Common Problems and PD for MQ V8 on z/OS

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Agenda

- **The heavy hitters**
  - ▶ Some of the top issues, APARs and advice from the good folks in Level 2 and Level 3

- **Problem Determination**
  - ▶ Is MQ down or is it a figure of your imagination?

TOP APARs and Issues

- **Leading the list is PI41460 -HIGH CPU FOR CHIN ADDRESS SPACE AFTER A CSQX209E COMMUNICATIONS FAILURE**
  - ▶ This only applies to channels where the SHARECNV>0 and there has been a communication failure of some sort
  - ▶ Many PMRs related to this issue
    - • Local work around is to set SHARECNV=0
  - ▶ This was flagged as HIPER and was fixed in June 2015
  - ▶ New upgrades to MQ V8 'should' have this code
    - • But do us all a favor and check….

TOP APARs and Issues

- **PI55397- When running with MQ MSTR trace active on a busy system, a high volume of post calls can occur causing performance degradation due to lock contention.**
  - ▶ Closed in Feb 2016
  - ▶ Limited PMRs related to this issue
  - ▶ This is flagged as HIPER
  - ▶ The customer who encountered this situation had at least 1024 active connections to the queue manager when the situation occurred.

TOP APARs and Issues

- **Z Systems Security Portal - remember that for TLS the support is provided by z/OS**
  - ▶ Level 2 cannot even look at this
  - ▶ Please see this link for additional information:
    http://www-03.ibm.com/systems/z/solutions/security_subintegrity.html

Finally a reminder from Level 2 & 3

- **In MQ V8 - new message CSQI004I is issued when a local queue is accessed getting messages by message id or correlation id and the queue does not have an index configured.**
  - ▶ This is for those of you who have not been looking at your task related accounting SMF data.

  - ▶ Might want to alert (low level) on this.

Problem Determination

Problem Determination - Philosophy

- **I prefer problem avoidance to problem determination, but sometimes you do what you have to do.**

- **It is not a skill that can be directly taught or automated – if it were it would have been automated by now.**
  - ▶ Though there are 'first places to look.'

- **It can require subtle knowledge of the workings of many systems and applications to find the real problem.**
  - ▶ Although throwing resources (CPU, memory) at a problem is often a temporary measure to get around a problem.

How is the problem reported?

- **There are times when a certain set of problem determination steps can be set into motion based simply on how it is reported. Some examples are:**
  - ▶ Automated system alert
    - Queue depth high or full – likely an application or channel serving that queue is down or running slowly.
    - Unusual/unexpected message in the JES log – usually something to be investigated, may not be an immediate issue
    - Presence of messages on dead letter queues, application backout queues, etc.
  - ▶ Problem ticket received
    - Always iffier
      - Sometimes an outage, sometimes a performance problem, sometimes ..
      - Requires attention
  - ▶ Phone is ringing, lights are flashing, there is the smell of sulfur
    - An Executive has become involved

What kinds of PD is typical with MQ?

- **Nothing is typical!**

- **What are the symptoms reported?**
  - ▶ Message Depth high or queue full
  - ▶ MQ is losing my messages
  - ▶ MQ is Broken
  - ▶ Missing my SLAs

Message Depth issues

- **Unfortunately, the single thing many use to determine how healthy the environment is happens to be queue depth**
  - ▶ And the knee jerk reaction is that there is something wrong with MQ when the depth is high or when applications start getting Queue Full reason codes
    - And maybe we, as administrators, have brought this on ourselves from time to time.
  - ▶ So look first to the MQ JES logs for the queue manager and channel initiator address space
    - Has a channel or feeding queue manager that was down for a while just restarted?
  - ▶ Second place to look is at the queue

Message Depth issues - notes

- **Look at the JES logs first - I am just as guilty of this as the next person, if that person is NOT Mitch.**
  - ▶ We have seen all too many instances of high queue depth, only to discover there were a trail of clues.
  - ▶ And it may not just be MQ's logs that should be examined.
    - • MQ just delivers the messages, CICS/IMS/Batch process the messages. There may be something there as well.

- **If the queues are shared, you may have to look in other LPARs as well.**

Message Depth issues

- **Second place to look is at the queue**

⁄	Queue name	Queue type	QSG dispos...	Open input c...	Ope...	Current queue depth	Put messages	Get messages
✉	QCPY.INPUT	Local	Queue man...	0	0	970	Allowed	Allowed
✉	QCPY.OUTPUT	Local	Queue man...	0	0	30	Allowed	Allowed

▶ In this case the 'Open input count' is zero, meaning the listening application is not connected. This could be any number of things:

- An application outage – planned or unplanned
- A triggering failure
- A CICS/IMS region is down

Message Depth issues – War Stories

▶ We have seen this one reported so often. Probably one of the worst cases was during an critical outage recovery. The customer had set up a tier structure of their applications, but had not really studied the relationships between their applications closely. And it seemed that a tier 1 application, that had to be brought back up and running within a very short period (10 minutes) was dependent on a tier 4 service occasionally. As that service was not required to be recovered for a full 24 hours, the important application failed.

Message Depth issues

- Finally there is the dreaded politician message

- Just chews up resources and never does anything

- Queue depth grows but little or nothing is being processed, because the message just gets rolled back

Message Depth issues – Poison messages

▶ Again a popular problem, a message that should have gone elsewhere or cannot be processed is not removed. The application does not check the backout count and keeps rolling it back to the original queue to be picked up again, and again, and again.

▶ Sometime the only way to find out if this is the problem is to stop the application (all instances) and look at the message header. If the back out count is high that message may need to be manually removed.

▶ This is occasionally seen when different components of an application are upgraded on different dates.

▶ Another symptom is high CPU use, while this spinning is going on.

Message Depth issues – if all else fails

- **Has the message volume been trending up?**
  - ▶ Eventually if the volume increases there may be performance issues, that can cause unavoidable build up.
    - Looking at your SMF data?

- **Has the business added workload?**
  - ▶ Did a universal pricing change take place, causing an unexpected spike?

- **Has the message size changed?**

- **For private queues, use the DISPLAY USAGE command to see if bufferpools and pagesets may be constrained**

Message Depth issues – if all else fails

- If there has been no monitoring of message volume, MQ will keep up for years, until it can no longer do so. Then there may be internal contention, etc.

- Businesses adding workload without considering the impact on infrastructure is an old tale. 'The straw that broke the camels back' is not a new adage.

- Even changes in message sizes have been know to cause issues, especially when the queue manager or the queue was already struggling. Increased message sizes impact the amount of data being logged, when the messages are persistent. Take up more pages in the bufferpool, etc.

MQ is losing my messages!

- **Why, after all these years, is this still a thing?**
  - ▶ As an overwhelming rule, MQ does NOT lose persistent messages.
    - There are very few exceptions to this rule.
  - ▶ Where might the messages have gone?
    - Messages have been routed somewhere 'unexpected'
    - Messages have been discarded by an application
    - Messages are not really persistent
    - Message PUT did not complete correctly
    - Messages have been put, but not committed

MQ is losing my messages!

- **OK, bet you want to know the exceptions:**
  - ▶ A shop co-located the pageset and logs on the same physical devise and cleared the device.
  - ▶ The log RBA Wrapped, and unless really determined this could not happen with current MQ versions

- **Messages routed somewhere unexpected**
  - ▶ Might be a system DLQ or an application DLQ/Backout queue
  - ▶ Might be a new instance of a cluster queue
    - • Run a trace-route test before and after significant changes in the cluster is a good preventative technique.
  - ▶ Might be a bad alias
  - ▶ Might be where the application 'really' told MQ to put it

MQ is losing my messages!

- **Messages not really persistent:**
  - ▶ Sadly, many applications rely on the queue definition for message persistence. That gets changed, and poof! As if by magic messages start disappearing.
  - ▶ Some applications have been known to use external information to determine message persistence. If that external information is not correct, then again messages that everyone thought were persistent are not.

- **Messages may have been discarded. We have seen a number of times where an application discards messages it cannot process rather than posting them to an application backout queue (or application DLQ). We recently heard of a DLH processing program that was discarding messages that did not have a 'known' reason code.**

- **Another all too common scenario, the putting application has not committed the messages so they cannot be processed.**

- **Using the log utility may be of assistance.**

MQ is losing my messages – continued!

▶ Where might the messages have gone? Continued
- Queue may have been cleared
  - Should have events turned on for this and have a paper trail on clearing of queues.
- Queue may have been unloaded and not yet restored
  - In dealing with a problem, the contents might have been moved to a temporary location or downloaded to a dataset
- Messages may have expired
- A new one that we, unfortunately, expect to see
  - CAPEXPRY is set too low

MQ is losing my publications/subscriptions

- **Introduced universally in V7 pub/sub is now growing in production environments**
  - ▶ We are starting to hear rumblings of publications going 'astray' or subscriptions not receiving publications as expected
  - ▶ So far, most of the issues have been with topic strings not quite matching
    - • Corporate/HR is not the same as Corporate/hr
  - ▶ With the implementation of security we have also heard that some subscribing applications suddenly become unable to both put to and get from the target queue

MQ V8 helps with this

- **Use the display commands:**
  - ▶ DISPLAY TPSTATUS
  - ▶ DISPLAY PUBSUB
  - ▶ DISPLAY SBSTATUS

MQ is missing SLAs

- **More subtle, the reasons for this can include every other symptom (missing messages, etc.)**

- **Quite often this is a natural outgrowth of volume and resource constraints**
  - ▶ For example, internal delays caused by longer I/O response time because both MQ and DB2 are logging as much data as they can, and the controller is at capacity
  - ▶ At times predictable, if the queue manager SMF Statistics and accounting are being monitored.

Missing SLAs – quick info

- **Use the DISPLAY QSTATUS command or the MQX**

- **This will give a quick view into latest put and get date and time**

- **In this case messages are being put, but the last GET was done several days previously.**
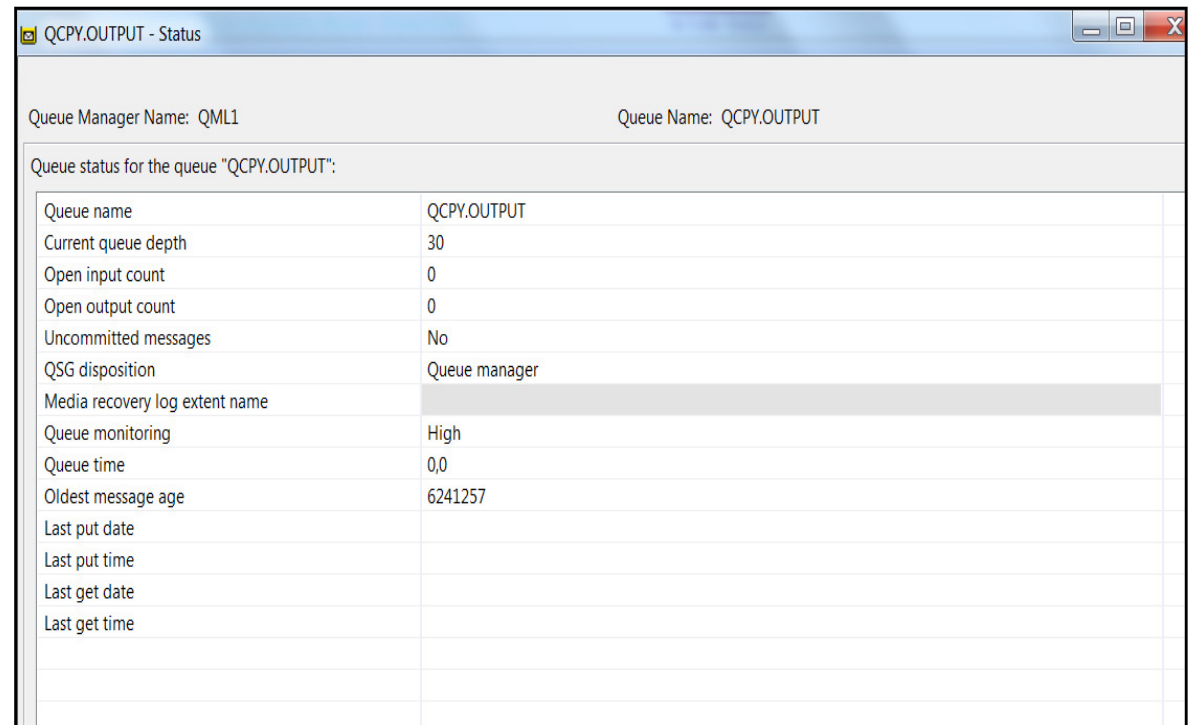

ELKINSC.CLIENT.TEST - Status

Queue Manager Name: QML1   Queue Name: ELKINSC.CLIENT.TEST

Queue status for the queue "ELKINSC.CLIENT.TEST":

Queue name	ELKINSC.CLIENT.TEST
Current queue depth	3
Open input count	0
Open output count	0
Uncommitted messages	No
QSG disposition	Queue manager
Media recovery log extent name	
Queue monitoring	High
Queue time	13224303,13256673
Oldest message age	13
Last put date	Mar 2, 2016
Last put time	7:14:36 PM
Last get date	Feb 27, 2016
Last get time	6:10:37 PM

Missing SLAs - continued

■ **If you do not get the last put and get times, like what is seen here, then the queue monitoring is not set correctly – or not set correctly when the messages were put**
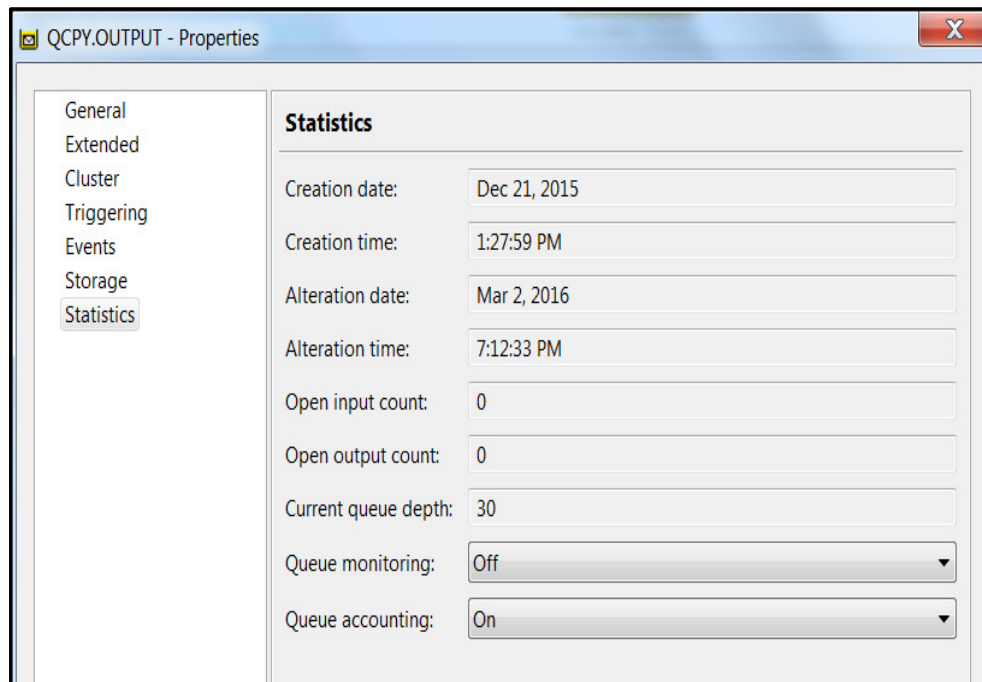
QCPY.OUTPUT - Status			
Queue Manager Name: QML1		Queue Name: QCPY.OUTPUT	

Queue status for the queue "QCPY.OUTPUT":

Queue name	QCPY.OUTPUT
Current queue depth	30
Open input count	0
Open output count	0
Uncommitted messages	No
QSG disposition	Queue manager
Media recovery log extent name	
Queue monitoring	High
Queue time	0,0
Oldest message age	6241257
Last put date	
Last put time	
Last get date	
Last get time	

Missing SLAs - continued

- **Queue monitoring is turned off for the queue, the information about the last put and get time is not available.**

- **For applications with a strict SLA queue monitoring and accounting should always be on.**

And of course

- It must be on at the queue manager level as well!
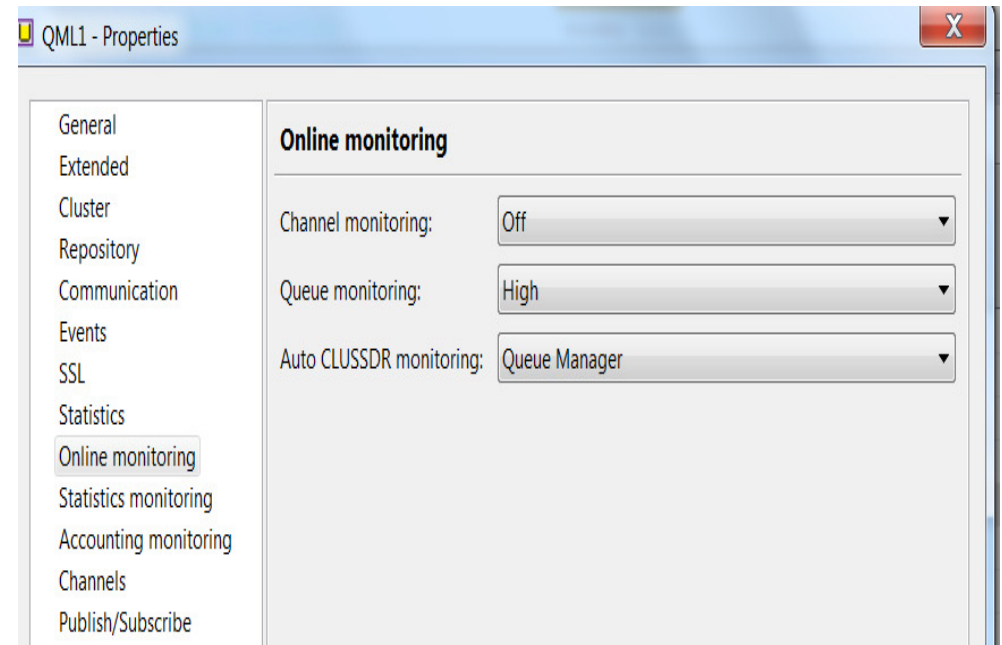
Missing SLAs

- **If the last get and put times are more reasonable, and SLAs are not being met closer investigation is needed.**
  - ▶ Hopefully it is as simple as adding a new getting application instance
    - May be a spike or early indication of growth
    - Might be a poison message indicator
    - However a new application instance can make the problem worse, when the issue is underlying contention
      - – Database contention
      - – Systems resource contention
    - Time to start looking at the SMF, the detailed accounting data

MQ is Broken

- **MQ may really be broken, it happens. We all need to admit that.**

- **Though often it is just links that are broken, not the queue manager**
  - ▶ Look for channel outages first

- **Often the MQ system admins know that this is happening before the first phone call, automations tools 'notice' the events and send urgent email/notification**

What do the MQ messages tell me?

- **All MQ for z/OS messages start with CSQ**

- **The fourth character indicates the MQ component**

- **The next three are the message number**

- **The final character is the message type code:**
  - ▶ A – Immediate Action Required
  - ▶ D – Immediate Decision Required
  - ▶ E – Action in needed in the future
  - ▶ I – Information, may need to be monitored for the future

MQ for z/OS Sample messages

- **CSQY023A - SOME OBJECTS COULD NOT BE MIGRATED, MANUAL RESOLUTION REQUIRED. REPLY TO ACKNOWLEDGE AND CONTINUE STARTUP**

- **CSQJ031D - csect-name, THE LOG RBA RANGE MUST BE RESET. REPLY 'Y' TO CONTINUE STARTUP OR 'N' TO SHUTDOWN.**

- **CSQJ032E- csect-name alert-lvl - APPROACHING END OF THE LOG RBA RANGE OF max-rba. CURRENT LOG RBA IS current-rba.**

- **CSQJ034I - csect-name END OF LOG RBA RANGE IS max-rba**

MQ is Broken – Abends & Dumps

- **An abend is an 'abnormal end' of the queue manager or channel initiator address space**
  - ▶ This is typically a bad thing, though there are times when an abend is issued to stop activity that would damage the queue manager or the integrity of the messages

- **There are also times when dumps are issued to help debug problems.**
  - ▶ You may be asked to introduce a 'trap' or a 'slip trap' to capture certain conditions for Level 2 or 3 to evaluated

- **Abend code x'5C6' or x'6C6'**
  - ▶ Followed by a reason code

- **Reason code:**
  - ▶ '00'
  - ▶ 'XX' – component identifier
  - ▶ 'YYYY' – problem identifier
  - ▶ Example:
    - • 5C6-00C90700

MQ is Broken – Abends

- MQ delivers an IPCS component to help pinpoint problems and format the dump and control blocks.

- For additional information please see the Knowledge Center:
  http://www-01.ibm.com/support/knowledgecenter/SSFKSJ_8.0.0/com.ibm.mq.ref.doc/q071790_.htm

We have lost all hope, PMR time!

- **There is no shame in asking for help**

- **Must Gather information**
  - ▶http://www-01.ibm.com/support/docview.wss?uid=swg21618796

Fantasy vs. Reality