

# WebSphere MQ V Intro to **SMF116 Lab**



SHARE – Intro to SMF116 Lab

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## **Lab Objectives**

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

## **General Lab Information and Guidelines**

- 1) 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](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 files TX\_SMF116\_LAB.txt and CHIN\_SMF116\_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.
- 2) Any time the labels TEAM00 or TEAMXX are used, please replace the '00' or 'XX' with your team ID (TEAM01 – TEAM20).
- 3) The data in use is not live, you will be looking at the output from the MP1B provided SMF print jobs. The libraries used are called:

TEAM01.SHARE.SMFTEXT  
TEAM02.SHARE.SMFTEXT  
TEAM03.SHARE.SMFTEXT  
TEAM04.SHARE.SMFTEXT  
TEAM05.SHARE.SMFTEXT  
TEAM06.SHARE.SMFTEXT  
TEAM07.SHARE.SMFTEXT  
TEAM08.SHARE.SMFTEXT  
TEAM09.SHARE.SMFTEXT  
TEAM10.SHARE.SMFTEXT  
TEAM11.SHARE.SMFTEXT  
TEAM12.SHARE.SMFTEXT  
TEAM13.SHARE.SMFTEXT  
TEAM14.SHARE.SMFTEXT  
TEAM15.SHARE.SMFTEXT  
TEAM16.SHARE.SMFTEXT  
TEAM17.SHARE.SMFTEXT  
TEAM18.SHARE.SMFTEXT  
TEAM19.SHARE.SMFTEXT

- 4) You will be signing on to MPX1 for this exercise.

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- 5) The IP address for MPX1 is 192.168.17.252
- 6) The IP address forMPX2 is 192.168.17.253
- 7) The TSO password for this lab is 'SHARE02' (S-H-A-R-E -zero - 2).
- 8) Any difficulty with connectivity should be reported, but please remember that the connections may be slow.

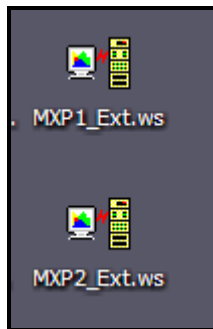
## ***SMF 116 – Class 3 Data – WMQ Accounting Data for a Transaction***

- 1) WebSphere MQ (WMQ) 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 WMQ 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) The IP address for MPX1 is 192.168.17.252
- 3) On your desktop you should have PCOMM shortcuts to your TSO sessions. They are called MPX1\_Ext.ws and MPX2\_Ext.ws respectively.



- 1) Double click on the PCOMM image for MPX1. If you do not rather quickly see the TSO panel, check that the IP address (in the lower left hand corner) is correct. If not, then if you do not know how to alter the link parameters please ask one of the lab assistants for help.

2) The TSO signon panel should be shown:

```
Your IP:192.168.215.166          Terminal: MPX10033
08/24/09                        13:30:12
      ****                      ****
                Washington Systems Center

Enter TSO for MPX1 TSO , or:

      USS xxxxxxxx          to access known APPLID xxxxxxxx

Enter Command ==>
```

- 3) Enter 'tso teamxx' where the XX is your team ID. You should then see the TSO/E logon screen, where you will enter your password (usually SHARE02).

```
----- TSO/E LOGON -----  
  
Enter LOGON parameters below:                                RACF LOGON parameters:  
Userid   ==> TEAMXX  
Password ==>  
Procedure ==> IKJACCMQ                                     New Password ==>  
Acct Nbr ==> SVS99                                         Group Ident  ==>  
Size     ==> 1500000  
Perform  ==>  
Command  ==> ispf  
  
Enter an 'S' before each option desired below:  
      -Nomail          -Nonotice      S -Reconnect          -OIDcard  
  
PF1/PF13 ==> Help    PF3/PF15 ==> Logoff    PA1 ==> Attention    PA2 ==> Reshow  
You may request specific help information by entering a '?' in any entry field
```

- 4) Once signed onto TSO and on the ISPF primary options plane, enter '3.4' on the command line and hit the enter key.
- 5) On the 'Data Set List Utility' panel, enter TEAM\*.SHARE, in the 'Dsname Level' fields and hit the enter key.

```
                                Data Set List Utility
Option ==> _

      blank Display data set list          P Print data set list
      V Display VTOC information          PV Print VTOC information

Enter one or both of the parameters below:
Dsname Level . . . TEAM*.SHARE
Volume serial . .

Data set list options
Initial View          Enter "/" to select option
2 1. Volume          / Confirm Data Set Delete
  2. Space           / Confirm Member Delete
  3. Attrib          / Include Additional Qualifiers
  4. Total           / Display Catalog Name
                    Display Total Tracks
                    Prefix Dsname Level

When the data set list is displayed, enter either:
"/" on the data set list command field for the command prompt pop-up,
an ISPF line command, the name of a TSO command, CLIST, or REXX exec, or
"=" to execute the previous command.
```



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- 6) From the 'DSLISIT' panel, select the PDS for your TEAM ID for edit by entering an 'e' in the 'Command' field by the data set name and hit the enter key.

```
DSLISIT - Data Sets Matching TEAM*.SHARE
Command ==>

Command - Enter "/" to select action
-----
e_      TEAMXX.SHARE.SMFTEXT
        TEAM01.SHARE.SMFTEXT
```

- 7) Select the 'TX116' member from the list.

```
EDIT          TEAMXX.SHARE.SMFTEXT          Row 00001 of 00003
Command ==>          Scroll ==> CSR
      Name      Prompt      Size  Created      Changed      ID
-----
      CHIN116
      SMF115
_s_      TX116          148  2013/02/04  2013/02/04  14:28:36  ELKINSC
      **End**
```

- 8) The SMF 116 Class 3 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.....>      fīiQT10
== Correlator ID.... (HEX)> 2B867858C4D7F6F40019100C
== Context token.....>
== Context token.... (HEX)> 00000000000000000000000000000000
== NID.....> CICS1-"Ö1 &
== NID..... (HEX)> D5C3C9C3E2D7D7C2CA7FEC9330175025
== Accounting token.....>
== Accounting token.. (HEX)> 0000000000000000000000000000000000000000
== UOW identifier.....>          -"Ö1
== UOW identifier... (HEX)> 4040404040404040404040404040404040CA7FEC93302F0001
== Task token : 18-01-2013 15:00:59.62, 2BF4CB20, 2BD2F3C0
== Interval   : START 18-01-2013 15:00:59.62
== 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           24
    
```

- 9) Preliminary task information notes and questions:
- What is the thread type? \_\_\_\_\_  
This field tells the type of connection that is captured in this set of SMF records. .
  - 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.
  - The UOW identifier can be very helpful when trying to track a long running unit of work.
  - How long (in minutes) was the interval captured? \_\_\_\_\_
  - 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? \_\_\_\_\_

10) Page forward (F8 key)

```

== Latch      : Max number      16, Max wait      19723 mics
> Latch 15,   Total wait      264 mics, Waits      7, Name CMXL1   |BMXL1
> Latch 16,   Total wait     19723 mics, Waits     1813, Name BMXL2 |RMRMST |RLMARQC
> Latch 19,   Total wait      211 mics, Waits      1, Name BMXL3   |CFXML2 |SRH1_L19
> Latch 21,   Total wait       4 mics, Waits      4, Name RLMLWRT
> Latch 24,   Total wait     229 mics, Waits     19, Name LMXL1
> Latch 30,   Total wait      16 mics, Waits      3, Name ASMSAGT |IFCTRACE|DDFDTM
> Latch 31,   Total wait     511 mics, Waits     59, Name DPSLTCH
> Latch 32,   Total wait       2 mics, Waits      2, Name SMCPHB
> Address of latch for longest wait: 00000007EC66A80
== Commit     : Count          320, Avg elapsed    517, Avg CPU          25
== Log I/O    : Count          699, Avg elapsed    873, Bytes      2292852,
                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

Open name ALIAS.SEND.Q1                               Object type:Alias Queue
Base name BASE.SEND.Q1                               Base type :Queue
Queue indexed by NONE
First opened 18-01-2013 15:09:13.68
Last closed 18-01-2013 15:09:13.68
    
```

11) 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 the 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.

12) 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:Alias Queue
Base name BASE.SEND.Q1                               Base type :Queue
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          0
Put to waiting getter: PUT          0, PUT1          0
PUTs: Valid          1, Max size          5233, Min size          5233, Total bytes          5233
-MQ call-           N      ET      CT      Susp      LOGW      PSET Epages      skip expire
Open  :              1      19      19      0
Close :              1      8      8      0
Put   :              1      128     101     0      0
Maximum depth encountered          1
    
```

13) 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?

14) Page forward to the second queue block.

```

Open name ALIAS.REPLY.Q1                               Object type:Alias Queue
Base name BASE.REPLY.Q1                               Base type :Queue
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 :
Persistent messages: GETs      345, PUTs      0, PUT1s      0
Put to waiting getter: PUT      0, PUT1      0
GETs: Valid      345, Max size  491704, Min size  491704, Total bytes  161 MB
GETs: Dest-S     690, Dest-G     0, Brow-S     0, Brow-G     0, Successful destructive  345
Time on queue : Max  0.028560, Min  0.006872, Avg  0.008911
-MQ call-      N      ET      CT      Susp      LOGW      PSET Epages  skip expire
Open   :      345      16      16      0
Close  :      345      6      6      0
Get    :      690      3488      2766      538      498      0  3900 3854025  0
-Logging: Total-count Total-elapsed Force-count Force-elapsed
MQGET   346      0.343864      346      0.343864
Maximum depth encountered      1845

Open name QREMOTE.REQ.Q1                               Object type:Alias Queue
Base name XMITQ1                                       Base type :Queue
    
```

15) 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? \_\_\_\_\_

16) Page forward to the QREMOTE.REQ.Q1 queue

```

Open name QREMOTE.REQ.Q1                               Object type:Alias Queue
Base name XMITQ1                                       Base type :Queue
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          0
Put to waiting getter: PUT          236, PUT1          0
PUTs: Valid          345, Max size          747, Min size          747, Total bytes 257715
-MQ call-            N      ET      CT      Susp      LOGW      PSET Epages  skip expire
Open   :              345      21      20      0
Close  :              345      11      10      0
Put    :              345      31      29      0      0
Maximum depth encountered          10
    
```

- 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? \_\_\_\_\_

- 17) 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 – WMQ Accounting Data for a channel

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

Menu	Functions	Confirm	Utilities	Help	
EDIT TEAMXX.SHARE.SMFTEXT Row 00001 of 00003					
Command ==> Scroll ==> CSR					
Name	Prompt	Size	Created	Changed	ID
CHIN116		156	2013/02/04	2013/02/04 14:27:39	ELKINSC
SMF115		125	2013/02/04	2013/02/04 14:26:54	ELKINSC
TX116		148	2013/02/04	2013/02/04 14:28:36	ELKINSC
**End**					

- This SMF 116 class three accounting information is from the message channel agent handling the QSGM.OUT channel.
  - How many queues is this task using?

```

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)> 0000000000000000000000000000000000000000000000000000000000000000
== UOW identifier.....> G W 0
== UOW identifier... (HEX)> 404040404040404040404040404040404040404040C71A1DE63C800001
== 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
    
```

- How many queues is this task using?



3. Page forward in the member.

```

== Other reqs : Count      116, Avg elapsed      229, Avg CPU      19
== 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 DMCSEGAL |SSSCONN
> Latch 21, Total wait       1 mics, Waits      1, Name RLMLWRT
> Latch 24, Total wait       98 mics, Waits      1, Name LMXL1
> Latch 30, Total wait      7940 mics, Waits      1, Name ASMSAGT |IFCTRACE|DDFDTM
> Address of latch for longest wait: 000000001AB4E108
== Commit      : Count      35, Avg elapsed      6, Avg CPU      3
== Backout     : Count      35, Avg elapsed     323, Avg CPU     20
== Log I/O     : Count       9, Avg elapsed    11430, Bytes     41734,
                Forces       9, Avg elapsed    11430
== Suspend    : Count      36, Avg elapsed     297
    
```

- 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:Local Queue
Base name QR.RESPONSE.ONE                               Base type :Queue
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 LARGMSG
Current opens      0, Total requests      3
Generated messages :      0
Persistent messages: GETs      0, PUTs      0, PUT1s      0
Put to waiting getter: PUT      1, PUT1      0
PUTs: Valid      1, Max size      485, Min size      485, Total bytes      485
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 recod to the top of the screen as shown.

Open name QR.REQUEST.ONE	Object type:Local Queue
Base name QR.REQUEST.ONE	Base type :Queue
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 0	
Put to waiting getter: PUT 0, PUT1 0	
PUTs: Valid 6, Max size 595, Min size 139, Total bytes 2460	
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 0	
WRITE: 54 Fn-N 2 S-E-N 204 1 AS-E-N 123 1	
Close et : 24 n 6	
ct : 23 n 6	
nocf : 6	
Put et : 221 n 6	
ct : 104 n 6	

- The information about the interaction with the coupling facility is captured for these shared queue messages.
- S-E-N is the average elapsed time for the synchronous calls made.
- AS-E-N is the average elapsed time for the asynchronous calls made.
- 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.