The top issues in IBM MQ and IIB

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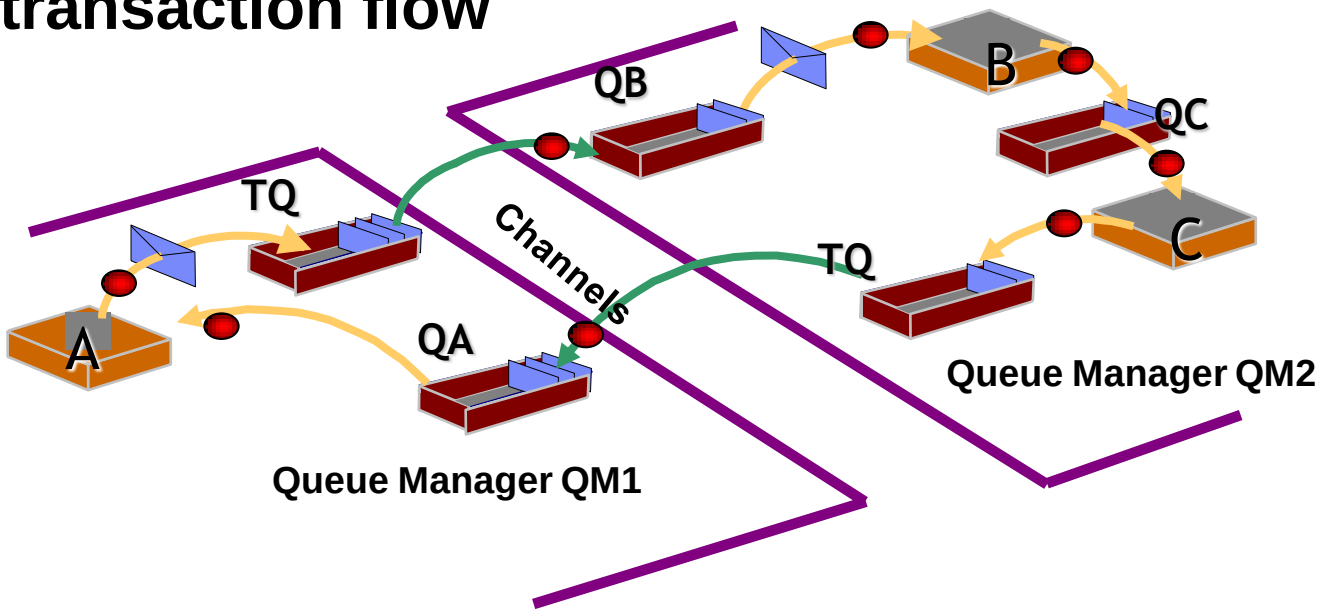
Who Am I?

- Barry Lamkin
- Army Helicopter Pilot 1967 – 1971
- Air Traffic Controller 1973 - 1981
- MVS (aka z/OS) Systems Programmer 1981 – 1994
- Candle Systems Engineer 1994 – 2004
- IBM Executive IT Specialist 2004 – whenever

IBM MQ - Features

- ✓ Assured, exactly once delivery
- ✓ Single API across 45+ platforms
- ✓ Network integration across various network protocols
- ✓ Transactional control
- ✓ Triggering of jobs/programs
- ✓ Content independence
- ✓ Single message > 100MB
- ✓ Asynchronous design (application & platform independent)
- ✓ Parallel processing
- ✓ Robust, commercial middleware
- ✓ Shields developers from network complexities

Monitoring Points used to track transaction flow



- Application A, B and C are components of a business transaction
- There are many objects that make up the underlying transactions
- There are as many as 8 monitoring points for objects associated to this transaction
- You should Monitor all the objects as it relates to the transaction (queues, channels)
- You should Monitor the flow of messages belonging to specific message queues (get/put rate)
- You need the ability to detect slowdown or stoppage in flow in specific queues (put rate exceeds get rate, channel down)
- You will need to identify problems and automatically react to them.

Top Issues in MQ & IIB/WMB

What to I need to look at to make sure my work is not delayed?

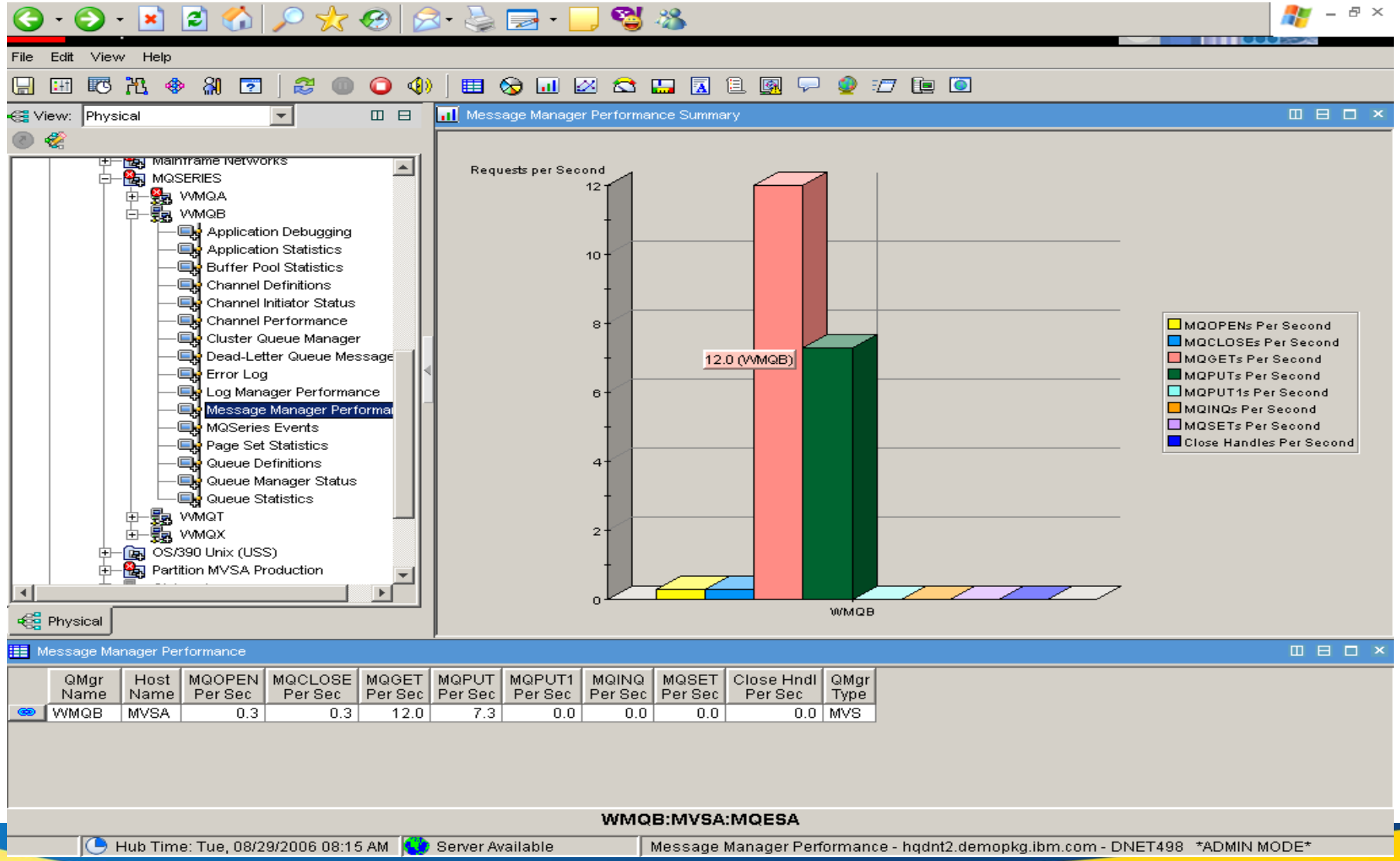
- MQ Channel Down
- Queue Full
- Messages in the Dead Letter Queue
- Messages in a queue and no open processes
- Isolating MQ problems between IBM z/OS® and distributed systems
- Changes in the MQ configuration
- Restoring last valid MQ configuration
- Determining if slow performance is due to network, MQ or Message Broker
- Problems connecting to broker's queue manager
- No messages flowing in the broker
- Execution Groups or Message Flows not started

How much work is my queue manager doing?

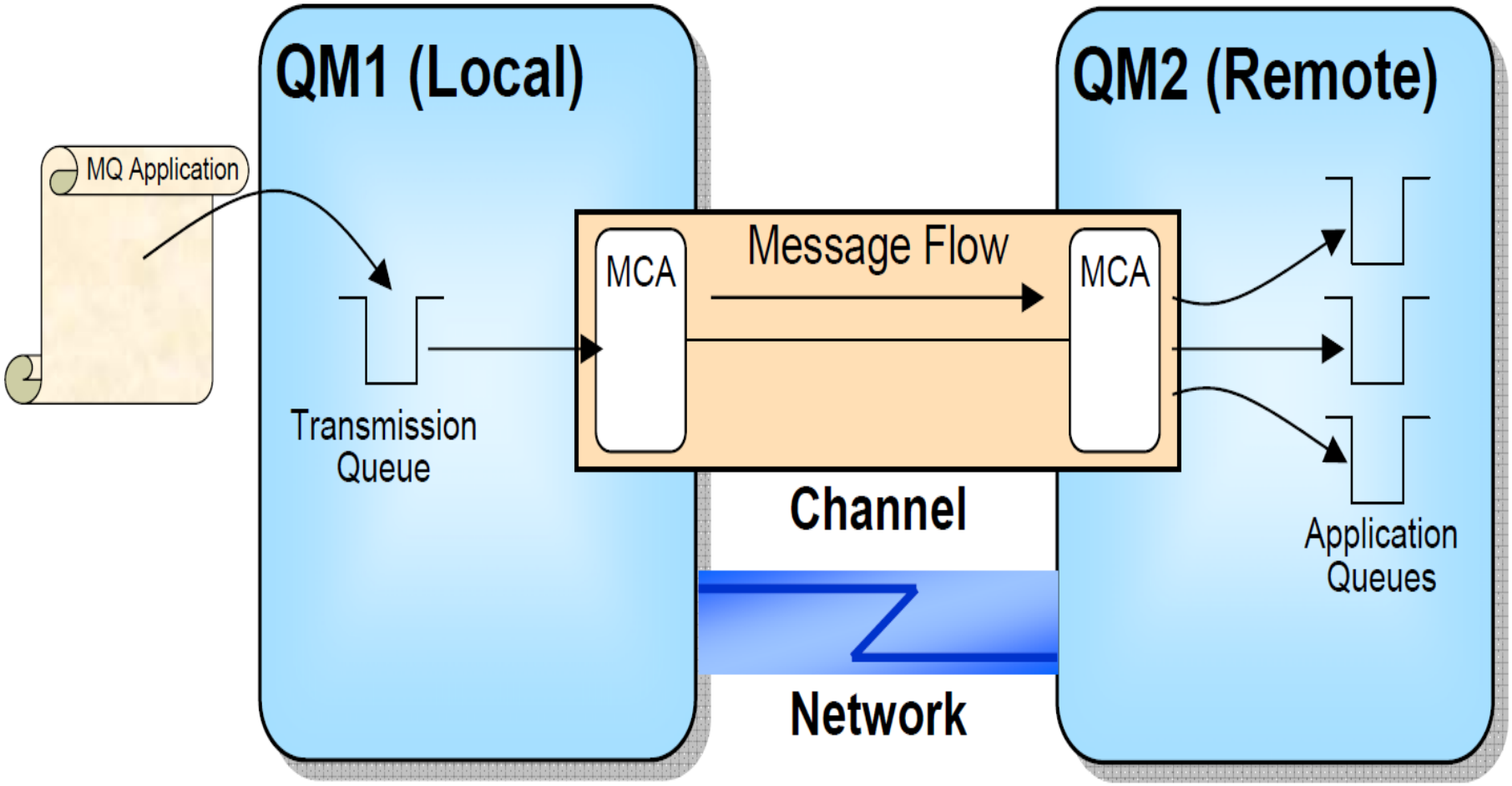
You should monitor your queue manager to see if there are trends in the work being done in the queue manager.

1. **Peak number of puts and gets per hour. This tells you if there is an increase in workload, or a change in the application workload**
2. **How many log CIs are created per hour. This tells you how much persistent data you are processing**
3. **Queue manager and Chinit virtual storage usage. This tells you how much storage you are using - and how much free storage is available**
4. **Peak number of channels in use.**
5. **Highest buffer pool usage for each buffer pool.**
6. **Peak number of pages in use in a page set.**
7. **For a structure, the % usage of the entries and elements from the D XCf,STR,strname=.... command**
8. **Display the SMDS usage (or use SMF) to display your SMDS activity. An increase in SMDS activity can be caused by more shared queue activity, or by larger messages.**

Message Manager Performance - zOS



MQ Channels


QM1 (Local)
QM2 (Remote)
MQ Application
Transmission Queue
MCA
Message Flow
MCA
Channel
Application Queues
Network

Issues with Channels

- Which channels are running or stopped?
- If my channel is up, is it transmitting messages?
- Are my channels optimally configured?
- If channel performance is poor, how does that impact my clients?

Channels

The WMQ command DIS CHSTATUS gives lots of information about the channels. You can use monitoring tools (or the MQCMD in MP1B) to periodically display this information.

In WMQ V8 this information is available in SMF records.

The time to send messages over a channel is in two areas

- **The time a messages is waiting to be sent**
- **The time to send the message over the network, and the end of batch processing.**

How long did messages have to wait before being sent?

To display the time the message is waiting using the XQTIME. This value may change over a day, as more MQ work is processed, or as the network gets busier.

If the BATCHINT value is zero, the achieved batch size should be less than the negotiated batch size for short messages. Values XBATCHSZ < BATCHSZ in DIS CHSTATUS. If XBATCHSZ is close to BATCHSZ then most of the time there were always messages waiting to be sent.

If the BATCHINT is a large value then XBATCHSZ can be the same as BATCHSZ, as there is a get with wait.

Network time (DISPLAY CHSTATUS)

The NETTIME is the time between sending an end of batch request, and getting the response back, excluding the time in the remote queue manager. This value has two components

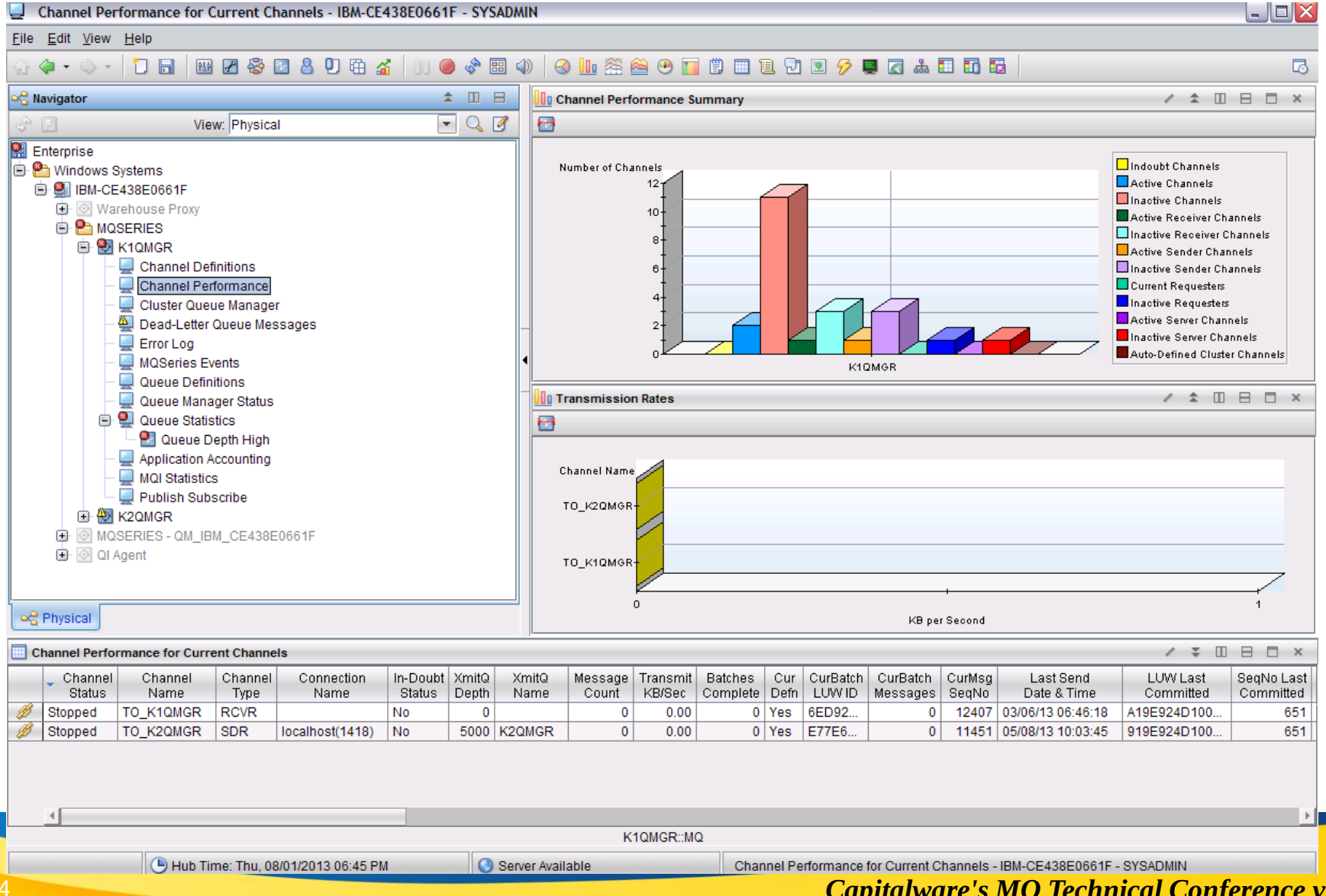
- **The time the request is on the network**
- **The delay before the remote queue manager processes the request. For example if the channel has put to a queue, and the queue is full, the channel can wait and retry the put. Once the message has been put successfully the next request can be processed, and end of batch processing can be done. In this case the nettime includes the wait and retry of the put.**

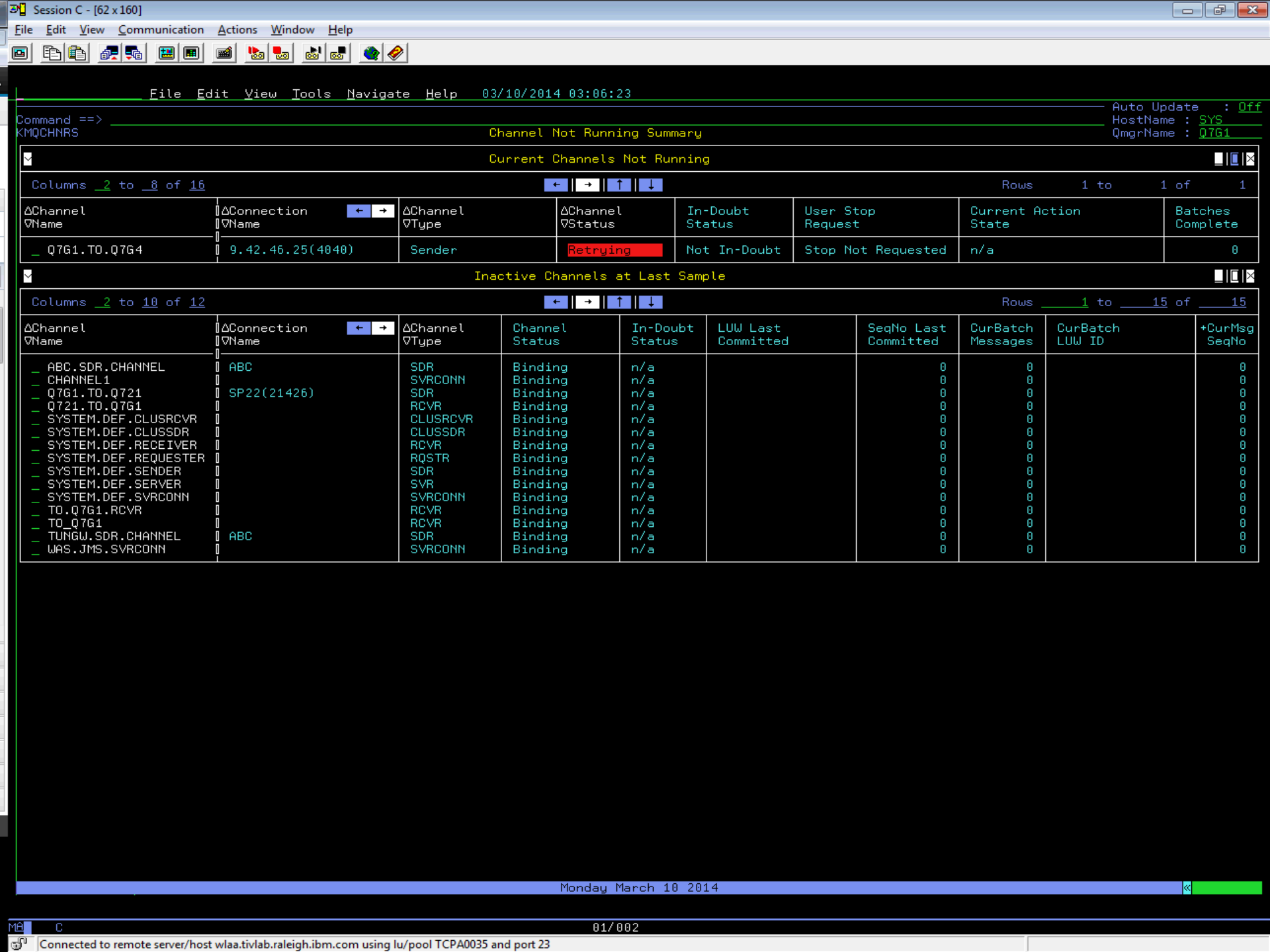
Your nettime values should be within a range specific to you over the day. if you get values longer than normal, this can indicate a network problem, or processing problem at the remote queue manager.

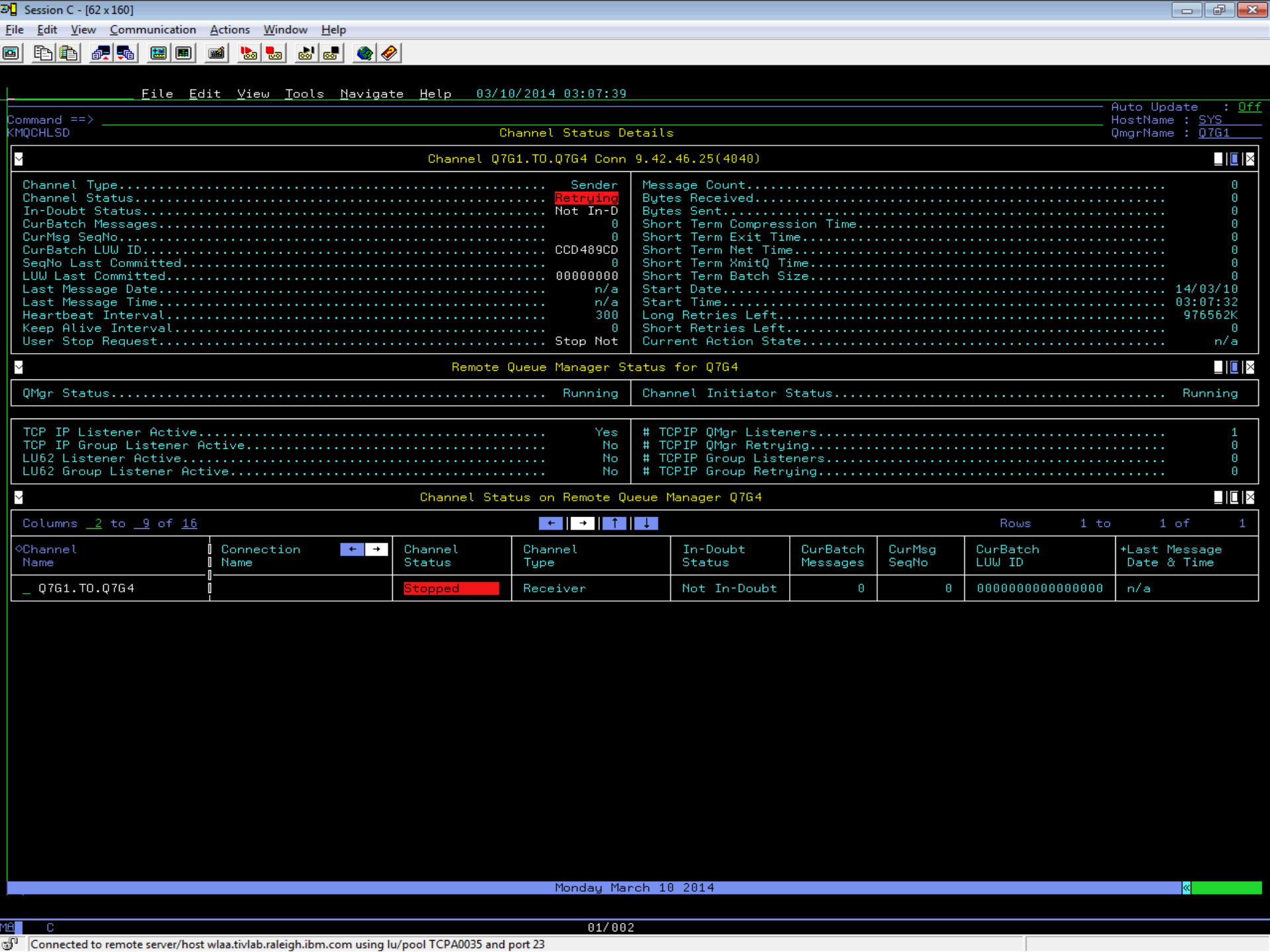
MQ Channel Down

- Is this a problem?
- MQ Event “Channel Stopped” may not be good enough
- Check Channel Status
- Are there messages in the XmitQ?
- Is the Remote Queue Manager down?
- Is the Remote Queue correct or full?
- Is there a Network problem?
- Is the Listener running on the Remote Queue Manager?

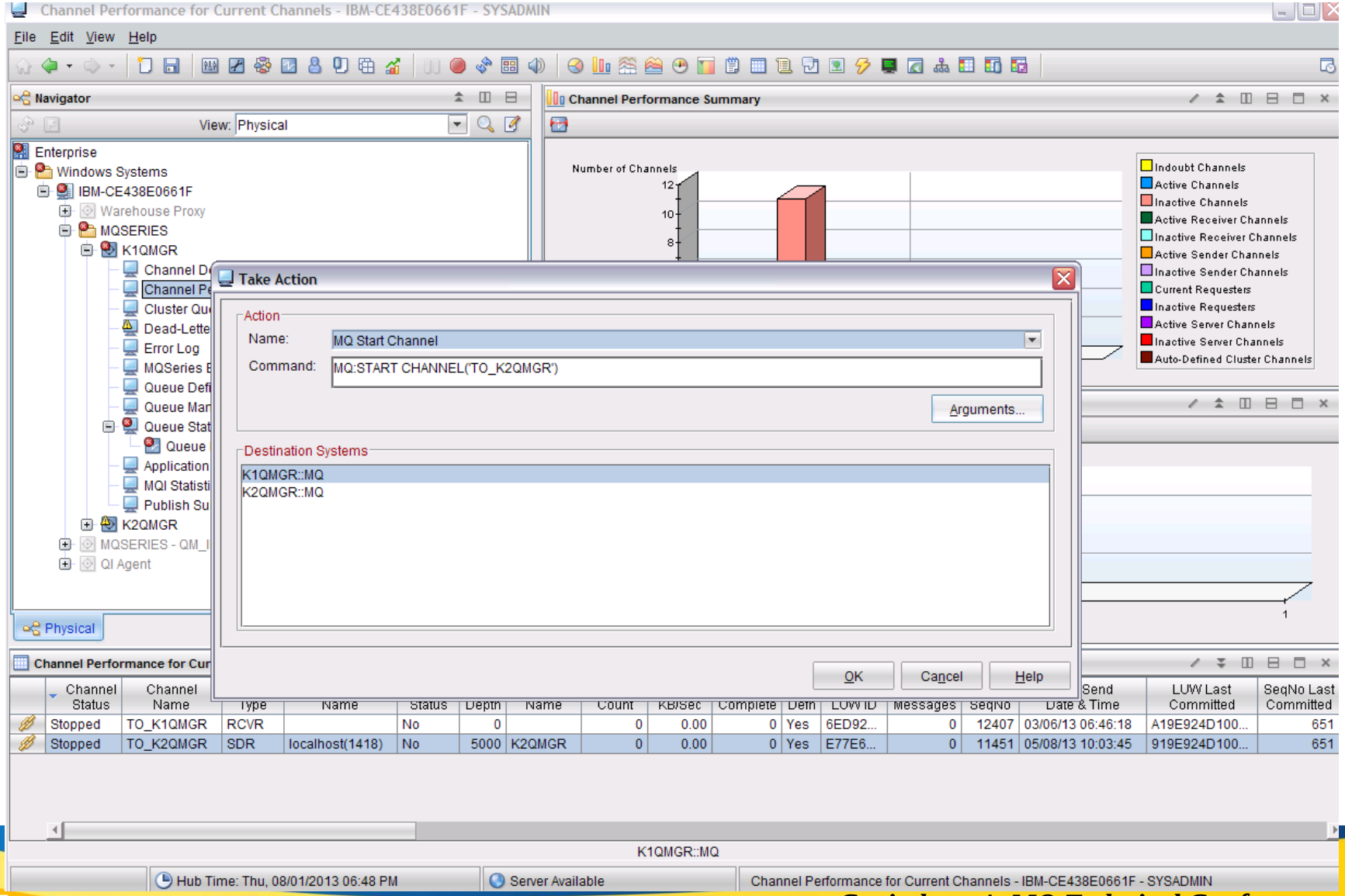
Channel Stopped



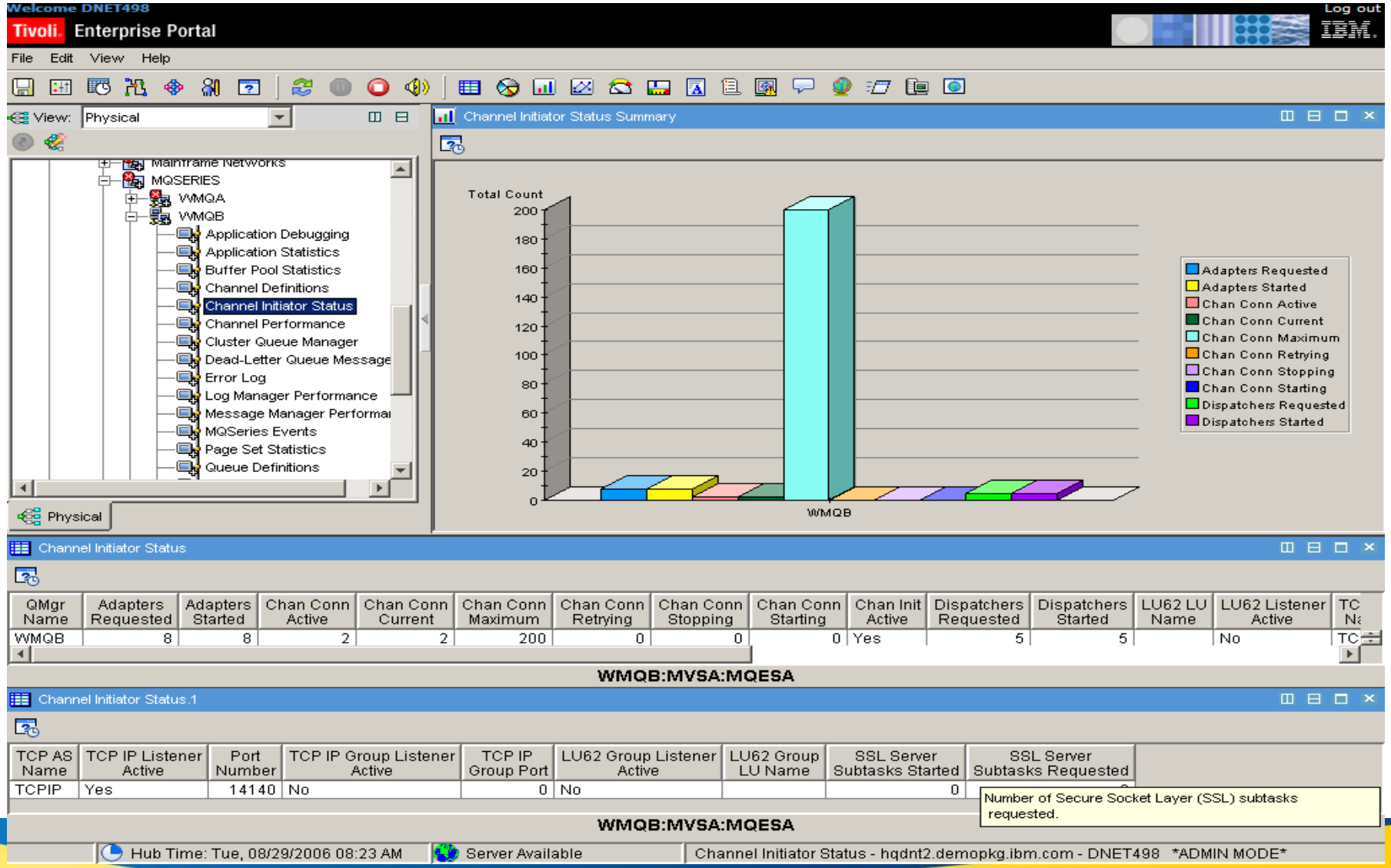

Session C - [62 x 160]
File Edit View Communication Actions Window Help
File Edit View Tools Navigate Help 03/10/2014 03:06:23
Auto Update : Off
Command ==>
HostName : SYS
KMQCHNRS
Channel Not Running Summary
QmgrName : Q7G1
Current Channels Not Running
Columns 2 to 8 of 16
Rows 1 to 1 of 1
ΔChannel ∇Name
ΔConnection ∇Name
ΔChannel ∇Type
ΔChannel ∇Status
In-Doubt Status
User Stop Request
Current Action State
Batches Complete
Q7G1.TO.Q7G4
9.42.46.25(4040)
Sender
Retrying
Not In-Doubt
Stop Not Requested
n/a
0
Inactive Channels at Last Sample
Columns 2 to 10 of 12
Rows 1 to 15 of 15
ΔChannel ∇Name
ΔConnection ∇Name
ΔChannel ∇Type
Channel Status
In-Doubt Status
LUW Last Committed
SeqNo Last Committed
CurBatch Messages
CurBatch LUW ID
+CurMsg SeqNo
ABC.SDR.CHANNEL ABC SDR Binding n/a 0 0 0
CHANNEL1 SVRCONN Binding n/a 0 0 0
Q7G1.TO.Q721 SP22(21426) SDR Binding n/a 0 0 0
Q721.TO.Q7G1 RCVR Binding n/a 0 0 0
SYSTEM.DEF.CLUSRCVR CLUSRCVR Binding n/a 0 0 0
SYSTEM.DEF.CLUSSDR CLUSSDR Binding n/a 0 0 0
SYSTEM.DEF.RECEIVER RCVR Binding n/a 0 0 0
SYSTEM.DEF.REQUESTER RQSTR Binding n/a 0 0 0
SYSTEM.DEF.SENDER SDR Binding n/a 0 0 0
SYSTEM.DEF.SERVER SVR Binding n/a 0 0 0
SYSTEM.DEF.SVRCONN SVRCONN Binding n/a 0 0 0
TO.Q7G1.RCVR RCVR Binding n/a 0 0 0
TO_Q7G1 RCVR Binding n/a 0 0 0
TUNGW.SDR.CHANNEL ABC SDR Binding n/a 0 0 0
WAS.JMS.SVRCONN SVRCONN Binding n/a 0 0 0
Monday March 10 2014
MA C 01/002
Connected to remote server/host wlaa.tivlab.raleigh.ibm.com using lu/pool TCPA0035 and port 23


Session C - [62 x 160]
File Edit View Communication Actions Window Help
File Edit View Tools Navigate Help 03/10/2014 03:07:39
Auto Update : Off
Command ==>
HostName : SYS
KMQCHLSD
Channel Status Details
QmgrName : Q7G1
Channel Q7G1.TO.Q7G4 Conn 9.42.46.25(4040)
Channel Type..... Sender
Channel Status..... Retrying
In-Doubt Status..... Not In-D
CurBatch Messages..... 0
CurMsg SeqNo..... 0
CurBatch LUW ID..... CCD489CD
SeqNo Last Committed..... 0
LUW Last Committed..... 00000000
Last Message Date..... n/a
Last Message Time..... n/a
Heartbeat Interval..... 300
Keep Alive Interval..... 0
User Stop Request..... Stop Not
Message Count..... 0
Bytes Received..... 0
Bytes Sent..... 0
Short Term Compression Time..... 0
Short Term Exit Time..... 0
Short Term Net Time..... 0
Short Term XmitQ Time..... 0
Short Term Batch Size..... 0
Start Date..... 14/03/10
Start Time..... 03:07:32
Long Retries Left..... 976562K
Short Retries Left..... 0
Current Action State..... n/a
Remote Queue Manager Status for Q7G4
QMgr Status..... Running
Channel Initiator Status..... Running
TCP IP Listener Active..... Yes
TCP IP Group Listener Active..... No
LU62 Listener Active..... No
LU62 Group Listener Active..... No
TCPIP QMgr Listeners..... 1
TCPIP QMgr Retrying..... 0
TCPIP Group Listeners..... 0
TCPIP Group Retrying..... 0
Channel Status on Remote Queue Manager Q7G4
Columns 2 to 9 of 16
Rows 1 to 1 of 1
◇Channel Name
Connection Name
Channel Status
Channel Type
In-Doubt Status
CurBatch Messages
CurMsg SeqNo
CurBatch LUW ID
+Last Message Date & Time
Q7G1.TO.Q7G4
Stopped
Receiver
Not In-Doubt
0
0
0000000000000000
n/a
Monday March 10 2014
MA C 01/002
Connected to remote server/host wlaa.tivlab.raleigh.ibm.com using lu/pool TCPA0035 and port 23

Start the Channel



Channel Initiator Status - zOS



Queues

- A queue is a container for messages
  - Local Queues
  - Transmission Queues
  - Remote Queues
  - Alias Queues
  - Model Queues
- **Managed by the Queue Manager**
- **Queue Defined**
  - Predefined
  - Dynamically defined
- **Messages are placed in queues to allow programs to interact with each other asynchromously**

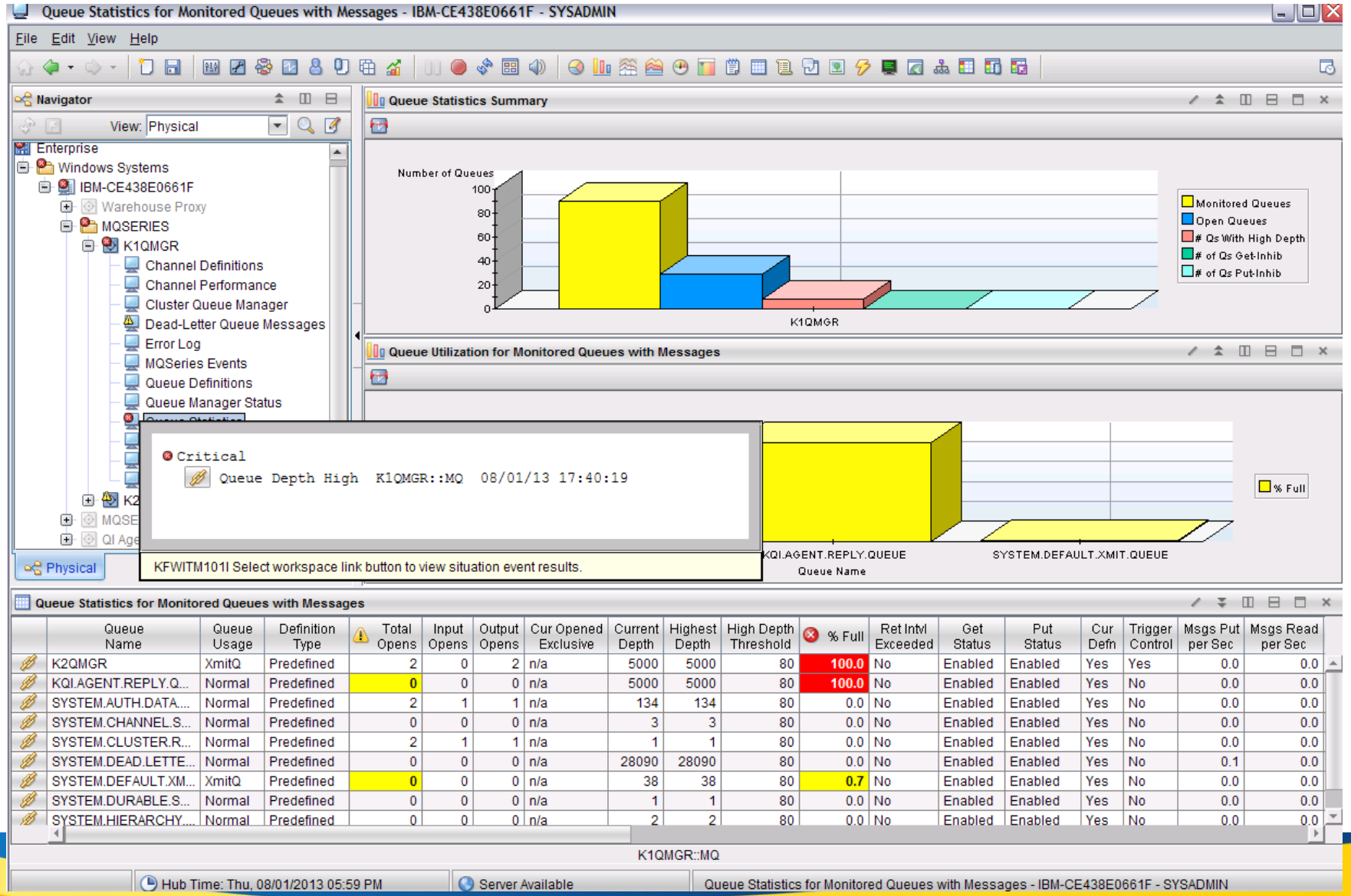
Queue Statistics / Definitions

- Active, Input and Output Processes
- Local Aliased Queue Name and Type
- Queue Configuration
  - Trigger Active
  - Trigger Depth
  - Max Message Length
- Oldest Message on the Queue (MONQ)

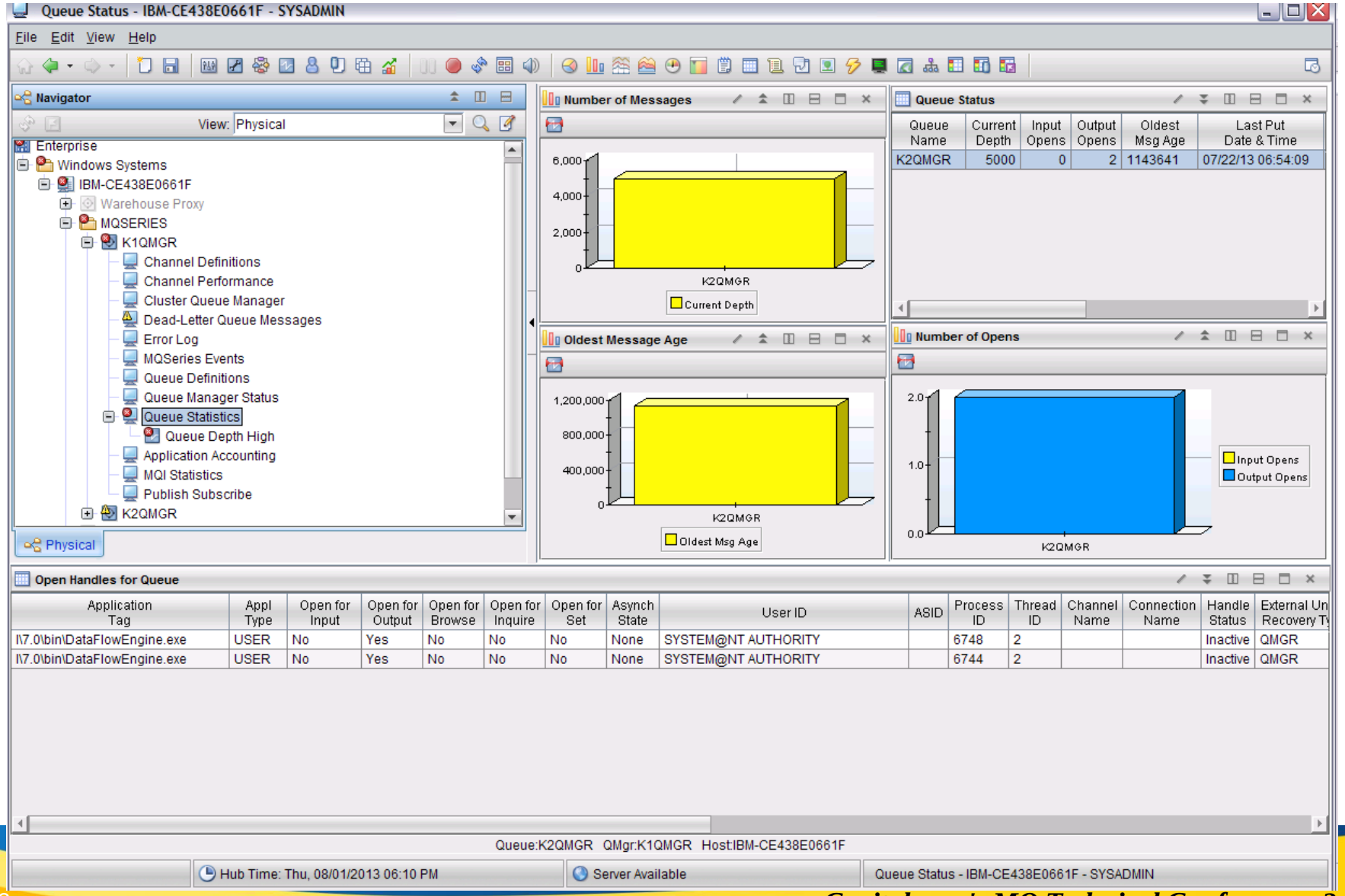
Queue Full

- **Local Application or MCA can no longer put messages to Queue**
- **Local Application should check for Queue Full condition**
  - MQRC_Q_FULL (2053, X'805')
- **MCA will put messages to Queue for a Remote Application**
  - If Queue Full messages go to Dead Letter Queue
  - If no Dead Letter Queue channel will be stopped
- **MQ Event “Queue Full” or “Queue High” may not be adequate**
  - These events do not get reset until the Queue Depth hits “Queue Low”
- **Check Queue Depth**
- **Check if messages are on a Queue and no processes have it opened**

Queue Depth High



Check Queue Status



Issues with DLQ

- Are there any messages in the DLQ?
- How long has a message been in the DLQ?
- What messages are in the DLQ?
- Why is a message in the DLQ?
- Can I view the message?
- Can I delete one or more messages?
- Can I requeue a message?

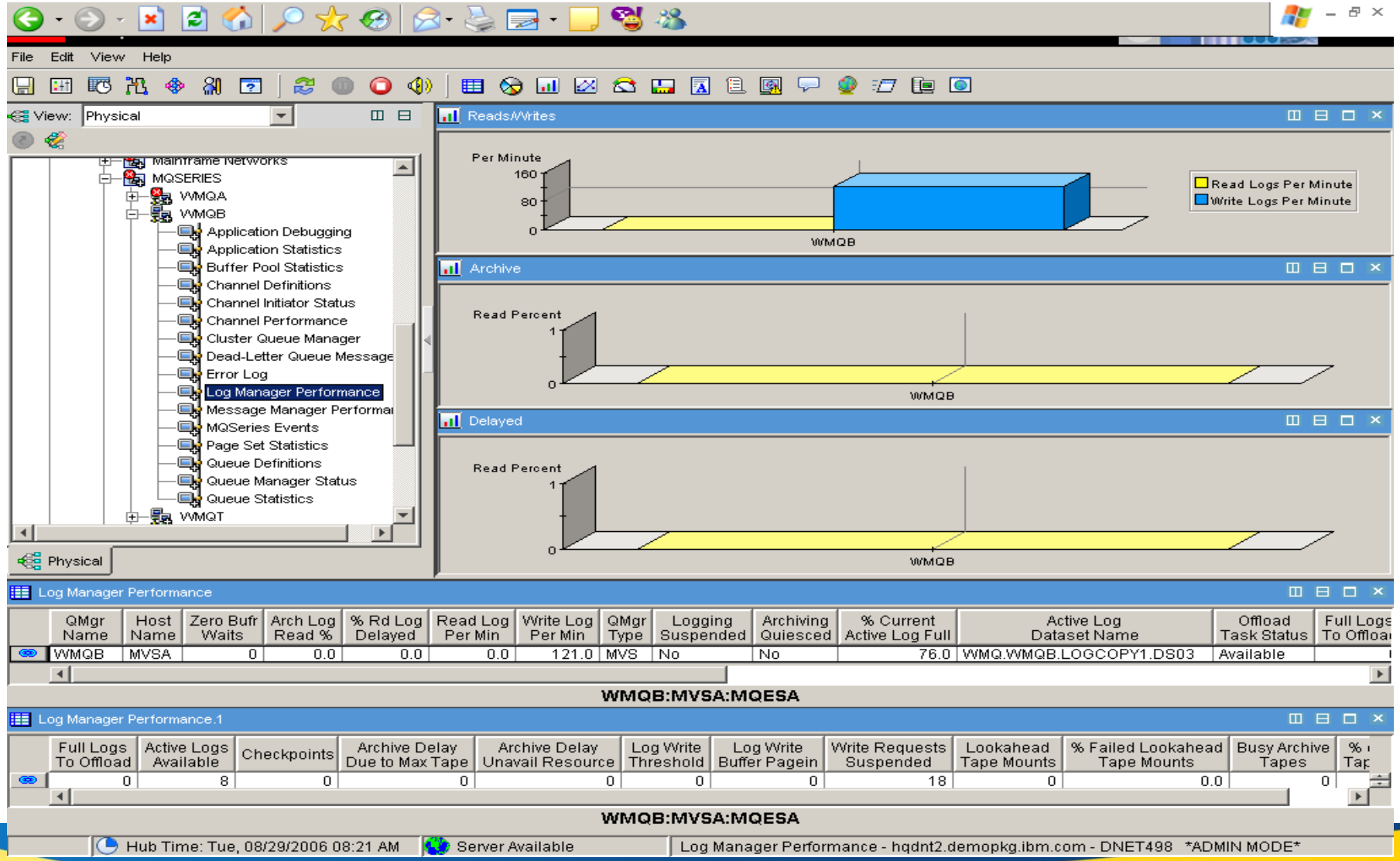
Messages in the Dead Letter Queue

- **Dead Letter Queue prevents the Queue Manager from stopping the channel**
- **Need to monitor if messages arrive in the Dead Letter Queue**
- **Need to quickly isolate the cause of the message(s) arriving in the DLQ**
- **Need to be able to resolve the issue with the DLQ messages**
  - Fix the issue
  - Delete the message(s)
  - Retry the messages

Rate at which data can be logged

- **For persistent messages the most important resource is the rate at which you can write to the active log datasets. The maximum rate at which you can log data depends on your DASD and your workload profile.**
  1. DASD dependent. The rate at which you can log to disk depends on your DASD. If our DASD is mirrored synchronously then this will be slower than if it is not mirrored. If your I/O subsystem is slow this will impact performance.
  2. If the workload profile has large persistent messages, then a lot of data can be written in each I/O. If the workload profile has only lots of short messages (a few KB) then there may only be a small amount of data per I/O.
  3. Log Switches - if these are exceeding every two minutes, you need to start thinking about a second queue manager for the workload.

Log Manager Performance - zOS



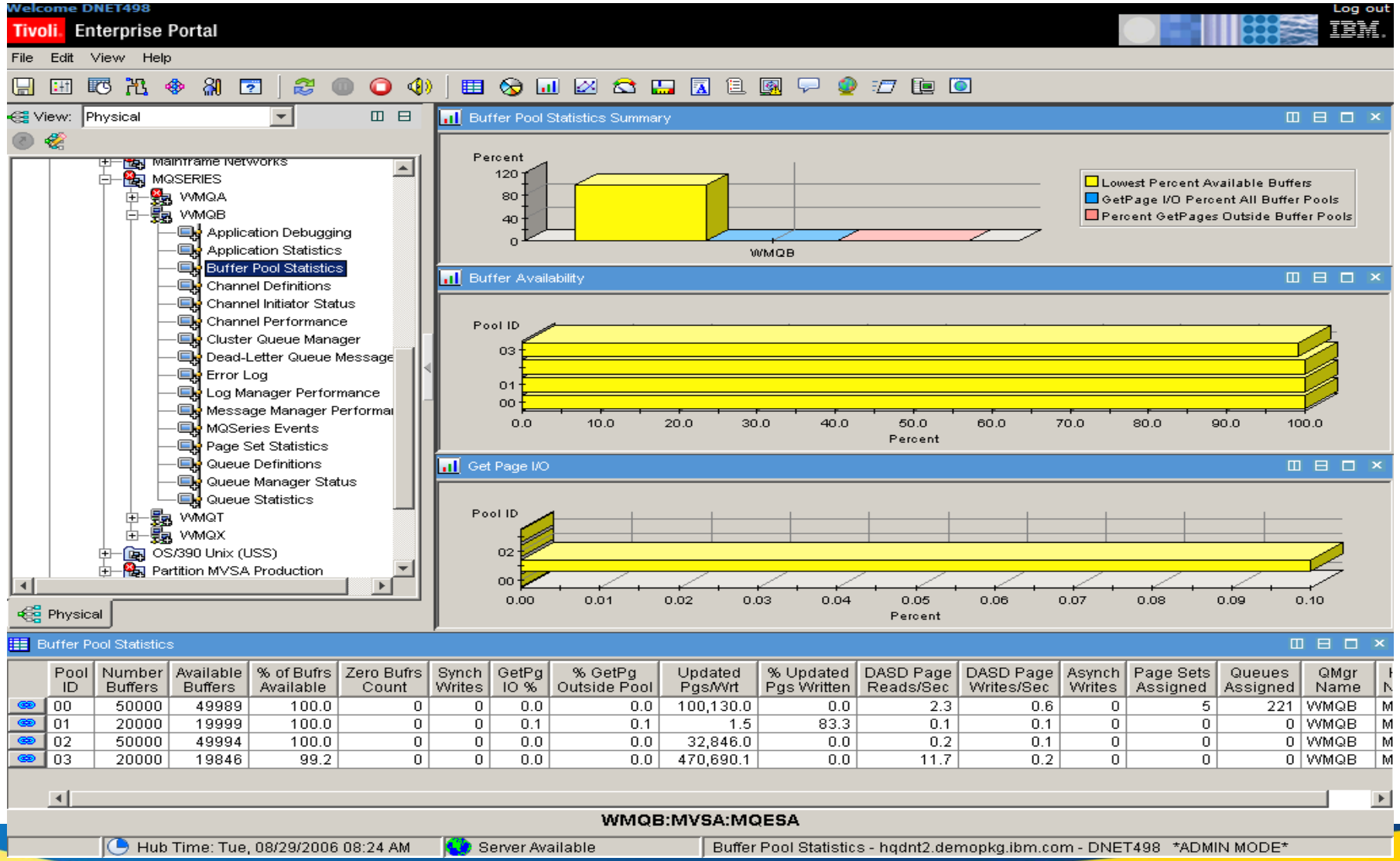
Issues with Buffers

- Do my buffer pools contain enough storage for message management?
- Am I experiencing a problem now?
- Are my buffer pools filling up?
- How are my buffer pools performing?

Buffer pool usage

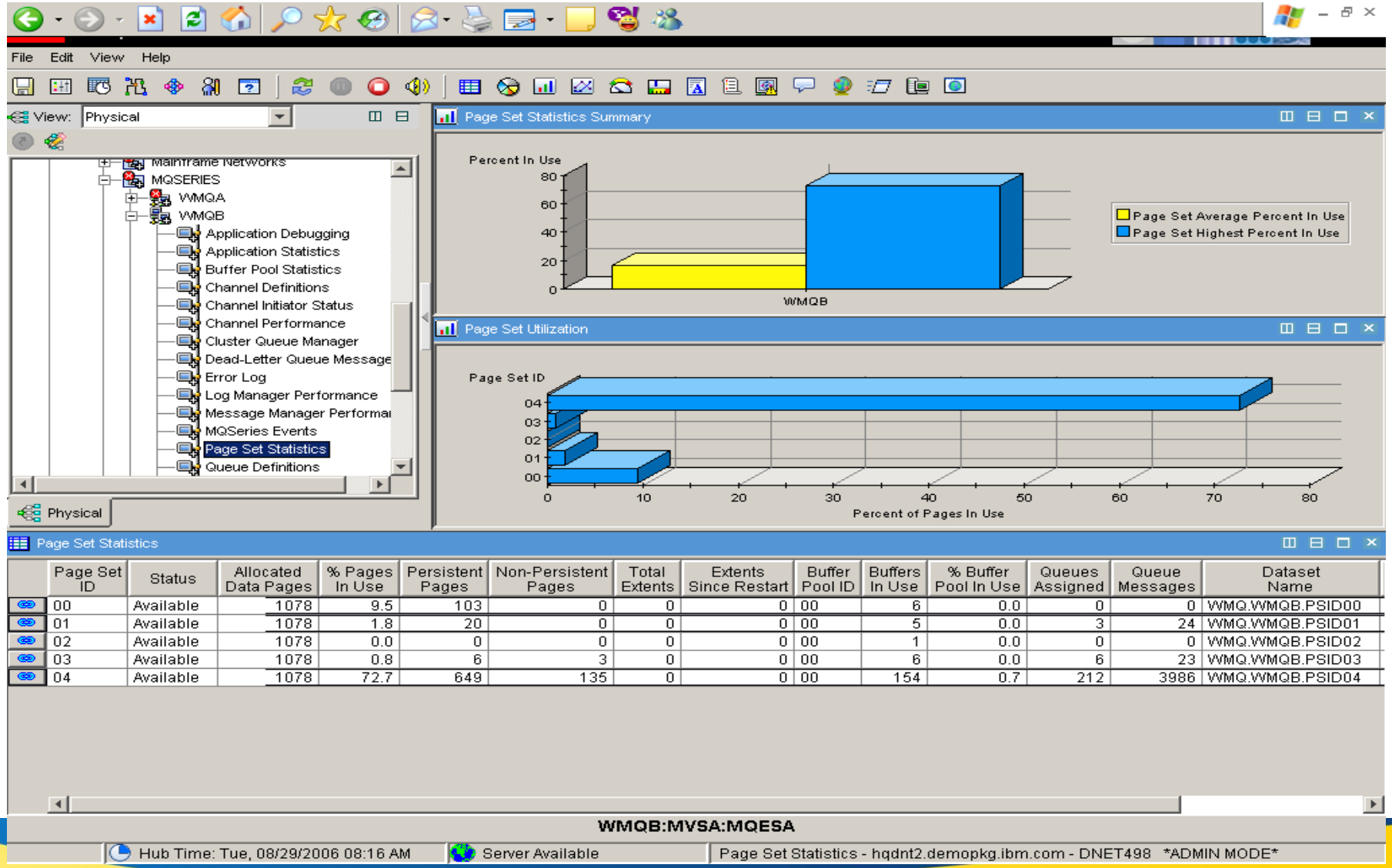
Keeping your buffers pools under 85% is key to good performance for short lived messages. This eliminates application I/O to the page set.
If all your messages are in the buffer pool (the optimum for performance) then there should be no reads from the page sets. There may be writes to pages sets during checkpoint activity.

Buffer Pool Statistics - zOS



Pool ID	Number Buffers	Available Buffers	% of Bufrs Available	Zero Bufrs Count	Synch Writes	GetPg IO %	% GetPg Outside Pool	Updated Pgs/Wrt	% Updated Pgs Written	DASD Page Reads/Sec	DASD Page Writes/Sec	Asynch Writes	Page Sets Assigned	Queues Assigned	QMgr Name
00	50000	49989	100.0	0	0	0.0	0.0	100,130.0	0.0	2.3	0.6	0	5	221	WMQB
01	20000	19999	100.0	0	0	0.1	0.1	1.5	83.3	0.1	0.1	0	0	0	WMQB
02	50000	49994	100.0	0	0	0.0	0.0	32,846.0	0.0	0.2	0.1	0	0	0	WMQB
03	20000	19846	99.2	0	0	0.0	0.0	470,690.1	0.0	11.7	0.2	0	0	0	WMQB

Page Set Statistics - zOS

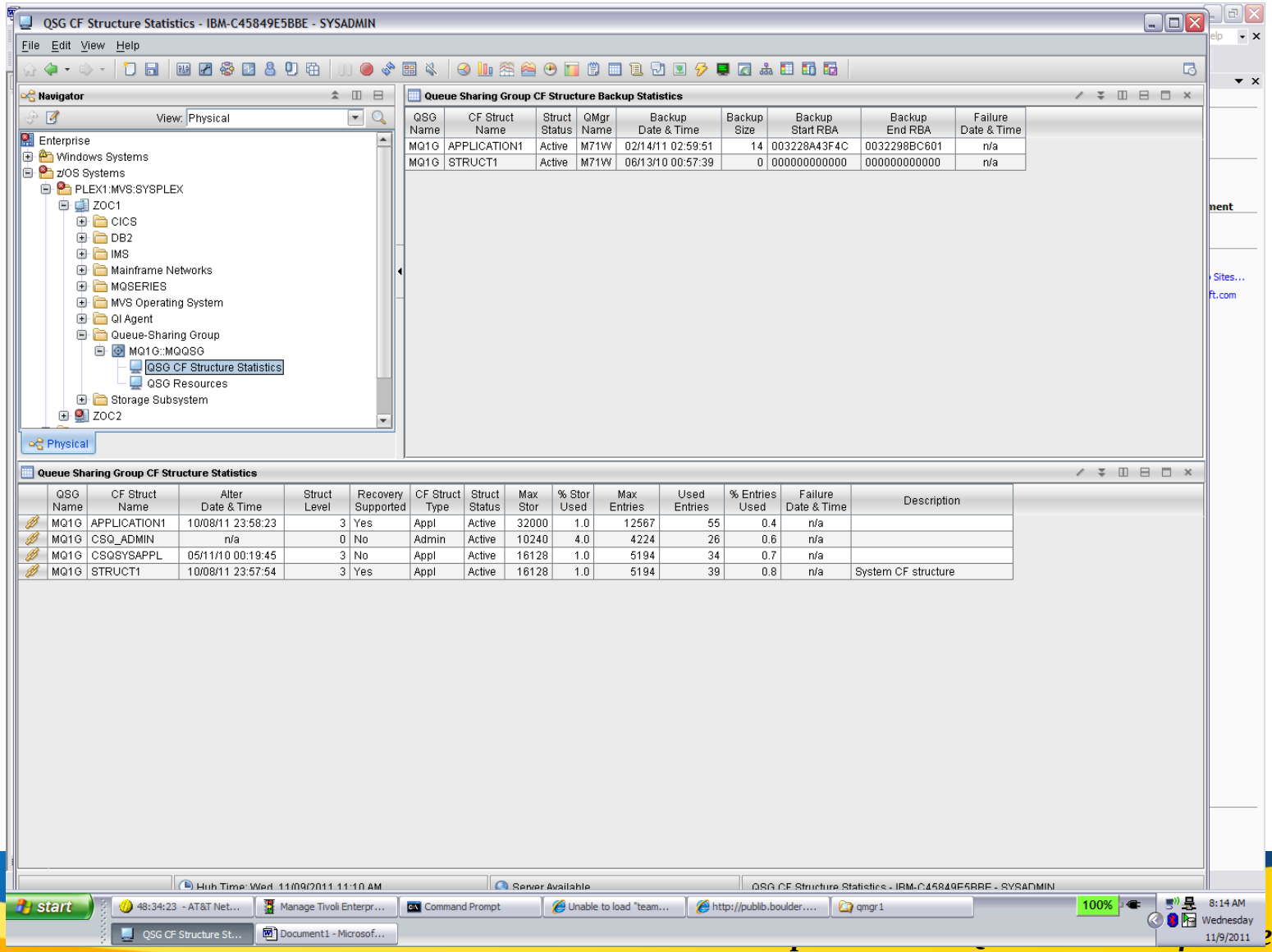


Page Set ID	Status	Allocated Data Pages	% Pages In Use	Persistent Pages	Non-Persistent Pages	Total Extents	Extents Since Restart	Buffer Pool ID	Buffers In Use	% Buffer Pool In Use	Queues Assigned	Queue Messages	Dataset Name
00	Available	1078	9.5	103	0	0	0	00	6	0.0	0	0	WMQ.WMQB.PSID00
01	Available	1078	1.8	20	0	0	0	00	5	0.0	3	24	WMQ.WMQB.PSID01
02	Available	1078	0.0	0	0	0	0	00	1	0.0	0	0	WMQ.WMQB.PSID02
03	Available	1078	0.8	6	3	0	0	00	6	0.0	6	23	WMQ.WMQB.PSID03
04	Available	1078	72.7	649	135	0	0	00	154	0.7	212	3986	WMQ.WMQB.PSID04

Shared Queue

For performance you should monitor the response time of the structures. The response time will depend on the configuration of the hardware. For example you can get contention on the channels to the CF. If the CF is on the same physical processor as an LPAR the response time will be much better than from a remote processor.
Use z/OS facilities, such as RMF to monitor these response times.

QSG CF Structure Statistics



MQ problems between IBM z/OS® and distributed systems

- MQ provides common API across all platforms
- Different monitoring/management solutions for each platform?
- Best practices dictate looking at MQ environment holistically
- Differing backup & recover strategies for MQ objects

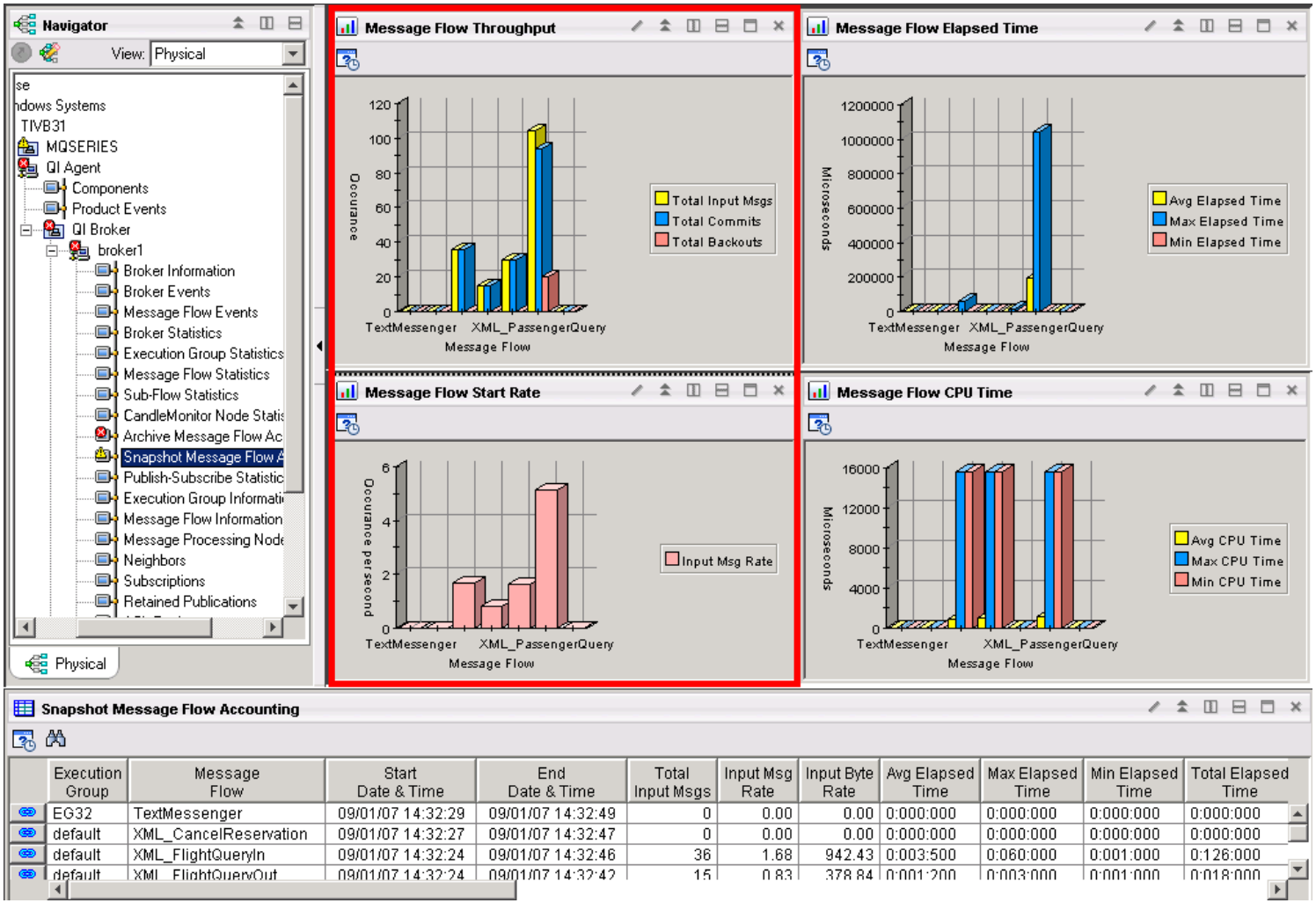
MQ Configuration - Administration

- Enterprise-wide configuration/administration strategy?
- Different strategies depending on platform?
- What about backup/recovery?
- If an object is modified you need to be able to detect that.

WebSphere Message Broker (IIB)

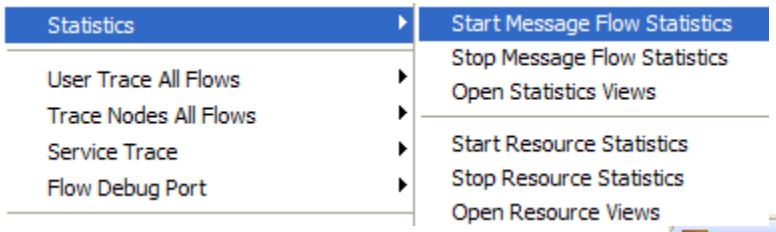
- **More of a Black Box than MQ**
  - Execution Groups
  - Message Flows
  - Processing Nodes
  - Threads
- **Need to understand if MB is being affected by MQ**
- **Is the Queue Manager running?**
- **Is the Broker connected to the Queue Manager?**
- **Are the issues with the Network?**
- **Are there issues with the OS?**
- **Demands a holistic approach to monitoring to improve MTTR**

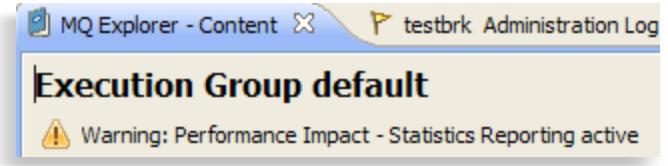
Message Flow Workspaces

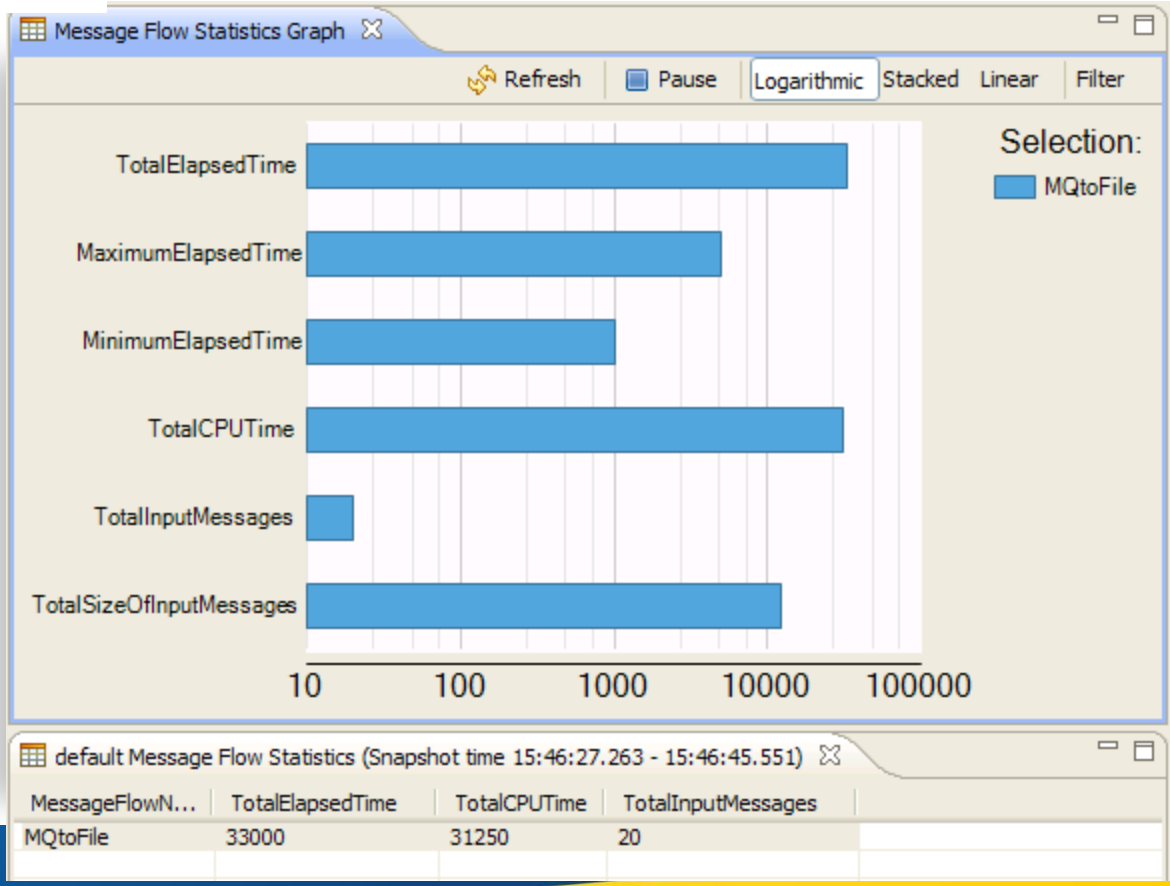


Execution Group	Message Flow	Start Date & Time	End Date & Time	Total Input Msgs	Input Msg Rate	Input Byte Rate	Avg Elapsed Time	Max Elapsed Time	Min Elapsed Time	Total Elapsed Time
EG32	TextMessenger	09/01/07 14:32:29	09/01/07 14:32:49	0	0.00	0.00	0:000:000	0:000:000	0:000:000	0:000:000
default	XML_CancelReservation	09/01/07 14:32:27	09/01/07 14:32:47	0	0.00	0.00	0:000:000	0:000:000	0:000:000	0:000:000
default	XML_FlightQueryIn	09/01/07 14:32:24	09/01/07 14:32:46	36	1.68	942.43	0:003:500	0:060:000	0:001:000	0:126:000
default	XML_FlightQueryOut	09/01/07 14:32:24	09/01/07 14:32:42	15	0.83	378.84	0:001:200	0:003:000	0:001:000	0:018:000

Broker Explorer & Message Flow Statistics







- The Message Broker Explorer enables you to start/stop message flow statistics on the broker, and view the output.
- New in V7 (although supportpac IS02 available for V6.1)
- Warnings are displayed advising there may be a performance impact (typically ~3%)

What else?

- Logs (different for z/OS and Distributed)
- Buffer Pools (z/OS)
- Page Sets (z/OS)
- Shared Queues/Coupling Facility (z/OS)
- Clusters
- Age of Messages
- Queue/Dequeue Rate
- Channel Usage
- Poison Messages
- What’s normal activity?
- Predictive Analysis

Summary

- Once introduced into an environment WMQ and WMB become ubiquitous.
- Monitoring/managing your messaging backbone in a silo is not adequate
- Start looking at your Enterprise Monitoring & Management strategy holistically.
- It may look like the problem is WMQ or WMB, maybe it Is not.
- Use automation for corrective action when appropriate

Questions & Answers