WebSphere MQ V
Intro to SMF116 Lab

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
   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.

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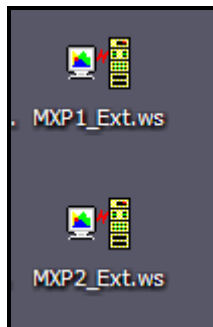
1) Double click on the PCOMM image for MPX1. If you do not rather quickly see the TSO panel, check that the IP address (in the lower left hand corner) is correct. If not, then if you do not know how to alter the link parameters please ask one of the lab assistants for help.

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  ===>                               New Password ===>

   Procedure ===> IKJACCMQ                      Group Ident  ===>

   Acct Nmbr ===> SVS99

   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 it 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.
```

6) From the 'DSLIST' 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.

```
DSLIST - 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              156  2013/02/04  2013/02/04 14:27:39  ELKINSC
_____  SMF115               125  2013/02/04  2013/02/04 14:26:54  ELKINSC
_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.

```
                                                     Top of data
            ====> 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)> 0000000000000000000000000000000000
== NID....................> CICS1-"Öl  &
== NID..............(HEX)> D5C3C9C3E2D7D7C2CA7FEC9330175025
== Accounting token.......>
== Accounting token..(HEX)> 0000000000000000000000000000000000000000000000000000
== UOW identifier.........>                   -"Öl
== UOW identifier....(HEX)> 40404040404040404040404040404040CA7FEC93302F0001
== 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:
   a. What is the thread type? ____CICS_____
      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?___23_____
   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? _____6__

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  |RMCRMST |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: 000000007EC66A80
== 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? _____8_____
   b. What was the longest wait time? _____19723 microseconds_____
   c. Which latch type was it for? __16_____
   d. How many waits were there for this interval? _____1813_____
   e. The total wait time divided by the number of waits, gives the average. _____10.87_____
   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?
      _____ALIAS.SEND.Q1_____
   b. What is the base
      name?_____BASE.SEND.Q1_____
   c. Why are they different? In this case there was an alias defined for a base
      queue. In other cases there may be a remote queue name as the Open name,
      with a transmission queue as the Base name. If using dynamic queues, the
      model queue is the Open name, and the actual queue manager defined name is
      the base name.
   d. What buffer pool is used? ___3_____
   e. What pageset? ___4_____
   f. How many successful MQPUTs were issued? _____1_____
   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?   1
   i. What was the CPU time recorded? 101

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 :       0
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, Su cessful 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? __No_____
    b. How many valid gets were performed during this interval? ____345_____
    c. Is the message length variable during this interval? __No_____
       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?__Yes_____
       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? __1845_____

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? _____345_____

    b. How many MQCLOSE commands were issued? ___345_____

    c. How many MQPUT commands were issued?_____345_____

    d. What Bufferpool is used for the queue?___2_____

    e. What is the pageset?____2_____

    f. Were the puts done to a waiting getter? ____yes, 236_____
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? _____10320_____

17) Review the queue information for the remaining queues.
   a. How many of the queues are using bufferpool 3? _____5_____
   b. How many of the queues are using bufferpool 2? _____1_____
   c. How many of the queues are using pageset 4?_____5_____
   d. How many of the queues are using pageset 2?_____1_____
   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

1. 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
_____s_____  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**
```

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)> 000000000000000000000000000000000000
== NID....................> QML4CHING  W È乧
== NID..............(HEX)> D4D8D7C5C3C8C9D5C71A1DE63B749E08
== Accounting token.......>
== Accounting token..(HEX)> 00000000000000000000000000000000000000000000000000
== UOW identifier.........>                     G  W 0
== UOW identifier....(HEX)> 404040404040404040404040404040C71A1DE63C800001
== 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          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? _____0____
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? _____8_____

    c. How many of those requests were multiple?_____1_____

    d. What was the total wait time on Latch 30? ___7940 microseconds_

    e. What was the average wait time on Latch 30? ____same - 7940_____
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? ____11430 microseconds_____
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 LARGMSGS
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?
       ___LARGMSGS_____

    b. What MQ API calls were made? ___OPEN, CLOSE,
       PUT_____

    c. What was the message size? _____485_____

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

    e. All the activity on the application queues were MQPUTs. What type
       of channel was this (sender, receiver)? ___Receiver, messages were
       flowing INTO local queues_____

5. Bring the QR.REQUEST.ONE queue record 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
```

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.