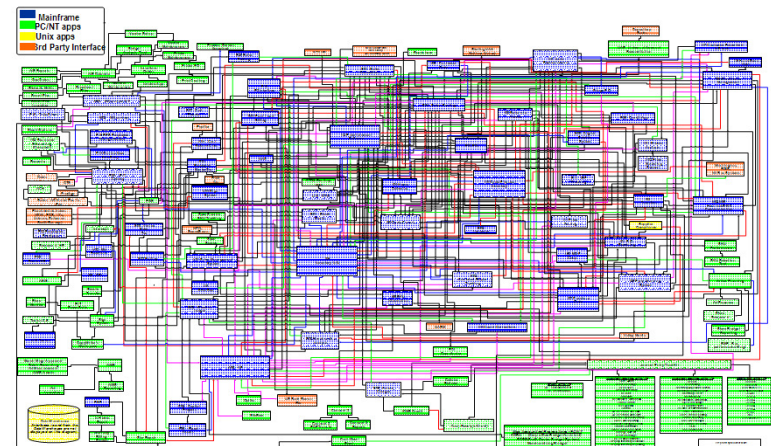


The Challenges Of Performance And Availability Management Of Complex Systems

- Most new applications are composite by design
 - ▶ Applications cross multiple subsystems and platforms
 - ▶ Integration and utilization of multiple core technologies
 - ▶ Pose challenges from a management and monitoring perspective

- Common Technical Challenges

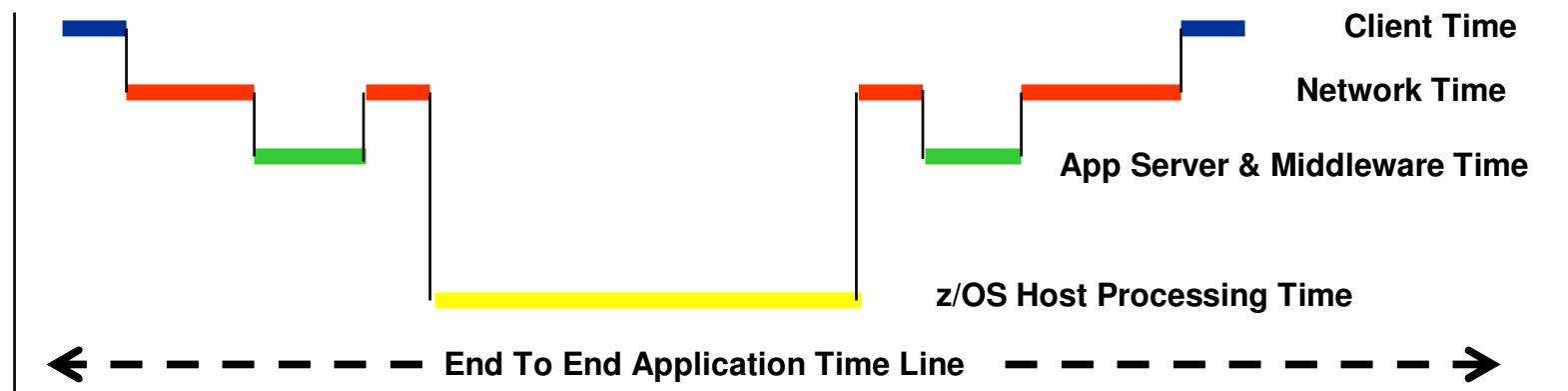
- ▶ Multiple platforms
- ▶ Potentially multiple DB systems
- ▶ Middleware considerations
- ▶ One or multiple network hops



- *Is the problem the network, the host, the DB, the client, or somewhere in between?*



The Network And The Application Time Line



- Portions of response time may reside in any of the following
 - ▶ End user client processing, the application server or middleware level, the database, or other aspects of host z/OS application processing
 - ▶ Potential for bottlenecks at multiple points
- The network will impact the overall application time line
 - ▶ Time is required to send messages across the network
 - ▶ Overhead processing, including communication subsystem session management
 - ▶ Network hardware, traffic, connections, connection pools

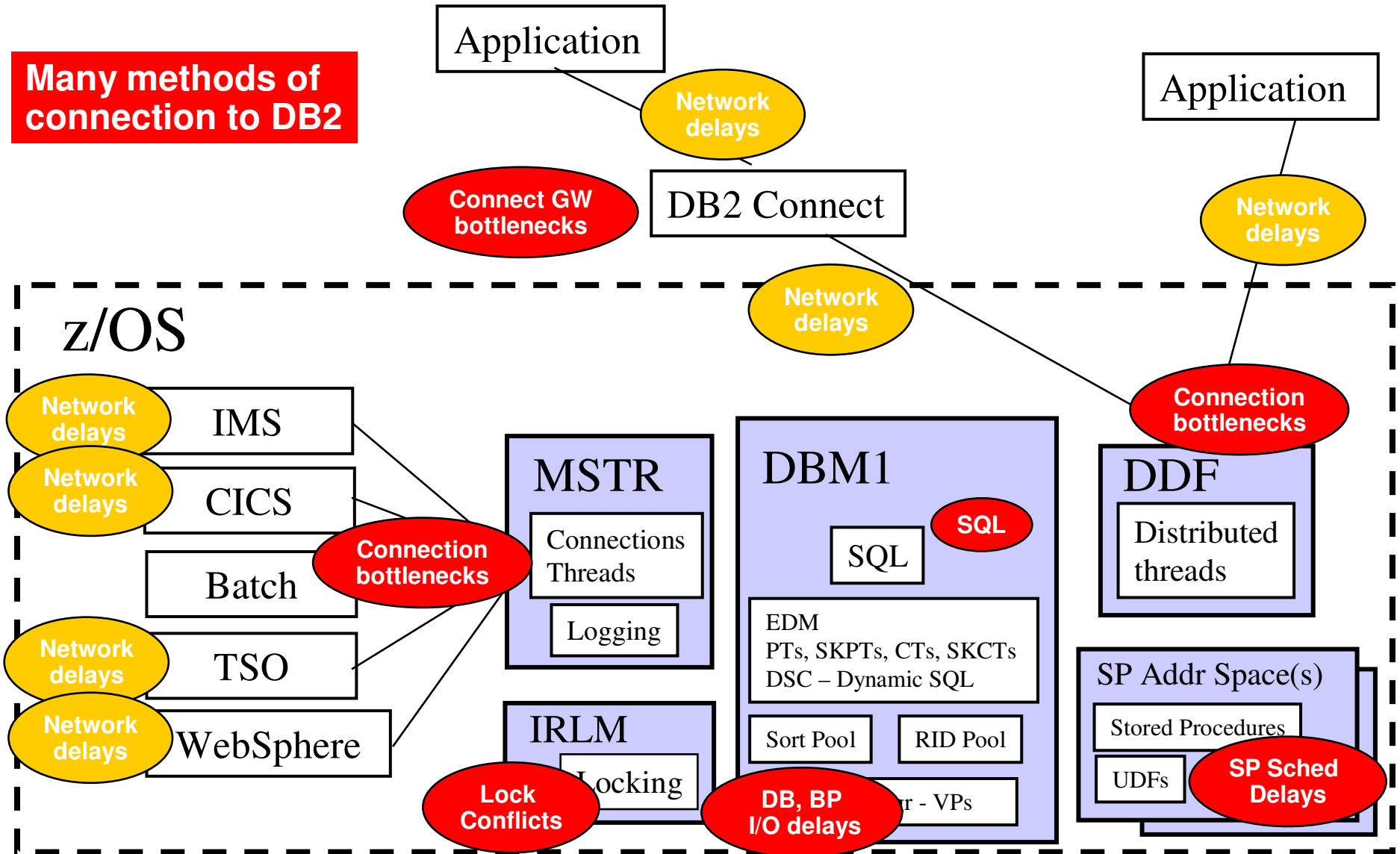
The Impact Of The Network On Critical z/OS Components

- The network has impact on z/OS workload in many ways
- Each z/OS application or component subsystem has unique network considerations
 - ▶ IMS
 - ▶ DB2
 - ▶ CICS
 - ▶ MQSeries
 - ▶ WebSphere
 - ▶ FTP
- Keep in mind that z/OS application/subsystem configuration and logic may also impact the network
 - ▶ Also, be aware of the potential impact of SSL and IPsec



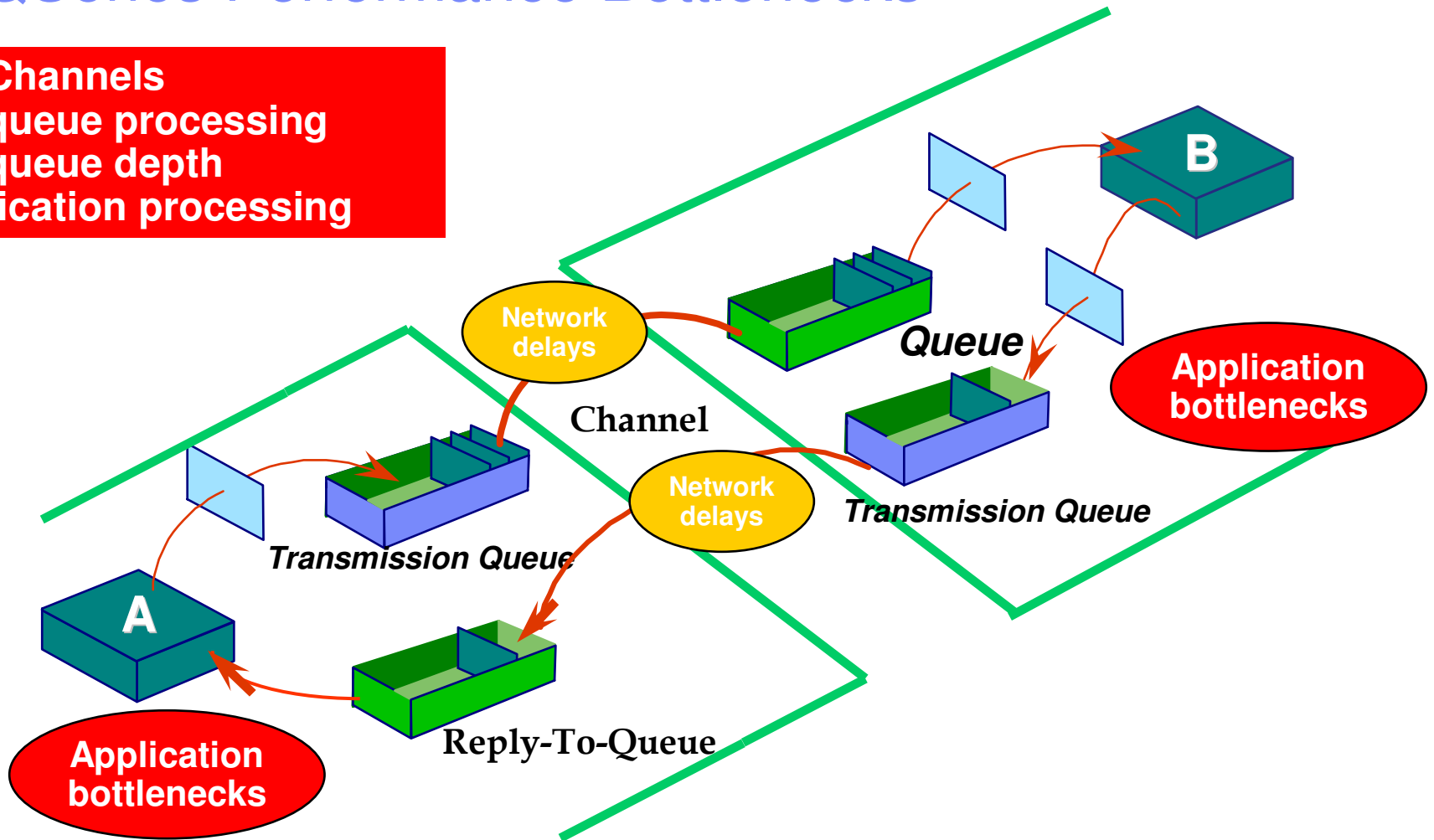
DB2 Has Several Potential Performance Bottlenecks

Many methods of connection to DB2

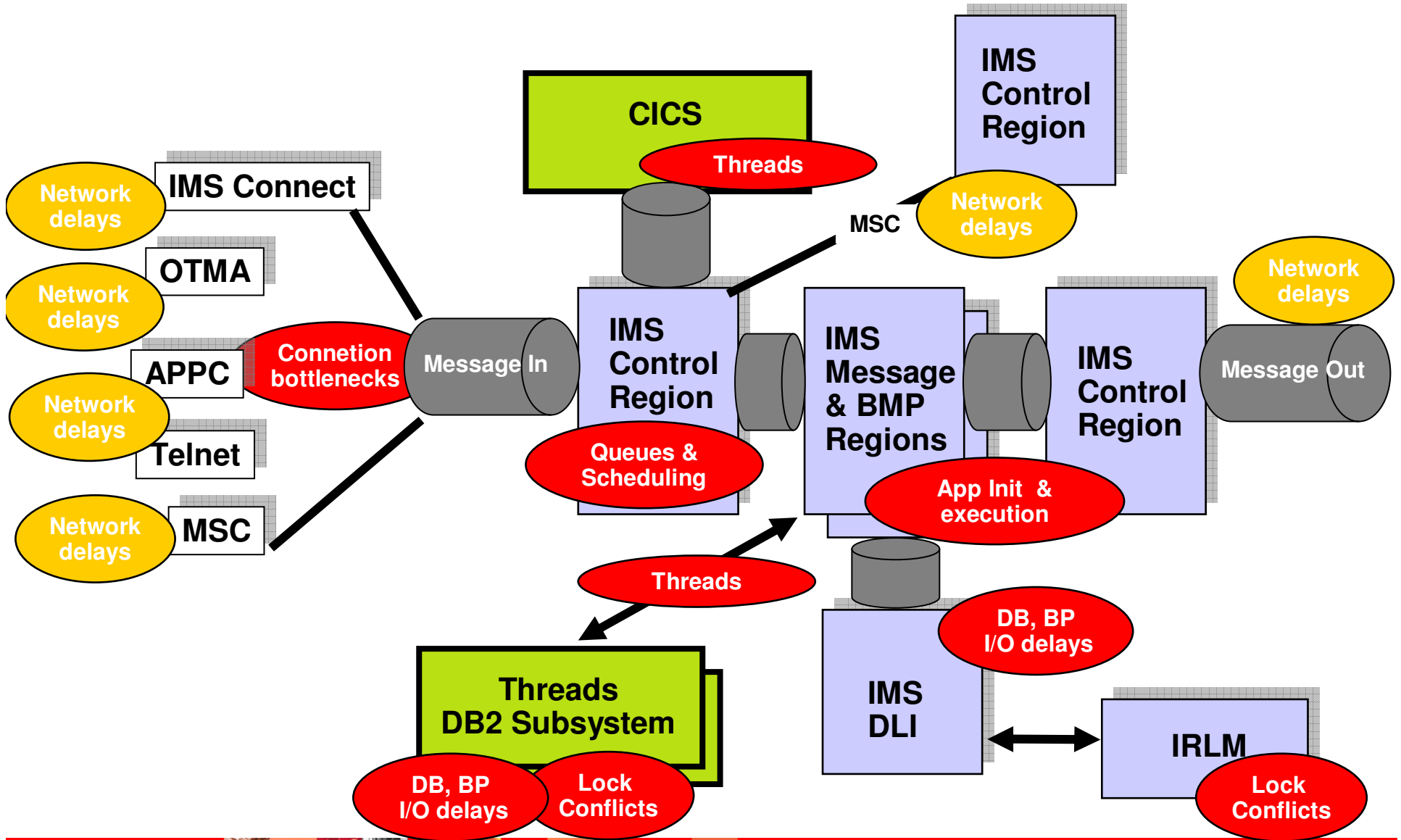


MQSeries Performance Bottlenecks

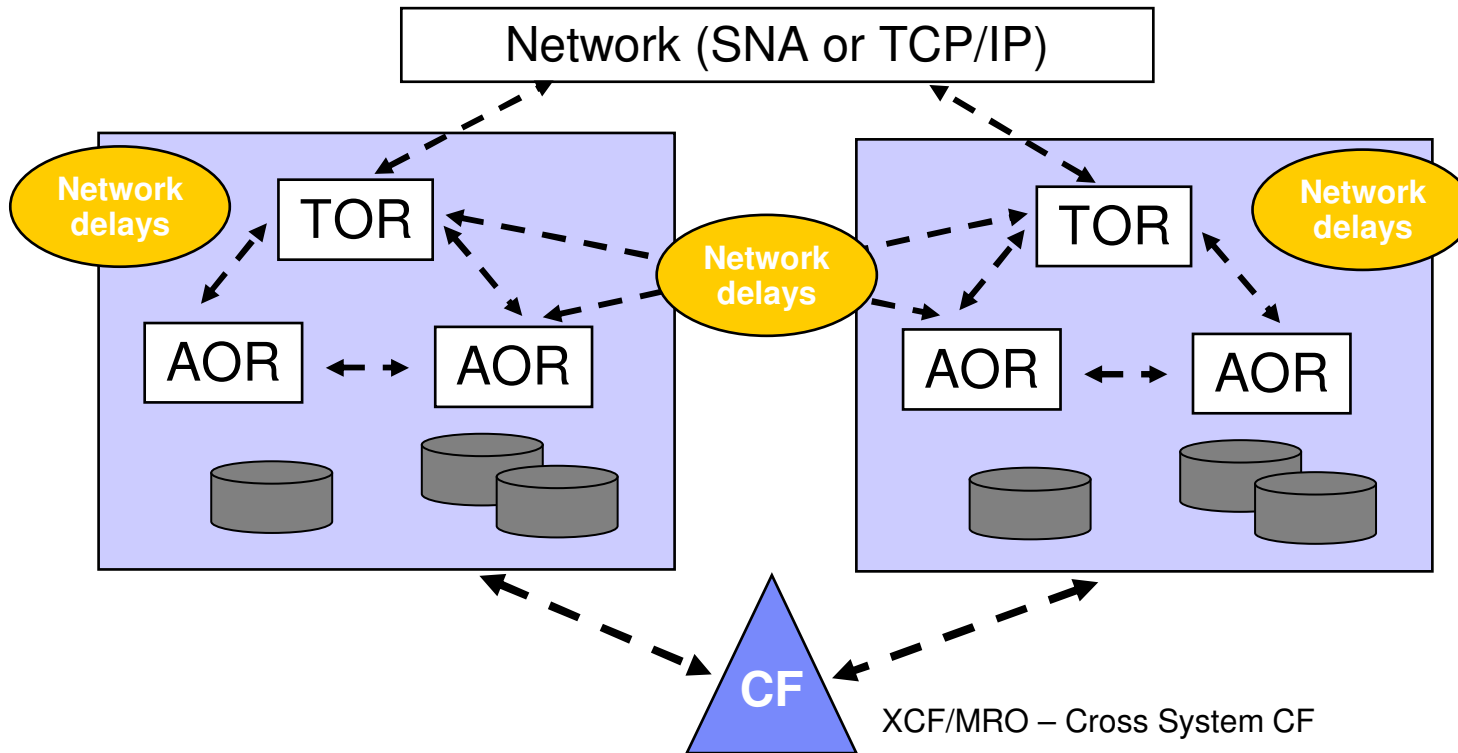
MQ Channels
MQ queue processing
MQ queue depth
Application processing



IMS Has Many Potential Bottlenecks (Including Network)

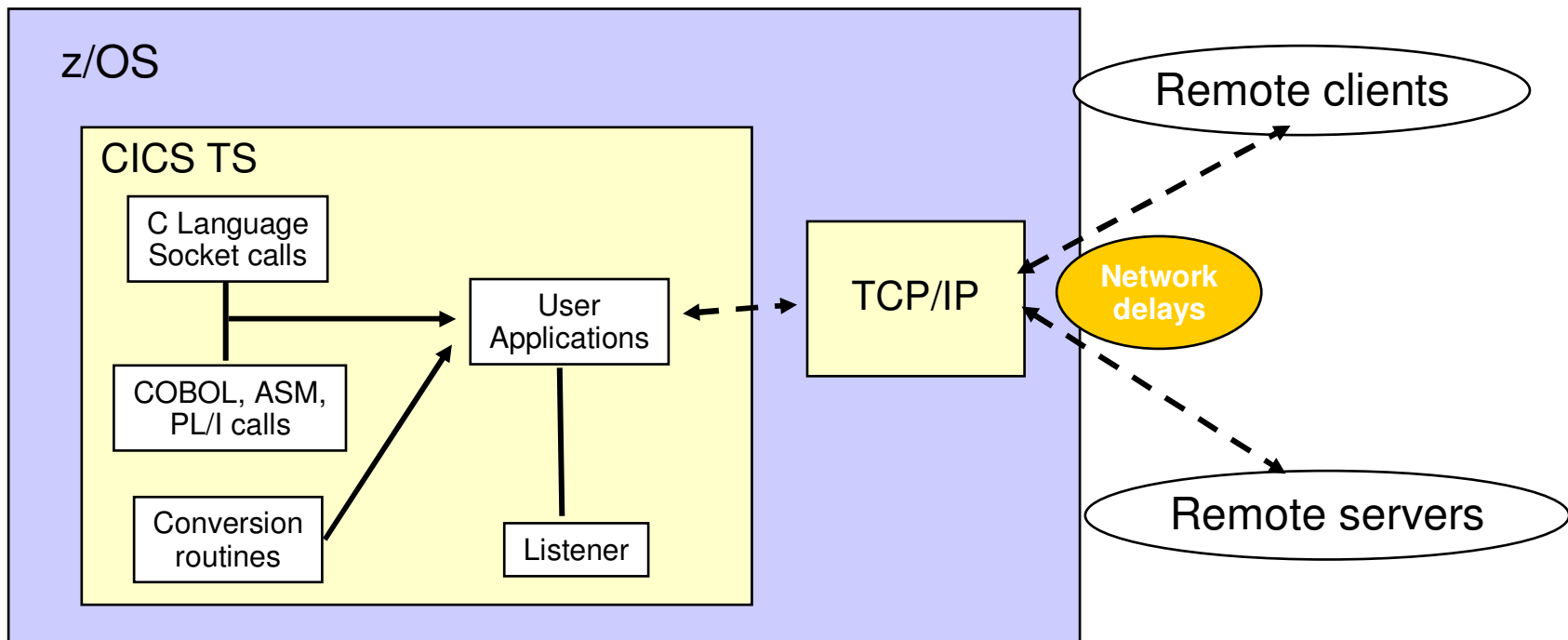


The Network Impacts CICS Processing



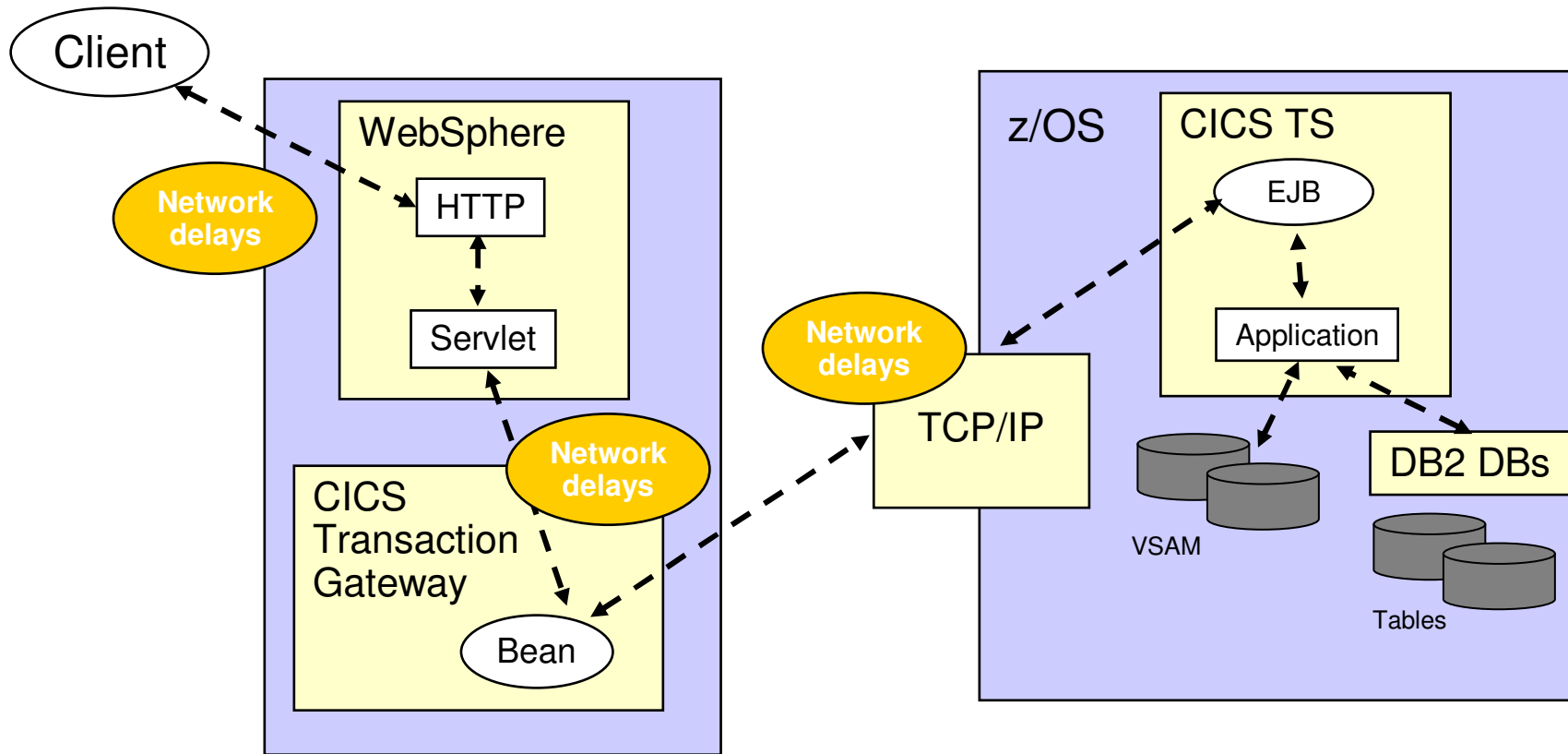
- Network potentially impacts CICS in a variety of ways
 - ▶ Connections to CICS – connections via a variety of means
 - ▶ Communication within CICS - ISC and MRO
 - InterSystems Communication - system to system, Multi-Region Operation - region to region, and IPIC – IP InterCommunications

CICS Socket Interface Example



- Socket API available for C, COBOL, PL/I and ASM applications
- Listener is a CICS transaction
- Conversion routines – ASCII/EBCDIC

A WebSphere Example With CICS Transaction Gateway



An Example - Looking At The Numbers

DB2 Distributed Performance

Statistics Trace Data For The DB2 Subsystem

```

>
DISTRIBUTED DATA FACILITY STATISTICS
DFST
+ Collection Interval:  REALTIME          Start:  06/04 13:40:46
+ Report Interval:     4 sec              End:   06/04 13:40:49
+
+ DCDB203   DDF Status                     =  ACTIVE
+           Dist Allied Threads           =    0
+ Active DBATs = 3                         Inactive DBATs =    0
+ DDF Send Rate = 0K/sec                   DDF Receive Rate = 0K/sec
+ Resync Attempts = 0                     Resync Successes =    0
+ Cold Start Connections = 0             Warm Start Connections =    0
+ DBAT Queued = 0                         Conversations Dealloc =    0
+ HWM All DBATs = 5                       HWM Active DBATs =    5
+ Max DB Access (MAXDBAT) = 500          HWM Inactive DBATs =    0
+
RDA REMOTE LOCS
+
+ Conversations Queued = 0                 Binds for Remote Access =    0
+ Message Buffer Rows = 174874             Block Mode Switches =    0
+ Commits/Remote = 0                      Rollbacks/Remote =    0
+ Indoubts/Remote = 0
+
+
+   Tran      SQL      Row Message      Byte  Commit  Abort   Conv   Blocks
+   -----  -----  -----  -----  -----  -----  -----  -----
+ Sent       0         0  174927    2486 43164569    0      0      0      1746
+ Recv      55       1714    0     2285 238429    363     8     55      0
+
    
```

Thread creation queues?

HWM of DBAT usage

Is buffering occurring?

**Recv – received into DB2
Sent – out to client/apps**

Bytes and messages sent and received

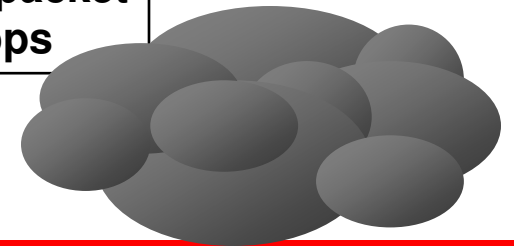
Network Analysis Tools

PING Command

- PING is a simple, but highly useful command
- Verifies connection between hosts by sending ICMP packets to the specified address (IP address or hostname)
- PING shows the time to echo a packet
- Beware - in some shops PING may have limitations

```
64 bytes from 198.210.45.27:icmp_seq=0 ttl=253 time=0.345 ms
64 bytes from 198.210.45.27:icmp_seq=1 ttl=253 time=0.345 ms
64 bytes from 198.210.45.27:icmp_seq=2 ttl=253 time=0.345 ms
```

PING <i>hostname</i> -l	# of bytes in echo packet
PING <i>hostname</i> -n	# of packets to echo
PING <i>hostname</i> -r	record the route of the packet
PING <i>hostname</i> -s	report timestamps of hops



Network Analysis Tools

NETSTAT Command

- NETSTAT reports TCP/IP connections and protocol statistics
- Get status information on connections and statistics on packets sent, packets received, fragmentation, etc.....

```
C:\Documents and Settings\woodse>netstat
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	IBM-1E47754C52F:4138	demomvs.demopkg.ibm.com:telnet	ESTABLISHED
TCP	IBM-1E47754C52F:4251	d01ml253.pok.ibm.com:1352	ESTABLISHED
TCP	IBM-1E47754C52F:4255	demomvs.demopkg.ibm.com:448	ESTABLISHED
TCP	IBM-1E47754C52F:1035	localhost:1036	ESTABLISHED
TCP	IBM-1E47754C52F:1036	localhost:1035	ESTABLISHED
TCP	IBM-1E47754C52F:1920	localhost:3416	ESTABLISHED
TCP	IBM-1E47754C52F:1920	localhost:3768	ESTABLISHED
TCP	IBM-1E47754C52F:3416	localhost:1920	ESTABLISHED
TCP	IBM-1E47754C52F:3417	localhost:3661	ESTABLISHED
TCP	IBM-1E47754C52F:3661	localhost:3417	ESTABLISHED
TCP	IBM-1E47754C52F:3661	localhost:3769	ESTABLISHED
TCP	IBM-1E47754C52F:3768	localhost:1920	ESTABLISHED
TCP	IBM-1E47754C52F:3769	localhost:3661	ESTABLISHED
TCP	IBM-1E47754C52F:1097	204.146.166.107:http	CLOSE_WAIT
TCP	IBM-1E47754C52F:1098	129.42.208.236:https	ESTABLISHED
TCP	IBM-1E47754C52F:1100	rarc0101.attglobal.net:http	CLOSE_WAIT
TCP	IBM-1E47754C52F:1187	www.live365.com:http	CLOSE_WAIT
TCP	IBM-1E47754C52F:1188	ss32.live365.com:http	ESTABLISHED
TCP	IBM-1E47754C52F:4204	58.mtl-mg05.streamtheworld.net:http	ESTABLISHED

NETSTAT command issued from client perspective.

Connection to DB2 on z/OS

NETSTAT Command

Display Connections To A Specific Port

```
netstat conn (port 448)
```

Connection to
DB2 on z/OS



```
EZZ2350I MVS TCP/IP NETSTAT CS V1R10          TCPIP Name: TCPIP          19:10:22
EZZ2585I User Id  Conn      Local Socket          Foreign Socket          State
EZZ2586I -----  ----  -----
EZZ2587I DSNCDIST 0000C90E 9.39.68.147..448      9.65.73.27..4255      Establ
sh
EZZ2587I DSNCDIST 0000005B 0.0.0.0..448          0.0.0.0..0            Listen
```

Command can be filtered a variety of ways including IP address and port number



NETSTAT Connection Detail

`netstat all (port 448)`

```

EZZ2350I MVS TCP/IP NETSTAT CS V1R10          TCPIP Name: TCPIP          19:16:24
EZZ2550I Client Name: DSNCDIST                Client Id: 0000C90E
EZZ2551I Local Socket: 9.39.68.147..448       Foreign Socket: 9.65.73.27..4255

EZZ2552I Last Touched:      19:14:58          State:      Establish
EZZ2577I BytesIn:           0000006973       BytesOut:   0008457981
EZZ2574I SegmentsIn:        0000003423       SegmentsOut: 0000006614
EZZ2553I RcvNxt:            3808791478       SndNxt:     2538223807
EZZ2554I ClientRcvNxt:     3808791478       ClientSndNxt: 2538223807
EZZ2555I InitRcvSeqNum:    3808784504       InitSndSeqNum: 2529765825
EZZ2556I CongestionWindow: 0000017349       SlowStartThreshold: 0000002620
EZZ2557I IncomingWindowNum: 3808824236       OutgoingWindowNum: 2538289289
EZZ2558I SndWl1:            3808791478       SndWl2:     2538223807
EZZ2559I SndWnd:            0000065482       MaxSndWnd:  0000131070
EZZ2560I SndUna:            2538223807       rtt_seq:    2538223753
EZZ2561I MaximumSegmentSize: 0000001310       DSField:    00
EZZ2563I Round-trip information:
EZZ2564I   Smooth trip time: 184.000          SmoothTripVariance: 84.000
EZZ2565I ReXmt:              0000000002       ReXmtCount: 0000000000
EZZ2572I DupACKs:            0000000284       RcvWnd:     0000032758
EZZ2566I SockOpt:            8D                TcpTimer:   00
EZZ2567I TcpSig:             04                TcpSel:     40
EZZ2568I TcpDet:             EC                TcpPol:     00
EZZ2537I QOSPolicy:          No
EZZ2542I RoutingPolicy:      No
EZZ2570I ReceiveBufferSize: 0000016384       SendBufferSize: 0000065536
EZZ2538I ReceiveDataQueued: 0000000000
EZZ2539I SendDataQueued:    0000000000
    
```

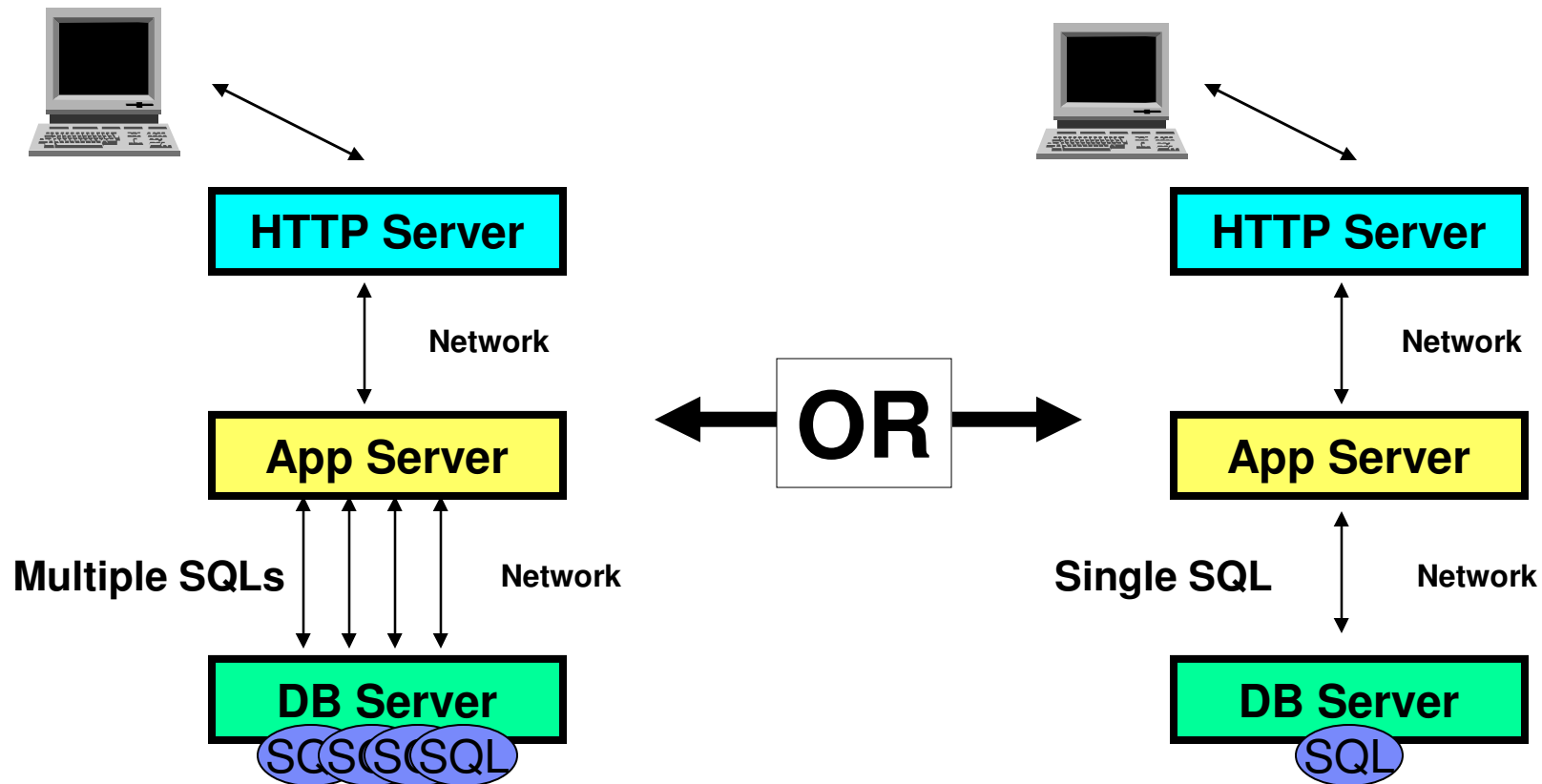
Byte counts

Network segment counts

Network response time info

Retransmission count

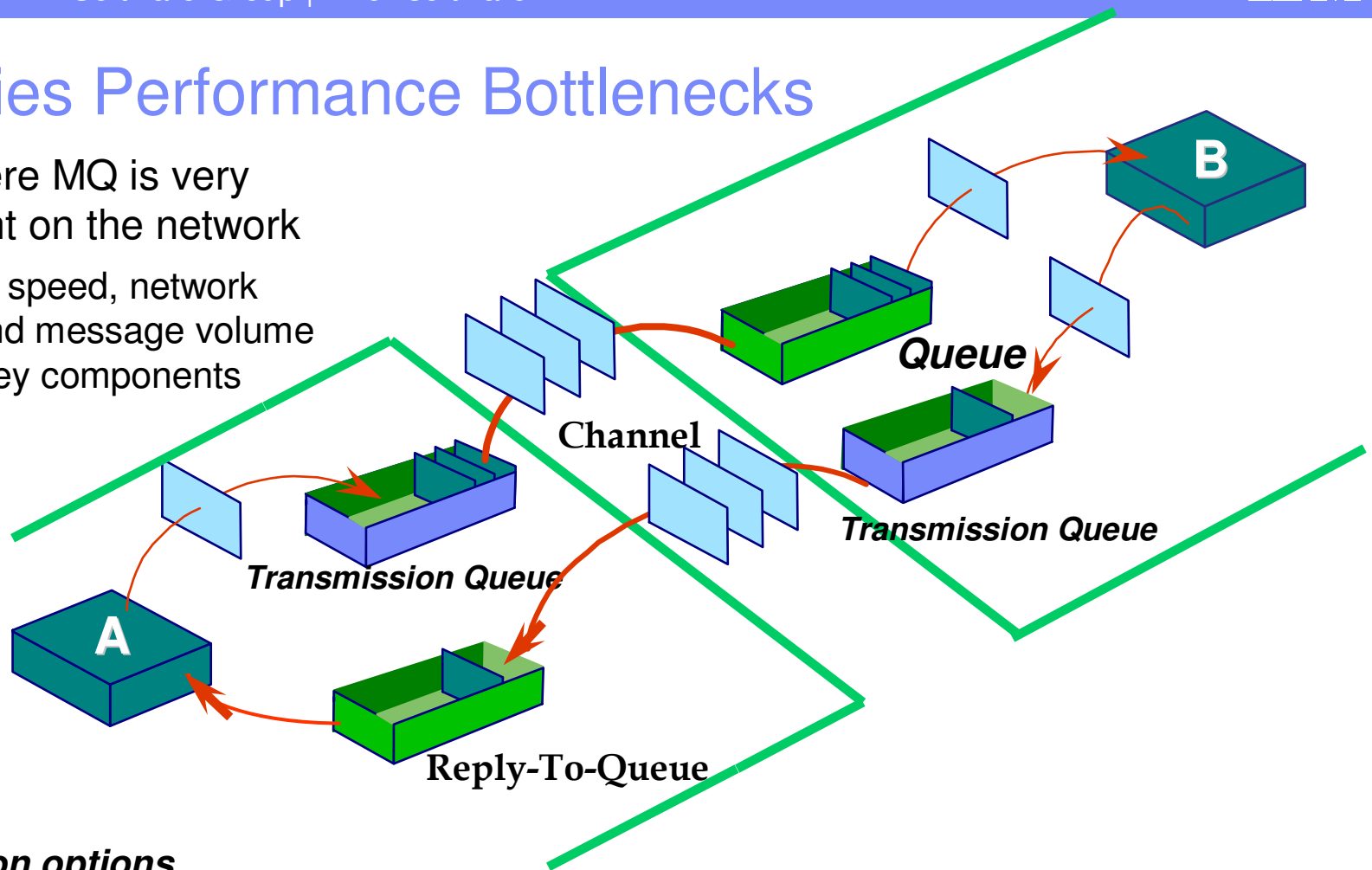
Example - Optimize DB2 Applications To Minimize Network Traffic



- Do more with SQL to eliminate redundant back/forth activity
- Crossing more layers will mean more overhead
- Don't put too much business logic in the DB layer

MQSeries Performance Bottlenecks

- WebSphere MQ is very dependent on the network
 - ▶ Network speed, network traffic and message volume are all key components



Optimization options

Increase network speed

Compress messages - decreases network transmission by reducing the size of the message.

Channel parameters

Batch size defines the maximum number of messages sent within a batch.

Reduces the amount of channel processing required.

Note – batching for small applications may result in delays and spikes



Many Factors May Impact Response Time

- Host processing bottlenecks
 - ▶ Transaction bottlenecks, application failures/stopped resources, high I/O and poor BP ratios, transaction/message queues, concurrency/lock conflicts
- Network performance
 - ▶ Network congestion, data fragmentation, data retransmission
- Network hardware issues
 - ▶ Adapter hardware errors, hardware configuration errors, hardware congestion issues
- Application subsystem connection issues
 - ▶ Application errors, subsystem configuration errors
- Application issues
 - ▶ Application design and logic problems

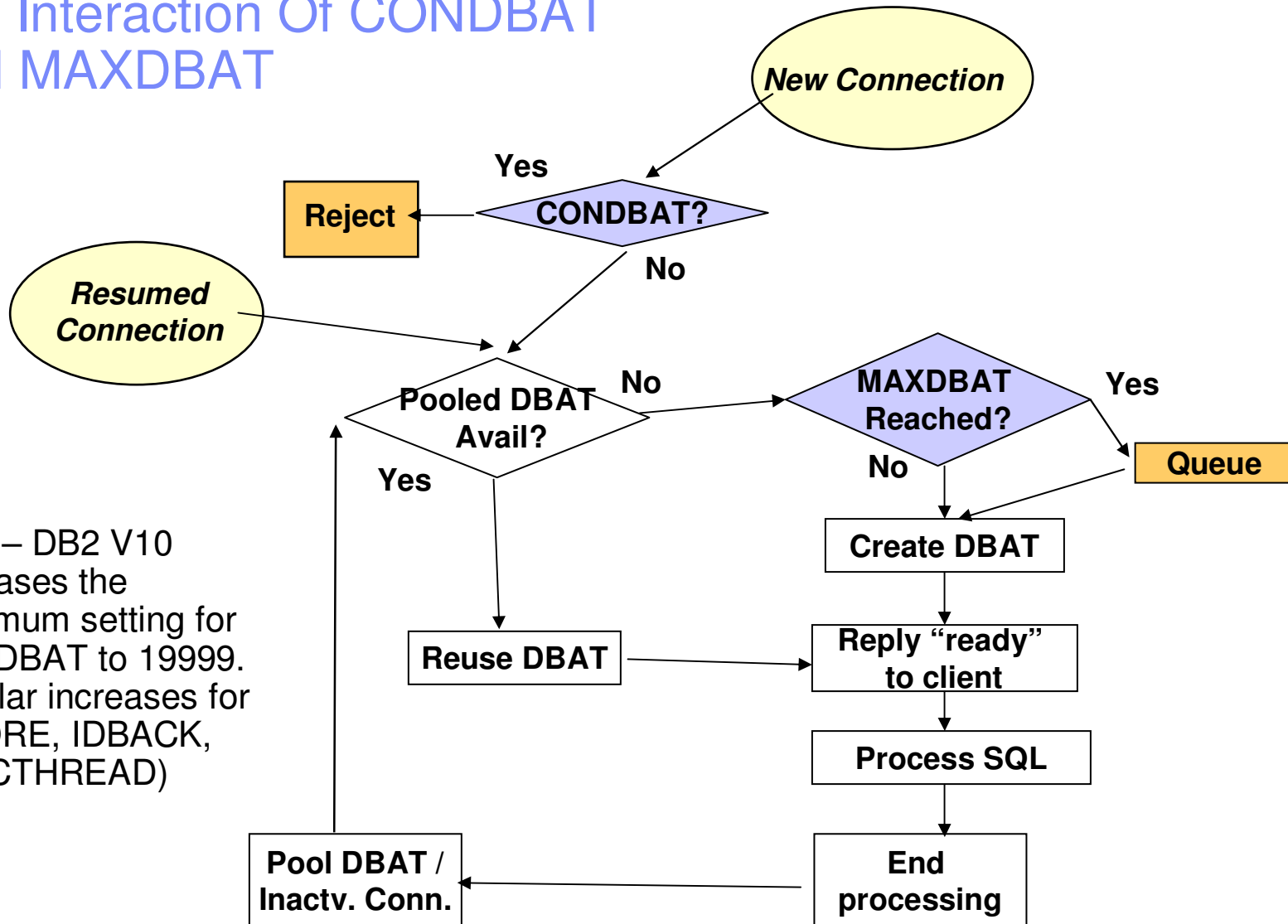


z/OS Application Configuration Considerations That May Impact Interaction With The Network

- CICS MAXSOCKETS
 - ▶ MAXSOCKETS SIT parameter specifies the maximum number of IP sockets that can be managed by the CICS sockets domain
- IMS Connect parameter MAXSOC
 - ▶ Total number of sockets IMS Connect supports across all ports at the same time
 - ▶ Note - USS parameter MAXFILEPROC must be equal to or greater than the value of the IMS Connect parameter MAXSOC
 - ▶ IMS Connect issues warning message HWSS0772W when the number of sockets reaches the default warning threshold of 80 percent of MAXSOC
- DB2 thread connection DSNZPARMs
 - ▶ MAXDBAT – Max Remote Active
 - ▶ CONDBAT – Max Remote Connected
 - ▶ Thread creation will queue if exceeded
- Application logic issues and errors
 - ▶ Application errors that tie up finite connection resources



A DB2 Example The Interaction Of CONDBAT And MAXDBAT

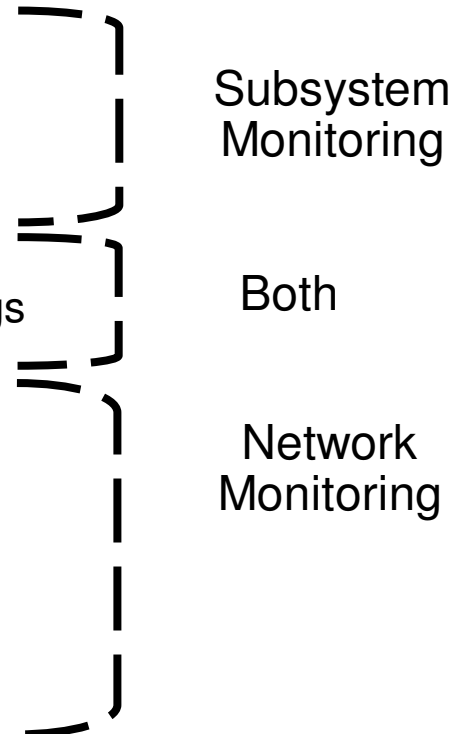


Note – DB2 V10 increases the maximum setting for MAXDBAT to 19999. (Similar increases for IDFORE, IDBACK, and CTHREAD)

Defining A Monitoring Strategy

Monitoring At Multiple Levels

- Monitor at the host application subsystem level
 - ▶ IMS, CICS, DB2, WebSphere, WebSphere MQ
 - ▶ Response time, transaction rates, message rates, queues
 - Monitor host application network connection activity
 - ▶ Connection activity, connection counts, connection backlogs
 - Monitor at the interface level
 - ▶ OSA adapters, error counts, fragmentation counts, retransmission counts
 - Monitor at the network connection level
 - ▶ Response time, traffic counts, error counts, fragmentation counts, retransmission counts
- Integrate host and network monitoring - - - - - Dashboard level monitoring
- Monitor from an end-to-end perspective - - - - - Composite level monitoring



An Example - IMS Host Subsystem Level Monitoring Detailed IMS Connect Transaction Level

Response Time Detail for Transaction PART Page: 1 of 144

Tran Code	Target Dastore	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	X
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000139	0.065653	0.000021	0.026154	HWSIMSO0	0.000000	0.118476	0.000000	0.000629	0.000025	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000062	0.000110	0.000018	0.000039	HWSIMSO0	0.000000	0.007838	0.000000	0.000342	0.000015	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000098	0.000089	0.000028	0.000013	HWSIMSO0	0.000000	0.009208	0.000000	0.000587	0.000020	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000113	0.000124	0.000018	0.000016	HWSIMSO0	0.000000	0.023006	0.000000	0.000614	0.000026	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000244	0.000117	0.000019	0.000016	HWSIMSO0	0.000000	0.007549	0.000000	0.000588	0.000020	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000096	0.000123	0.000030	0.000016	HWSIMSO0	0.000000	0.010288	0.000000	0.000622	0.000020	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000093	0.000124	0.000020	0.000018	HWSIMSO0	0.000000	0.008585	0.000000	0.000601	0.000020	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000080	0.000108	0.000016	0.000016	HWSIMSO0	0.000000	0.010068	0.000000	0.000550	0.000017	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000078	0.000115	0.000018	0.000014	HWSIMSO0	0.000000	0.008033	0.000000	0.000620	0.000018	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000082	0.000105	0.000018	0.000014	HWSIMSO0	0.000000	0.008343	0.000000	0.000542	0.000017	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000123	0.000124	0.000019	0.000018	HWSIMSO0	0.000000	0.009186	0.000000	0.000647	0.000029	HW

Response Time Detail for Transaction PART Page: 1 of 144

Tran Code	Target Dastore	Client ID	Port Number	User ID	Collection Level	Message Received Time	XMIT Exit Name	Time Outs	Commit Mode	Synchronization Level	NAK Count	OTMA NAK Sense Code	Client IP Address	Client IP Port	Timestamp	Sysplex Name
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	2999	11/14/09 12:13:04	LPAR400J
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3000	11/14/09 12:13:04	LPAR400J
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3001	11/14/09 12:13:04	LPAR400J
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3002	11/14/09 12:13:04	LPAR400J
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3003	11/14/09 12:13:04	LPAR400J
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3004	11/14/09 12:13:04	LPAR400J
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3005	11/14/09 12:13:04	LPAR400J
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3006	11/14/09 12:13:04	LPAR400J
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3007	11/14/09 12:13:04	LPAR400J
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3008	11/14/09 12:13:04	LPAR400J
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3009	11/14/09 12:13:04	LPAR400J
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3010	11/14/09 12:13:04	LPAR400J

Example - Understanding IMS Response Time

Mainframe network monitoring

Network time for IMS transactions

Total Bytes Received	Total Bytes Sent (in GB)	Total Bytes Sent	Total Bytes (in GB)	Total Bytes	Bytes Received	Bytes Sent	Bytes Sent or Received	Time Since Last Activity	Byte Rate	Response Time	Response Time Variance	Telnet Appl Name	Telnet LU Name	Sec Retra
670	0	6906	0	7576	291	2402	2693	14.00	53	0.98	0.02	IMSACB	TCP00012	
		298402	0	306704	105	5123	5228	80.66	104	1.13	0.11	DDCTSO03	TCP00010	
		11737	0	815097	0	0	0	243,022.19		0.01	0.01			
		0	0	3	0	0	0	651,449.87		0.82	11.24			
		0	0	3	0	0	0	759,051.09		1.03	11.24			

Including network monitoring detail provides a more complete analysis of IMS response time

View: Physical

- IMS MQSeries Status
- IMS Multiple Systems Coupli
- IMS OSAM BP Statistics
- IMS OSAM Subpool Statistic
- IMS OTMA Status
- IMS Pools Display
- IMS Program Scheduling Blc
- IMS Recovery Control Data
- IMS Response Time Analysis
- IMS RTA Item Summary
- IMS Startup Parameters
- IMS System Datasets

RTA Group - Queuing Time

RTA Group - Response Time

RTA Group Name	RTA Group Number	Input Queue Time (Secs.)	Program Input Queue Time (Secs.)	Processing Time (Secs.)	R0 Time (Secs.)	Output Queue Time (Secs.)	R1 Time (Secs.)	Timestamp
SYSTEM	0	0.0047	0.0000	0.0410	0.0458	0.0117	0.0458	01/17/09 11:43:46
OTHER	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	01/17/09 11:43:46
CLASS 1	1	0.0047	0.0000	0.0410	0.0458	0.0200	0.0458	01/17/09 11:43:46

IMS subsystem monitoring

IMS host response time including queue and processing time for the transaction

Another Example Combining Host And Network Level Monitoring

Tivoli Enterprise Portal Welcome Ed Woods Log out

File Edit View Help

Navigator View: Physical

- TCPIP: MVSA
 - Address Space
 - Applications
 - Connections
 - Gateways and D
 - FTP
 - Interfaces

DB2 thread level monitoring

Originating System ID	DB2 Subsystem	Enclave CPU Time	Current Period	Performance Index	Service Class	Authorization ID	Connection Type	Connection	Correlation ID
DSNA: MVSA: DB2	DSNA	00:00:00.000		N/A		DB2PM	RRSAF	RRSAF	
DSNA: MVSA: DB2	DSNA	00:00:00.000		N/A		DB2PM	RRSAF	RRSAF	OMEGAMON
DSNA: MVSA: DB2	DSNA	00:00:00.000		N/A		DB2PM	RRSAF	RRSAF	
DSNA: MVSA: DB2	DSNA	00:00:03.908	2	22	DDFDEF	JAZZ	DBAccess	SERVER	db2jcc_appli
DSNA: MVSA: DB2	DSNA	00:00:00.000		N/A		DB2ADM	RRSAF	RRSAF	BBOS001S
DSNA: MVSA: DB2	DSNA	00:00:00.000		N/A		DNET453	RRSAF	RRSAF	BBOS001S
DSNA: MVSA: DB2	DSNA	00:00:04.862	2	22	DDFDEF	JAZZ	DBAccess	SERVER	db2jcc_appli
DSNA: MVSA: DB2	DSNA	00:00:00.449	2	22	DDFDEF	JAZZ	DBAccess	SERVER	db2jcc_appli
DSNA: MVSA: DB2	DSNA	00:00:20.879	2	22	DDFDEF	JAZZ	DBAccess	SERVER	db2jcc_appli

DB2 network level monitoring

Application Name	Local IP Address	Local Port	Remote IP Address	Remote Port	Connection State	Total Bytes Received	Total Bytes Sent	Total Bytes	Bytes Received	Bytes Sent	Bytes Sent or Received	Time Since Last Activity	Byte Rate	Response Time	Response Time Variance
DSNADIST	9.39.68.147	4462	9.39.68.147	44891	ESTABLISHED	14,985,704	13,202,480	28,188,184	11250	8872	20122	7.97	2012	0.46	1.68
DSNADIST	9.39.68.147	4462	9.39.68.147	49868	ESTABLISHED	22,533,231	22,441,947	44,975,178	78805	76540	155345	3.17	15534	0.56	1.83

Monitor Host Application Network Connection Activity

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Applications Summary Table

	Collection Time	Application Name	Connection Count	Active Connections	Accepted connections	Connection Rate	Active Connection High Water Mark	Time stamp for Active Connections High Water Mark	Idle Time Since Last Accept	Time Since Last Activity	Server Up Time	Connections in Backlog	Backlog Connections Rejected	Total Backlog Connections Rejected
	03/08/12 12:32:21	CICSAOR2	3	0	0	0	0		3.18	0.00	456.94	0	0	
	03/08/12 12:32:21	CICSAOR3	9	2	0	0	2	02/29/12 12:14:56	172.51	575.94	172.51	0	0	
	03/08/12 12:32:21	CICSAOR4	4	0	0	0	1	03/07/12 12:22:21	456.94	0.00	456.94	0	0	
	03/08/12 12:32:21	CICSAOR5	7	0	0	0	1	03/05/12 20:16:20	67.36	0.00	67.36	0	0	
	03/08/12 12:32:21	CICSAOR6	3	0	0	0	0		17.42	0.00	17.42	0	0	
	03/08/12 12:32:21	CICSAOR7	2	0	0	0	0		0.23	0.00	17.41	0	0	
	03/08/12 12:32:21	CICSAOR8	3	0	0	0	0		456.94	0.00	456.94	0	0	
	03/08/12 12:32:21	CICSAOR9	1	0	0	0	0		456.94	0.00	456.94	0	0	
	03/08/12 12:32:21	CIC SAR10	1	0	0	0	0		334.42	0.00	334.42	0	0	
	03/08/12 12:32:21	CIC SAR11	2	0	0	0	0		456.95	0.00	456.95	0	0	
	03/08/12 12:32:21	CICSBPM1	3	0	0	0	2	02/22/12 20:04:55	311.78	0.00	456.94	0	0	
	03/08/12 12:32:21	CICSBPM2	3	0	0	0	0		456.94	0.00	456.94	0	0	
	03/08/12 12:32:21	CICSCM	6	0	0	0	2	02/28/12 14:27:56	19.18	0.00	456.95	0	0	
	03/08/12 12:32:21	CICSILOG	2	0	0	0	0		404.84	0.00	404.84	0	0	
	03/08/12 12:32:21	CICSPA01	6	2	0	0	2	03/06/12 00:07:21	60.41	5,876.35	60.41	0	0	
	03/08/12 12:32:21	CICSPA02	6	2	0	0	2	03/06/12 00:13:21	60.32	5,476.38	60.32	0	0	
	03/08/12 12:32:21	CIC SPT01	9	4	0	0	4	03/06/12 00:13:21	60.32	5,476.38	60.41	0	0	

- Connection activity, connection counts, connection backlogs
 - ▶ Look for applications with connection failures and backlogs

Monitor At The Interface Level

Tivoli Enterprise Portal Welcome Ed Woods Log out

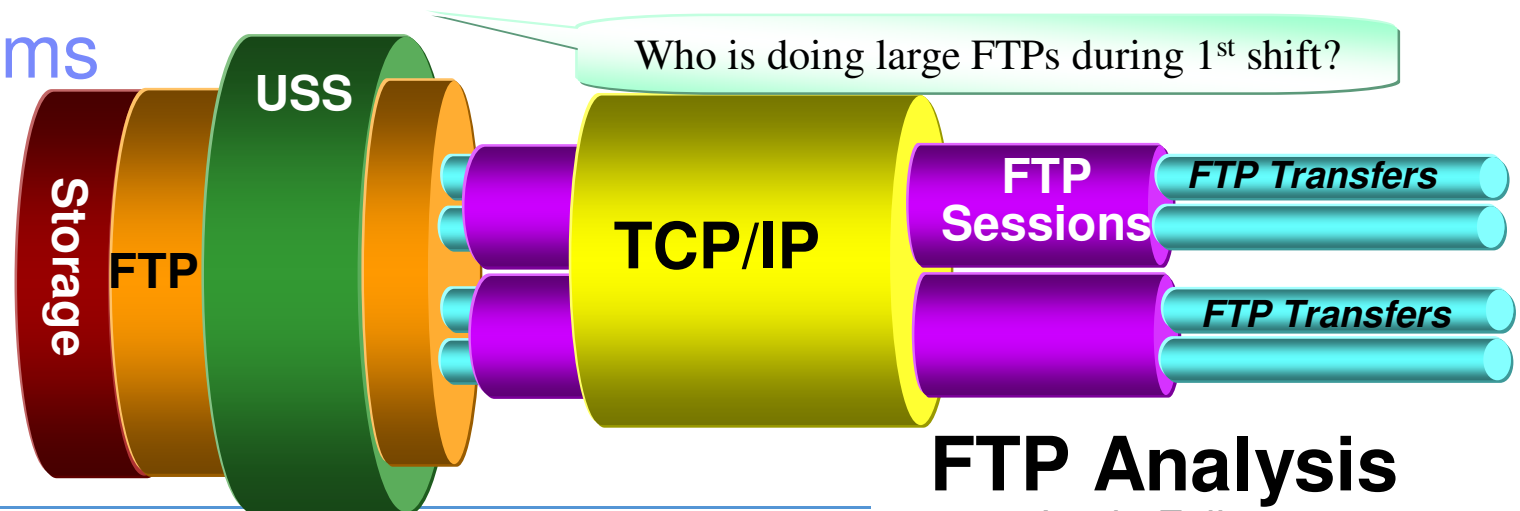
File Edit View Help

Interfaces Summary Table

Interface Name	Interface Type	Current State	Transmit Packet Rate	Receive Packet Rate	Transmit Bandwidth Utilization	Receive Bandwidth Utilization	Bandwidth Utilization	Inbound Packets Discarded	Inbound Packet Discard Rate	Outbound Packets Discarded	Outbound Packet Discard Rate	Percent Packets Discarded	Outbound Packets in Error	Transmit Error Rate
LOOPBACK	Loopback	Up	76779	76779	0	0	0	0	0	0	0	0	0	0
LOOPBACK6	Loopback	Up	0	0	0	0	0	0	0	0	0	0	0	0
EZ6OSM01	OSA_QDIO_ethernet_OSM	Up	0	0	0	0	0	0	0	0	0	0	0	0
EZ6OSM02	OSA_QDIO_ethernet_OSM	Up	0	0	0	0	0	0	0	0	0	0	0	0
EELINK1	Static_virtual	Up	0	0	0	0	0	0	0	0	0	0	0	0
OSAFBC0L	OSA_QDIO_ethernet OSD	Up	611	524	0	0	0	0	0	0	0	0	0	0
OSX3200P	OSA_QDIO_ethernet_OSX	Up	0	0	0	0	0	0	0	0	0	0	0	0
OSX3400P	OSA_QDIO_ethernet_OSX	Up	0	0	0	0	0	0	0	0	0	0	0	0
HIPERLF5	Hipersocket	Down	0	0	0	0	0	0	0	0	0	0	0	0
EZASAMEMVS	MPC_ptp_samehost	Up	0	0	0	0	0	0	0	0	0	0	0	0
IQDIOLNKC0A80193	Hipersocket	Up	0	0	0	0	0	0	0	0	0	0	0	0
EZAXCFS2	MPC_ptp_xcf	Up	0	0	0	0	0	0	0	0	0	0	0	0
EZAXCFS3	MPC_ptp_xcf	Up	0	0	0	0	0	0	0	0	0	0	0	0

- Monitor for interface status, bandwidth utilization, and errors
- Look for potential problems at the interface level

FTP Problems



FTP Analysis

- Login Failure reasons
- Hung
- Too Large
- Failures codes
- Last command
- Datasets names

User ID on Server	Session Start	Session End	Login Failure Reason Description
MS519	02/17/08 09:07:03	02/17/08 09:07:03	Password_not_valid
MS519	02/17/08 09:07:52		

User ID on Server	Last Reply to Client	Transmission Duration	Bytes Transmitted	Command	Last Reply to Client Description	Dataset Name
MS519	250	1140	1965120	RETRIEVE	Requested_file...	MS519.ELVIS...
MS519	250	490	429056	RETRIEVE	Requested_file...	MS519.ELVIS...
MS519	250	1140	1965120	RETRIEVE	Requested_file...	MS519.ELVIS...
MS519	250	500	429056	RETRIEVE	Requested_file...	MS519.ELVIS...
MS519	250	1160	1965120	RETRIEVE	Requested_file...	MS519.ELVIS...

Dashboard Level Monitoring Creating An Integrated Performance Interface

- Creating an integrated performance management display allows for the easy inclusion of network detail into various mainframe monitoring displays
- Integrated monitoring takes several forms
 - ▶ Integrated displays pulling together performance detail from multiple sources (host and network monitoring)
 - ▶ Integrated cross monitoring tool navigation
 - ▶ History integrated with real time performance information
 - ▶ Integrated alerts, alert correlation, and corrective actions



Dashboard Level Monitoring Integrate Host And Network Monitoring

Real time monitoring provides a view of current utilization, status, and alerts

The dashboard provides a comprehensive view of system health. Key components include:

- Graphic View:** A central visualization showing the relationship between z/OS, CICS, and Network components, represented by green circles.
- DB2 Distributed threads:** A table showing active threads for DB2 systems.
- CICS Response Time:** A table detailing response times for various CICS regions and groups.
- DB2 Dist Netw...:** A table showing network performance for DB2 applications.
- CICS TCPIP Performance:** A table showing network performance metrics for CICS applications.
- IMS Response Time:** A table showing response times for IMS systems.
- IMS Network Re...:** A table showing network details for IMS systems.
- Situation Event Console:** A panel for monitoring and managing system events and alerts.

Provides a view of current status, but is not necessarily 'predictive' in nature

DB2 Distributed threads

CICS Response time

DB2 network

CICS network

IMS Response time

IMS network

Collect History For Trending And Analysis

- Collect history data at multiple levels
 - ▶ System/LPAR level
 - ▶ Application level
 - ▶ Interface/adaptor level
 - ▶ Connection level
- Frequency and retention will vary by type
- Useful for trending and alert threshold analysis

Select desired group of information, collection interval, and destination

Group	Collection	Collection Interval	Collection Location	Warehouse Interval	Summarize Yearly	Prune Yearly	SU Q
TCPIP_FTP							
HPR_RTP_Connections							
VTAM_Summary_Statistics							
TCPIP_Applications		15 minutes	TEMS	1 hour			
TCPIP_Address_Space		15 minutes	TEMS				
TCPIP_Devices							

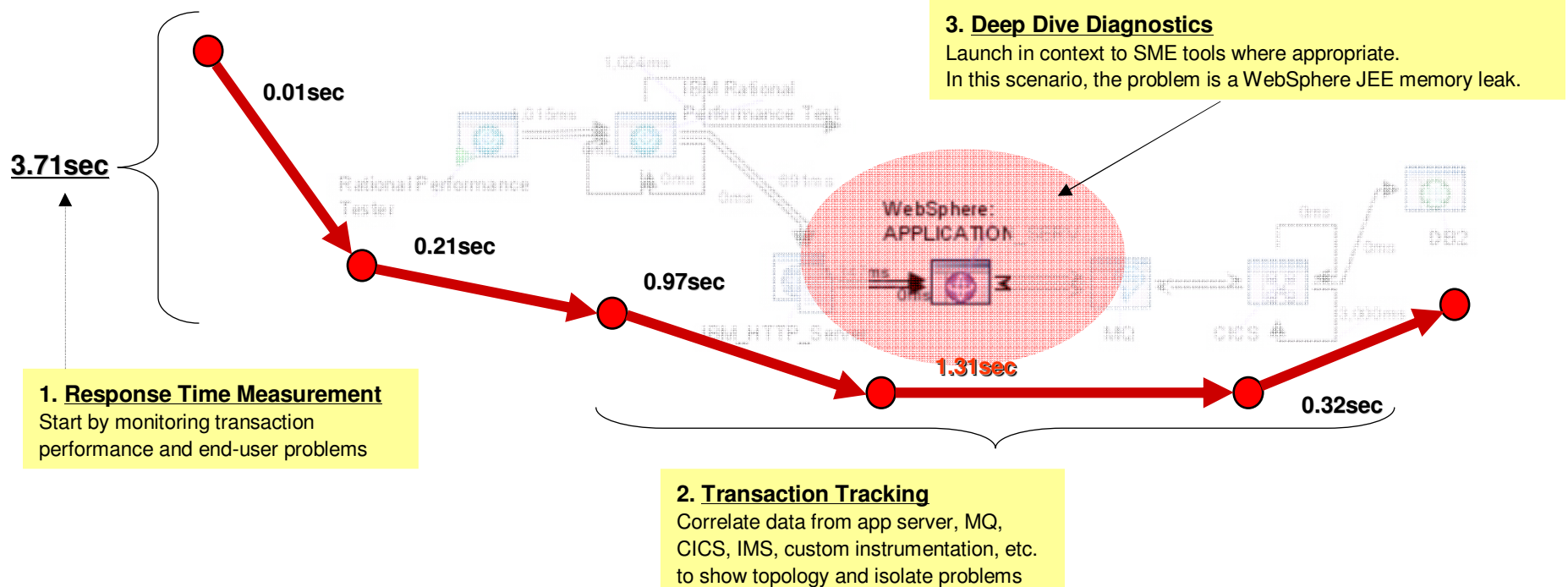
Collect at the TEMA or the TEMS

To warehouse or not to warehouse
Hourly, Daily, or not at all

Specify summarization and pruning along with collection interval

Graphics make it easier to spot peaks and valleys over time

End-to-End Monitoring, Tracking and Diagnosis



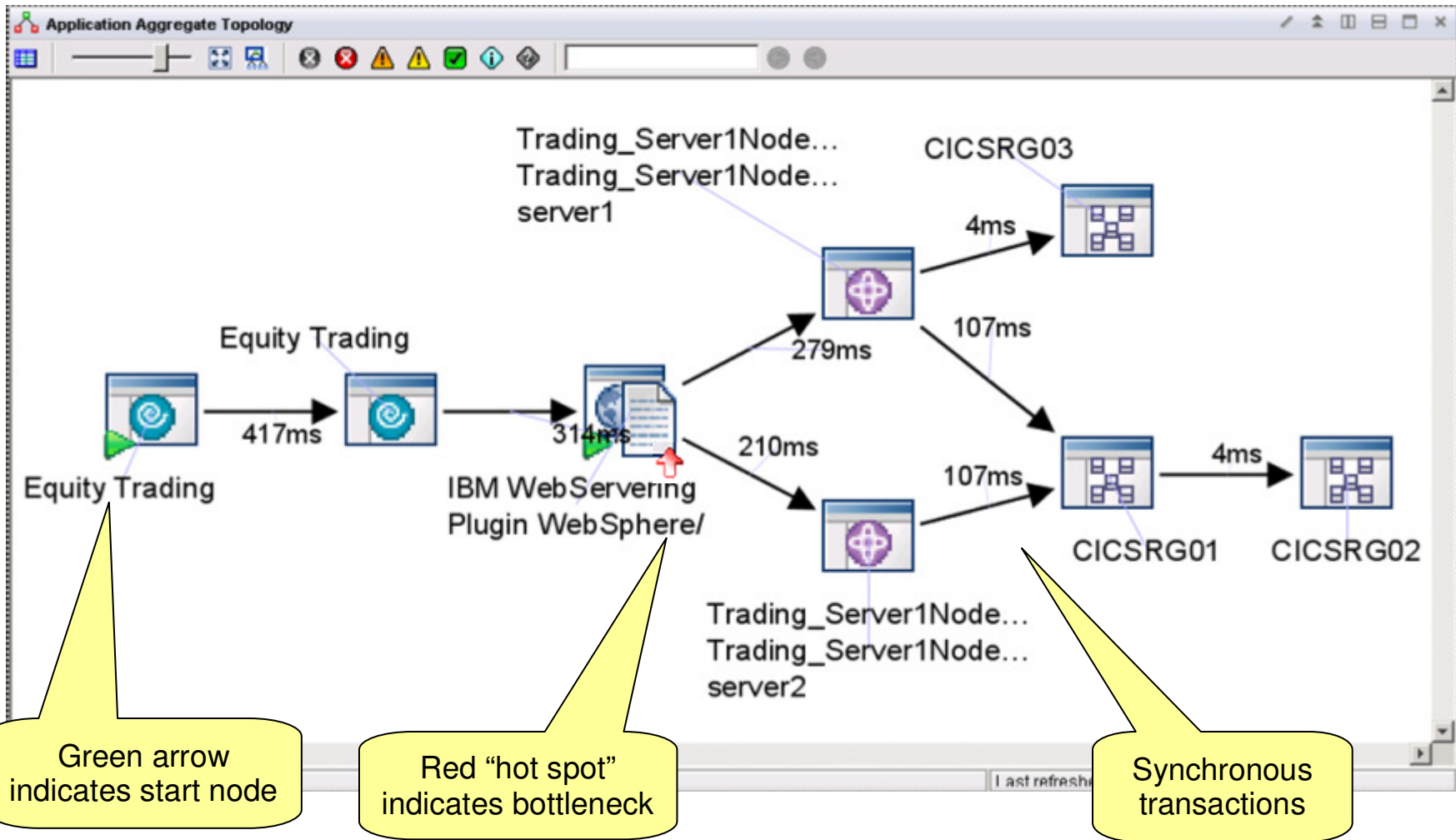
Transaction Root Cause Analysis

1. Sense End User Experience and alert on threshold violation

2. Isolate by measuring performance data against baseline through entire infrastructure

3. Diagnose and repair through launch-in-context into deep-dive diagnostics

End To End Monitoring Enables The Isolation of “Hot Spots”



Green arrow indicates start node

Red "hot spot" indicates bottleneck

Synchronous transactions

Summary

- The network is an essential part of the overall mainframe application time line
 - ▶ Each network application/subsystem has interactions with the network
- It's important to understand how the mainframe interacts with the network
 - ▶ Application/subsystem configuration and options
- It is useful to have an integrated monitoring strategy that pulls together core mainframe and network monitoring information
 - ▶ Integrated dashboard views, integrated analysis, integrated alerts and automated corrections
 - ▶ Defining an end to end analysis strategy



Thank You!



Check Out My Blog

http://tivoliwithaz.blogspot.com

The screenshot shows a browser window titled "Tivoli With A z - Microsoft Internet Explorer" displaying the blog "Tivoli With A z". The blog post is dated "Friday, February 5, 2010" and is titled "OMEGAMON DB2 Near Term History". The post content includes two screenshots of OMEGAMON DB2 NTH (Near Term History) displays. The first screenshot shows the NTH menu options, and the second shows a table of record information.

OMEGAMON DB2 Near Term History

OMEGAMON DB2 has a very useful Near Term History (NTH) function. NTH provides an easy way to be able to retrieve and review DB2 Accounting and Statistics records from the past few hours of DB2 processing. The data is stored in a set of VSAM files allocated to the OMEGAMON collection task. How far back the history goes depends upon the size of the files and the amount of data being written to these files. Now some of the data volume is driven by the DB2 workload activity. Accounting records are typically written when a DB2 thread terminates processing, and it is the Accounting data that is often looked at by the analyst when studying what DB2 applications have been doing. Statistics records are created on a time interval basis. Usually, you will have much more accounting data than statistics data. Also, OMEGAMON has the ability to pull in additional trace IFCIDs to get information on things such as dynamic SQL activity.

To understand the amount of data being gathered by NTH, there are displays that show the number of records written to the NTH files, by type. In the example I show, you see an example of common NTH settings/options, and then you see the record count in the NTH record information display. If you look carefully you see that 'Perf-Dyn SQL' has a lot of records written relative to the other record types. This is a good way to understand the impact of enabling certain collection options, such as dynamic SQL collection, and see how many trace records are being gathered, as a result.

Posted by Ed Woods at 3:13 PM 0 comments

ED WOODS

I'm an IT Specialist with IBM Corporation supporting Tivoli Performance solutions on z/OS. Please note that comments made on this blog are my own, and do not necessarily reflect the position of IBM Corporation.

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- [Article on policy automation](#)
- [Article on monitoring DB2 dynamic SQL](#)
- [IMS historical performance analysis](#)

Useful Links

- [Link to IBM Tivoli product information](#)
- [Link To Tivoli User Group](#)
- [Link to OPAL](#)
- [Tivoli System z Blog](#)