IMQ09 - IBM MQ V9 for z/OS Wildfire Workshop

L22 – Queue Sharing Groups – Comparing Offload Options

Version V6.0

October 2018

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Overview

Please note that Tech Tips (yellow or shaded boxes) are included throughout the exercise to provide suggestions regarding TSO commands, ISPF options or other information which may be useful.

- Information required to complete this exercise will be provided on a 'worksheet' prior to the start of this exercise. Refer to this worksheet for which user identity and password are to be used and for other values, for example:

  ✓ Any time a reference is made to TEAMXX, teamxx, XX or xx appears in the instructions; please replace the XX or xx characters with your assigned user identifier number (01 – 20). Some of these occurrences of these strings with X's are case sensitive so be sure to not change the case of other characters.

  ✓ There are four queue managers for use in this workshop. Each team is assigned a primary queue manager as follows:

  - QML1 - TEAM01, TEAM05, TEAM09, TEAM13, TEAM17
  - QML2 - TEAM02, TEAM06, TEAM10, TEAM14, TEAM18
  - QML3 - TEAM03, TEAM07, TEAM11, TEAM15, TEAM19
  - QML4 - TEAM04, TEAM08, TEAM12, TEAM16, TEAM20

  ✓ As a reminder, when a value from your worksheet should be used, the values in the instructions will be in red rather than black.

  ✓ ***Bold italicized*** text indicates values that need to be entered on a screen

  ✓ *Italicized* text indicates values that are constants or names that appear on a screen.

  ✓ Bold text indicates the name of buttons or keyboard keys that need to be pressed

Exercise Requirement

You will be using MQ Explorer to verify coupling facility structures and to define queues in this exercise. If your explorer session has been shut down, please restart it and connect to your primary queue manager. Also start a TSO session to the host where your primary queue manager is executing.

Part 1: Verifying the Coupling Facility Structures (CFSTRUCT)

In this part of the exercise you use MQ Explorer and MQ commands to review the coupling facility structures used in this exercise.

Part 2: Define the SMDS off-loadable queue

In this part of the exercise you will define the queue which uses SMDS for off-loading messages.

Part 3: Define the DB2 off-loadable queue

In this part you will define the queue which uses DB2 for off-loading messages.

Part 4: Test 1 – Nonpersistent message comparison

In this part of the test the off-loading of nonpersistent messages and then use the results to compare the differences in the use of SMDS versus DB2 when off-loading nonpersistent messages.

Part 5: Test 2 – Persistent message comparison

In this part of the exercise you will test the off-loading of persistent messages and then compare the differences in the use of SMDS versus DB2 when off-loading persistent messages.

Part 1: Verifying the Coupling Facility Structures (CFSTRUCT)

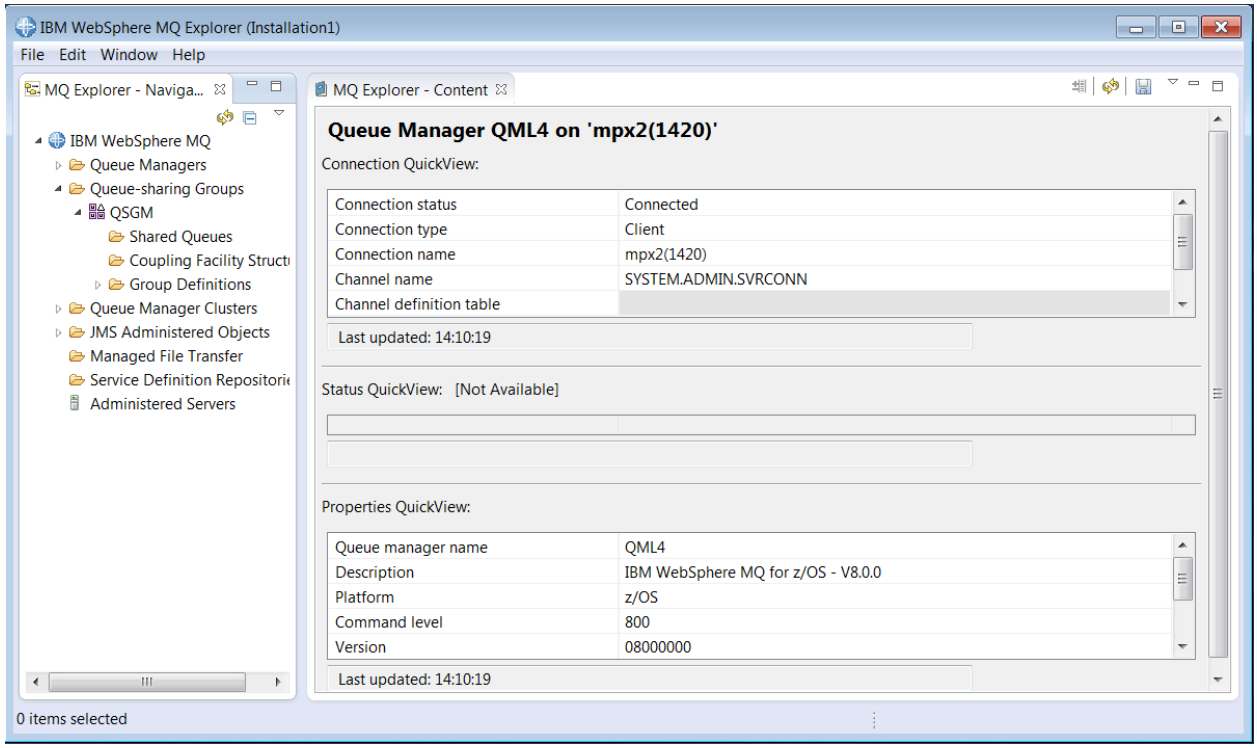
For this exercise you will define two shared queues on two coupling facility (CFSTRUCT) structures, one queue on the *SMDSMSGS* structure and the other queue on the *LARGMSGS* structures. First we want to verify the offload characteristics of these structures.

Verify the Offload characteristics of the two CFSTRUCT using MQ Explorer

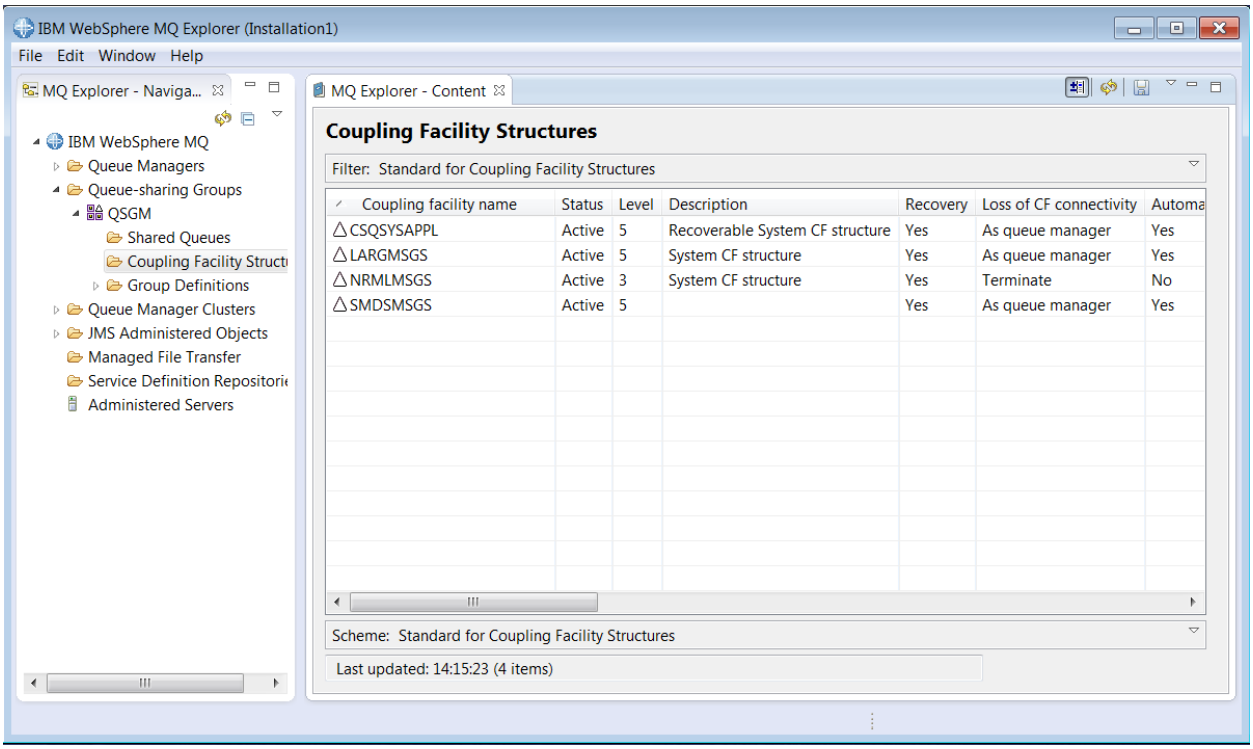
___1. Connect to with at least one queue manager in your Queue Sharing Group

___2. Expand the *Queue-sharing Groups* folder

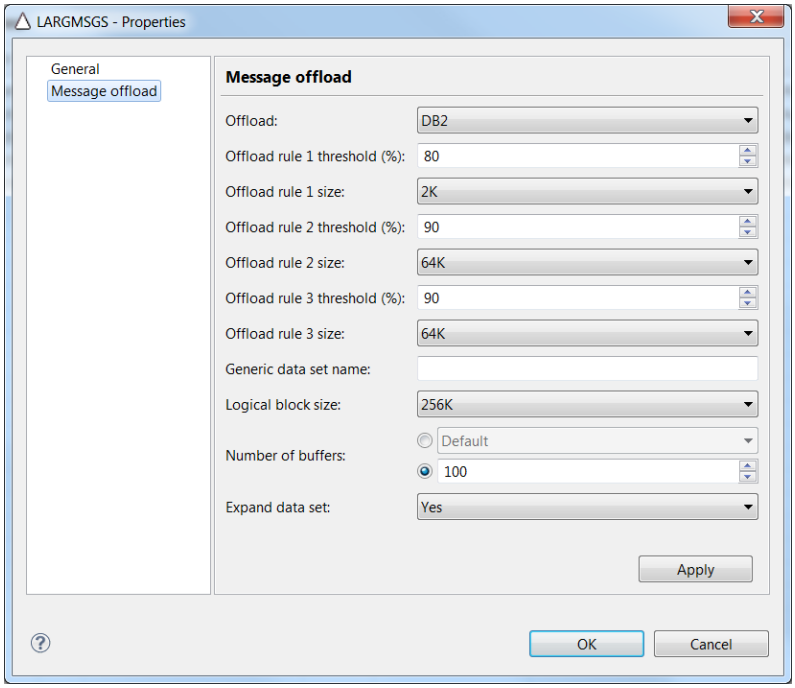
___3. Expand the *QSGM* folder. The navigation pane should look something like below:



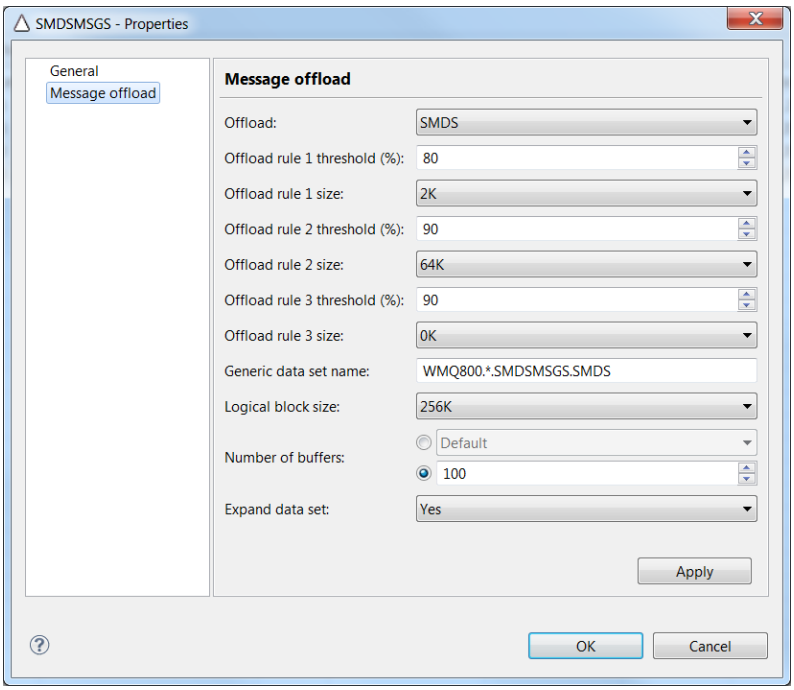
___4. Click on the *Coupling Facility Structures*, the *Content* pane (on the right) should show the coupling facility structures that have been defined for this QSG. It should look as shown below.



___5. The *LARGMSGS* structure should be at CF Level 5. Select and right mouse button click the *LARGMSGS* structure and select *Properties* and then the *Message offload* tab. The *Offload* should be set to *DB2* and the *Offload rule 1 size* should be set to *2K*. If this is not the case, please notify the workshop leaders.



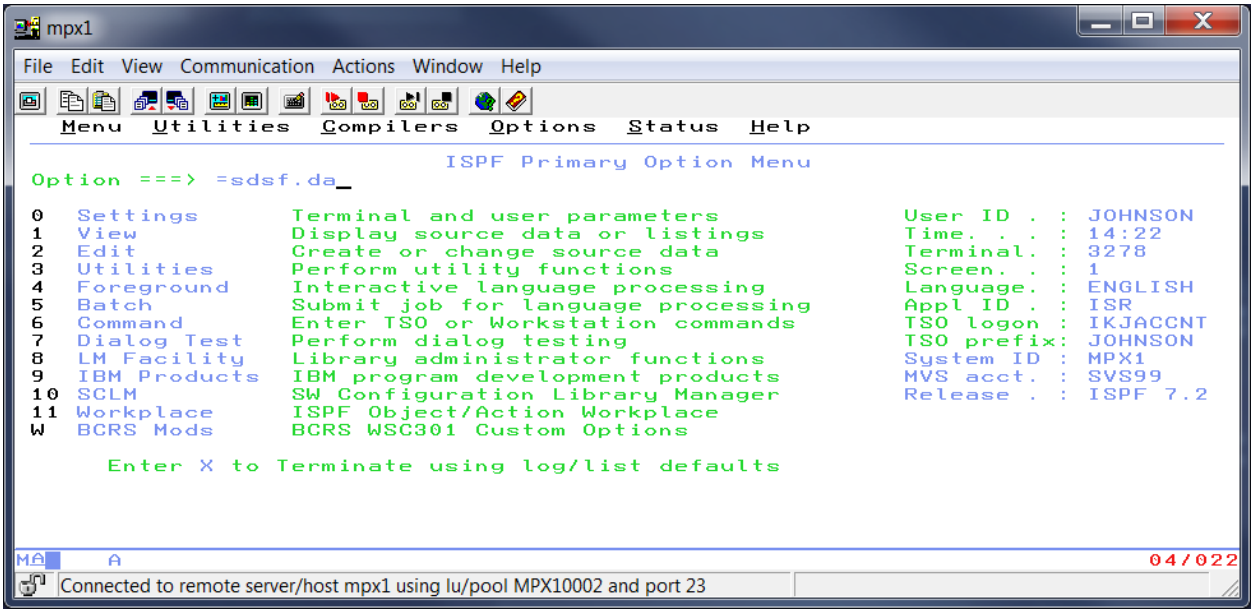
___6. The *SMDSMSGS* structure should be at CF level 5. Select and right mouse button click the *SMDSMSGS* structure and select *Properties* and then the *Message offload* tab. The *Offload* should be set to *SMDS* and the *Offload rule 1 size* should be set to *2K*. If this is not the case, please notify the workshop leaders.



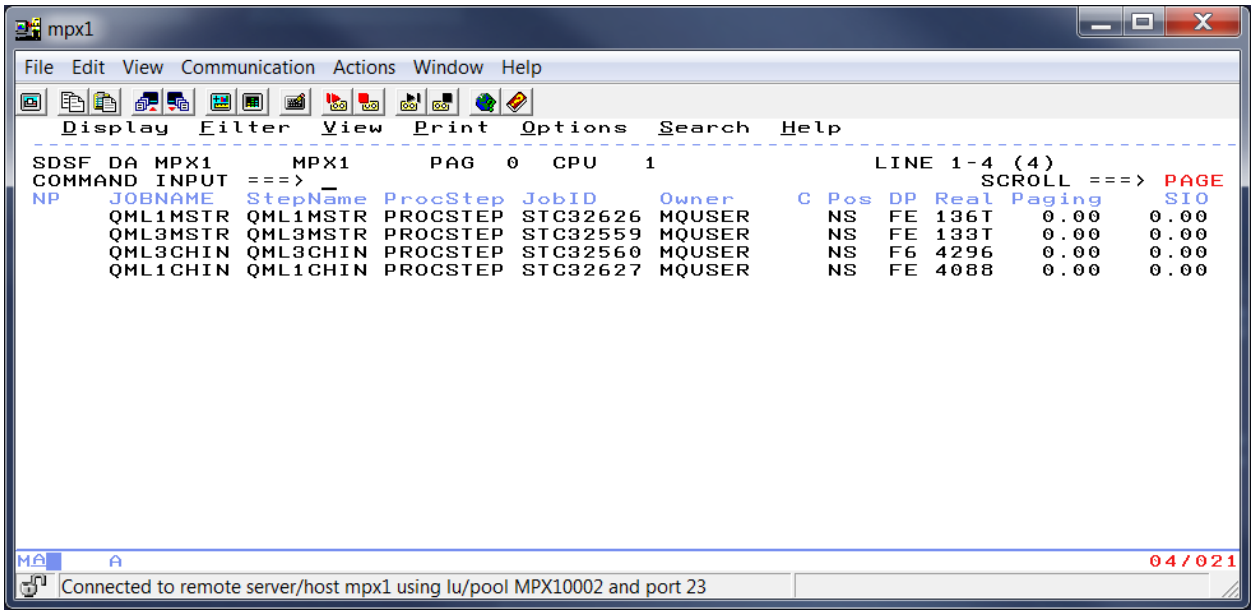
Verify the Offload characteristics of the two CFSTRUCT using commands

CF structures can also be verified using MQ commands:

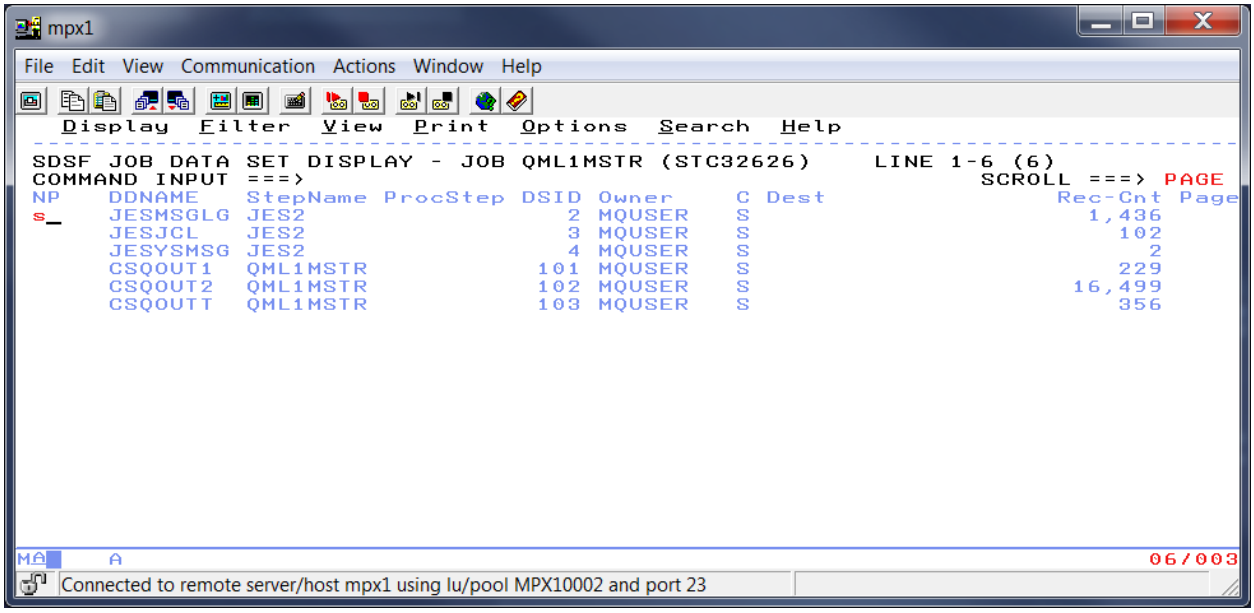
___1. In a TSO session on the host of your primary queue manager, navigate to the SDSF *Display Active* panel, by entering ***=sdsf.da*** at the command prompt and pressing the **Enter** key.



___2. To display the queue manager tasks that are running, enter the command ***prefix QML**** and press the **Enter** key. The running queue managers and channel initiation tasks should be displayed. On MPX1 the list will look something like what is shown below.

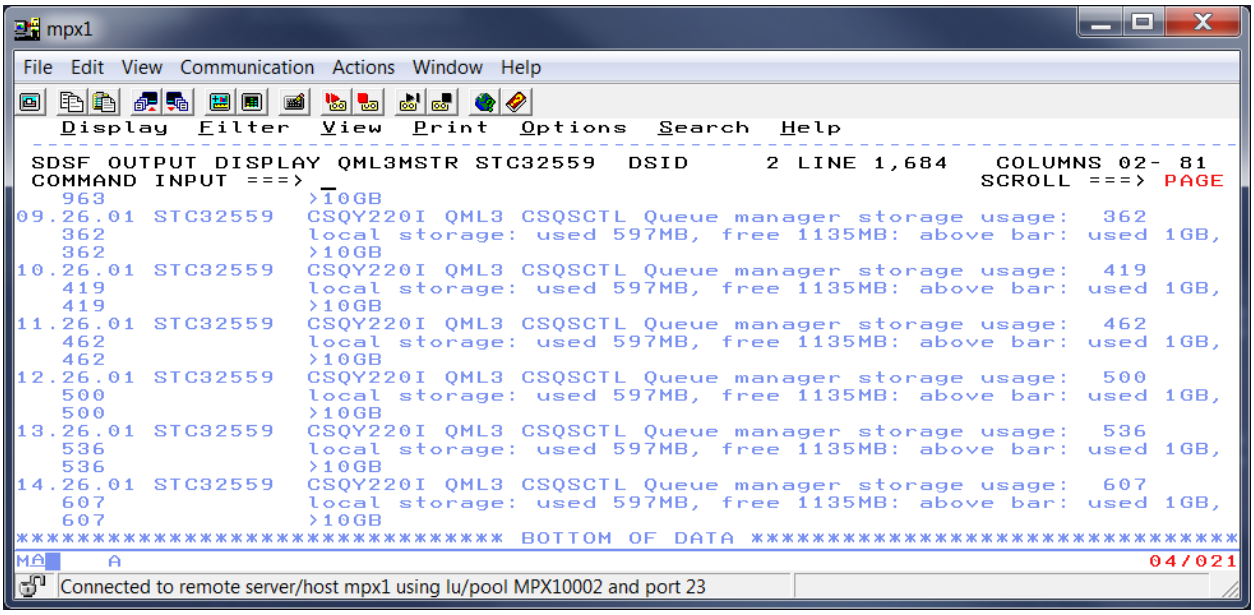


___3. Put a question mark(***?***) beside one of the MSTR address spaces to expand the output list into its output components and select *JESMSGLG* DD name output.



___4. Navigate to the bottom of the log by entering **M** on the command line and pressing the **F8** (page forward) key.

The end of the log may look something like what is shown:

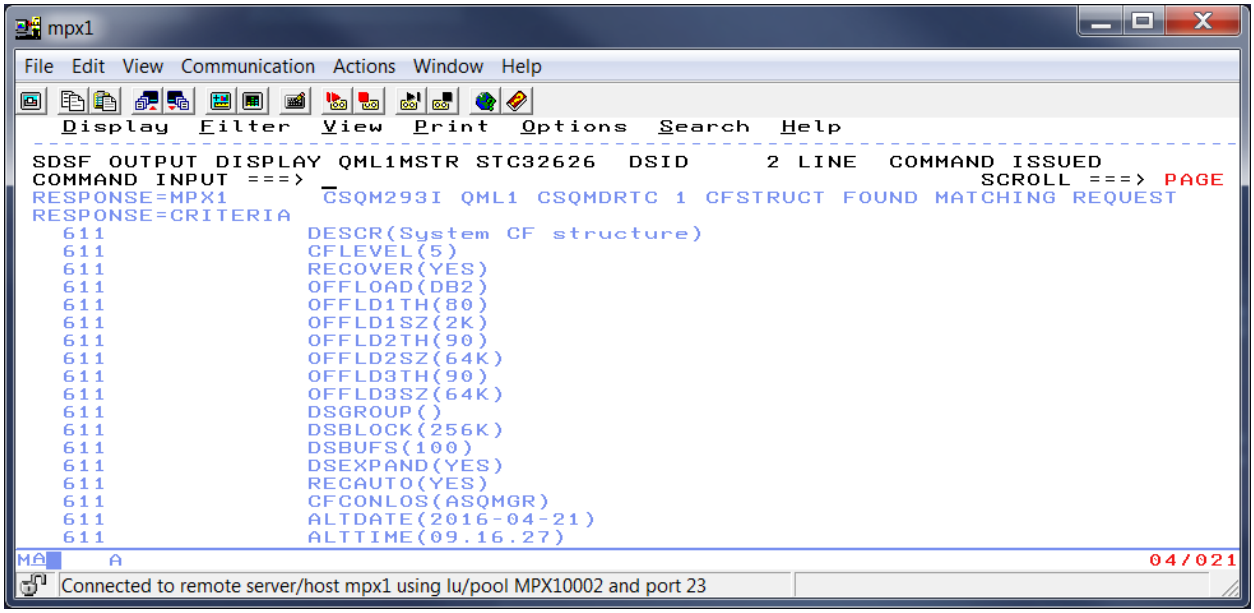


___5. Enter the MVS MQ command *DISPLAY CFSTRUCT()* command as shown below, using the command prefix (cpf) of the primary queue manager for your user identity..

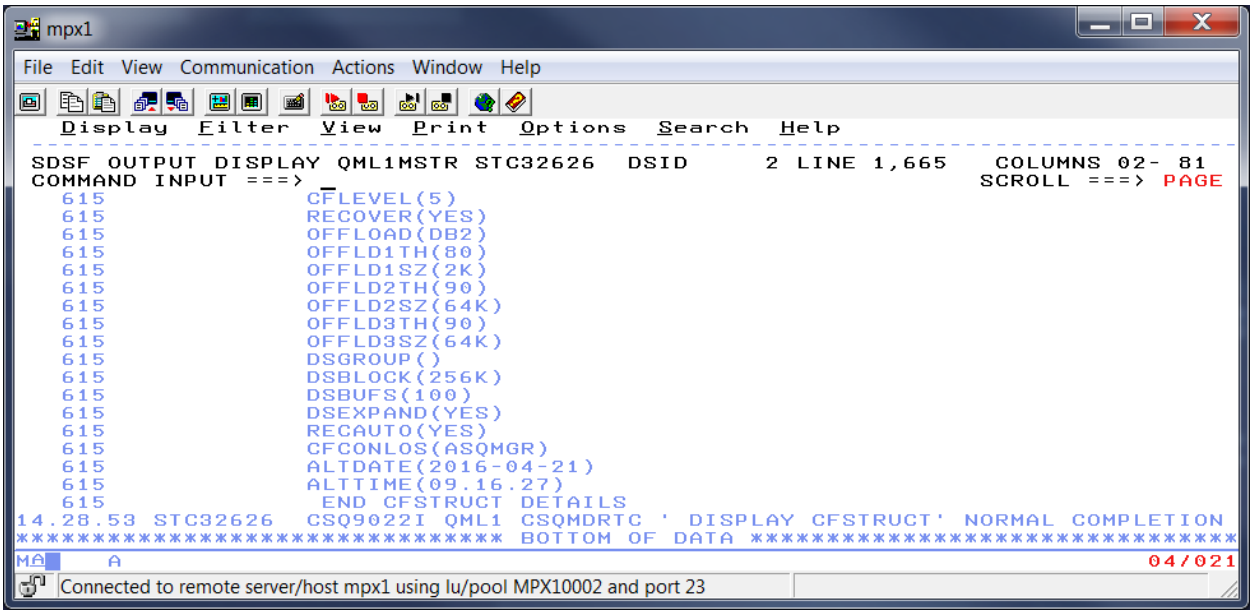
/qml1 display cfstruct(largmsgs)

> **Tech-Tip:** On these systems the command prefix for all queue managers is the queue manager name.

___6. The command should return a positive response.

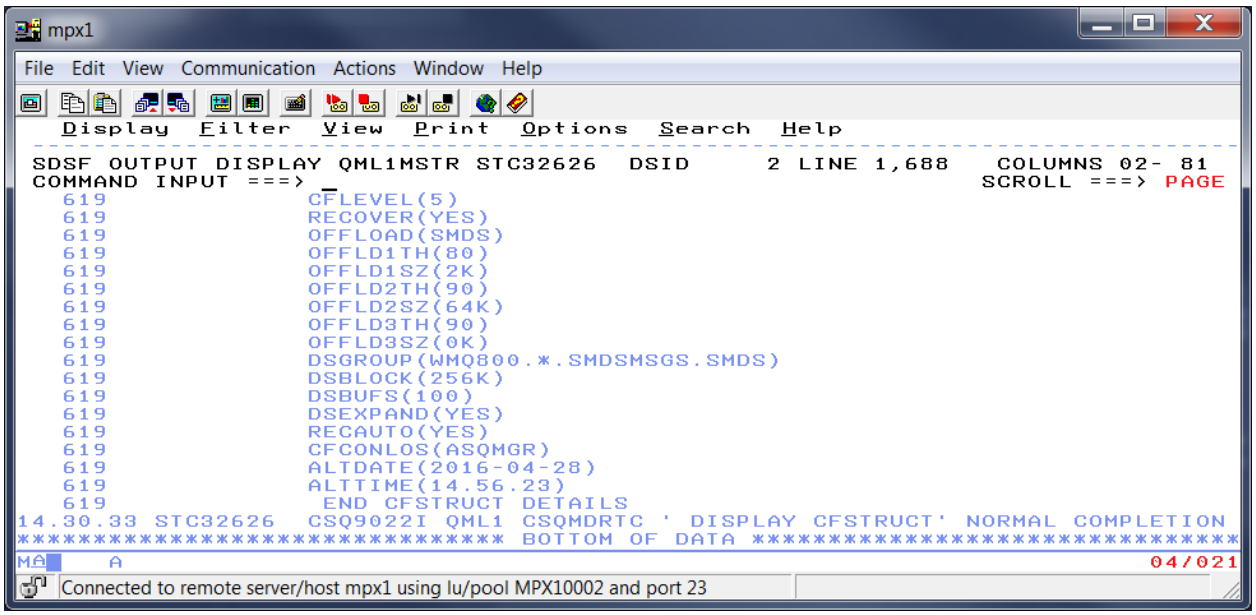


___7. Page forward to the end of the log (**F8**), and you should see the characteristics of the *LARGMSGS* structure.



___8. Verify that the off-load size for rule 1 (*OFFFLD1SZ*) is set to *2K*.

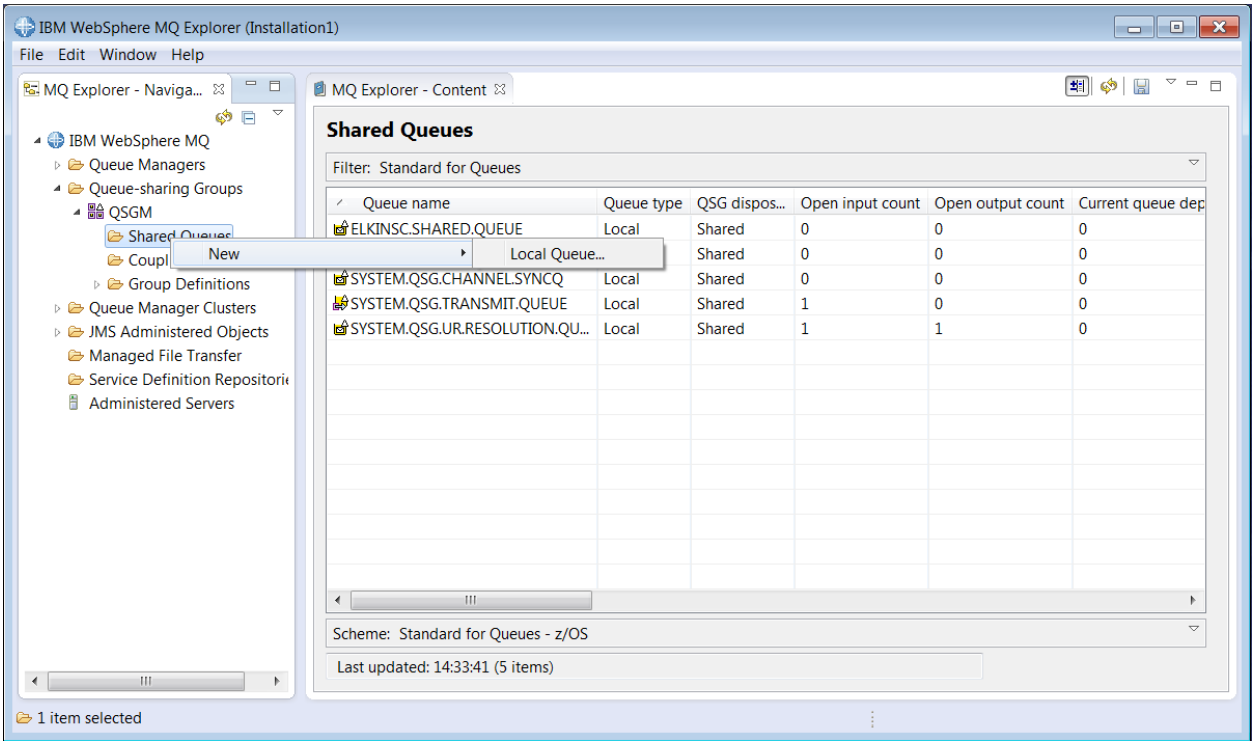
___9. Repeat the display command for the *SMDSMSGS* structure. The results should looks as shown.



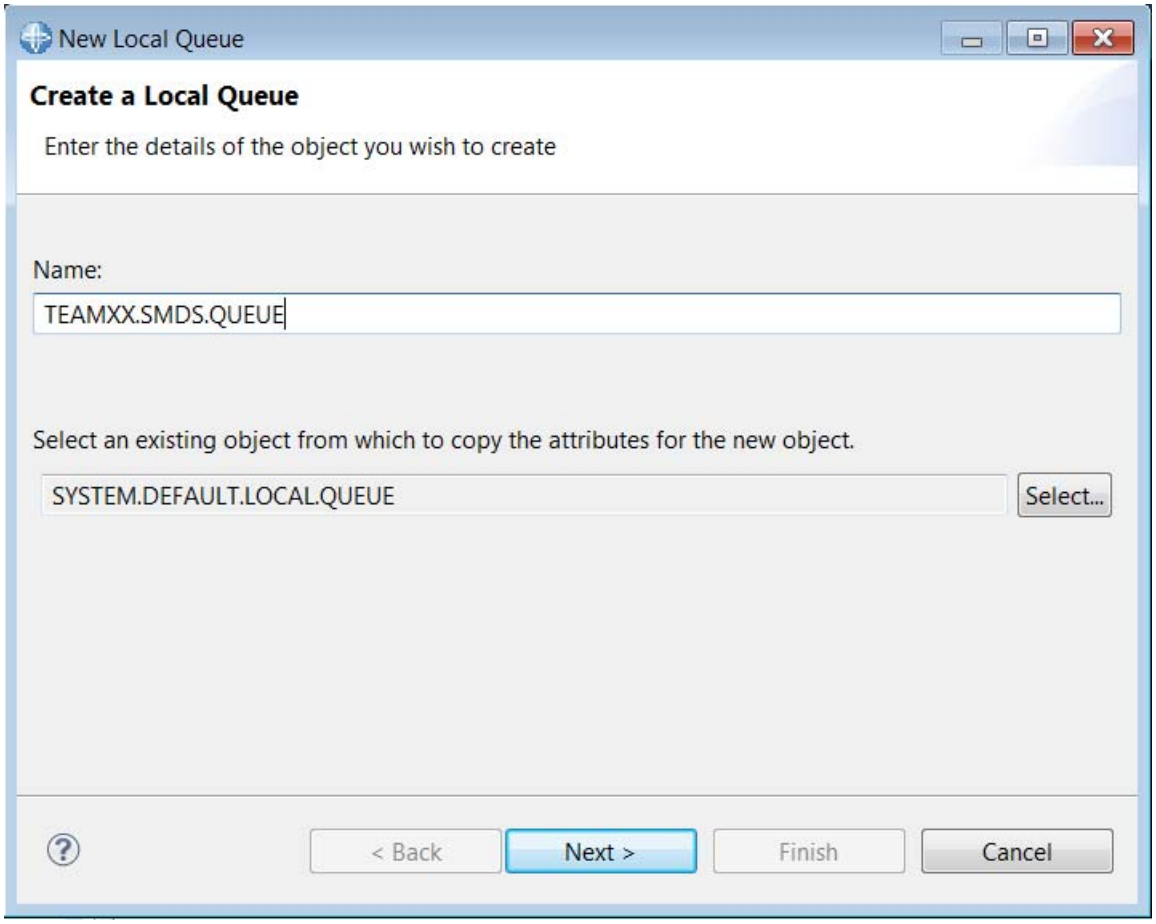
___10. Verify that the off-load size for rule 1 (*OFFFLD1SZ)* is set to *2K*.

Part 2 - Define the SMDS off-loadable queue

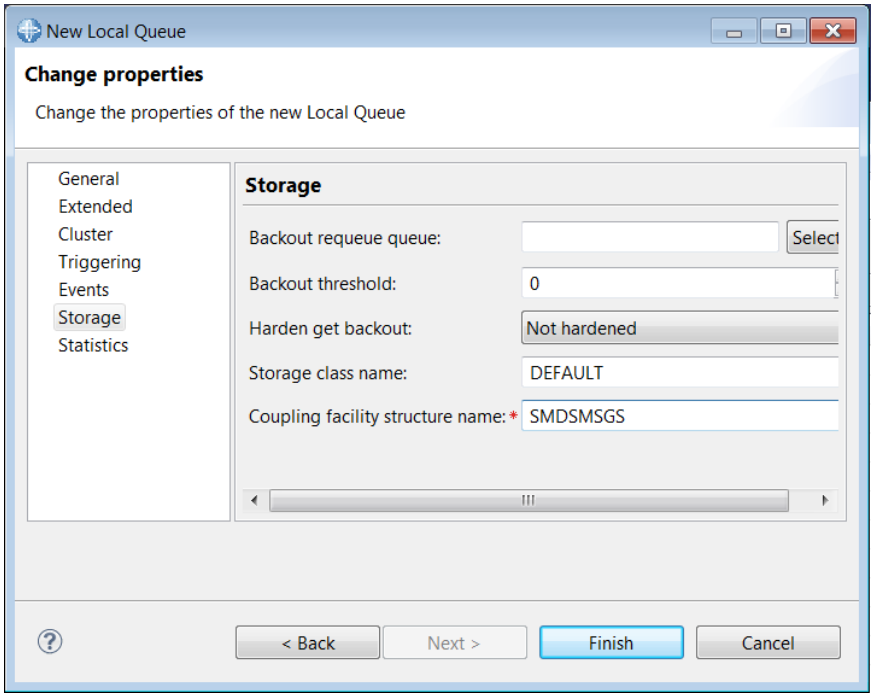
____1. Using the MQ Explorer, right click on the *Shared queues* folder; select *New* -> and then click *Local queue* as shown below.



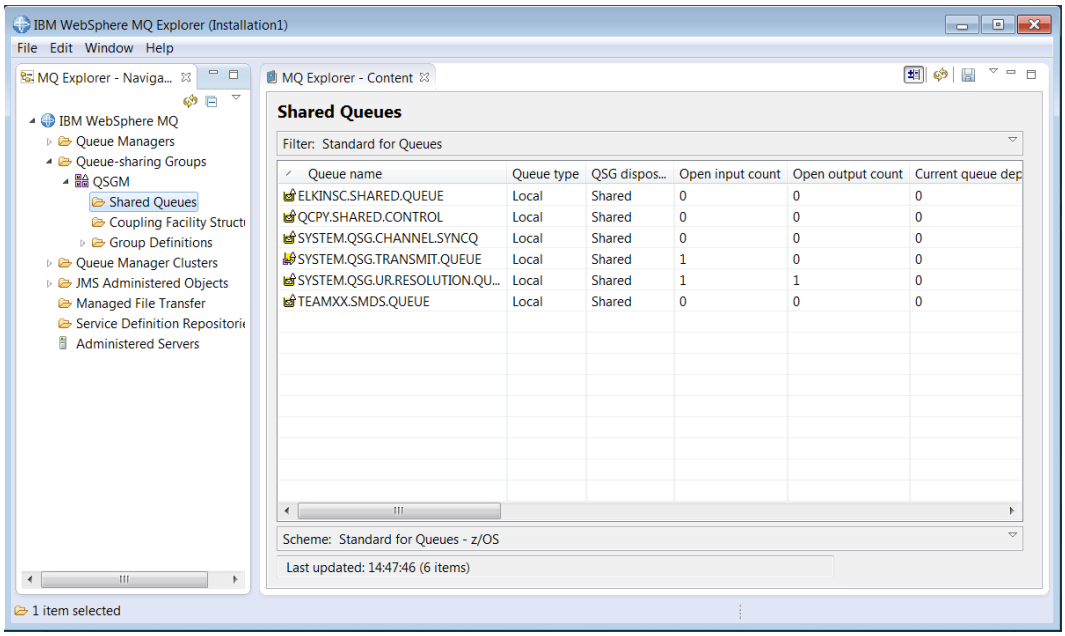
____2. Enter the queue name as ***TEAMXX.SMDS.QUEUE***. Click **Next** to continue.



____3. On the *Change Properties* pane, enter ***SMDSMSGS*** in the *Coupling facility structure name* area. Then press the **Finish** key to continue.

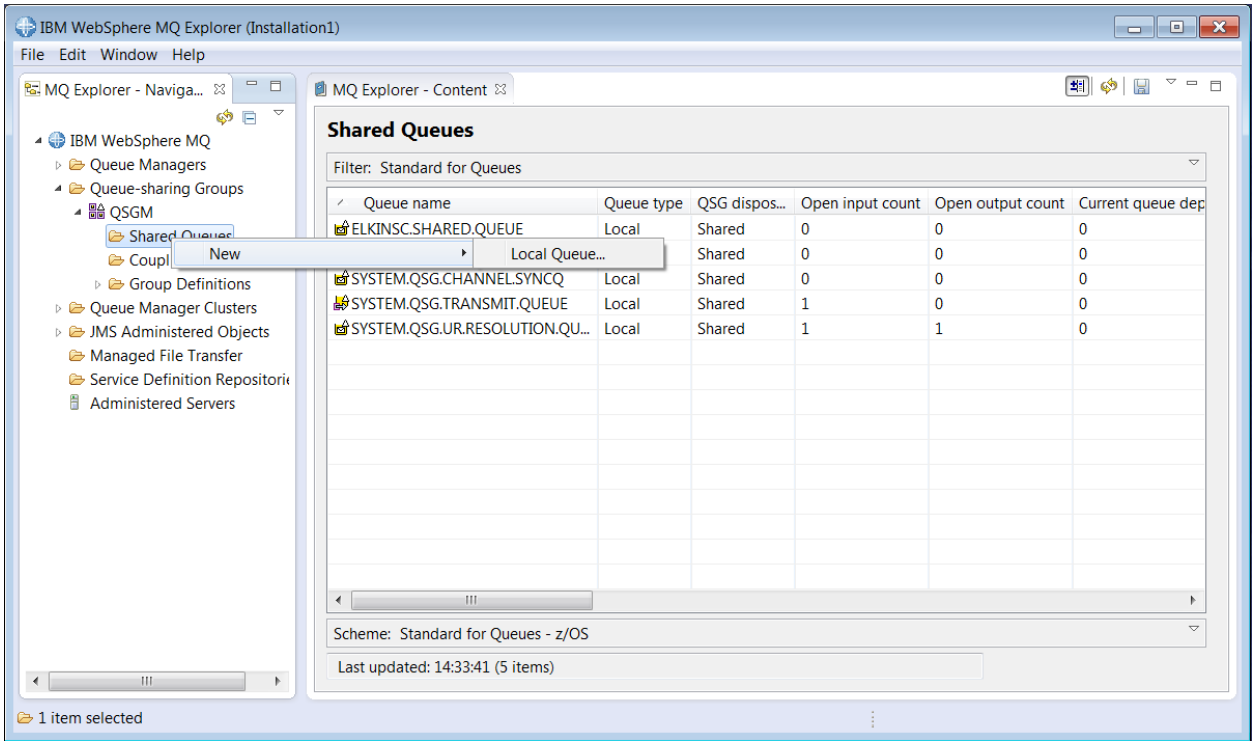


____4. The new queue should show up in the queue list as shown.

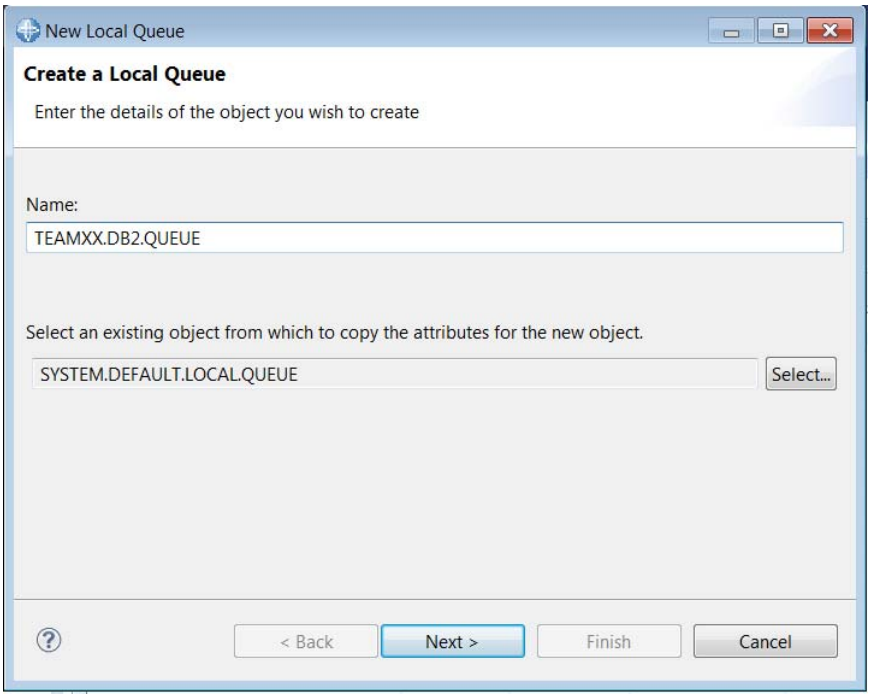


Part 3 - Define the DB2 off-loadable queue

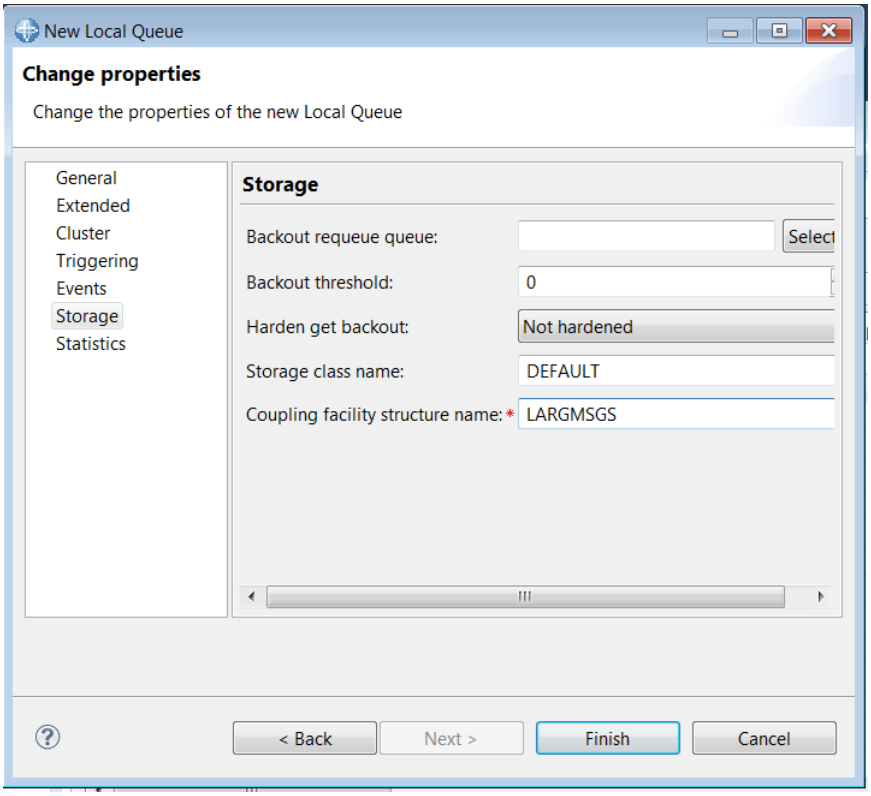
____1. Using the MQ Explorer, right click on the *Shared queues* folder; *New* -> and then click *Local Queue* as shown below:



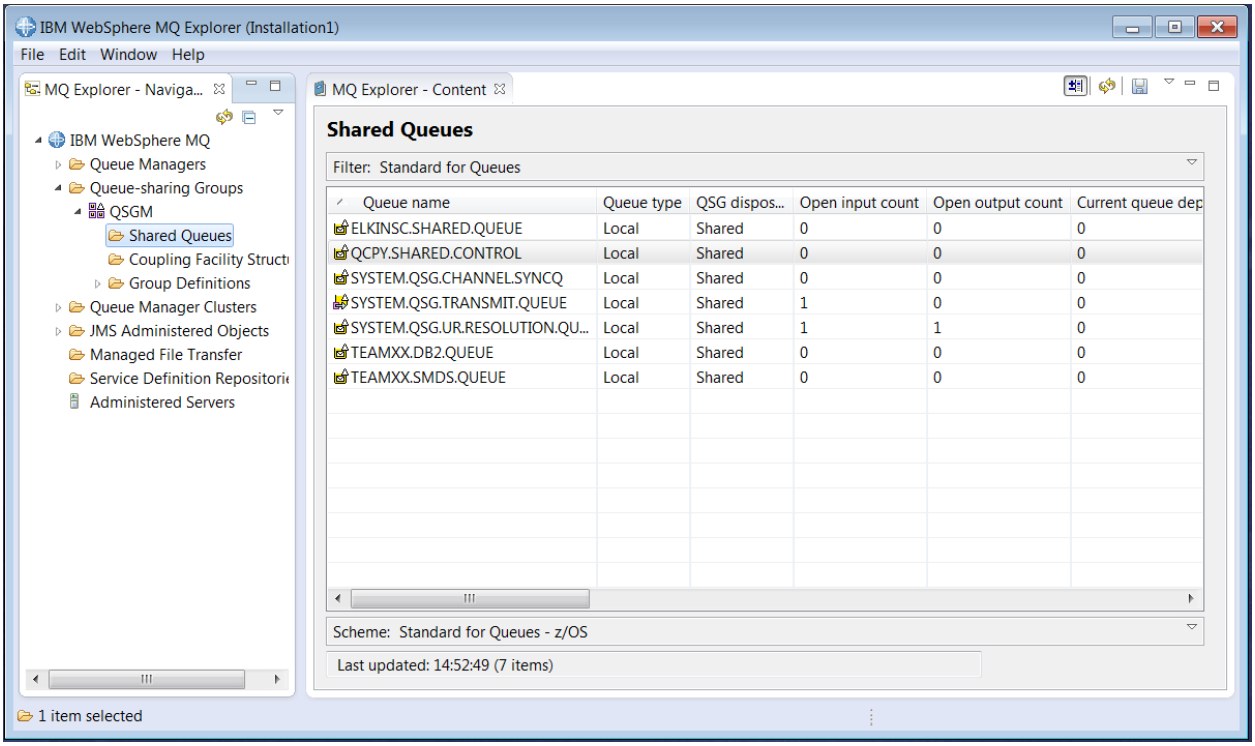
____2. Enter the queue name as ***TEAMXX.DB2.QUEUE***. Press the **Next** key to continue.



____3. On the *Change Properties* pane, enter ***LARGMSGS*** in the *Coupling facility structure name* area. Press **Finish** to continue.



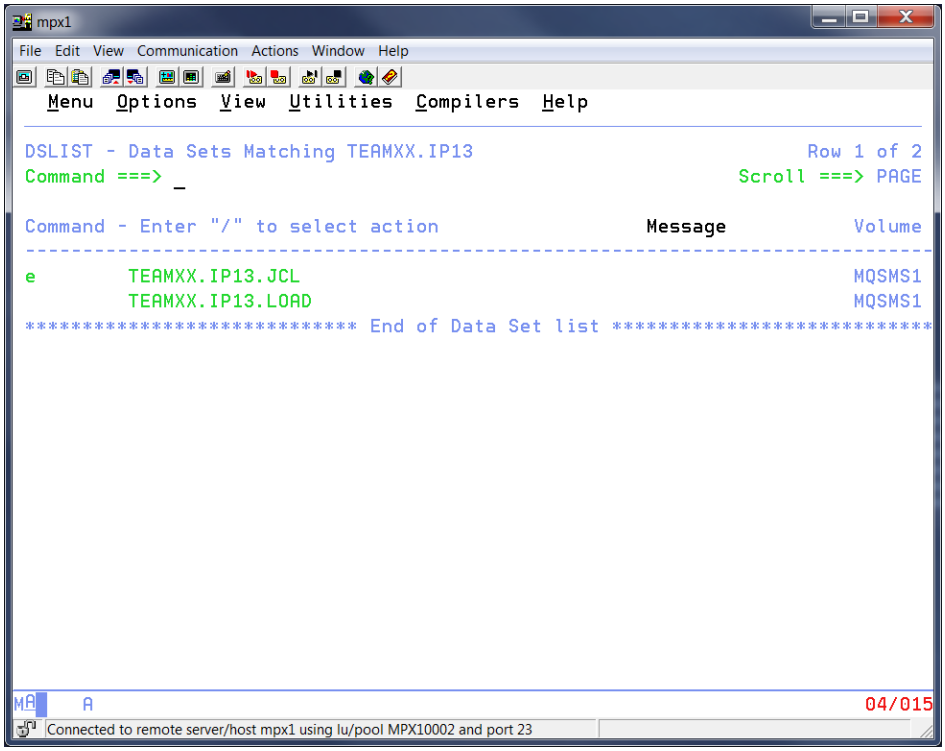
____4. The new queue should show up in the queue list as shown.



Part 4 - Nonpersistent message comparison

Step 1 - Running the test for off-loading nonpersistent messages

___1. In a TSO session use ISPF option 3.4 to edit data set *TEAMXX.IP13.JCL*.



___2. If you review the IP13 sniff test documentation, you will see that we are bypassing several steps that are normally done for testing the message broker.

___3. Select member *SMDSCOMN* to set default values for the nonpersistent test. This JCL member contain two jobs, both do a simple in/out test against the SMDS and DB2 queues defined above.

Note that the number of messages is set to '10'; please do not alter this for the workshop, as we have a limited amount of storage in the structures. Also note that the message size is set to 4K via the '-s4096' parameter used. This is to ensure the message body will be offloaded to the storage facility defined for the structure.

___4. Do a global change to alter all occurrences of XX to your user identifier (from the worksheet). On the command line, enter command ***c XX ?? all*** where the ?? is your user identifier.

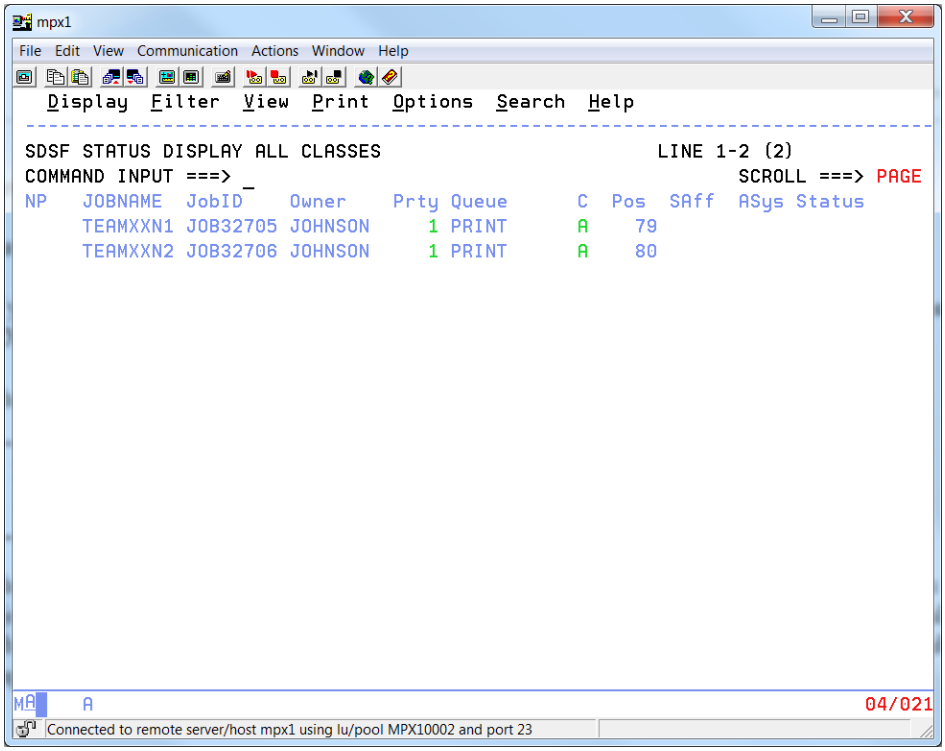
___5. Change the queue manager from QML1 to your primary queue manager. Enter the following command ***c 'QML1' 'QML?' all*** where ? is your primary queue manager number.

___6. Save the member and submit by entering the command ***SAVE;SUB***

___7. Navigate to the SMDS panels by entering the navigation command ***=sdsf.st***

___8. If you do not see the jobs for your ID, enter the following command ***prefix TEAMXX**** where XX is your user identity.

___9. The job list should look something like this:



___10. The *SYSPRINT* output from the *TEAMXXN1* job is from the SMDS offload test, the output from the *TEAMXXN2* job is from the DB2 offload test. Please be aware that your results may vary from those shown here, but the variance should not be too significant (unless someone has submitted a large number of messages).

Step 2 – Review the nonpersistent test results

___1. Open the *SYSPRINT* files from the SMDS offload test, by putting a question mark beside the job name, then selecting the SYSPRINT file.

```
 Display  Filter  View  Print  Options  Search  Help
-------------------------------------------------------------------------------
SDSF STATUS DISPLAY ALL CLASSES                          LINE 1-2 (2)
COMMAND INPUT ===>                                         SCROLL ===> PAGE
NP   JOBNAME  JobID    Owner    Prty Queue      C  Pos  SAff  ASys Status
     TEAMXXN1 JOB32705 JOHNSON     1 PRINT      A    79
?_   TEAMXXN2 JOB32706 JOHNSON     1 PRINT      A    80
```

```
 Display  Filter  View  Print  Options  Search  Help
-------------------------------------------------------------------------------
SDSF JOB DATA SET DISPLAY - JOB TEAMXXN2 (JOB32706)    LINE 1-4 (4)
COMMAND INPUT ===>                                       SCROLL ===> PAGE
NP   DDNAME   StepName ProcStep DSID Owner    C Dest              Rec-Cnt Page
     JESMSGLG JES2                2 JOHNSON  S LOCAL                  20
     JESJCL   JES2                3 JOHNSON  S LOCAL                  33
     JESYSMSG JES2                4 JOHNSON  S LOCAL                  61
s_   SYSPRINT                   102 JOHNSON  S LOCAL                  46
```

___2. Split your screen (entering the **F2** key) and open the *SYSPRINT* for the DB2 offload results.

On the following pages, the results of our tests are shown. Your results may vary due to system usage, but the comparisons should be similar.

SMDS Test Output:

```
Compiled Sep 13 2006 11:23:57.
 buffer:-qTEAMXX.SMDS.QUEUE           * REQUEST QUEUE
 buffer:-rTEAMXX.SMDS.QUEUE           * REPLY QUEUE
 buffer:-fileDD:MSGIN
 buffer:-dJTEST4
 parm: -mQML1 -n10 -x -s4096
 Message file: DD:MSGIN
 OEMPUTX about to MQCONN to QMgr QML1.
 OEMPUTX about to MQOPEN request queue: TEAMXX.SMDS.QUEUE
 OEMPUTX about to MQOPEN reply queue: TEAMXX.SMDS.QUEUE
 CPU type 0000012817
 Date Time 2011/12/12 16:09:06.
 Description JTEST4.
 Entering PUT/GET loops (MQGET_Wait=60 seconds)...
 Preload the queue with 0 messages...
   Message size        : 4096
   Message persistence : NON-PERSISTENT
   Messages per loop   : 1
   Total messages      : 10
   Syncpoints          : NO-SYNCPOINT
   MQGET replies by    : Any message
 Starting loop at 2011-12-12 16:09:06.994381
  Workload manager data
                   Samples %idle %unknown(MQ?) %using CPU %doing I/O %Wait
for CPU
    QML1CHIN.0068        1   100             0          0          0
0
    QML1MSTR.005A        1   100             0          0          0
0
 ---------------------------------------------------------
 Total Transactions  : 10
 Elapsed Time        :    0.014 seconds
 Application CPU Time:    0.001 seconds  (10.6%)
 Transaction Rate    :  738.554 trans/sec
 ---------------------------------------------------------
 Round trip per msg  :     1353 microseconds
 Avg App CPU per msg :      143 microseconds
 ---------------------------------------------------------
  Jobname.ASID  TCB(uS)  SRB(uS) Tot(uS) (%)
                /tran    /tran   /tran
 ------------ -------- -------- -------- ----
 QML1MSTR.005A 00000132 00000037 00000169 12.5
 QML1CHIN.0068 00000000 00000000 00000000 0.0
 QML1BRK*      00000000 00000000 00000000 0.0
 Total CPUmicrosecs/tran              169
 ---------------------------------------------------------
 Ending loop at 2011-12-12 16:09:07.008686
 OEMPUTX Normal Exit: End of program
 Exiting at 2011-12-12 16:09:07.012683
```

DB2 Offload Results

```
Compiled Sep 13 2006 11:23:57.
 buffer:-qTEAMXX.DB2.QUEUE           * REQUEST QUEUE
 buffer:-rTEAMXX.DB2.QUEUE           * REPLY QUEUE
 buffer:-fileDD:MSGIN
 buffer:-dJTEST4
 parm: -mQML1 -n10 -x -s4096
 Message file: DD:MSGIN
 OEMPUTX about to MQCONN to QMgr QML1.
 OEMPUTX about to MQOPEN request queue: TEAMXX.DB2.QUEUE
 OEMPUTX about to MQOPEN reply queue: TEAMXX.DB2.QUEUE
 CPU type 0000012817
 Date Time 2011/12/12 16:09:06.
 Description JTEST4.
 Entering PUT/GET loops (MQGET_Wait=60 seconds)...
 Preload the queue with 0 messages...
   Message size        : 4096
   Message persistence : NON-PERSISTENT
   Messages per loop   : 1
   Total messages      : 10
   Syncpoints          : NO-SYNCPOINT
   MQGET replies by    : Any message
 Starting loop at 2011-12-12 16:09:06.994825
  Workload manager data
                   Samples %idle %unknown(MQ?) %using CPU %doing I/O
%Wait for CPU
    QML1CHIN.0068        1   100             0          0           0
0
    QML1MSTR.005A        1   100             0          0           0
0
 ---------------------------------------------------------
 Total Transactions  : 10
 Elapsed Time        :    0.078 seconds
 Application CPU Time:    0.002 seconds  (2.5%)
 Transaction Rate    :  128.833 trans/sec
 ---------------------------------------------------------
 Round trip per msg  :     7762 microseconds
 Avg App CPU per msg :      192 microseconds
 ---------------------------------------------------------
  Jobname.ASID  TCB(uS)  SRB(uS) Tot(uS) (%)
                /tran    /tran   /tran
 ------------ -------- -------- -------- ----
 QML1MSTR.005A 00000900 00000060 00000960 12.4
 QML1CHIN.0068 00000000 00000000 00000000 0.0
 QML1BRK*      00000000 00000000 00000000 0.0
 Total CPUmicrosecs/tran              960
 ---------------------------------------------------------
 Ending loop at 2011-12-12 16:09:07.073163
 OEMPUTX Normal Exit: End of program
 Exiting at 2011-12-12 16:09:07.075500
```

___3. Comparing the results:

a. What was the transaction rate for the SMDS Offload in the sample test? _____
In your test? _____

b. The DB2 Offload in the sample test?
_____
In your test?
_____

c. What was the round trip rate for the SMDS offload in the sample test?
_____
In your test?
_____

d. What was the round trip rate for the DB2 offload in the sample test?
_____
In your test?
_____

e. What was the CPU Microseconds per transaction in the SMDS offload sample test?
_____
In your test?
_____

f. What was the CPU Microseconds per transaction in the DB2 offload sample test?
_____
In your test?
_____

Part 5 – Persistent message comparison

Step 1 - Running the test for off-loading persistent messages

___1. Select member *SMDSCOMP* to set default values for the nonpersistent test. This JCL member contain two jobs, both do a simple in/out test against the SMDS and DB2 queues defined above.

Note that the number of messages is set to '10'; please do not alter this for the workshop, as we have a limited amount of storage in the structures. Also note that the message size is set to 4K via the '-s4096' parameter used. This is to ensure the message body will be offloaded to the storage facility defined for the structure.

___2. Do a global change to alter all occurrences of XX to your identity. On the command line, enter the command ***C XX ?? ALL*** where the *??* is your team identity number.

___3. Change the queue manager from QML1 to your primary queue manager by entering the command ***C QML1 QML? ALL*** where *?* is your primary queue manager number.

___4. Save the member and submit by entering the command ***SAVE;SUB***

___5. Navigate to the SMDS panels by entering the navigation command ***=sdsf.st***

___6. If you do not see the jobs for your ID, enter the following command ***prefix TEAMXX**** where XX is your team ID.

___7. The job list should look something like this:

```
  Display  Filter  View  Print  Options  Search  Help
-------------------------------------------------------------------------------
SDSF OUTPUT ALL CLASSES ALL FORMS    LINES 642         LINE 1-4 (4)
COMMAND INPUT ===> _                                   SCROLL ===> PAGE
NP   JOBNAME  JobID    Owner    Prty C Forms    Dest                 Tot-Rec
     TEAMXXN1 JOB32705 JOHNSON   144 S STD      LOCAL                    161
     TEAMXXN2 JOB32706 JOHNSON   144 S STD      LOCAL                    160
     TEAMXXP1 JOB32707 JOHNSON   144 S STD      LOCAL                    161
     TEAMXXP2 JOB32708 JOHNSON   144 S STD      LOCAL                    160
```

___8. The *SYSPRINT* output from the *TEAMXXP1* job is from the SMDS offload test, the output from the *TEAMXXP2* job is from the DB2 offload test. Please be aware that your results may vary from those shown here, but the variance should not be too significant (unless someone has submitted a large number of messages).

Step 2 – Review the persistent test results

___1. Open the SYSPRINT files from the SMDS offload test, by putting a question mark beside the job name, then selecting the SYSPRINT file.

```
  Display  Filter  View  Print  Options  Search  Help
------------------------------------------------------------------------------
SDSF OUTPUT ALL CLASSES ALL FORMS    LINES 642         LINE 1-4 (4)
COMMAND INPUT ===>                                     SCROLL ===> PAGE
NP   JOBNAME  JobID    Owner    Prty C Forms    Dest                 Tot-Rec
     TEAMXXN1 JOB32705 JOHNSON   144 S STD      LOCAL                    161
     TEAMXXN2 JOB32706 JOHNSON   144 S STD      LOCAL                    160
 ?_  TEAMXXP1 JOB32707 JOHNSON   144 S STD      LOCAL                    161
     TEAMXXP2 JOB32708 JOHNSON   144 S STD      LOCAL                    160
```

```
  Display  Filter  View  Print  Options  Search  Help
------------------------------------------------------------------------------
SDSF JOB DATA SET DISPLAY - JOB TEAMXXP1 (JOB32707)    LINE 1-4 (4)
COMMAND INPUT ===>                                     SCROLL ===> PAGE
NP   DDNAME   StepName ProcStep DSID Owner    C Dest              Rec-Cnt Page
     JESMSGLG JES2                2 JOHNSON  S LOCAL                  20
     JESJCL   JES2                3 JOHNSON  S LOCAL                  34
     JESYSMSG JES2                4 JOHNSON  S LOCAL                  61
s_   SYSPRINT                   102 JOHNSON  S LOCAL                  46
```

___2. Split your screen (entering the *F2* key) and open the *SYSPRINT* for the DB2 offload results.

___3. On the following pages, the results of our tests are shown. Your results may vary due to system usage, but the comparisons should be similar.

SMDS Test Result

```
1
 Compiled Sep 13 2006 11:23:57.
 buffer:-qTEAMXX.SMDS.QUEUE           * REQUEST QUEUE
 buffer:-rTEAMXX.SMDS.QUEUE           * REPLY QUEUE
 buffer:-fileDD:MSGIN
 buffer:-dJTEST4
 parm: -mQML1 -n10 -x -p -s4096
 Message file: DD:MSGIN
 OEMPUTX about to MQCONN to QMgr QML1.
 OEMPUTX about to MQOPEN request queue: TEAMXX.SMDS.QUEUE
 OEMPUTX about to MQOPEN reply queue: TEAMXX.SMDS.QUEUE
 CPU type 0000012817
 Date Time 2011/12/12 16:48:33.
 Description JTEST4.
 Entering PUT/GET loops (MQGET_Wait=60 seconds)...
 Preload the queue with 0 messages...
   Message size        : 4096
   Message persistence : PERSISTENT
   Messages per loop   : 1
   Total messages      : 10
   Syncpoints          : NO-SYNCPOINT
   MQGET replies by    : Any message
 Starting loop at 2011-12-12 16:48:33.521404
  Workload manager data
                  Samples %idle %unknown(MQ?) %using CPU %doing I/O
%Wait for CPU
    QML1CHIN.0068       27   100             0          0          0
0
    QML1MSTR.005A       27   100             0          0          0
0
 ------------------------------------------------------
 Total Transactions  : 10
 Elapsed Time        :    0.033 seconds
 Application CPU Time:    0.002 seconds  (4.7%)
 Transaction Rate    :  301.905 trans/sec
 ------------------------------------------------------
 Round trip per msg  :     3312 microseconds
 Avg App CPU per msg :      155 microseconds
 ------------------------------------------------------
  Jobname.ASID  TCB(uS)  SRB(uS) Tot(uS) (%)
                /tran    /tran   /tran
 ------------ -------- -------- -------- ----
 QML1MSTR.005A 00000034 00000089 00000124 3.8
 QML1CHIN.0068 00000000 00000000 00000000 0.0
 QML1BRK*      00000000 00000000 00000000 0.0
 Total CPUmicrosecs/tran              124
 ------------------------------------------------------
 Ending loop at 2011-12-12 16:48:33.555247
 OEMPUTX Normal Exit: End of program
 Exiting at 2011-12-12 16:48:33.558693
```

DB2 Offload Test Result

```
1
 Compiled Sep 13 2006 11:23:57.
 buffer:-qTEAMXX.DB2.QUEUE           * REQUEST QUEUE
 buffer:-rTEAMXX.DB2.QUEUE           * REPLY QUEUE
 buffer:-fileDD:MSGIN
 buffer:-dJTEST4
 parm: -mQML1 -n10 -x -p -s4096
 Message file: DD:MSGIN
 OEMPUTX about to MQCONN to QMgr QML1.
 OEMPUTX about to MQOPEN request queue: TEAMXX.DB2.QUEUE
 OEMPUTX about to MQOPEN reply queue: TEAMXX.DB2.QUEUE
 CPU type 0000012817
 Date Time 2011/12/12 16:48:33.
 Description JTEST4.
 Entering PUT/GET loops (MQGET_Wait=60 seconds)...
 Preload the queue with 0 messages...
   Message size        : 4096
   Message persistence : PERSISTENT
   Messages per loop   : 1
   Total messages      : 10
   Syncpoints          : NO-SYNCPOINT
   MQGET replies by    : Any message
 Starting loop at 2011-12-12 16:48:33.536356
  Workload manager data
                   Samples %idle %unknown(MQ?) %using CPU %doing I/O %Wait
for CPU
    QML1CHIN.0068       28   100             0          0          0
0
    QML1MSTR.005A       28   100             0          0          0
0
 ---------------------------------------------------------
 Total Transactions  : 10
 Elapsed Time        :    0.280 seconds
 Application CPU Time:    0.002 seconds  (0.6%)
 Transaction Rate    :   35.776 trans/sec
 ---------------------------------------------------------
 Round trip per msg  :    27951 microseconds
 Avg App CPU per msg :      156 microseconds
 ---------------------------------------------------------
  Jobname.ASID  TCB(uS)  SRB(uS) Tot(uS) (%)
                /tran    /tran   /tran
 ------------- -------- -------- -------- ----
 QML1MSTR.005A 00000878 00000131 00001010 3.6
 QML1CHIN.0068 00000000 00000000 00000000 0.0
 QML1BRK*      00000000 00000000 00000000 0.0
 Total CPUmicrosecs/tran             1010
 ---------------------------------------------------------
 Ending loop at 2011-12-12 16:48:33.816510
 OEMPUTX Normal Exit: End of program
 Exiting at 2011-12-12 16:48:33.819107
```

___4. Comparing the results:

a. What was the transaction rate for the SMDS Offload in the sample test? _____
In your test? _____
b. The DB2 Offload in the sample test?
_____
In your test?
_____
c. What was the round trip rate for the SMDS offload in the sample test?
_____
In your test?
_____
d. What was the round trip rate for the DB2 offload in the sample test?
_____
In your test?
_____
e. What was the CPU Microseconds per transaction in the SMDS offload sample test?
_____
In your test?
_____
f. What was the CPU Microseconds per transaction in the DB2 offload sample test?
_____
In your test?
_____