

IBM MQ for z/OS

Administration – Introduction to MQ for z/OS Test
Programs

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Agenda

- Put Samples
- Get Samples



OEMPUT

A general MQ for z/OS Test tool





OEMPUT – a general test tool


- OEMPUT was originally developed to exercise the Message Broker on z/OS
 - It would help identify potential bottlenecks in MQ
 - It was based on a program used by the development lab for testing
 - It includes some simple performance metrics as output
 - Transactions per second
 - Approximate CPU use
 - It provides several message attributes that can be set to test various scenarios
 - Persistent or nonpersistent
 - Message size
 - Message type
 - Load and pseudo-production testing can be done
 - Option to allow running for a set amount of time
 - Option to put a message then wait for X hundredths of a second



OEMPUT – Basic Information

- OEMPUT is now part of SupportPac MP1B
 - <https://www.ibm.com/support/pages/mp1b-ibm-mq-interpreting-accounting-and-statistics-data-and-other-utilities>
- Source is not delivered
 - Load module only
- Installation is part of MP1B
 - Download
 - FTP files to z/OS
 - RECEIVE the load library and sample JCL library

OEMPUT – Running the program – an MQPUT1 sample


- The Sample JCL, tailored for some testing I was doing looks like this 


- The parms are: 

- -m – The queue manager
 - Note: You can use a QSG name for the connection, but it does not return the QSG member
- -put1 – Use an MQPUT1 command for each put, if not specified OEMPUT will open the queue and do puts in a loop, then close
- -q – the queue messages will be put to this queue
- -s – the length of the messages
- -n – the number of messages to be put
- -fileDD – the DD name of the file used for the message contents

```
//*  
// SET M=QML1  
// SET Q=ELKINSC.TEST.MQPUT1  
// SET R=ELKINSC.TEST.MQPUT1  
// SET L=1000  
// SET N=25  
//PUT01A EXEC PGM=OEMPUT,REGION=0M,  
// PARM=(' -m&M -put1 -q&Q -s&L -n&N -fileDD:MIN ')  
//SYSIN DD *  
/*  
//STEPLIB DD DISP=SHR,DSN=MQPERF.OEMPUT.LOAD  
// DD DISP=SHR,DSN=MQ91#.SCSQLOAD  
// DD DSN=MQ905.SCSQANLE,DISP=SHR  
// DD DSN=MQ905.SCSQAUTH,DISP=SHR  
//SYSPRINT DD SYSOUT=*  
//MIN DD DISP=SHR,DSN=MQPERF.ELKINSC.JCL(MSGS)  
//COR DD DISP=SHR,DSN=MQPERF.ELKINSC.JCL(COR01)  
//SUMMARY DD SYSOUT=*
```


OEMPUT – Running the program – an MQGET sample


- The Sample JCL, tailored for some testing I was doing looks like this 

- The parms are: 
 - -m – The queue manager
 - Note: You can use a QSG name for the connection, but it does not return the QSG member
 - -r – the queue messages will be retrieved from
 - -n – the number of messages to be retrieved

```
// SET M=QML1™
// SET Q=ELKINSC.TEST.MQPUT1
// SET R=ELKINSC.TEST.MQPUT1
// SET L=1000
// SET N=25
//PUT01A EXEC PGM=OEMPUT,REGION=0M,
// PARM=(' -m&M -r&Q -s&L -n&N ')
//SYSIN DD *
/*
//STEPLIB DD DISP=SHR,DSN=MQPERF.OEMPUT.LOAD
// DD DISP=SHR,DSN=MQ905.SCSQLOAD
// DD DSN=MQ905.SCSQANLE,DISP=SHR
// DD DSN=MQ905.SCSQAUTH,DISP=SHR
//SYSPRINT DD SYSOUT=*
//MIN DD DISP=SHR,DSN=MQPERF.ELKINSC.JCL(MSGS)
//COR DD DISP=SHR,DSN=MQPERF.ELKINSC.JCL(COR01)
//SUMMARY DD SYSOUT=*
/*...
```



OEMPUT – Other frequently used parameters

- -l – Loop – controls the number of messages put and then gotten in a loop. Batches messages. The default value is 1, but if emulating an application it may put 10 messages, then start getting 10 ‘replies’
 - -c – Commit – if the messages are being processed in loops (as above) will commit the ‘loop’
 - -cgpc – After any initial load of messages, this GETs the number of messages in the loop and commits, then puts the number of messages in the loop and commits
 - Designed to emulate client processing, though does not do the connects and disconnects
 - -cgpc - Any initial load of messages, GET the number of messages in the loop, then puts the number of messages in the loop THEN commits.
 - Designed to emulate a long running server application
 - -np or -p – Messages are Nonpersistent (the default) or Persistent
 - -putwait – there is a wait of X hundredths of seconds between MQPUTs
 - -tm or -ts – run the test for the specified number of minutes (-tm) or seconds (-ts)
 - -w – the MQGET wait interval in seconds, default is 60 seconds
- 

OEMPUT – Output from the PUT1 Test

```
Compiled Nov  1 2018 19:44:10.  
parm: -mQSGM -put1 -qELKINSC.TEST.MQPUT1 -s1000 -n25 -fileDD:MIN  
Message file -FILE: DD:MIN open mode:rb  
bytes read from msg file 800  
reply size 104857600  
OEMPUT about to MQCONN to QMgr QSGM.  
CPU type 0000013906  
Date Time 2020/06/08 18:23:23.  
Using MQPUT1  
Entering PUT only loops...  
Preload the queue with 0 messages...  
  Message size      : 1000  
  Reply size       : 104857600  
  Message persistence : NON-PERSISTENT  
  Messages per loop  : 1  
  Total messages    : 25  
  Syncpoints        : NO-SYNCPPOINT  
Starting loop at 2020-06-08 18:23:23.280916
```


- The parameters used to control the job are listed.
- Note that even though there were no replies expected or included, a 'reply size' is listed
- It indicates that MQPUT1 is being used
- Then provides information about the test
 - Message persistence
 - Messages per loop
 - Total messages
 - Syncpoint status

OEMPUT – Output from the PUT1 Test - Continued

```
Total Transactions : 25  
Elapsed Time      : 0.001 seconds  
Application CPU Time: 0.001 seconds (85.1%)  
Transaction Rate  : 20341.937 trans/sec
```

```
-----  
Round trip per msg : 49 microseconds  
Avg App CPU per msg : 41 microseconds  
-----
```

- Now for the interesting bits
 - The total transactions and the calculated transaction rate.
 - In this case there were only 25 messages put so the elapsed time and CPU time are not terribly interesting
 - The round trip per message and average CPU per message can be very useful when making comparisons – there will be more on that!



Testing a z/OS Queue Manager

Some ideas





Testing a new or upgraded z/OS queue manager

- At the WSC we use OEMPUT to test new queue managers
 - Simple tests to put and get
 - Nothing fancy
- There are samples delivered with MQ to test for additional functionality
 - Batch, CICS and IMS
- Running comparisons between an existing queue manager and an upgraded version can be helpful to see where there may be improvements
- Running comparisons, like the three that follow, can help quantify cost differences
 - Remember – each environment may have substantial physical differences that can mean even more differences in run time costs

Simple Comparison – Persistent vs Nonpersistent

```
Message size      : 1000
Reply size        : 10240
Message persistence : PERSISTENT
Messages per loop : 1
Total messages    : -1
Syncpoints Get 1, Put 1, Commit in syncpoint
MQGET replies by  : Any message
Starting loop at 2020-06-08 21:41:54.066292
Workload manager data
      Samples %idle %unknown(MQ?) %using CPU %doing I/O %
QML1CHIN.005E    35   100           0         0         0
QML1MSTR.005D     9     0           0        88         0
      WLM queue delay 11
-----
Total Transactions : 23318
Elapsed Time      : 10.000 seconds
Application CPU Time: 1.095 seconds (11.0%)
Transaction Rate  : 2331.715 trans/sec
-----
Round trip per msg : 428 microseconds
Avg App CPU per msg : 46 microseconds
```

```
Message size      : 1000
Reply size        : 10240
Message persistence : NON-PERSISTENT
Messages per loop : 1
Total messages    : -1
Syncpoints Get 1, Put 1, Commit in syncpoint
MQGET replies by  : Any message
Starting loop at 2020-06-08 21:40:06.311459
Workload manager data
      Samples %idle %unknown(MQ?) %using CPU %doing I/O %Wait for CPU
QML1CHIN.005E     4   100           0         0         0         0
QML1MSTR.005D     4   75           0        25         0         0
-----
Total Transactions : 218063
Elapsed Time      : 10.000 seconds
Application CPU Time: 8.056 seconds (80.6%)
Transaction Rate  : 21806.036 trans/sec
-----
Round trip per msg : 45 microseconds
Avg App CPU per msg : 36 microseconds
```


Simple Comparison – 10,000 bytes vs 1,000 bytes

Message size : 10000
Reply size : 10240
Message persistence : NON-PERSISTENT
Messages per loop : 1
Total messages : -1
Syncpoints Get 1, Put 1, Commit in syncpoint
MQGET replies by : Any message

Starting loop at 2020-06-08 22:39:07.604818

Workload manager data

	Samples	%idle	%unknown(MQ?)	%using CPU
QML1CHIN.005E	8	100	0	0
QML1MSTR.005D	8	100	0	0

Total Transactions : 11241
Elapsed Time : 10.001 seconds
Application CPU Time: 0.538 seconds (5.4%)
Transaction Rate : 1124.011 trans/sec

Round trip per msg : 889 microseconds
Avg App CPU per msg : 47 microseconds

Message size : 1000
Reply size : 10240
Message persistence : NON-PERSISTENT
Messages per loop : 1
Total messages : -1
Syncpoints Get 1, Put 1, Commit in syncpoint
MQGET replies by : Any message

Starting loop at 2020-06-08 21:40:06.311459

Workload manager data

	Samples	%idle	%unknown(MQ?)	%using CPU	%doing I/O	%Wait for CPU
QML1CHIN.005E	4	100	0	0	0	0
QML1MSTR.005D	4	75	0	25	0	0

Total Transactions : 218063
Elapsed Time : 10.000 seconds
Application CPU Time: 8.056 seconds (80.6%)
Transaction Rate : 21806.036 trans/sec

Round trip per msg : 45 microseconds
Avg App CPU per msg : 36 microseconds

Simple Comparison – Private vs Shared Queue

```
Message size      : 1000
Reply size       : 10240
Message persistence : NON-PERSISTENT
Messages per loop : 1
Total messages    : -1
Syncpoints Get 1, Put 1, Commit in syncpoint
MQGET replies by  : Any message
Starting loop at 2020-06-08 21:40:06.311459
Workload manager data
      Samples %idle %unknown(MQ?) %using CPU %doing I/O %Wait for CPU
QML1CHIN.005E    4   100           0          0          0          0
QML1MSTR.005D    4    75           0         25          0          0
-----
Total Transactions : 218063
Elapsed Time      : 10.000 seconds
Application CPU Time: 8.056 seconds (80.6%)
Transaction Rate  : 21806.036 trans/sec
-----
Round trip per msg : 45 microseconds
Avg App CPU per msg : 36 microseconds
```

```
Message size      : 1000
Reply size       : 10240
Message persistence : NON-PERSISTENT
Messages per loop : 1
Total messages    : -1
Syncpoints Get 1, Put 1, Commit in syncpoint
MQGET replies by  : Any message
Starting loop at 2020-06-08 22:31:02.630880
Workload manager data
      Samples %idle %unknown(MQ?) %using CPU %doing I/O %Wait for CPU
QML1CHIN.005E    28   100           0          0          0          0
QML1MSTR.005D    31    61           0          0          0          0
-----
Total Transactions : 77578
Elapsed Time      : 10.000 seconds
Application CPU Time: 3.485 seconds (34.8%)
Transaction Rate  : 7757.647 trans/sec
-----
Round trip per msg : 128 microseconds
Avg App CPU per msg : 44 microseconds
```



Testing client connections

- Unfortunately OEMPUTX does not connect as a client will, but there are options
 - Using the sample amqsputc and amqsgetc client programs can demonstrate the costs of clients connecting directly.
 - A very simple example, and windows batch file:
 - Set the MQSERVER environment variable to set the SVRCONN variable to appropriate values
 - An execution of amqsputc to a test queue
 - An execution of amqsgetc to pull the messages from the test queue
 - It looks like this:

```
SET MQSERVER=ELKINSC.SVRCONN/TCP/9.82.31.252(1417)
amqsputc ELKINSC.TEST.MQPUT QML1 <D:\test10.txt >D:\putcout10.txt
amqsgetc ELKINSC.TEST.MQPUT QML1 >D:\getcout10.txt
```

Results from the test:

```
D:\Tests>SET MQSERVER=ELKINSC.SVRCONN/TCP/9.82.31.252(1417)
D:\Tests>amqsputc ELKINSC.TEST.MQPUT QML1 0<D:\test10.txt 1>D:\putcout10.txt
D:\Tests>amqsgetc ELKINSC.TEST.MQPUT QML1 1>D:\getcout10.txt
```

Input File

```
this is message 1
this is message 2
this is message 3
this is message 4
this is message 5
this is message 6
this is message 7
this is message 8
this is message 9
this is message 10
```

Output File

```
Sample AMQSGET0 start
message <this is message 1>
message <this is message 2>
message <this is message 3>
message <this is message 4>
message <this is message 5>
message <this is message 6>
message <this is message 7>
message <this is message 8>
message <this is message 9>
message <this is message 10>
no more messages
Sample AMQSGET0 end
```



In conclusion

- There is much, much more!
- But I hope this has given enough background to be useful.
 - Or enough to make a new admin familiar with some areas to explore.