IMQ09 - IBM MQ V9 for z/OS Wildfire Workshop

# L07 – Introduction to SMF 116 Records

*Version V6.0*

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## Lab Objectives

This lab is to introduce the SMF116 Class 3 data produced by IBM MQ. The examples used are taken from real data, based on situations both Level 3 and ATS have seen.

## *Gen*eral Lab Information and Guidelines

- ✓ This exercise requires using TSO user *USER1* on the *wg31.washington.ibm.com* system.
- ✓ The TSO password for this exercise will be provided by the lab instructor.
- ✓ If performing this lab as a paper exercise, outside the ATS environment, please:
  a) Download and review SupportPac MP1B, which can be found at: http://www-01.ibm.com/support/docview.wss?rs=171&uid=swg24005907&loc=en_US&cs=utf-8&lang=en
  b) Allocation a library (PDS or sequential) for the sample SMF listing. It should be variable blocked with a record length of 133 and a blocksize of 6233.
  c) Upload the text file SMF115_LAB.txt into the created file.
  d) Edit the file o member, using normal ISPF editing.
  e) Skip to step 8.
  f) Otherwise, if in an ATS lib environment, use the following steps.
- ✓ The data in use is not live; you will be looking at the output from the MP1B provided SMF print jobs. The data set used is *USER1.SHARE.SMFTEXT*.

# SMF 116 – Class 3 Data – IMQ Accounting Data for a Transaction

____1. IBM MQ (IMQ) produces extremely detailed accounting information about the MQ use by transactions and batch jobs, including the channel initiator. This data is prolific, but is very useful when looking for performance problems or when changing applications.

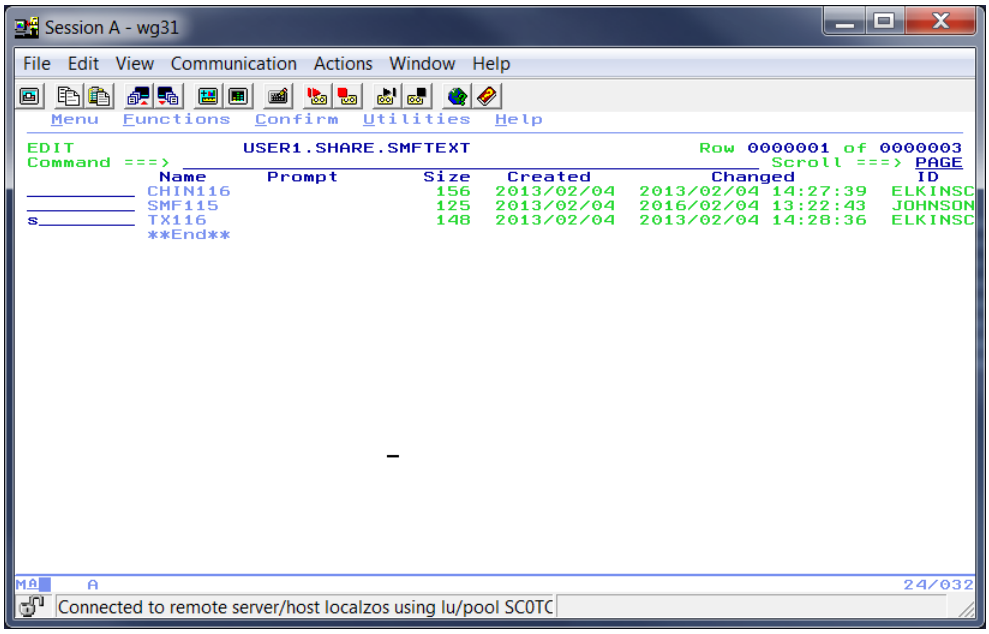
The records are produced for each transaction and at the SMF interval for long running tasks, including batch jobs and channels.

The IMQ SMF interval is set by the STATIME parameter. It can be set in the CSQSYSP macro, or by the SET SYSTEM STATIME command. The interval is in minutes and can be set to 0, meaning that the system SMF interval will be used; or any value up to 1440, which will only broadcast the data gathered once a day. Most production environments used 15 or 30 minute intervals. Lower intervals are sometimes set for problem determination

____2. Go to ISPF option 3.4 and on the *Data Set List Utility* panel, enter ***.SHARE***, in the *Dsname Level* fields and click the **ENTER** key.

____3. From the *DSLIST* panel, edit data set *USER1.SHARE.SMFTEXT* by entering an ***E*** in the *Command* field by the data set name and click the **ENTER** key.

____4. Select the *TX116* member from the list.



____5. The SMF 116 data, as interpreted by the MP1B program MQ116S.

```
           ====> New task record found     <==========
== Thread type............> CICS
== Connection name........> CICS1
== Operator ID............> MQUSER
== User ID................> MQUSER
== Channel name...........>
== Chl connection.........>
== Correlator ID..........>      fÌìQT10
== Correlator ID.....(HEX)> 2B867858C4D7F6F40019100C
== Context token..........>
== Context token.....(HEX)> 00000000000000000000000000000000
== NID....................> CICS1-"Öl  &
== NID................(HEX)> D5C3C9C3E2D7D7C2CA7FEC9330175025
== Accounting token.......>
== Accounting token..(HEX)> 0000000000000000000000000000000000000000
== UOW identifier.........>                    -"Öl
== UOW identifier....(HEX)> 4040404040404040404040404040404040CA7FEC93302
== Task token : 18-01-2013 15:00:59.62,  2BF4CB20,  2BD2F3C0
== Interval   : START 18-01-2013 15:00:59.62
```

____6. Preliminary task information notes and questions:

a. What is the thread type? _____
   This field tells the type of connection that is captured in this set of SMF records. .
b. The Correlator ID, not to be confused with a message correlation ID, provides the transaction ID for CICS and IMS tasks. In this case it is QT10. When looking for performance problems in a transaction or set of transactions, the SMF116 data can be sorted to eliminate all the other transactions.
c. The UOW identifier can be very helpful when trying to track a long running unit of work.
d. How long (in minutes) was the interval captured?_____
e. The count of the queues reported on for this transaction is the number of queue blocks. How many are there for this instance of QT10? _____

____7. Page forward (F8 key)

```
== Interval   : END   18-01-2013 15:23:26.98
 == Number of queue blocks for this task          6
 == Other reqs : Count        149,  Avg elapsed        847,  Avg CPU
 == Latch     : Max number         16,  Max wait      19723 mics
  > Latch 15,  Total wait        264 mics, Waits           7, Name CMXL1
  > Latch 16,  Total wait      19723 mics, Waits        1813, Name BMXL2
  > Latch 19,  Total wait        211 mics, Waits           1, Name BMXL3
  > Latch 21,  Total wait          4 mics, Waits           4, Name RLMLWR
  > Latch 24,  Total wait        229 mics, Waits          19, Name LMXL1
  > Latch 30,  Total wait         16 mics, Waits           3, Name ASMSAG
  > Latch 31,  Total wait        511 mics, Waits          59, Name DPSLTC
  > Latch 32,  Total wait          2 mics, Waits           2, Name SMCPHB
  > Address of latch for longest wait: 000000007EC66A80
 == Commit     : Count        320,  Avg elapsed        517,  Avg CPU
 == Log I/O    : Count        699,  Avg elapsed        873,  Bytes    22
                 Forces       699,  Avg elapsed        873
 == Suspend    : Count        321,  Avg elapsed        490
 == Pages      : New         2368,  Old    1487170
WTASVER 5
 == Task token : 18-01-2013 15:00:59.62,  2BF4CB20,  2BD2F3C0
```

____8. This transaction showed a lot of latching activity. Latches are the way the queue manager serializes requests internally. They may indicate a performance problem, but are at times reported due to normal circumstances.

a. How many different latch types are reported for this transaction? _____
b. What was the longest wait time? _____
c. Which latch type was it for? _____
d. How many waits were there for this interval? _____
e. The total wait time divided by te number of waits, gives the average.

   _____

f. The name of the wait is ‘BMXL2’, which indicates a bufferpool wait. ‘BM’ is for the buffer manager component of the queue manager. To evaluate the waits, the SMF115 data for the same interval should be examined. It may indicate a bufferpool shortage. If this were a batch process, a bufferpool wait might not be critical, for an online transaction any wait can impact service level agreements.
   Another area to investigate is whether all the queues being used are using the same resource pool. If there is a concentration, often a performance problem can be eliminated just by moving queues to a less used resource pool.

____9. Bring the first queue block to the top of the panel. The queue block begins with 'Open name'

```
Open name ALIAS.SEND.Q1                                    Object type
Base name BASE.SEND.Q1                                     Base type
Queue indexed by NONE
First opened 18-01-2013 15:09:13.68
Last closed  18-01-2013 15:09:13.68
Page set ID             4,  Buffer pool          3
Current opens           0,  Total requests          3
Generated messages :          1
Persistent messages: GETs          0,  PUTs           1,  PUT1s
Put to waiting getter: PUT          0,  PUT1           0
PUTs: Valid         1,  Max size      5233,  Min size      5233,  Tota
-MQ call-          N         ET         CT       Susp       LOGW
 Open   :          1         19         19          0
 Close  :          1          8          8          0
 Put    :          1        128        101          0          0
Maximum depth encountered          1

Open name ALIAS.REPLY.Q1                                   Object type
Base name BASE.REPLY.Q1                                    Base type
Queue indexed by NONE
```

____10. Queue block 1 questions and notes:

a. What is the Open name of the queue? _____
b. What is the base name?_____
c. Why are they different?

_____

_____

d. What buffer pool is used? _____
e. What pageset? _____
f. How many successful MQPUTs were issued? _____
g. The 'N' column is the number of MQAPI requests, 'ET' is the average elapsed time for the MQ API call to complete, 'CT' is the average CPU time, and Susp is the number of times the requests were suspended.
h. How many MQPUTs were performed?
i. What was the CPU time recorded?

____11. Page forward to the second queue block.

```
Open name ALIAS.REPLY.Q1                                    Object type
Base name BASE.REPLY.Q1                                     Base type
Queue indexed by NONE
First opened 18-01-2013 15:01:01.65
Last closed  18-01-2013 15:22:56.76
Page set ID             4,  Buffer pool          3
Current opens           0,  Total requests       1380
Generated messages :          0
Persistent messages: GETs        345,  PUTs          0,  PUT1s
Put to waiting getter: PUT          0,  PUT1          0
GETs: Valid       345,  Max size    491704,  Min size    491704,  Tota
GETs: Dest-S      690,  Dest-G         0,  Brow-S         0,  Brow-G
Time on queue : Max    0.028560,  Min    0.006872, Avg    0.008911
-MQ call-          N         ET         CT       Susp       LOGW
 Open   :        345         16         16          0
 Close  :        345          6          6          0
 Get    :        690       3488       2766        538        498
-Logging: Total-count  Total-elapsed   Force-count Force-elapsed
 MQGET            346       0.343864           346      0.343864
```

____12. This queue is more interesting because there is a lot more activity.

a. Is the queue indexed? _____

b. How many valid gets were performed during this interval? _____

c. Is the message length variable during this interval? _____
   Hint – look at the Max and Min sizes.

d. The Dest-S count gives the number of messages that are destructively retrieved using a specific matching field; typically the correlation ID or the message ID. The Dest-G count gives the number of messages that are retrieved as the next message on the queue.
   Were the messages retrieved using a matching field?_____
   If the answer is 'yes' and the queue is not indexed, setting the appropriate index value on the queue will improve performance and reduce CPU consumption.

e. What was the maximum queue depth? _____

____13. Page forward to the QREMOTE.REQ.Q1 queue

```
Open name QREMOTE.REQ.Q1                                    Object type
Base name XMITQ1                                            Base type
Queue indexed by NONE
First opened 18-01-2013 15:01:01.65
Last closed  18-01-2013 15:22:56.76
Page set ID             2,  Buffer pool          2
Current opens           0,  Total requests       1035
Generated messages :          0
Persistent messages: GETs          0,  PUTs           0,  PUT1s
Put to waiting getter: PUT        236,  PUT1           0
PUTs: Valid       345,  Max size       747,  Min size       747,  Tota
-MQ call-          N         ET         CT       Susp       LOGW
 Open   :        345         21         20          0
 Close  :        345         11         10          0
 Put    :        345         31         29          0          0
Maximum depth encountered         10

Open name ALIAS.SEND.Q1                                     Object type
Base name BASE.SEND.Q1                                      Base type
```

a. How many MQOPEN commands were issued in the SMF interval? _____
b. How many MQCLOSE commands were issued? _____
c. How many MQPUT commands were issued?_____
d. What Bufferpool is used for the queue?_____
e. What is the pageset?_____
f. Were the puts done to a waiting getter? _____
   Putting to a waiting getting is a performance enhancement added to WMQ V6.
g. In this case the application did an open and close for each put. Each Open uses an average of 20 CPU microseconds, each close uses an average of 10. If the application was restructured to only open and close this queue once, how much CPU would be saved?
   _____

____14. Review the queue information for the remaining queues.
a. How many of the queues are using bufferpool 3? _____
b. How many of the queues are using bufferpool 2? _____
c. How many of the queues are using pageset 4?_____
d. How many of the queues are using pageset 2?_____
e. If the majority of the active queues are using the same resource pool, and that pool is under stress; a rebalancing of queues in the available resources may help improve performance and reduce CPU consumption.

# SMF 116 – Class 3 Data – IMQ Accounting Data for a channel

____1. Return to the member list and select the *CHIN116* member, as shown.

____2. This SMF 116 class three accounting information is from the message channel agent handling the QSGM.OUT channel.

```
z/OS:LPA1  MQ QMGR:QML4  Time: 2010363 14:29:23.80  Jobname:QML4CHIN  Userid:MQUSER
           ====> New task record found     <==========
== Thread type.............> MOVER
== Connection name.........> QML4CHIN
== Operator ID.............> MQUSER
== User ID.................> MQUSER
== Channel name............> QSGM.OUT
== Chl connection..........> 1.2.3.43
== Correlator ID...........>            }
== Correlator ID.....(HEX)> 243DD000E7E75C5C243DD2C0
== Context token...........>
== Context token.....(HEX)> 00000000000000000000000000000000
== NID.....................> QML4CHING  W ÈÆ
== NID.................(HEX)> D4D8D7C5C3C8C9D5C71A1DE63B749E08
== Accounting token........>
== Accounting token..(HEX)> 0000000000000000000000000000000000000000
== UOW identifier..........>                    G  W 0
== UOW identifier....(HEX)> 4040404040404040404040404040C71A1DE63C800001
== Task token : 29-12-2010 19:29:14.38,  694F4950,  6A10B040
== Interval   : START 29-12-2010 19:29:15.53
== Interval   : END   29-12-2010 19:29:23.80
== Number of queue blocks for this task          5
```

a. How many queues is this task using?

____3. Page forward in the member.

```
== Other reqs : Count        116,  Avg elapsed        229,  Avg CPU
 == DB2 activity           :          3 requests
  > Total elapsed (thread) :    0.021460
  > Total elapsed (SQL)    :    0.021056
  > Max   elapsed (thread) :    0.010217
  > Max   elapsed (SQL)    :    0.010152
  > MSG bytes put to DB2   :      0
  > MSG bytes got from DB2 :      0
 == CF  activity : Requests - Single          7,  Multiple          1
  >                Retries  - Single          0,  Multiple          0
  > Average time per IXLLSTE requests :      144 n:       7
  > Average time per IXLLSTM requests :       38 n:       1
 == Latch     : Max number         30,  Max wait       7940 mics
  > Latch 11,  Total wait        933 mics, Waits          1, Name DMCSEG
  > Latch 21,  Total wait          1 mics, Waits          1, Name RLMLWR
  > Latch 24,  Total wait         98 mics, Waits          1, Name LMXL1
  > Latch 30,  Total wait       7940 mics, Waits          1, Name ASMSAG
  > Address of latch for longest wait: 000000001AB4E108
 == Commit     : Count         35,  Avg elapsed          6,  Avg CPU
 == Backout    : Count         35,  Avg elapsed        323,  Avg CPU
```

a. The DB2 activity is recorded because some of the queues used by this task are shared queues. How many messages have been put to DB2? _____
   Messages are typically put to DB2 when they exceed the 63K limit. Note that currently the SMF print programs do not report any of the new SMDS data.
b. How many requests were made to the CF? _____
c. How many of those requests were multiple?_____
d. What was the total wait time on Latch 30? _____
e. What was the average wait time on Latch 30? _____
   Note that latch 30 frequently indicates a wait for a response from a security request. This value is probably not a problem, especially when it only appears during the first information about this task.
f. What is the average elapsed time for the Log I/O? _____
   This elapsed time seems quite high, and may indicate contention for the log. If this rate continues, check with the administrators responsible for the I/O subsystem to see if there are known issues. Check to make sure that the MQ logs are striped across 4 volumes.

____4. Bring the first queue block to the top of the screen, as shown.

```
Open name QR.RESPONSE.ONE                                    Object type
Base name QR.RESPONSE.ONE                                    Base type
Queue indexed by NONE
First opened 29-12-2010 19:29:17.89
Last closed  29-12-2010 19:29:17.96
CF structure name LARGMSGS
Current opens           0,  Total requests          3
Generated messages :          0
Persistent messages: GETs          0,  PUTs           0,  PUT1s
Put to waiting getter: PUT          1,  PUT1           0
PUTs: Valid         1,  Max size       485,  Min size       485,  Tota
 Open   et :       58 n        1
        ct :       51 n        1
      nocf :                   1
 Close  et :       24 n        1
        ct :       24 n        1
      nocf :                   1
 Put    et :      272 n        1
        ct :      252 n        1
```

a. What CF structure is used for this queue? _____

b. What MQ API calls were made?

_____

c. What was the message size? _____

d. Were any messages put to a waiting getter? _____

e. All the activity on the application queues were MQPUTs. What type of channel was this (sender, receiver)? _____

____5. Bring the QR.REQUEST.ONE queue record to the top of the screen as shown.

```
Open name QR.REQUEST.ONE                                    Object type
Base name QR.REQUEST.ONE                                    Base type
Queue indexed by NONE
First opened 29-12-2010 19:29:15.84
Last closed  29-12-2010 19:29:22.95
CF structure name LARGMSGS
Current opens           0,  Total requests         18
Generated messages :          0
Persistent messages: GETs          0,  PUTs           0,  PUT1s
Put to waiting getter: PUT          0,  PUT1           0
PUTs: Valid         6,  Max size       595,  Min size       139,  Tota
 Open   et :      111 n        6
        ct :       61 n        6
      nocf :                   5
    CFTotal:       59
        READ:        5 Fn-N      1 S-E-N    31      1 AS-E-N      0
       WRITE:       54 Fn-N      2 S-E-N   204      1 AS-E-N    123
 Close  et :       24 n        6
        ct :       23 n        6
```

a. The information about the interaction with the coupling facility is captured for these shared queue messages.
b. S-E-N is the average elapsed time for the synchronous calls made.
c. AS-E-N is the average elapsed time for the asynchronous calls made.
d. The values reported here should be reviewed occasionally. The coupling facility activity report should be used in conjunction to determine if the calls to the structure are being converted from synchronous to asynchronous due to resource constraints, or if this expected behavior.