	Standard Operating Procedure # MULE MQ # DEPTH ERROR	**TAOS** **DATE:** 150623 **VERSION :** 1.0 **APPLICATION: MULE** **OWNER:** Joshua Roebuck

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PROBLEM
Several queues tend to have a large number of messages dropped in them, producing many 'false positive' alerts. However, under certain circumstances, the alerts may indeed indicate a serious issue.

BUSINESS IMPACT

Severity level 1
- The ripple effect of one queue not draining can lead to no queues draining on the given AMQ server. If it's a hung db transaction, it can have enterprise-wide effects.
- Generally the ripple effect is that the issue slows down AMQ and the WMQs are not being read from, everything else starts to back up, which means we have no picks going through, and no ship confirms coming back up.

PURPOSE
Provide guidelines for how Taos should interpret and respond to these MQ Depth Alerts.

SCOPE

Applies to any of these 3 MQs:

Monitor Name: WMQ Monitor for MULE.CWD.ITEM.TO.MULE (queue on s1pmule1)
Status: error

Monitor Name: WMQ Monitor for MULE.ESTOREITEM.TO.MULE (queue on s1pmule1)
Status: error

Monitor Name: WMQ Monitor for MULE.CWD.INVENTORYDOWNLOAD.TO.MULE (queue on s1pmule1)
Status: error

Sitescope generates alert when a queue is in error state, i.e., if queue depth > 30 for more than two iterations.
- First 10-minute iteration, then another 10, then if it hits 15 after that, it is considered in error state and sends the alert.
    - Possible that alert frequency increases if error state continues.

NOTE: There may be a typo/error in the Sitescope setup for Monitor Name field: Monitor Name: WMQ Monitor for MULE.CWD.ITEM.TO.MULE.   The bold Mule prefix should not be there.
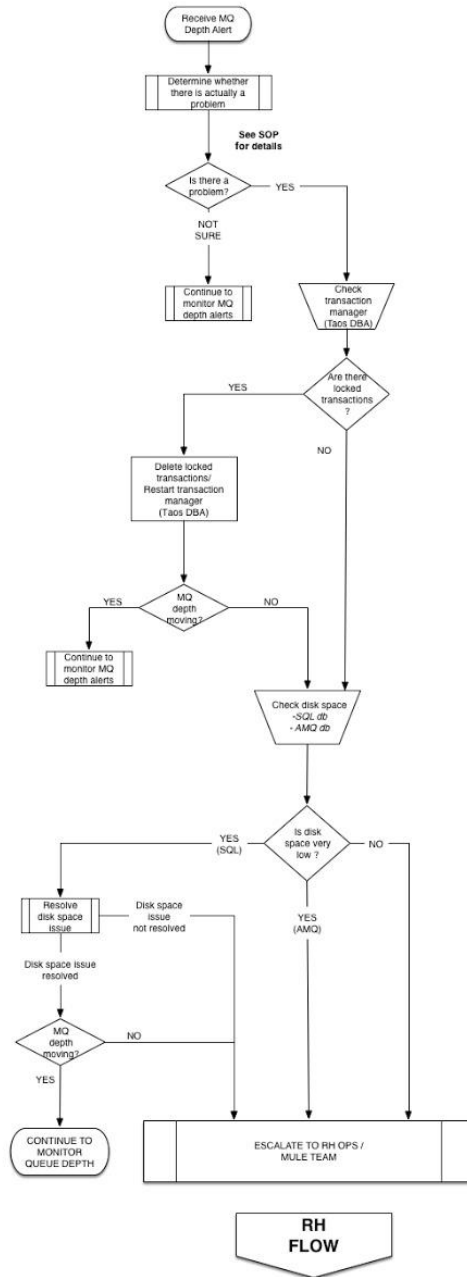
NOTE: Sometimes you may see alerts for MULE.ESTOREITEM.TO.MULE; according to Dan, this is just a typo and should be CWD.ESTOREITEM.TO.MULE, not an internal queue (MULE.CWD.ITEM.TO.MULE).

TAOS PROCEDURE

1. Receive MQ depth alert
    - Generated by Sitescope

2. Determine whether or not the alerts indicate a problem situation
    - Observe queue patterns for problem indicators

3. If there does appear to be a problem, Taos DBA investigates/troubleshoots transaction manager.

4. If transaction manager does not have locked transactions, or removing them does not produce changes in MQ depth, check disk space (SQL server and AMQ data store).
    - If necessary, RH Operations team may get involved

5. If disk space is adequate, if Taos/RH Operations are not able to resolve the issue, or if clearing disk space does not produce changes in MQ depth, **escalate to Mule team** (Bryan Schneider, Dan Duffy).

    - They will investigate possible issues with AMQ and take steps to resolve.

See decision flow diagram (next page)

TAOS SOP
MQ DEPTH ERRORS
PROCESS FLOW

Receive MQ
Depth Alert

Determine whether
there is actually a
problem

**See SOP
for details**

Is there a
problem?

YES

NOT
SURE

Continue to
monitor MQ
depth alerts

Check
transaction
manager
(Taos DBA)

Are there
locked
transactions
?

YES

NO

Delete locked
transactions/
Restart transaction
manager
(Taos DBA)

YES

MQ
depth
moving?

NO

Continue to
monitor MQ
depth alerts

Check disk space
-SQL db
- AMQ db

YES
(SQL)

Is disk
space very
low ?

NO

YES
(AMQ)

Resolve
disk space
issue

Disk space
issue
not resolved

Disk space issue
resolved

MQ
depth
moving?

NO

YES

CONTINUE TO
MONITOR
QUEUE DEPTH

ESCALATE TO RH OPS /
MULE TEAM

RH
FLOW

BACKGROUND

QUEUES OVERVIEW

bold=local queue   not bold=remote queue

INBOUND QUEUE	**CWD.ITEM.TO.MULE**	CWD.ESTOREITEM.TO.MULE	CWD.INVENTORYDOWNLOAD.TO.MULE
DATA	Item Master	Enterprise SKU	Inventory Actuals
SOURCE SYSTEM	PIM (on CWD prod)	PIM (on CWD prod)	CWD (on CWD prod)
ALERT (example)	(error ALERT!) - WMQ Monitor for MULE.CWD.ITEM.TO.MULE (queue on s1pmule1 Queues\CWD.ITEM.TO.MULE\Current Queue Depth=15394	(error ALERT!) - WMQ Monitor for MULE.ESTOREITEM.TO.MULE (queue on s1pmule1 Queues\CWD.ESTOREITEM.TO.MULE\Current Queue Depth=32638	(error ALERT!) - WMQ Monitor for MULE.CWD.INVENTORYDOWNLOAD.TO.MULE (queue on s1pmule1 Queues\CWD.INVENTORYDOWNLOAD.TO.MULE\Current Queue Depth=1
MULE PROCESSING	Transformation dependent on consuming system destination. Routed to one of five different consuming systems. See appendix for details.	No transformation. Just routed to either RH or BC outbound queues. See appendix for details.	Transformation on all messages to reduce message size; a subset of dropship POs go through additional transformation. See appendix for details.
OUTBOUND QUEUES	MULE.ITEM.TO.WMIS (PKMS) MULE.ITEM.TO.WMIS1 (KCS) MULE.ITEM.TO.RHOM	**MULE.ITEM.TO.RHPROD*** **MULE.ITEM.TO.BCPROD***	**MULE.INVENTORYDOWNLOAD.TO.RH.WEB** **MULE.INVENTORYDOWNLOAD.TO.BC.WEB**
DESTINATION SYSTEM(S)	KCS, PKMS, RHOM, DESCARTES, ORACLE FINANCIALS	ATG**	ATG**

* NOTE: Although these two outbound queues are called 'item,' they really are 'estoreitem' data (Enterprise SKU not Item Master). It's the same xml as the parent feed, and different than the xml in the CWD. ITEM queues up top.

- contributing to the confusion, when the estore portion was originally developed around 3 years ago, both what's now CWD.ITEM and CWD.ESTOREITEM lived in the Item Master service. just a subset was the web stuff.
- when we migrated up, we decided the web stuff should be in its own service, so now we have an ITEM MASTER service and an ESTORE ITEM service.
    - but we didn't change the name of the queues.

** NOTE: The ATG-bound outbound queues are local because at present, ATG does not pick those messages up from a WMQ, rather they pick them up from Mule using JMS.

INTERPRETING QUEUE DEPTH

You may observe that queue depth is very high, may not be decreasing at all or only very slowly, and may even be increasing.
These conditions are not necessarily indicative of a problem.
Don't escalate or assume there is a problem until one or more queues is not moving **and** you've given it some time to determine whether it's really stuck.

Many Messages In Queue(s)
There may be many thousands or even over a million messages in one or more queues. Such spikes reflect normal business activity. **High MQ depth is not in itself an indication of a problem.**

Queue(s) Depth Going Down
Even though there are a lot of messages, it's going in the right direction. For instance, you may observe that over the course of a half hour, MQ depth goes from 1.5 million to 1.3 to 1.1 million. Even though queue depth remains very high, Mule is processing messages and there is no need yet to take any action.

Note: While this situation is likely just congestion due to business activity, the fact that Mule is processing slowly may lead some in the business to become uneasy, as they expect to see data updates that just may not have completed processing yet.

Queue(s) Depth Going Up
Even though there are a lot of messages, and queue depth continues to increase, this is not evidence of a problem. In this scenario, it is often simply that the business is dropping

messages into Mule faster than it can process them. Eg, the business might load one spreadsheet, and then they follow it with a different update, and load up a different spreadsheet, and maybe another one. That is, even though MQ depth is increasing, Mule may still be processing those messages.   This has happened on estore item or inventory download; we haven't yet seen it on Item.

- it'll usually be one or the other queue, not both. But really depends on when you happen to catch it.

Queue(s) Depth Not Changing

You may observe that MQ depth stays static for one or more queues. Again, this is not necessarily evidence of a problem. Oftentimes it will appear stuck, but then after 10-15 minutes begins moving in one direction or the other. In that scenario, either it was just that a large number of messages had to be processed, or that the transaction manager had issues but was able to recover.

PROBLEM INDICATORS

Based on whichever diagnostic resources are available, the following patterns are indicative of problem requiring immediate troubleshooting:

Queue depth not decreasing
- You may notice that it never goes down, it only either goes up or stays the same.
  - The distinction between going up and staying same is not critical; the salient issue in both cases is that queue depth is not going down.
- MQ queue depth increasing, in itself, is not a problem.

Multiple queues involved
- If you see that there are thousands of messages in numerous different MQs, there's a problem!
- If you see that other queues are becoming involved (filling up) and none are draining, that is indicator of work not being done (messages not being processed).

Situation not improving over time
- Problems may not become evident until everything from each of the queues has come from CWD into Mule, and there's no more coming in, so the number (depth) is not increasing, but it's not going down either – staying same number.
- May not be sure there's a problem until you observe the count just not moving
  - Just wait and see, keep refreshing the queues
  - No clear rule of thumb for how long to wait
    - Cannot give a specific time limit, like if after 30 minutes it hasn't come down, because we can't control what the business does.

Outbound Queues not draining
- If the outbound queues are not draining for a period of time, this does indicate a problem, though it does not indicate where the problem is. Particularly if estoreitem is involved, it can be helpful to check the MULE.ITEM.TO.RHPROD queue too.

TROUBLESHOOTING

Whatever the root cause is that's causing Mule to stop processing messages, it will eventually produce a domino effect and bring everything to a grinding halt. It could be any of the three queues that is implicated in the root cause, just depends on what's running at the time.

The key symptom - no movement in either inbound or outbound queues - generally has one of the following three root causes:
- Database transactions are hung due to locked transactions in the transaction manager
- Database transactions are pending (but not hung) due to low disk space
- Database transactions are pending (but not hung) due to AMQ instability

Each root cause has a different recovery process.

Transaction Manager
The first thing to check is the Transaction Manager. The SQL db has a Microsoft XA Transaction Manager on it. That software has known reliability issues that produce locked transactions, which leaves the db in a hung state.

PROCEDURE
1. Taos DBA should check the transaction manager for transaction locks.

2. If any locks are found, delete them (or restart transaction manager).
   - This operation usually things will start flowing again.

3. If the problem continues, check disk space.

Disk Space

MQ depth issues can arise when inadequate disk space leaves db transactions pending. Disk space must be checked on both the SQL server and AMQ instance.

RESOLUTION/PROCEDURE
1. Determine whether there is adequate disk space on SQL server and Mule server.

2. If disk space is insufficient on SQL server, free up disk space (likely transaction logs).
    ● Depending on related SOPs, Taos may involve RH Operations in that process.

3. If disk space is insufficient in AMQ, **escalate to Mule team**.
    ● Bryan knows how to fix the disk space issue, while making sure that there's no data loss.