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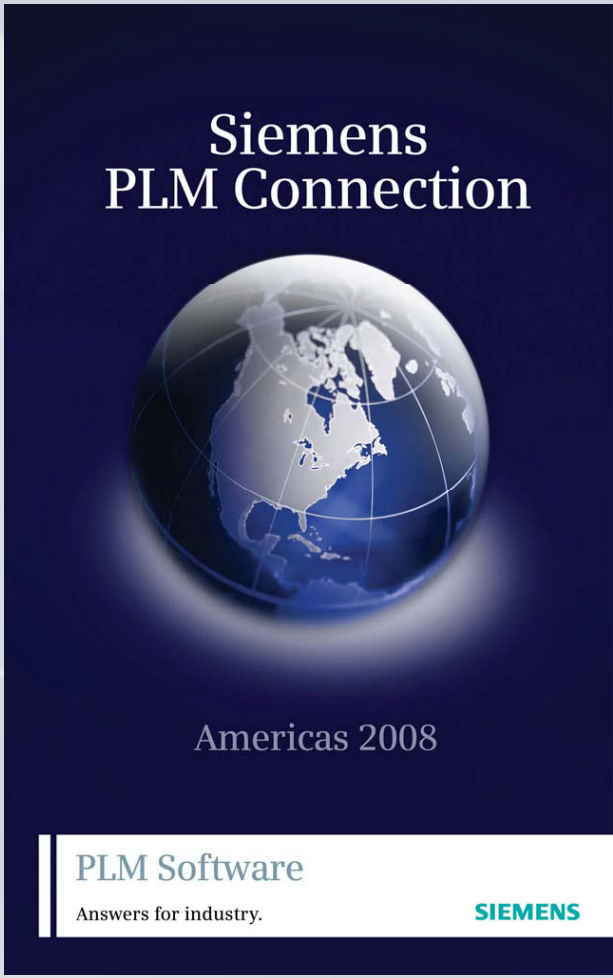
Siemens PLM Connection

The Network is Slow!



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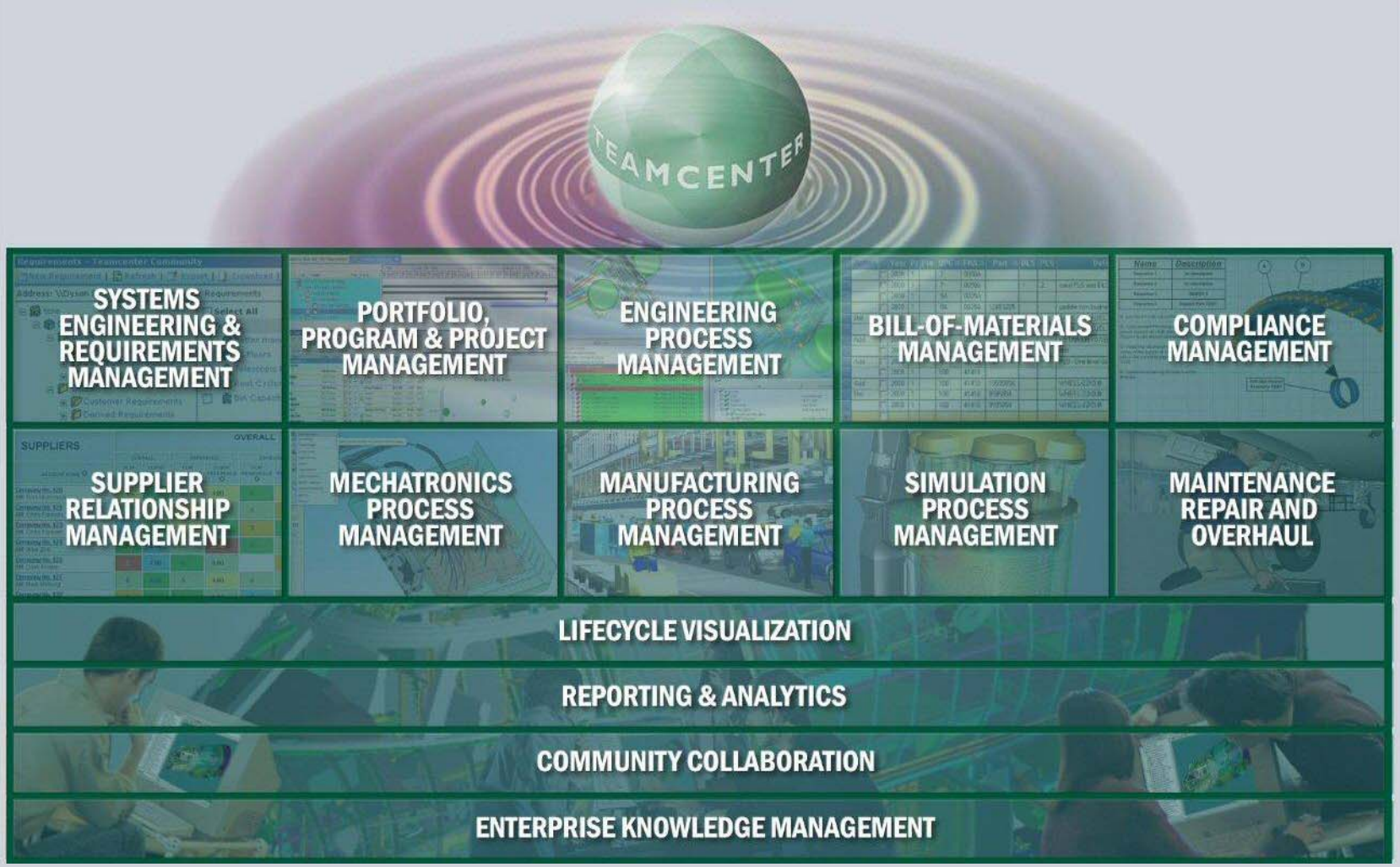
Teamcenter Digital Lifecycle Management Solutions



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Agenda

The introduction of 4-tier Teamcenter brings many advantages especially with WAN deployments but it also increases the opportunity for performance issues. Often problems are reported as a slow network when in fact the problem lies else where and requires more analysis to locate the cause.

We will look at:

- The causes of poor network performance
- Analysis Approaches
- Examining the evidence
- Network analysis resources
- Service level monitoring

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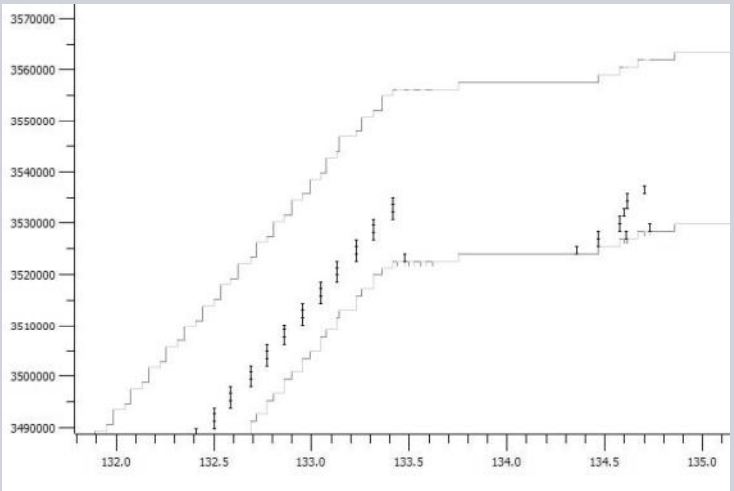
Common Causes of Performance Problems



High latency

- Client Processing
- Server Processing
- Database Processing
- Link Delays

Network Configuration problems
Packet loss
Redirections (routing, service)
Interdependencies (third parties)
Low throughput (small packets)
Negotiation faults (protocol or application layer)

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Causes of High latency

Client Processing

- Typical issues
  - RAC
    - Heap size too small
    - Too much running on the client
  - Thin Client
    - Rendering speed of the browser

Server Processing

- Web Application Server
  - Typical issues
    - JVM has not been tuned
- **Business logic Server**
  - Typical Issues
    - Memory
    - Server processes using too much CPU.

Covered in detail in the "Performance Engineering" presentation

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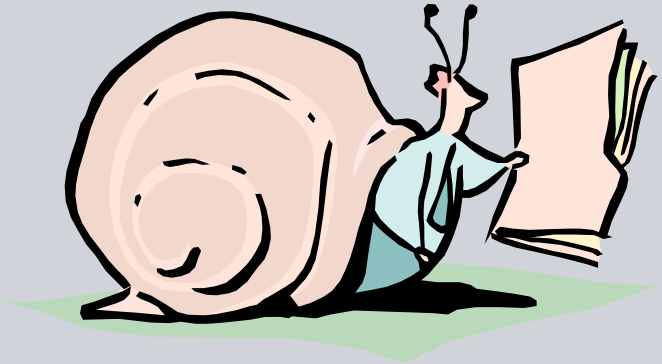
Causes of High latency



Database Processing

- Poorly tuned database

Link Delays

- Transmission
  - Physics
    - Transmission speed varies with medium
  - Network topology
    - Poor topology adds to the distance travelled
- Processing
  - Each active network component (switches, routers, firewalls) will slow down the transfer as well
    - The component needs time to receive the packet, analyse what must be done with it, and address the next destination.
  - Serialisation Delay,
    - Queuing within components
    - Queuing to cross narrow bandwidth links.
      - Components ‘store and forward’.

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Analysis Approaches

How do you know where to look?

- Database and Business logic can be analysed using Oracle and TC debugging (see “Performance Engineering “ for more details on debugging)
- Analyzing the network traffic.
  - At first packet level analysis may seem extreme but it provides clear pointer to issues in the network and isn’t difficult to do.

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How to start

First you need a packet capture and analyses tool

- Snoop
- For example Wireshark http://www.wireshark.org/
- For a Thin Client Fiddler can give excellent information http://www.fiddler2.com/fiddler2/ for browser analysis, it code decode HTTPS.

Next who is complaining about performance?

Is it general or local?

Collecting traffic

- Run Wireshark on the system with a problem
- Tap-in

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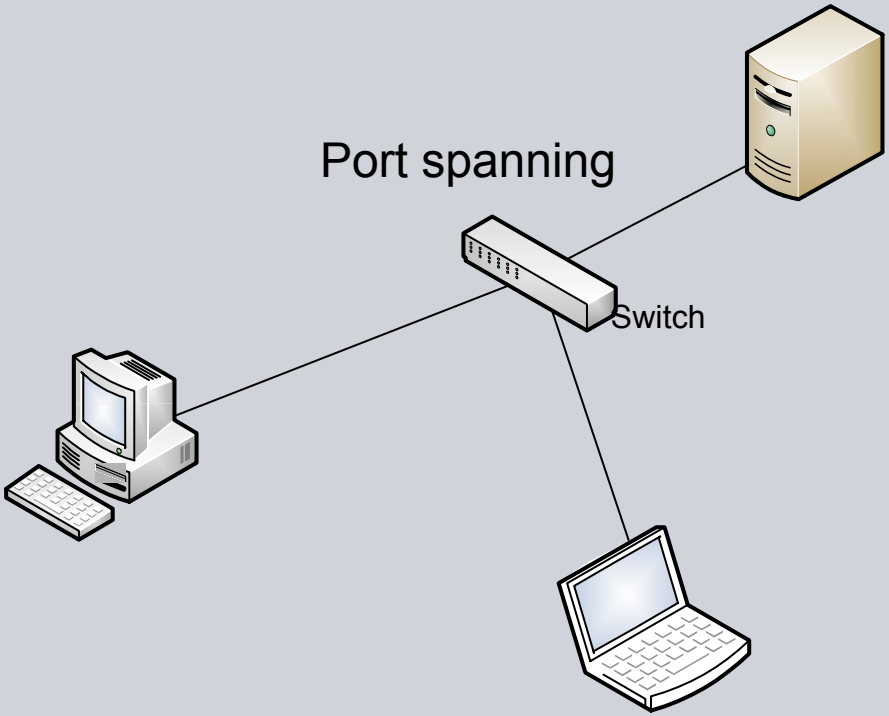
Tapping-in – Port Spanning



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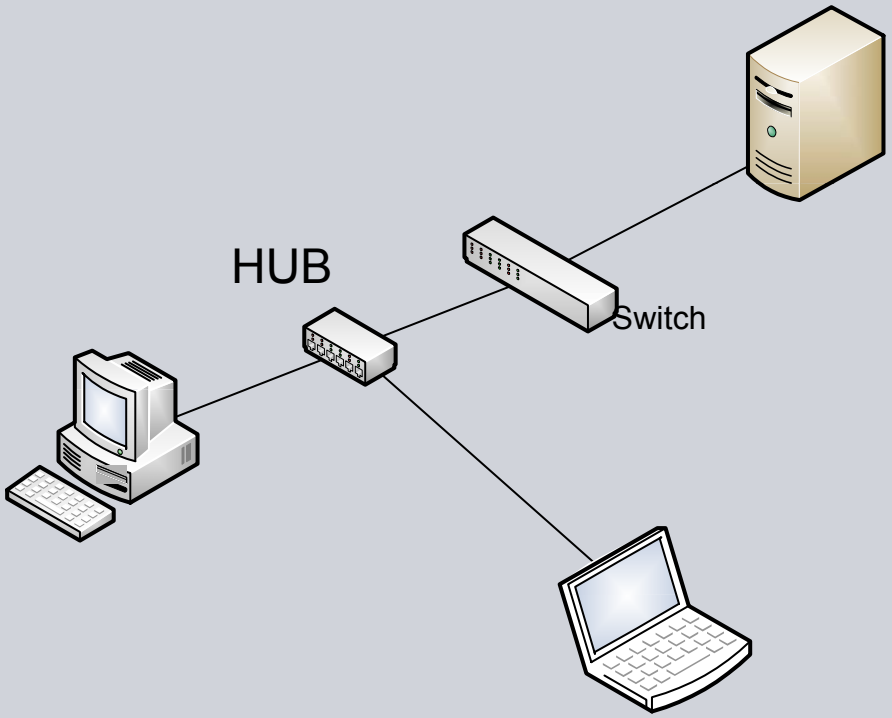
Tapping-in - HUB



A simple HUB will
Not work with full-duplex connection

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Wireshark

Set timing to

- View- > Time display format -> Seconds Since previous displayed packet

Wireshark resources

- www.wiresharkU.com
- http://wiki.wireshark.org/

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Syn, Syn Ack, Ack

Connection Established

Latency

Server Response time

login.pcap - Wireshark

File Edit View Go Capture Analyze Statistics Help

Filter: (ip.addr eq 134.244.3.12 and ip.addr Expression... Clear Apply

No.	Time	Source	Destination	Info
4	1.732	134.244.3.12	134.244.154.183	2570 > 7001 [SYN] Seq=0 Win=16384 Len=0 MSS
5	0.567	134.244.154.183	134.244.3.12	7001 > 2570 [SYN, ACK] Seq=0 Ack=1 Win=6553
6	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [ACK] Seq=1 Ack=1 Win=17706 Len
7	0.023	134.244.3.12	134.244.154.183	2570 > 7001 [PSH, ACK] Seq=1 Ack=1 Win=1770
8	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [PSH, ACK] Seq=237 Ack=1 Win=17
12	0.532	134.244.154.183	134.244.3.12	7001 > 2570 [ACK] Seq=1 Ack=374 Win=65162 L
14	3.443	134.244.154.183	134.244.3.12	7001 > 2570 [PSH, ACK] Seq=1 Ack=374 Win=65
15	0.000	134.244.154.183	134.244.3.12	7001 > 2570 [PSH, ACK] Seq=269 Ack=374 Win=
16	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [ACK] Seq=374 Ack=274 Win=17433
17	0.041	134.244.3.12	134.244.154.183	2570 > 7001 [PSH, ACK] Seq=374 Ack=274 Win=
18	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [PSH, ACK] Seq=696 Ack=274 Win=
19	0.611	134.244.154.183	134.244.3.12	7001 > 2570 [ACK] Seq=274 Ack=910 Win=64626
20	0.000	134.244.154.183	134.244.3.12	7001 > 25 Win=

```
45 00   ..fakeDE STB...E.
86 f4   ..OL@... .O......
50 18   .....Y.. ..+..%P.
6d 65   E*.a..j_ username
73 77   =infodba &j_passw
67 72   ord=info dba&j_gr
5f 63   oup=&j_r ole=&j_c
34 32   lient_se ssion=42
25 33   04557fbb 19d343%3
63 64   A1135cd9 %3A119cd
26 6a   afdc72%3 A-8000&j
```

Time: Seconds since previous displayed packet

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Overload

234	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [PSH, ACK] Seq=82870 Ack=18040 Win=16928 Len=10	TCP
235	0.306	134.244.154.183	134.244.3.12	7001 > 2570 [ACK] Seq=18040 Ack=69220 Win=65535 Len=0	TCP
236	0.000	134.244.154.183	134.244.3.12	7001 > 2570 [ACK] Seq=18040 Ack=70592 Win=65535 Len=0	TCP
237	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [ACK] Seq=82880 Ack=18040 Win=16928 Len=1362	TCP
238	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [ACK] Seq=84242 Ack=18040 Win=16928 Len=1362	TCP
239	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [ACK] Seq=85604 Ack=18040 Win=16928 Len=1362	TCP
240	0.000	134.244.154.183	134.244.3.12	7001 > 2570 [ACK] Seq=18040 Ack=73316 Win=65535 Len=0	TCP
241	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [PSH, ACK] Seq=86966 Ack=18040 Win=16928 Len=10	TCP
242	0.015	134.244.154.183	134.244.3.12	7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=65535 Len=0	TCP
243	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [ACK] Seq=86976 Ack=18040 Win=16928 Len=1362	TCP
244	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [ACK] Seq=88338 Ack=18040 Win=16928 Len=1362	TCP
245	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [ACK] Seq=89700 Ack=18040 Win=16928 Len=1362	TCP
246	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [PSH, ACK] Seq=91062 Ack=18040 Win=16928 Len=10	TCP
247	0.290	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#1] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=6	TCP
248	0.000	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#2] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=6	TCP
249	0.000	134.244.3.12	134.244.154.183	[TCP Fast Retransmission] 2570 > 7001 [ACK] Seq=74688 Ack=18040	TCP
250	0.000	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#3] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=6	TCP
251	0.000	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#4] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=6	TCP
252	0.000	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#5] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=6	TCP
253	0.000	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#6] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=6	TCP
254	0.000	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#7] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=6	TCP
256	0.083	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#8] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=6	TCP
257	0.130	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#9] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=6	TCP
258	0.000	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#10] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=	TCP
259	0.000	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#11] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=	TCP
260	0.037	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#12] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=	TCP
261	0.043	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#13] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=	TCP
262	0.003	134.244.154.183	134.244.3.12	[TCP Dup ACK 242#14] 7001 > 2570 [ACK] Seq=18040 Ack=74688 Win=	TCP
263	0.210	134.244.154.183	134.244.3.12	7001 > 2570 [ACK] Seq=18040 Ack=84242 Win=65535 Len=0 SLE=85604	TCP
264	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [ACK] Seq=91072 Ack=18040 Win=16928 Len=1362	TCP
265	0.000	134.244.3.12	134.244.154.183	2570 > 7001 [PSH, ACK] Seq=92434 Ack=18040 Win=16928 Len=412	TCP
267	0.409	134.244.154.183	134.244.3.12	[TCP Dup ACK 263#1] 7001 > 2570 [ACK] Seq=18040 Ack=84242 Win=6	TCP
268	0.003	134.244.154.183	134.244.3.12	[TCP Dup ACK 263#2] 7001 > 2570 [ACK] Seq=18040 Ack=84242 Win=6	TCP
269	0.000	134.244.3.12	134.244.154.183	[TCP Fast Retransmission] 2570 > 7001 [ACK] Seq=84242 Ack=18040	TCP
270	0.610	134.244.154.183	134.244.3.12	7001 > 2570 [ACK] Seq=18040 Ack=92846 Win=65535 Len=0	TCP
271	0.000	134.244.154.183	134.244.3.12	7001 > 2570 [PSH, ACK] Seq=18040 Ack=92846 Win=65535 Len=196	TCP
272	0.001	134.244.154.183	134.244.3.12	7001 > 2570 [ACK] Seq=18236 Ack=92846 Win=65535 Len=1362	TCP

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TCP Windows

Expert i

Wireshark: 333 Ex

Errors: 0 Warnings: 0

No.	Sever.	Group		
20934	Note	Sequen		
21207	Note	Sequen		
21293	Note	Sequen		
21352	Note	Sequen		
22125	Note	Sequen		
22305	Note	Sequen		
22662	Note	Sequen		
23483	Note	Sequen		
24064	Note	Sequen		
24150	Note	Sequence		
24241	Note	Sequence	TCP	Window update
24374	Note	Sequence	TCP	Window update
24792	Note	Sequence	TCP	Window update
24793	Note	Sequence	TCP	Window update
24797	Note	Sequence	TCP	Window update
24801	Note	Sequence	TCP	Window update
25276	Note	Sequence	TCP	Window update
26296	Note	Sequence	TCP	Window update
26822	Note	Sequence	TCP	Window update
27013	Note	Sequence	TCP	Window update
27544	Note	Sequence	TCP	Window update
27667	Note	Sequence	TCP	Window update
28296	Note	Sequence	TCP	Window update
28900	Note	Sequence	TCP	Window update
28909	Note	Sequence	TCP	Window update
30030	Note	Sequence	TCP	Window update
32279	Note	Sequence	TCP	Window update
32427	Note	Sequence	TCP	Window update
32517	Note	Sequence	TCP	Window update
32603	Note	Sequence	TCP	Window update
33068	Note	Sequence	TCP	Window update
33153	Note	Sequence	TCP	Window update
33636	Note	Sequence	TCP	Window update

Help

146.122.45.252	146.122.45.191	4545 > 2211 [ACK] Seq=14707895 Ack=51896 Win=64080 Len=1460		
146.122.45.191	146.122.45.252	2211 > 4545 [ACK] Seq=51896 Ack=14709355 Win=4215 Len=0		
146.122.45.252	146.122.45.191	4545 > 2211 [ACK] Seq=14709355 Ack=51896 Win=64080 Len=1460		
146.122.45.252	146.122.45.191	4545 > 2211 [ACK] Seq=14710815 Ack=51896 Win=64080 Len=1460		
146.122.45.191	146.122.45.252	2211 > 4545 [ACK] Seq=51896 Ack=14712275 Win=1295 Len=0		
146.122.45.191	146.122.45.252	[TCP Window Update] 2211 > 4545 [ACK] Seq=51896 Ack=14712275 Win=65535 Len		
146.122.45.252	146.122.45.191	4545 > 2211 [ACK] Seq=14712275 Ack=51896 Win=64080 Len=1460		
146.122.45.252	146.122.45.191	4545 > 2211 [ACK] Seq=14713735 Ack=51896 Win=64080 Len=1460		
146.122.45.191	146.122.45.252	2211 > 4545 [ACK] Seq=51896 Ack=14715195 Win=65535 Len=0		
146.122.45.252	146.122.45.191	4545 > 2211 [ACK] Seq=14715195 Ack=51896 Win=64080 Len=1460		
146.122.45.252	146.122.45.191	4545 > 2211 [ACK] Seq=14716655 Ack=51896 Win=64080 Len=1460		
146.122.45.191	146.122.45.252	2211 > 4545 [ACK] Seq=51896 Ack=14718115 Win=65535 Len=0		
146.122.45.252	146.122.45.191	4545 > 2211 [ACK] Seq=14718115 Ack=51896 Win=64080 Len=1460		
1141 Note	Sequence	TCP	Retransmission (suspected)	
1142 Note	Sequence	TCP	Retransmission (suspected)	
1202 Note	Sequence	TCP	Window is full	
1203 Note	Sequence	TCP	Zero window	
1204 Note	Sequence	TCP	Keep-Alive	
1205 Note	Sequence	TCP	Keep-Alive ACK	
1205 Note	Sequence	TCP	Zero window	
1206 Note	Sequence	TCP	Keep-Alive	
1207 Note	Sequence	TCP	Keep-Alive ACK	
1207 Note	Sequence	TCP	Zero window	
1208 Note	Sequence	TCP	Keep-Alive	
1209 Note	Sequence	TCP	Keep-Alive ACK	
1209 Note	Sequence	TCP	Zero window	
1210 Note	Sequence	TCP	Keep-Alive	
1211 Note	Sequence	TCP	Keep-Alive ACK	

Window is zero

No data can be received

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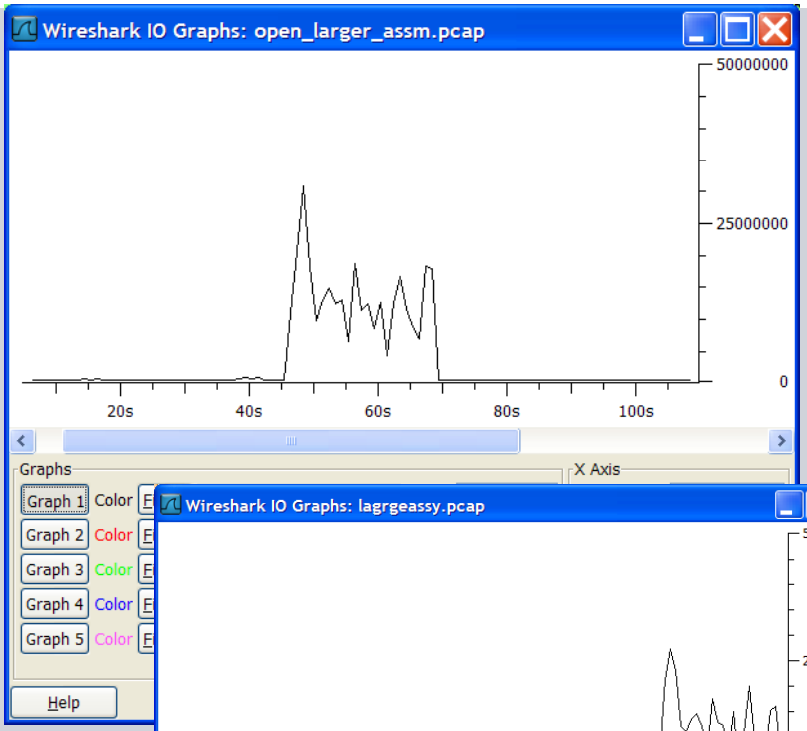
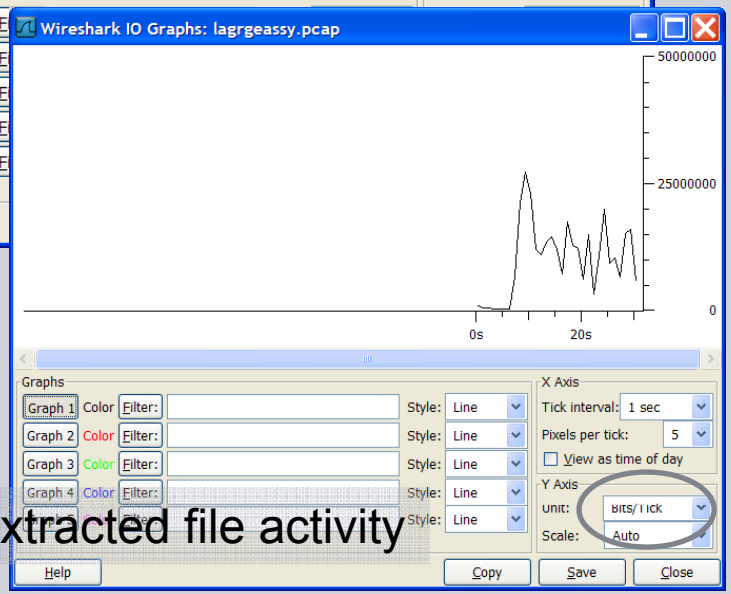
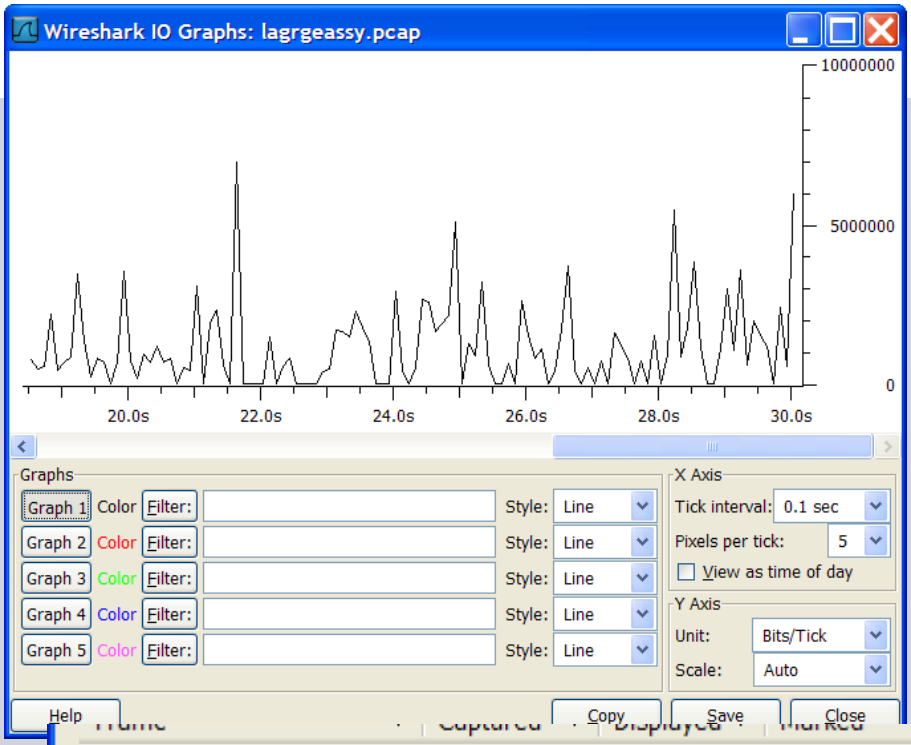
IO graphing





Extracted file activity



Packets	40105	40105	0
Between first and last packet	30.085 sec		
Avg. packets/sec	1333.048		
Avg. packet size	961.966 bytes		
Bytes	38579633		
Avg. bytes/sec	1282346.033		
Avg. MBit/sec	10.259		

Help

IO summary

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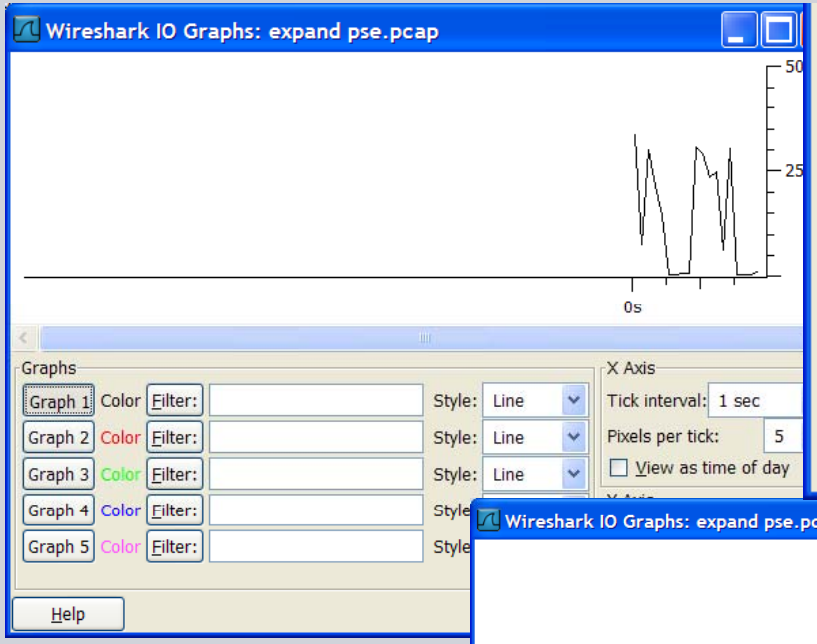
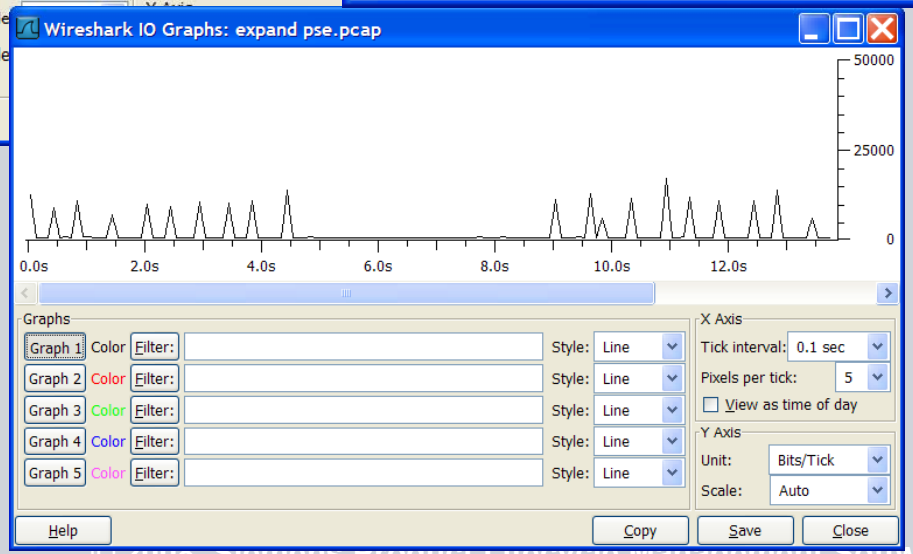
IO Graphing, estimating bandwidth



Traffic	Captured	Displayed	Marked
Packets	138	138	0
Between first and last packet	18.633 sec		
Avg. packets/sec	7.406		
Avg. packet size	226.507 bytes		
Bytes	31258		
Avg. bytes/sec	1677.593		
Avg. MBit/sec	0.013		

Help Close



PSE expansion

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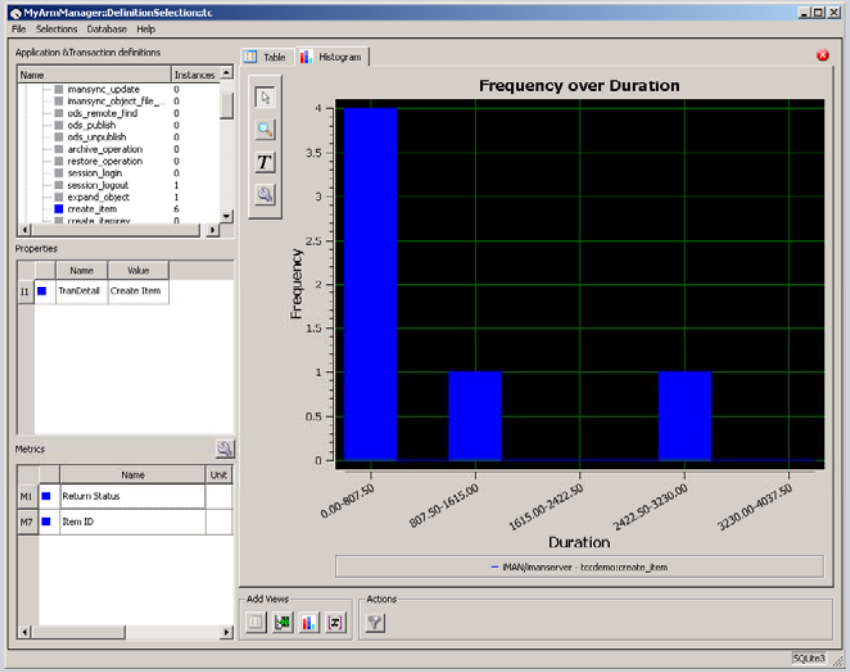
Service Level Monitoring

Two Mechanism are provided for monitoring the system:

- ARM – Application Response Measurement
  - Glance - HP
  - MyArm (www.myarm.de)
- JMX _ Java Management Extensions
  - Most Teamcenter Java elements support JMX can be monitored by tools such as Jconsole, IBM Tivoli Monitoring , HP-Jmeter, Glance



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