IBM MQ for z/OS

Administration – Introduction to MQ Batch Utilities

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Oh Dear, Oh Dear

- This is SOOOOO dull

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Agenda

- MQ for z/OS Batch Utilities
  - CSQJU003 – Change Log and BSDS Utility, primary uses
    - Used to register MQ active logs
    - Deleting information about obsolete MQ active or archive logs
  - CSQ1LOGP – Print information from MQ Logs or BSDS
    - Often used to extract messages from the MQ active or archive log
  - CSQ4LOGS – Sample job to replay and summarize log data
  - CSQUTIL – This is the workhorse of the utilities
    - Used when queue manager is both active and inactive
    - Used to make back-ups and restoring object definitions
    - Copying queues and pagesets
    - Resetting the pages when the log RBA is getting to the limit

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CSQJU003

- The queue manager should be down when using this utility
- First use is formatting the MQ log files
  - Log files are used to keep track of units of recovery and provide recovery for persistent messages
  - This program is used primarily to register new logs to the Boot Strap Data Set (BSDS) and delete old archive logs
    - NEWLOG also sets the log to COPY1 or COPY2
  - JCL samples
    - CSQ4BSDS – initial definition of 4 dual log files, including registering them with the BSDS and formatting the logs
    - CSQ4LREC – definition of a new dual log, registering it with the BSDS and formatting the log
      - For some reason uses the same name as the third log file defined in the CSQ4BSDS sample

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CSQ1LOGP

- This utility is primarily used for log analysis, message extract and replay
  - Will work with both active and archive log files
  - There are some limitations of the messages that can be replayed
    - Messages with properties are known not to work.
  - Unique for MQ on z/OS
    - There are commercial providers that provide similar functionality for distributed platforms.
- The Extract function can produce the following output files:
  - CSQBACK – persistent messages that were rolled back
  - CSQCMT – persistent messages that were committed
  - CSQINFLT – persistent messages that remain inflight
  - CSQOBJS – MQ object changes

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CSQ4LOGS –The log replay sample

- This is a sample program
  - Source delivered, written in C
  - Can replay messages or provide summary information about the log(s)
  - Might be used to replay messages when there has been an application failure causing messages to be discarded.
  - To summarize activity

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Auditing Object changes – using the CSQOBJS Output

- One use of the LOG Extract program is to audit changes made to object.
  - The log contains records of changes. To get a file run CSQ1LOGP with the CSQOBJS output as shown:

```
//PRTLOG   EXEC PGM=CSQ1LOGP
//STEPLIB   DD DISP=SHR,DSN=MQ910.SCSQANLE
//          DD DISP=SHR,DSN=MQ910.SCSQLOAD
//ACTIVE1   DD DISP=SHR,DSN=QML1.LOGCOPY1.DS003
//SYSPRINT DD SYSOUT=*
//SYSSUMRY DD SYSOUT=*
//SYSIN DD *
EXTRACT(YES)
/*
//CSQOBJS    DD DISP=(NEW,CATLG),DSN=ELKINSC.CSQOBJS.TEST,
//           UNIT=SYSDA,SPACE=(CYL,(30))
//
```

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The CSQOBJS Output file

```
SYSTEM.CSQUTIL.D805AA3D7F5FE0D1                  System-command reply-to queue
SYSTEM.CSQUTIL.D805ADA08F8A6CD8                  System-command reply-to queue
SYSTEM.CSQUTIL.D805AE003D4010D1                  System-command reply-to queue
SYSTEM.CSQUTIL.D805AE1C84A3D6D7                  System-command reply-to queue
SYSTEM.CSQUTIL.D805AE9A59E1D0D8                  System-command reply-to queue
SYSTEM.CSQUTIL.D805AEA7F850F2D7                  System-command reply-to queue
ELKINSC.ALIAS                                    THIS IS A TEST DESCRIPTION
ELKINSC.ALIAS
ELKINSC.SUB.QUEUE                                THIS IS A TEST DESCRIPTION
ELKINSC.SUB.QUEUE
ELKINSC.TEST                                     THIS IS A TEST DESCRIPTION
ELKINSC.TEST
ELKINSC.TEST.MODEL                               THIS IS A TEST DESCRIPTION
ELKINSC.TEST.MODEL
ELKINSC.TEST.MQPUT.COPIED                        THIS IS A TEST DESCRIPTION
ELKINSC.TEST.MQPUT.COPIED
ELKINSC.TEST.MQPUT1.COPIED                       THIS IS A TEST DESCRIPTION
ELKINSC.TEST.MQPUT1.COPIED
ELKINSC.TEST.PUT2WG                              THIS IS A TEST DESCRIPTION
ELKINSC.TEST.PUT2WG
```

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The CSQOBJS Output file

- The file snippet shows what was changes (in the next section you will be able to see how the changes to the ELKINSC queues were created).
  - This is in human readable format, so if I was looking for a change had been made in the past few minutes I could see that
  - This is run against an active log, it could be done against an archive log
- Other information in the records includes:
  - Date and time stamp (in GMT)
  - User ID
  - What the object change was (DEFINE,ALTER, DELETE)
  - There are records for the AFTER and BEFORE object definition
  - The object types, for example
    - MQAO = Alias Queue
    - MQLO = Local Queue
    - MQRO = Remote Queue
  - If the type is ALIAS the base name is included

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The CSQOBJS Output file WARNING!

- In spite of the statement that this can be used to
  “Re-create object definitions for recovery purposes after a major failure.”
- The object definitions and changes are only valid for private queues
  - Shared queue information is stored in Db2, so not logged to the MQ logs

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CSQUTIL – The workhorse

- From the IBM MQ Knowledge Center:
  The CSQUTIL utility program is provided with IBM® MQ to help you to perform backup, restoration, and reorganization tasks, and to issue IBM MQ commands.
  - https://www.ibm.com/support/knowledgecenter/SSFKSJ_9.1.0/com.ibm.mq.ref.adm.doc/q088720_.htm

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CSQUTIL – One of many ways to send commands to the QMGR

- There are so many ways to get commands into a queue manager these days!
  - MQ Explorer
  - MQ Console
  - CSQINP2 – at queue manager start-up
  - RUNMQSC in client mode
  - CSQUTIL
  - Etc.
- This section will deal with using CSQUTIL for doing all kinds of useful tasks
  - Back-ups and restoration of messages on a queue
  - Back-ups of object definitions
  - Creating other commands

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CSQUTIL – backing up a queue

- Ever needed to remove all messages from a queue, but felt like they might be needed again?
  - Especially when those messages may have been flagged as nonpersistent, but drive transactions
- CSQUTIL can copy messages from a queue (or a pageset) onto a dataset as a back-up
  - The queue manager can be running (COPY) or not (SCOPY)
  - When using the COPY functions the queue (or queues) must not be in use
- Also used
  - When preparing for a queue manager shutdown
  - Moving queues to a new storage class to improve performance
  - Isolating queues to prevent clashes
  - Copying messages from production to test
- Recommendation:
  - Have sample tested JCL available to do this copy at all times.
    - Its not difficult, until you are being screamed at

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CSQUTIL – Loading (restoring) a queue

- CSQUTIL can restore messages to a queue (or a pageset) from a dataset back-up
  - The queue manager can be running (LOAD) or not (SLOAD)
- Also used
  - After bringing a queue manager back up
  - Moving messages to a new queue
  - Copying captured messages from production to test environments
- Recommendation:
  - Have sample tested JCL available to do a queue load at all times.
    - Just like the copy, its not difficult, until you are being screamed at

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Sample Unload and Load JCL

```
//COPYQS   EXEC PGM=CSQUTIL,PARM='QML1'
//STEPLIB  DD DISP=SHR,DSN=MQ910.SCSQANLE
//         DD DISP=SHR,DSN=MQ910.SCSQAUTH
//         DD DISP=SHR,DSN=MQ910.SCSQLOAD
//OUTPUTQ1 DD DISP=(NEW,CATLG),
//            SPACE=(CYL,(5,1),RLSE),UNIT=SYSDA,
//            DCB=(RECFM=VBS,BLKSIZE=23200),
//            DSN=ELKINSC.TEST.MQPUT1.OUTPUT
//OUTPUTQ2 DD DISP=(NEW,CATLG),
//            SPACE=(CYL,(5,1),RLSE),UNIT=SYSDA,
//            DCB=(RECFM=VBS,BLKSIZE=23200),
//            DSN=ELKINSC.TEST.MQPUT.OUTPUT
//SYSIN    DD *
 COPY QUEUE(ELKINSC.TEST.MQPUT1)   DDNAME(OUTPUTQ1)
 COPY QUEUE(ELKINSC.TEST.MQPUT)    DDNAME(OUTPUTQ2)
/*
//SYSPRINT DD  SYSOUT=*
```

```
//COPYQS   EXEC PGM=CSQUTIL,PARM='QML1'
//STEPLIB  DD DISP=SHR,DSN=MQ910.SCSQANLE
//         DD DISP=SHR,DSN=MQ910.SCSQAUTH
//         DD DISP=SHR,DSN=MQ910.SCSQLOAD
//INPUTQ1 DD DISP=(SHR,KEEP),
//           DSN=ELKINSC.TEST.MQPUT1.OUTPUT
//INPUTQ2 DD DISP=(SHR,KEEP),
//           DSN=ELKINSC.TEST.MQPUT.OUTPUT
//SYSIN    DD *
 LOAD QUEUE(ELKINSC.TEST.MQPUT1.COPIED) DDNAME(INPUTQ1)
 LOAD QUEUE(ELKINSC.TEST.MQPUT.COPIED)  DDNAME(INPUTQ2)
/*
//SYSPRINT DD  SYSOUT=*
```

CSQUTIL and the MAKE commands

- MAKE* Commands
  - Generally used in conjunction with a DISPLAY command to generate commands
  - MAKEDEF creates DEFINE commands for all displayed resources with the ‘NOREPLACE’ option
    - Often used for complete back-ups of objects defined to a queue manager
    - Can also be used for capturing subsets for migration between development, QA and production environments
    - Output may be used as part of the CSQINP2 concatenation at queue manager start-up
  - MAKEREP creates DEFINE commands for all displayed resources with the ‘REPLACE’ option
  - MAKEDEL create DELETE commands for all displayed resources
    - May be used to remove objects no longer in use, etc.
  - MAKEALT creates ALTER definitions from the input defined in the DATA keyword

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MAKEDEF and MAKEREP Examples

```
//MKDQS    EXEC PGM=CSQUTIL,PARM='QML1'
//STEPLIB  DD DISP=SHR,DSN=MQ91#.SCSQANLE
//         DD DISP=SHR,DSN=MQ91#.SCSQAUTH
//         DD DISP=SHR,DSN=MQ91#.SCSQLOAD
//MAKDEFO  DD  DISP=(SHR),
//            DSN=ELKINSC.TEST.MAKEDEF.OUT(ELKQUES)
//SYSIN    DD *
 COMMAND DDNAME(CMDINP) MAKEDEF(MAKDEFO)
/*
//CMDINP   DD *
  DISPLAY QUEUE(ELKINSC*) ALL QSGDISP(QMGR)
/*
//SYSPRINT DD  SYSOUT=*
```

```
//MKDQS    EXEC PGM=CSQUTIL,PARM='QML1'
//STEPLIB  DD DISP=SHR,DSN=MQ91#.SCSQANLE
//         DD DISP=SHR,DSN=MQ91#.SCSQAUTH
//         DD DISP=SHR,DSN=MQ91#.SCSQLOAD
//MAKREPO  DD  DISP=(SHR),
//            DSN=ELKINSC.TEST.MAKEDEF.OUT(MAKEREP)
//SYSIN    DD *
 COMMAND DDNAME(CMDINP) MAKEREP(MAKREPO)
/*
//CMDINP   DD *
  DISPLAY QUEUE(ELKINSC*) ALL QSGDISP(QMGR)
/*
//SYSPRINT DD  SYSOUT=*
```

MAKEDEF and MAKEREP - Output Sample

```
* COMMANDS GENERATED FOR QML1
DEFINE NOREPLACE
 QALIAS('ELKINSC.ALIAS')
 QSGDISP(QMGR)
 CLUSTER(' ')
 CLUSNL(' ')
 TARGTYPE(QUEUE)
 DESCR(' ')
 PUT(ENABLED)
 DEFPRTY(0)
 DEFPSIST(NO)
 GET(ENABLED)
 DEFREADA(NO)
 DEFPRESP(SYNC)
 TARGET('ELKINSC.PERSIST.QUEUE1')
 PROPCTL(COMPAT)
 DEFBIND(OPEN)
 CLWLRANK(0)
 CLWLPRTY(0)
 CUSTOM(' ')
```

```
000001 * COMMANDS GENERATED FOR QML1
000002 DEFINE REPLACE
000003  QALIAS('ELKINSC.ALIAS')
000004  QSGDISP(QMGR)
000005  CLUSTER(' ')
000006 DEFINE REPLACE
000007  QLOCAL('ELKINSC.PERSIST.QUEUE1')
000008  QSGDISP(QMGR)
000009  CFSTRUCT(' ')
000010  CLUSTER(' ')
000011 DEFINE REPLACE
000012  QLOCAL('ELKINSC.PERSIST.QUEUE2')
000013  QSGDISP(QMGR)
000014  CFSTRUCT(' ')
000015  CLUSTER(' ')
```

MAKEREP – hummm, That didn't look right

```
//MKDQS     EXEC PGM=CSQUTIL,PARM='QML1'
//STEPLIB   DD DISP=SHR,DSN=MQ91#.SCSQANLE
//          DD DISP=SHR,DSN=MQ91#.SCSQAUTH
//          DD DISP=SHR,DSN=MQ91#.SCSQLOAD
//MAKREPO   DD  DISP=(SHR),
//              DSN=ELKINSC.TEST.MAKEDEF.OUT(MAKEREP2)
//SYSIN     DD *
 COMMAND DDNAME(CMDINP) MAKEREP(MAKREPO) DATA(CMDREP)
/*
//CMDINP    DD *
  DISPLAY QUEUE(ELKINSC*) QSGDISP(QMGR)
/*
//CMDREP DD *
DESCR('THIS IS A TEST DESCRIPTION') +
GET(ENABLED)
/*
//SYSPRINT DD  SYSOUT=*
```

```
* COMMANDS GENERATED FOR QML1
DEFINE REPLACE
 QALIAS('ELKINSC.ALIAS')
 QSGDISP(QMGR)
DESCF('THIS IS A TEST DESCRIPTION') +
GET(ENABLED)
DEFINE REPLACE
 QLOCAL('ELKINSC.PERSIST.QUEUE1')
 QSGDISP(QMGR)
DESCF('THIS IS A TEST DESCRIPTION') +
GET(ENABLED)
DEFINE REPLACE
 QLOCAL('ELKINSC.PERSIST.QUEUE2')
 QSGDISP(QMGR)
DESCF('THIS IS A TEST DESCRIPTION') +
```

MAKEDEL Examples

```
//MKDQS    EXEC PGM=CSQUTIL,PARM='QML1'
//STEPLIB  DD DISP=SHR,DSN=MQ91#.SCSQANLE
//         DD DISP=SHR,DSN=MQ91#.SCSQAUTH
//         DD DISP=SHR,DSN=MQ91#.SCSQLOAD
//MAKDELO  DD  DISP=(SHR),
//             DSN=ELKINSC.TEST.MAKEDEF.OUT(MAKEDEL)
//SYSIN    DD *
 COMMAND DDNAME(CMDINP) MAKEDEL(MAKDELO)
/*
//CMDINP   DD *
  DISPLAY QLOCAL(ELKINSC*) QSGDISP(QMGR)
/*
//SYSPRINT DD  SYSOUT=*
```

```
* COMMANDS GENERATED FOR QML1
DELETE
 QLOCAL('ELKINSC.PERSIST.QUEUE1')
 QSGDISP(QMGR)
DELETE
 QLOCAL('ELKINSC.PERSIST.QUEUE2')
 QSGDISP(QMGR)
DELETE
 QLOCAL('ELKINSC.SUB.QUEUE')
 QSGDISP(QMGR)
DELETE
 QLOCAL('ELKINSC.TEST')
 QSGDISP(QMGR)
```

To use the commands you have created

- CSQUTIL allows you to input the commands created as shown

```
//*
//* THIS CSQUTIL USES THE MAKEREP OUTPUT AS INPUT TO UPDATE QUEUE DEFS
//*
//*
//RREPQS   EXEC PGM=CSQUTIL,PARM='QML1'
//STEPLIB  DD DISP=SHR,DSN=MQ91#.SCSQANLE
//         DD DISP=SHR,DSN=MQ91#.SCSQAUTH
//         DD DISP=SHR,DSN=MQ91#.SCSQLOAD
//MAKREPI  DD  DISP=(SHR),
//             DSN=ELKINSC.TEST.MAKEDEF.OUT(MAKEREP2)
//SYSIN    DD *
 COMMAND DDNAME(MAKREPI)
/*
//SYSPRINT DD  SYSOUT=*
```

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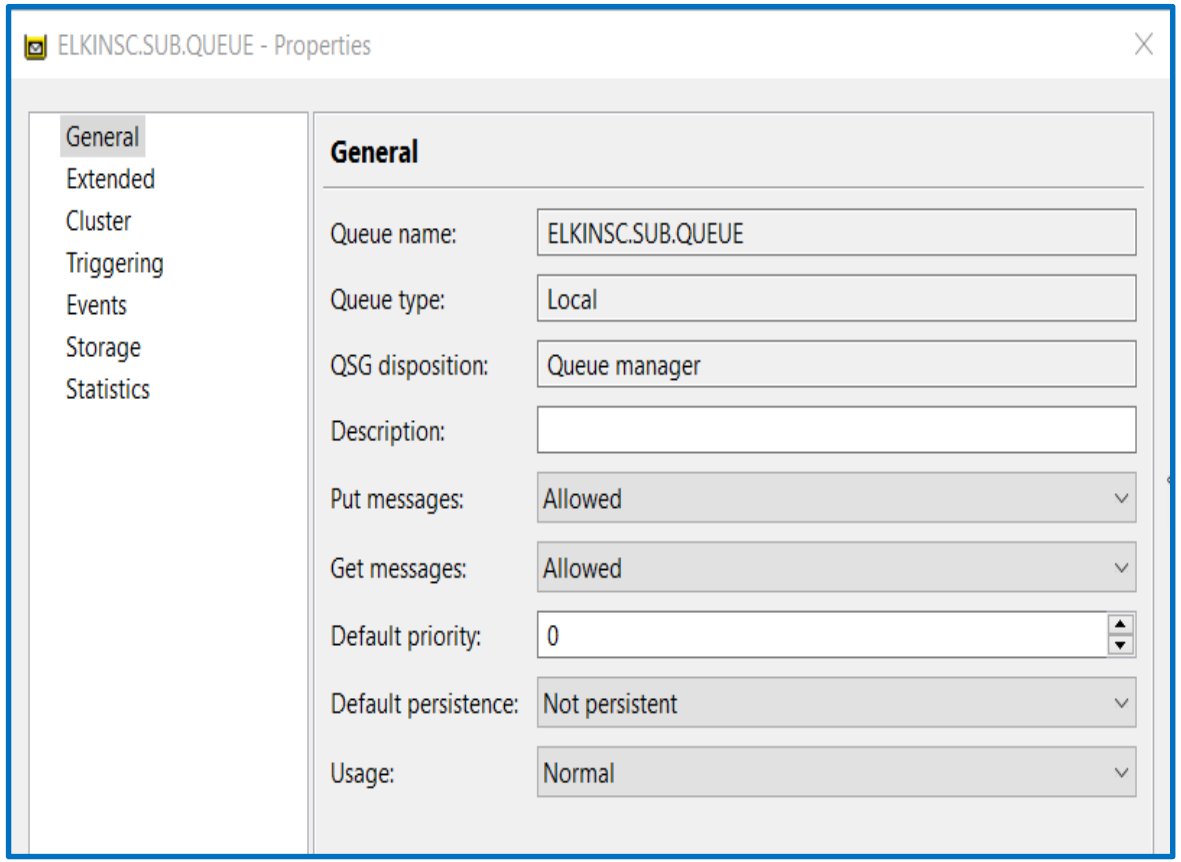
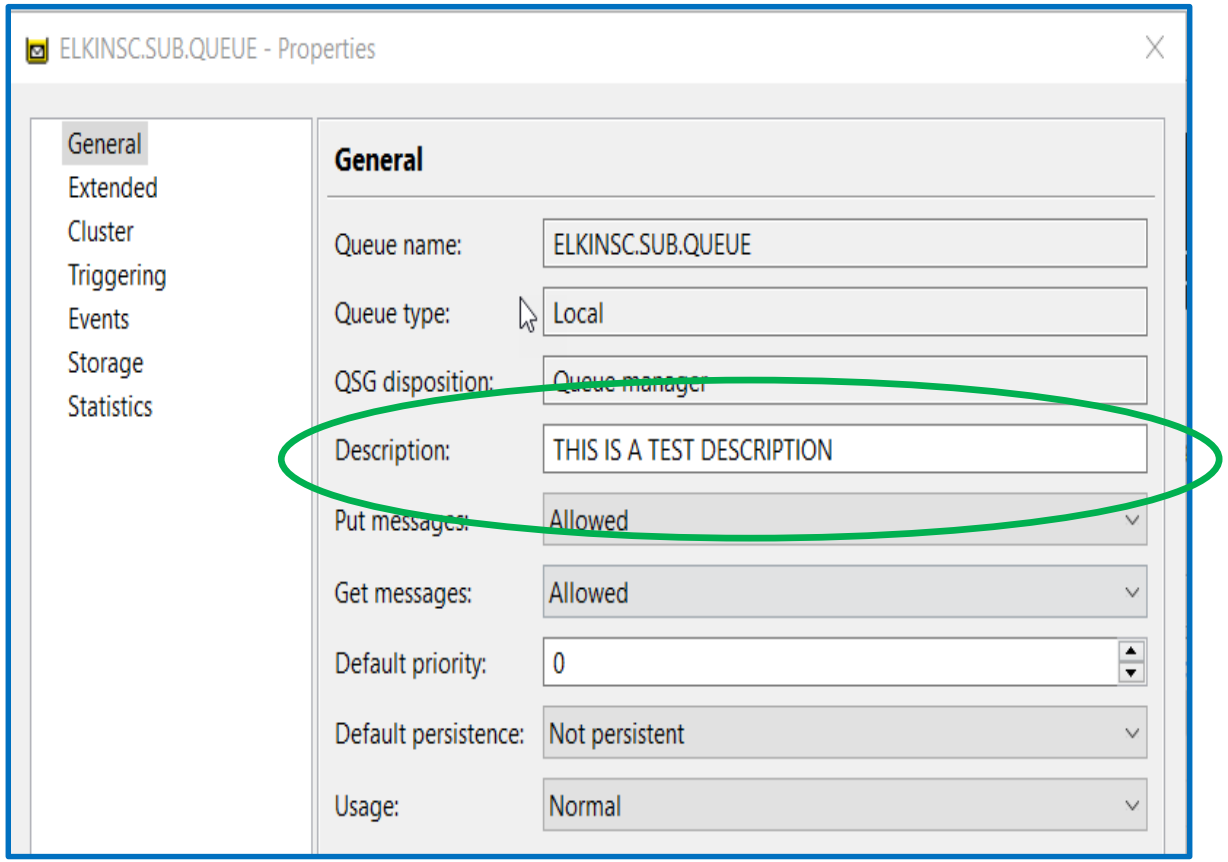
Before and After





CSQUTIL Gotchas!

- You get a ‘0’ return code
  - Even when no commands work

```
 CSQU000I CSQUTIL IBM MQ for z/OS V9.1.5
 CSQU001I CSQUTIL Queue Manager Utility - 2020-06-05 13:34:48
 COMMAND DDNAME(MAKREPI)
 CSQU127I  Executing COMMAND using input from MAKREPI data set
 CSQU120I  Connecting to QML1
 CSQU121I  Connected to queue manager QML1
 CSQU055I  Target queue manager is QML1
* COMMANDS GENERATED FOR QML1
DEFINE REPLACE                                                  -
 QALIAS('ELKINSC.ALIAS.TWO')                                    -
 QSGDISP(QMGR)                                                  -
DESCE('THIS IS A TEST DESCRIPTION') +
GET(ENABLED)
CSQN205I    COUNT=        3, RETURN=00000008, REASON=FFFFFFFF
CSQ9001E QML1 'DESCE' is invalid
CSQ9023E QML1 CSQ9SCND 'DEFINE QALIAS' ABNORMAL COMPLETION
 CSQU057I  1 commands read
 CSQU058I  1 commands issued and responses received, 1 failed
 CSQU143I  1 COMMAND statements attempted
 CSQU144I  1  statements executed successfully
 CSQU148I CSQUTIL Utility completed, return code=0
```

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Other information

- If the execution cannot connect to the queue manager or there are other critical errors (resource not found for example), then a bad return code is expected.

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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.

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