
An
IBM
Washington
Systems
Center
Wildfire Workshop

Lab Objective

This lab emphasizes examining the messages output – what it does and does not report on - and task reports from MP1B in more detail.

Lab Steps

1) Alter the MQSMFV9 JCL in the TEAMXX.MQPERF.JCL PDS (where the XX is your team number) to point to the TEAMXX.MQSMF.COMBO dataset as the SMFIN file.

DO NOT USE THE MQPREF.IMQPF.JCL!!! Use your JCL PDS TEAMXX.MQPERF.JCL

The SMFIN should look as follows, where 'TEAMXX' is actually your user ID.
//SMFIN DD DISP=SHR,DSN=TEAMXX.MQSMF.COMBO

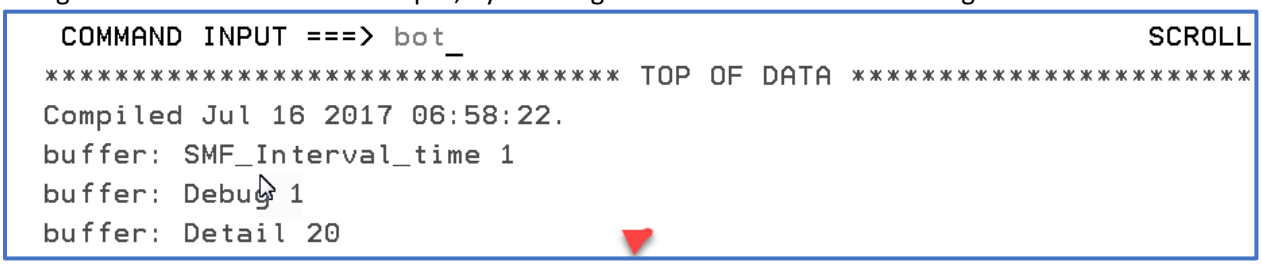
2) Save and submit the job.
3) Navigate to SDSF.ST to review the results.
4) Select the job, using the question mark to display the list of files:

```
SDSF STATUS DISPLAY ALL CLASSES                                LINE
COMMAND INPUT ===>
NP   JOBNAME  JobID    Owner    Prty Queue      C  Pos  SAff
?    ELKINSCM JOB06703 ELKINSC     1 PRINT      A   41
     ELKINSSF JOB06702 ELKINSC     1 PRINT      A   40
```

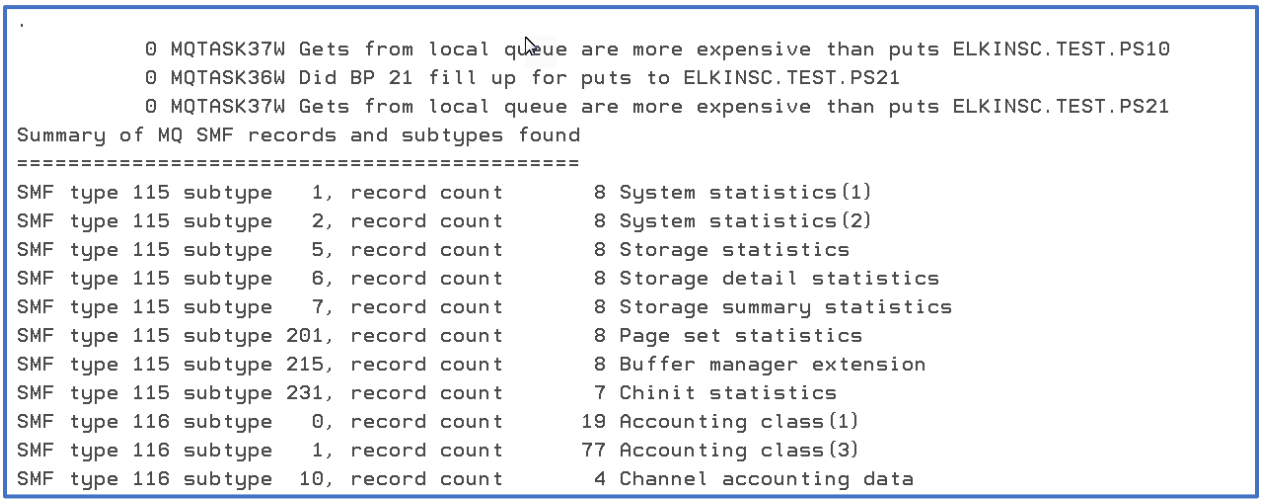
5) Page forward to the SYSPRINT output, or do a F(ind) for the file. Select it as shown:

```
SDSF JOB DATA SET DISPLAY - JOB ELKINSCM (JOB
COMMAND INPUT ===>
NP   DDNAME   StepName ProcStep DSID Owner
 s_  SYSPRINT S1                151 ELKINSC
     PSET     S1                152 ELKINSC
     BUFFIO   S1                153 ELKINSC
```

6) Navigate to the bottom on the output, by entering the 'bot' command and hitting enter:

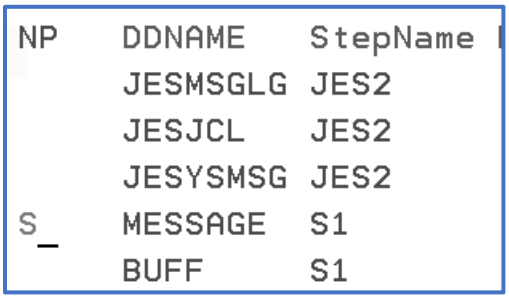


7) The output should look something like this:



8) If the output looks radically different, please let the instructor know.
9) Return to the list of files by using the F3 key.

10) Select the Message output, as shown:



11) There are several problems reported, just of the first page of messages.

```
MQQJST11W MPX1,QML1,2018/12/17,14:48:43,VRM:900, logging rate is low  0 < 50 MB/Sec
MQQJST11W MPX1,QML3,2018/12/17,14:49:32,VRM:900, logging rate is low  0 < 50 MB/Sec
MQQJST11W MPX1,QML1,2018/12/17,14:49:43,VRM:900, logging rate is low  0 < 50 MB/Sec
MQQJST11W MPX1,QML1,2018/12/17,14:50:06,VRM:900, logging rate is low  0 < 50 MB/Sec
MQQJST11W MPX1,QML3,2018/12/17,14:50:33,VRM:900, logging rate is low  0 < 50 MB/Sec
MQQIST02W MPX1,QML3,2018/12/17,14:50:33,VRM:900, QIST Message read from disk 2 > 0
MQPSET02W MPX1,QML3,2018/12/17,14:50:33,VRM:900, Page set 21 expansion occurred. Current expansion count 11 times
MQPSET03E MPX1,QML3,2018/12/17,14:50:33,VRM:900, Page set 0, I/O for writing to page set was 2% busy
MQPSET04E MPX1,QML3,2018/12/17,14:50:33,VRM:900, Page set 0, I/O for Immediate Writing to page set was 3% busy
MQPSET05E MPX1,QML3,2018/12/17,14:50:33,VRM:900, Page set 0, I/O for getting from page set was 2% busy
MQPSET06E MPX1,QML3,2018/12/17,14:50:33,VRM:900, Page set 0,Total I/O time to page set was 7% busy
MQQPST00W MPX1,QML3,2018/12/17,14:50:33,VRM:900, BP 21 Many(5975) buffers written immediately.   Buffer pool may be too small
MQQPST02S MPX1,QML3,2018/12/17,14:50:33,VRM:900, BP 21 Filled many(610) times.    This is typical of long lived messages. Buffer poo
l may be too small
MQQPST04E MPX1,QML3,2018/12/17,14:50:33,VRM:900, BP 21 Many (5877) pages read from disk.  This is typical of long lived messages. Bu
ffer pool may be too small
MQQJST11W MPX1,QML3,2018/12/17,14:51:34,VRM:900, logging rate is low  0 < 50 MB/Sec
MQQJST11W MPX1,QML1,2018/12/17,14:51:45,VRM:900, logging rate is low  0 < 50 MB/Sec
```

12) As noted before, these messages provide direction on where to look for problems. The first problem to investigate is MQQPST02S. As that is immediately followed by MQQPST04E – it is a pretty clear indication that Bufferpool 21 is too small for the workload.
13) Return to the list of reports and select the BUFF report.

```
NP    DDNAME    StepName
      MESSAGE   S1
s_    BUFF      S1
      BUFFCSV   S1
```

14) Page forward until Bufferpool 21 is located. How many pages are allocated? - _____
15) Is Bufferpool 21 below or above the bar? _____
16) Is BP 21 page fixed? _____
17) Keep paging forward (F8) until you find a record that indicates the bufferpool trouble:

```
= BPool  21, Size     1000,%full now 40, Highest %full 95, Disk reads     5877 MPX1,QML3,2018/12/17,14:50:33,VRM:900,
< BPool  21, Pages written/sec     194, Pages read/sec       96              MPX1,QML3,2018/12/17,14:50:33,VRM:900,
 > 21 Buffs     1000  Low       50  Now      592  Getp     7511  Getn    12185
   21 Rio       5877  STW     13901  TPW    11847  WIO      6342  IMW      5975
   21 DWT        610  DMC         0  STL    16492  STLA        0  SOS         0
   21 Above the bar   PAGECLAS 4KB
```

18) Note that even though the bufferpool was reported in the messages as having 'filled many times (610)' that is the Deferred Write Threshold count – or the number of times the BP hit the 15% free pages threshold. This may not be a problem for some workloads, for a batch workload where messages will remain on a queue for a long period of time this can be expected behavior.
19) The bufferpool never when into a short on storage situation but did see a large number of immediate writes (5975), to me that is a more telling problem than the DWT count – this means that the messages were probably quite large – and even though the pool had not hit the 5% freepage DMC threshold or short on storage, the messages would not fit. This may mean that

message sizes or workload has increased, and may be both. It may also indicate that a very active queue was defined to the wrong bufferpool. Has someone recently done a define like. The Messages file reports this as a warning, but I think it is a much more serious problem that the DWT count going non-zero – which is reported as an error.

20) There are no messages in the MESSAGE output about the pageset, but we know from the buffer report that there was I/O. Navigate to the PSET output file to see what may have happened. Once opened, do a find on 'BP 21' (note there are two spaces between the 'BP' and the '21'), and keep repeating the find until pageset I/O activity is found. It should look like this:

```
PS21 BP  21, Pages      7018, Size   27 MB, free   100.0%, used     0.0%, P  0%, NP  0%, #full 0,
     Pages written in checkpoint             0
     Pages written not in checkpoint     11847
     Number of stripes                       1
     Put Cursor high                  00000106
     Expansion type:User   Expansions       11

     Page set expansion occurred
PS21 Type :I/O requests,   Pages, Avg I/O time, pages per I/O, MB/Sec,  busy%
PS21 Write:          367,    5872,          4128,           16.0,      15,      2%
PS21 IMW  :         5975,    5975,           328,            1.0,      12,      3%
PS21 GET  :         5877,    5877,           213,            1.0,      18,      2%
```

21) As you can see, the pageset itself has expended 11 times – and pageset expansion can be a component of response time problems. Each time a pageset expands, there is not only the normal VSAM activity to do the expansion but there is also formatting of the new extent. However, not allowing expansion could mean that applications start receiving a 2192 (Storage Media Full) reason code.
22) Another useful piece of information is that none of the pages were writing during checkpoint processing. If messages have been in a bufferpool for 3 checkpoints, they will be written at that 3rd checkpoint. The checkpoint could be from log switches or the LOGLOAD records being reached. If there is an increase in the number of messages being written during checkpoint processing, and the bufferpool is supposed to be processing real-time workload that often indicates the serving processes cannot keep up. It may be time to add more instances of the serving applications.
23) The other output files dealing with pageset and buffer I/O are summaries and may be more helpful when dealing with large quantities of data, instead of a few short tests.
24) Tests were also run to look at the impact of an MQGET with match options, without a corresponding index. It is a bit surprising that there was no message in the MESSAGE output, especially when there was one in the JES log:

```
CSQI004I QML3 CSQIMGE3 Consider indexing  749
ELKINSC.TEST.PS10 by CORRELID for BATCH connection ELKING2P, 140
messages skipped
```

25) Open the TASK output and search for the ELKING2P task, as this is a controlled test the data does not have to be sorted to just get the records for that task.

26) Page forward in the task, bringing the get count to the top of the page as shown.

95	Get count	10		ELKINSC.TEST.PS10
95	Get avg elapsed time	296	uS	ELKINSC.TEST.PS10
95	Get avg CPU time	255	uS	ELKINSC.TEST.PS10
95	Get avg suspended time	26	uS	ELKINSC.TEST.PS10
95	Get skipped message count	1411		ELKINSC.TEST.PS10
95	Get TOQ average	74422305	uS	ELKINSC.TEST.PS10
95	Get TOQ maximum	74428879	uS	ELKINSC.TEST.PS10
95	Get TOQ minimum	74418602	uS	ELKINSC.TEST.PS10
95	Get valid count	10		ELKINSC.TEST.PS10
95	Get valid destructive	10		ELKINSC.TEST.PS10
95	Get size maximum	1000	bytes	ELKINSC.TEST.PS10
95	Get size minimum	1000	bytes	ELKINSC.TEST.PS10
95	Get size average	1000	bytes	ELKINSC.TEST.PS10
95	Get Dest-Specific	10		ELKINSC.TEST.PS10
95	Get not persistent count	10		ELKINSC.TEST.PS10
95	Curdepth maximum	199		ELKINSC.TEST.PS10
95	Total Queue elapsed time	3016	uS	ELKINSC.TEST.PS10
95	Total Queue CPU used	2603	uS	ELKINSC.TEST.PS10
95	Grand total CPU time	0.002610	S	

27) How many messages were skipped? _____
28) How many messages returned to the application? _____
29) What was the maximum depth? _____
30) Adding a proper index to the queue would eliminate the skipped messages in this case and make processing more efficient.
31) Note that if an application is using message selectors to retrieve messages from a queue, there can be skipped messages without a corresponding CSQI004I message. Some customers have suppressed the CSQI004I message, so there may be instances where there are a large number of skipped messages and no corresponding message in the JES log. The TASK report shows that – and is the only place to catch these inefficiencies under those circumstances.

32) Open the DB2 report, and search for the word 'Blob'. There are entries for both queue managers QML1 and QML3.

```
MPX1,QML1,2018/12/17,14:50:06,VRM:900,
 Tasks  : Servers    8, Active    9, Conns       0, Discs       0
          HighMax    1, Abend       0,  Requeue       0
               Count  Task avg   Task max   DB2 avg  DB2 max(ms)  (Task-DB2)Avg    Max
 List       :     4         0          0         0          0                  0       0
 Blob Select:   326         0          7         0          7                  0       0
 Blob Delete:   326         1          2         1          2                  0       0
MPX1,QML3,2018/12/17,14:50:33,VRM:900,
 Tasks  : Servers    8, Active    9, Conns       0, Discs       0
          HighMax    1, Abend       0,  Requeue       0
               Count  Task avg   Task max   DB2 avg  DB2 max(ms)  (Task-DB2)Avg    Max
 List       :    14         1          8         1          8                  0       0
 SCS Select :     1         0          0         0          0                  0       0
 Blob Insert:   326         4        209         4        209                  0       0
```

33) There is no indication of message offlloading to Db2 in the messages file, which there probably should be. Using Db2 for message offloading is much less efficient than using Shared Message Data sets. The use of Db2 for that is discouraged for that reason.

34) Also note that due to the timing of the SMF generation on the two queue managers, it almost looks like the Blobs were retrieved before they were actually written – the time reported on QML1, where the gets were done was 14:50:06, on QML3 it was 14:50:03 and that is where the puts were done.

The only reason I mention this is that I've gotten questions on that before! A queue manager is many things, but it is not clairvoyant.

35) To compare the costs of Db2 blobs to SMDS, really to compare any two messaging or infrastructure choices, locating the TASK records for the tests must be done. Return to the list of output files and select the TASK output.

36) Do a find for DB2OFF, which I used as part of the queue name for the test.

```
SDSF OUTPUT DISPLAY ELKINSCM JOB06703
COMMAND INPUT ===> f DB2OFF_
********************************* TOP OF
```

37) Page back to the top of the task, it should look like this:

```
79 MPX1,QML3,2018/12/17,14:49:58,VRM:900,
79 QML3 Batch Jobname:ELKINTPT Userid:ELKINSC
79 Start time Dec 17 14:49:33 2018 Started this interval
79 Interval   Dec 17 14:49:33 2018 - Dec 17 14:49:34 2018 : 1.428541 seconds
79 Other reqs : Count                  1
79 Other reqs : Avg elapsed time       7 uS
79 Other reqs : Avg CPU                7 uS
79 Other reqs : Total ET               0.000007 Seconds
79 Other reqs : Total CPU              0.000007 Seconds
79 == DB2 activity :         326 requests
79 > Average time per DB2 request-Server :     4223 uS
79 > Average time per DB2 request-Thread :     4223 uS
79 > Maximum time per DB2 request-Server :   209279 uS
79 > Maximum time per DB2 request-Thread :   209293 uS
79 > Bytes put to DB2     : 32714752
79 > Bytes read from DB2 :         0
79 == CF activity : Requests - Single        652, Multiple        163
79 >                Retries  - Single          0, Multiple          0
```

38) There is a great deal of detail in this report, as it has been run at the maximum detail level ('20'). For normal problem resolution, including most performance work, that much detail is not usually necessary. It is presented in this exercise for your review.

39) Page forward to the end of the task, which looks like this:

```
79 Put avg elapsed time             4305 uS    ELKINSC.TEST.DB2OFF
79 Put avg CPU time                   47 uS    ELKINSC.TEST.DB2OFF
79 Put suspended time               4227 uS    ELKINSC.TEST.DB2OFF
79 Put + put1 valid count            326       ELKINSC.TEST.DB2OFF
79 CF time/verb     30
79  CF Avg Sync elapsed time/verb      30 us
79  CF Sync number of request         326
79  CF Avg Sync CF response time       30 us
79  CF Avg Sync CF response time       30 us
79    New      Avg Sync elapsed time/verb      30 us
79    New      Avg Sync number of request     326
79    New      Avg Sync CF response time       30 us
79 Put size maximum               100000 bytes ELKINSC.TEST.DB2OFF
79 Put size minimum               100000 bytes ELKINSC.TEST.DB2OFF
79 Put size average               100000 bytes ELKINSC.TEST.DB2OFF
79 Put num not persistent            326       ELKINSC.TEST.DB2OFF
79 Curdepth maximum                    2       ELKINSC.TEST.DB2OFF
79 Total Queue elapsed time      1403840 uS    ELKINSC.TEST.DB2OFF
79 Total Queue CPU used            15715 uS    ELKINSC.TEST.DB2OFF
79 Grand total CPU time         0.019232 S
79 Grand Elapsed time           1.421942 S
79 % total busy                      100    B,ELKINTPT," ",
```

40) How many messages were put? _____

41) What was the queue CPU time?_____

42) What was the queue elapsed time? _____

43) What was the put average CPU time? _____

44) Paging forward the next task is the Get task that retrieved the messages. Again, there is quite a bit of Db2 activity

```
81 MPX1,QML1,2018/12/17,14:49:58,VRM:900,
81 QML1 Batch Jobname:ELKINTGT Userid:ELKINSC
81 Start time Dec 17 14:49:33 2018 Started this interval
81 Interval   Dec 17 14:49:33 2018 - Dec 17 14:49:34 2018 : 1.838559 seconds
81 Other reqs : Count                    1
81 Other reqs : Avg elapsed time         9 uS
81 Other reqs : Avg CPU                  9 uS
81 Other reqs : Total ET                 0.000009 Seconds
81 Other reqs : Total CPU                0.000009 Seconds
81 == DB2 activity :          652 requests
81 > Average time per DB2 request-Server :       893 uS
81 > Average time per DB2 request-Thread :       893 uS
81 > Maximum time per DB2 request-Server :      7361 uS
81 > Maximum time per DB2 request-Thread :      7383 uS
81 > Bytes put to DB2    :         0
81 > Bytes read from DB2 : 32714752
81 == CF activity : Requests - Single         332, Multiple           8
81 >                Retries  - Single           0, Multiple           0
```

45) Paging forward, to the GET counts:

```
81 Get count                          489        ELKINSC.TEST.DB2OFF
81 Get avg elapsed time               399 uS     ELKINSC.TEST.DB2OFF
81 Get avg CPU time                    28 uS     ELKINSC.TEST.DB2OFF
81 Get avg suspended time             350 uS     ELKINSC.TEST.DB2OFF
81 Get TOQ average                   7052 uS     ELKINSC.TEST.DB2OFF
81 Get TOQ maximum                 212793 uS     ELKINSC.TEST.DB2OFF
81 Get TOQ minimum                   3295 uS     ELKINSC.TEST.DB2OFF
81 Get valid count                    326        ELKINSC.TEST.DB2OFF
81 Get valid destructive              326        ELKINSC.TEST.DB2OFF
81 Get size maximum                100000 bytes  ELKINSC.TEST.DB2OFF
81 Get size minimum                100000 bytes  ELKINSC.TEST.DB2OFF
81 Get size average                100000 bytes  ELKINSC.TEST.DB2OFF
81 Get Dest-Next                      489        ELKINSC.TEST.DB2OFF
81 Get not persistent count           326        ELKINSC.TEST.DB2OFF
81 CF time/verb     21
81  CF Avg Sync elapsed time/verb      21 us
81  CF Sync number of request         327
81  CF Avg Sync CF response time       32 us
81    StartMon Avg Sync elapsed time/verb       0 us
81    StartMon Avg Sync number of request       1
81    StartMon Avg Sync CF response time       23 us
81    Move     Avg Sync elapsed time/verb      21 us
81    Move     Avg Sync number of request     326
81    Move     Avg Sync CF response time       32 us
81 Curdepth maximum                   0        ELKINSC.TEST.DB2OFF
81 Total Queue elapsed time      195910 uS     ELKINSC.TEST.DB2OFF
81 Total Queue CPU used           14297 uS     ELKINSC.TEST.DB2OFF
81 Grand total CPU time        0.014372 S
81 Grand Elapsed time          0.614083 S
```

46) How many valid destructive gets were completed? _____

47) What was the Total queue CPU? _____

48) Total queue elapsed time? _____

49) The average CPU time per GET? _____

50) The average elapsed time per GET? _____

51) Page forward in the TASK report until you find:
    QML1 Batch Jobname:ELKINTPT
    This is the start of the SMDS Offload test.

52) Paging forward to the end of this put task

```
91 Put count                          326        ELKINSC.TEST.SMDSOFF
91 Put avg elapsed time              2677 uS     ELKINSC.TEST.SMDSOFF
91 Put avg CPU time                    79 uS     ELKINSC.TEST.SMDSOFF
91 Put suspended time                2570 uS     ELKINSC.TEST.SMDSOFF
91 Put + put1 valid count             326        ELKINSC.TEST.SMDSOFF
91 CF time/verb     31
91  CF Avg Sync elapsed time/verb      31 us
91  CF Sync number of request         326
91  CF Avg Sync CF response time       31 us
91    New      Avg Sync elapsed time/verb      31 us
91    New      Avg Sync number of request     326
91    New      Avg Sync CF response time       31 us
91 Put size maximum                100000 bytes ELKINSC.TEST.SMDSOFF
91 Put size minimum                100000 bytes ELKINSC.TEST.SMDSOFF
91 Put size average                100000 bytes ELKINSC.TEST.SMDSOFF
91 Put num not persistent             326        ELKINSC.TEST.SMDSOFF
91 Curdepth maximum                     3        ELKINSC.TEST.SMDSOFF
91 Total Queue elapsed time        873095 uS     ELKINSC.TEST.SMDSOFF
91 Total Queue CPU used             26097 uS     ELKINSC.TEST.SMDSOFF
```

    91 Grand total CPU time   0.029407 S

53) 91 Grand Elapsed time   0.890596 S

54) What was the put + Put1 valid count? _____

55) What was the put average elapsed time? _____

56) What was the put average CPU time? _____

57) What was the total Queue CPU time? _____

58) Total Queue Elapsed time? _____

59) The puts for the DB2 offloaded messages were:
    79 Total Queue elapsed time   1403840 uS   ELKINSC.TEST.DB2OFF
    79 Total Queue CPU used   15715 uS   ELKINSC.TEST.DB2OFF

60) What is the difference in total CPU costs? _____

61) What is the Elapsed Time difference? _____

62) Paging forward to the end of the get task, the totals for the queue and grand totals are:

```
93 Curdepth maximum                    0       ELKINSC.TEST.SMDSOFF
93 Total Queue elapsed time       890908 uS    ELKINSC.TEST.SMDSOFF
93 Total Queue CPU used            32099 uS    ELKINSC.TEST.SMDSOFF
93 Grand total CPU time         0.032176 S
93 Grand Elapsed time           0.891740 S
```

63) What is interesting is that the Db2 offloaded Puts and Gets use less CPU in this test environment, but the elapsed time is significantly higher. This is not typical, in most environments the CPU costs for the Db2 offlloads will also be higher.
THIS IS WHY WE ALWAYS RECOMMEND TESTING! Your mileage will vary.