IBM MQ multi-instance queue manager setup in Linux

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+++ Objective +++

This documentation has the steps for setting up and verifying multi-instance queue manager in Linux. The setup is small to illustrate the concepts involved.

Servers used in the documentation:
NFS Server: sayyid1.fyre.ibm.com (9.46.77.180)
MQ Server1: whelk1.fyre.ibm.com (9.46.78.22)
MQ Server2: sketcher1.fyre.ibm.com (9.46.83.145)

(NOTE: Use your server IPs in the setup)

1. Multi-instance setup

Setting up the NFS server:

1) Login as 'root' user.

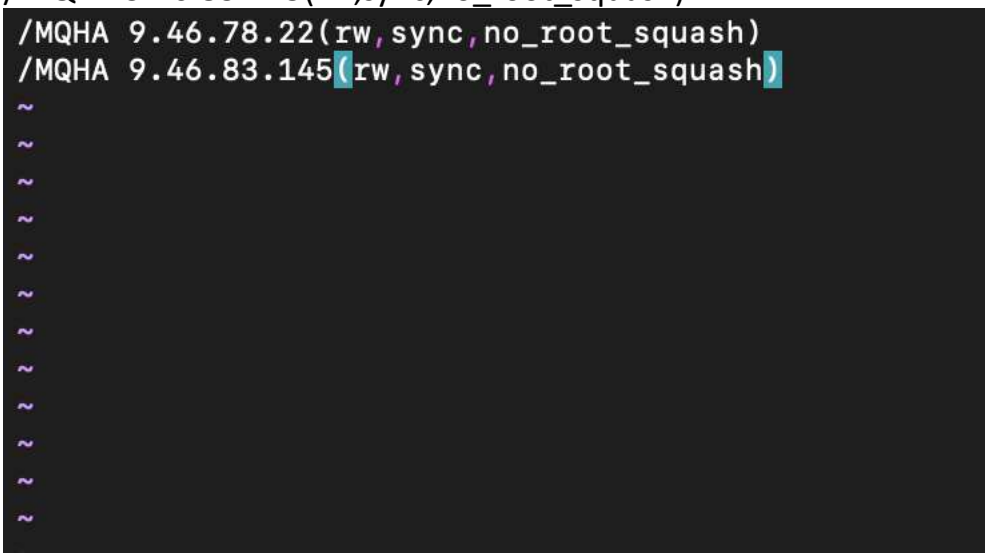
2) Install NFS:
2.1) Install the NFS utilities package: **yum install nfs-utils**
2.2) Enable and start the NFS service: **sudo systemctl enable --now nfs-server**

3) Verify if nfs-server service is up and running:
systemctl status nfs-server.service

4) create a directory on NFS Server as 'root' user:
mkdir -p /MQHA

5) Add entries for the mounts in /etc/exports file that are exported for both the MQ Servers:
vi /etc/exports

Paste the below content (Mention your MQ server IPs):
/MQHA 9.46.78.22(rw,sync,no_root_squash)
/MQHA 9.46.83.145(rw,sync,no_root_squash)



```
[[root@sayyid1 /]# cat /etc/exports
 /MQHA 9.46.78.22(rw,sync,no_root_squash)
 /MQHA 9.46.83.145(rw,sync,no_root_squash)
 [root@sayyid1 /]#
```

6) To export the directory as an NFS4 mount, execute the below command every time you update the /etc/exports files:

exportfs –av

```
[[root@sayyid1 /]# exportfs -av
 exporting 9.46.78.22:/MQHA
 exporting 9.46.83.145:/MQHA
 [root@sayyid1 /]#
```

(NOTE: Run every time you update the /etc/exports file)

Setting up the MQ server (run in both the MQ Server):

Install MQ in the other two Linux servers. These will be our MQ servers.

1) Login as 'root' user

2) Install IBM MQ

3) Install NFS:
3.1) Install the NFS utilities package: **yum install nfs-utils**
3.2) Enable and start the NFS service: **sudo systemctl enable --now nfs-server**

4) Verify nfs server service is up and running:
systemctl status nfs-server.service

5) Check the mount:
showmount -e 9.46.77.180

```
[root@sketcher1 MQServer]# showmount -e 9.46.77.180
Export list for 9.46.77.180:
/MQHA 9.46.83.145,9.46.78.22
```

6)
6.1) Create the directory: **mkdir -p /MQHA**

6.2) execute with root privilege: **mount -t nfs4 9.46.77.180:/MQHA /MQHA**

6.3) Command to verify that the mount is completed or not: $ **mount or showmount -e 9.46.77.180**

6.4) Verify that files are created successfully by creating a test file in all three servers (NFS server, MQ Server1, MQ Server2):
a) **cd /MQHA**
b) **touch <filename>**

6.5) Add the following line in the MQ Servers "/etc/fstab" for automatic mount of the shared directory /MQHA after restart:
9.46.77.180:/MQHA /MQHA nfs4 defaults 0 0

Run only on one MQ server:

NOTE: I am using MQ Server1 (whelk1)

1) Create log and data directories in a common folder, /MQHA, that is to be shared.

mkdir /MQHA/logs
mkdir /MQHA/qmgrs

Set access permissions to rwx for user and group and make mqm the directory owner:

chown -R mqm:mqm /MQHA
chmod -R ug+rwx /MQHA

2) Create the queue manager by entering the following command: **crtmqm -ld** /MQHA/logs **-md** /MQHA/qmgrs QM1

```
[mqm@whelk1 /]$ crtmqm -ld /MQHA/logs -md /MQHA/qmgrs QM1
IBM MQ queue manager 'QM1' created.
Directory '/MQHA/qmgrs/QM1' created.
The queue manager is associated with installation 'Installation1'.
Creating or replacing default objects for queue manager 'QM1'.
Default objects statistics : 83 created. 0 replaced. 0 failed.
Completing setup.
Setup completed.
```

3) Copy the queue manager configuration details from Server1:

dspmqinf -o command QM1

and copy the result to the clipboard: addmqinf -s QueueManager -v Name=QM1 -v Directory=QM1 -v Prefix=/var/mqm -v DataPath=/MQHA/qmgrs/QM1

Run only in MQ server2 (sketcher1):

NOTE: I used MQ Server1 earlier so in this step I will be pasting the configurations in Server2. You can do the same steps in opposite manner.

1) Add queue manager configuration data:

addmqinf -s QueueManager -v Name=QM1 -v Directory=QM1 -v Prefix=/var/mqm -v DataPath=/MQHA/qmgrs/QM1

2) Start the queue manager instances, with the **-x** parameter: **strmqm -x QM1**

Status in current MQ server (sketcher1):

```
QMNAME(QM2)                    STATUS(Running)
```

Status in other MQ server (whelk1):

```
QMNAME(QM1)                    STATUS(Running elsewhere)
```

Run only in MQ server1(whelk1):

Before the start of QM, its status should be "Running elsewhere"

Start the queue manager instances : **strmqm -x QM1**

```
[mqm@whelk1 root]$ strmqm -x QM1
IBM MQ queue manager 'QM1' starting.
The queue manager is associated with installation 'Installation1'.
Plain text communication is enabled.
A standby instance of queue manager 'QM1' has been started. The active instance
is running elsewhere.
```

After start of QM1, its status should be "Running as standby"

Run only in MQ server2 (sketcher1):

Here, the status of QM is "Running". And in the other MQ server, status is "Running as standby"

1)
Switchover to the other MQ server: **endmqm -is QM1**

QM1 is now running in Server1(whelk1).

Status in this MQ server (sketcher1):

```
QMNAME(QM1)                    STATUS(Running elsewhere)
```

Status in the other MQ server (whelk1):

```
QMNAME(QM1)                    STATUS(Running)
```

2) Start the queue manager instances: **strmqm -x QM1**

This will start the queue manager as a standby on this server.

Status in this MQ server (sketcher1):

```
QMNAME(QM1)                    STATUS(Running as standby)
```

Status in another MQ server (whelk1):

```
QMNAME(QM1)                    STATUS(Running)
```

2. Verifying failover using IBM MQ Explorer

Run only on one MQ server:

NOTE: I am using MQ Server1 (whelk1)

1) Create the queue manager by entering the following command:
crtmqm -ld /MQHA/logs -md /MQHA/qmgrs QM3

```
[[mqm@whelk1 /]$ dspmq
QMNAME(QM1)                                               STATUS(Running)
QMNAME(QM2)                                               STATUS(Running)
QMNAME(QM3)                                               STATUS(Ended immediately)
[mqm@whelk1 /]$
```

2) Copy the queue manager configuration details from Server1:
dspmqinf -o command QM3
and copy the result to the clipboard: addmqinf -s QueueManager -v Name=QM3 -v Directory=QM3 -v Prefix=/var/mqm -v DataPath=/MQHA/qmgrs/QM3

Run only in MQ server2 (sketcher1):

1) Add queue manager configuration data:
addmqinf –s QueueManager -v Name=QM3 -v Directory=QM3 -v Prefix=/var/mqm -v DataPath=/MQHA/qmgrs/QM3

```
[[mqm@sketcher1 /]$ dspmq
QMNAME(QM1)                                               STATUS(Running as standby)
QMNAME(QM2)                                               STATUS(Running as standby)
QMNAME(QM3)                                               STATUS(Ended immediately)
[mqm@sketcher1 /]$
```

2) Start the queue manager instances, with the **-x** parameter: **strmqm -x QM3**

```
[mqm@sketcher1 /]$ dspmq
QMNAME(QM1)                                               STATUS(Running as standby)
QMNAME(QM2)                                               STATUS(Running as standby)
QMNAME(QM3)                                               STATUS(Running)
[mqm@sketcher1 /]$
```

```
[mqm@whelk1 /]$ dspmq
QMNAME(QM1)                                               STATUS(Running)
QMNAME(QM2)                                               STATUS(Running)
QMNAME(QM3)                                               STATUS(Running elsewhere)
[mqm@whelk1 /]$
```

Run only in MQ server1(whelk1):

Start the queue manager instance: **strmqm -x QM3**

```
[mqm@whelk1 /]$ dspmq
QMNAME(QM1)                                               STATUS(Running)
QMNAME(QM2)                                               STATUS(Running)
QMNAME(QM3)                                               STATUS(Running as standby)
[mqm@whelk1 /]$
```

Run only in MQ server2 (sketcher1):

Create local queues, channels, listener and alter authinfo.

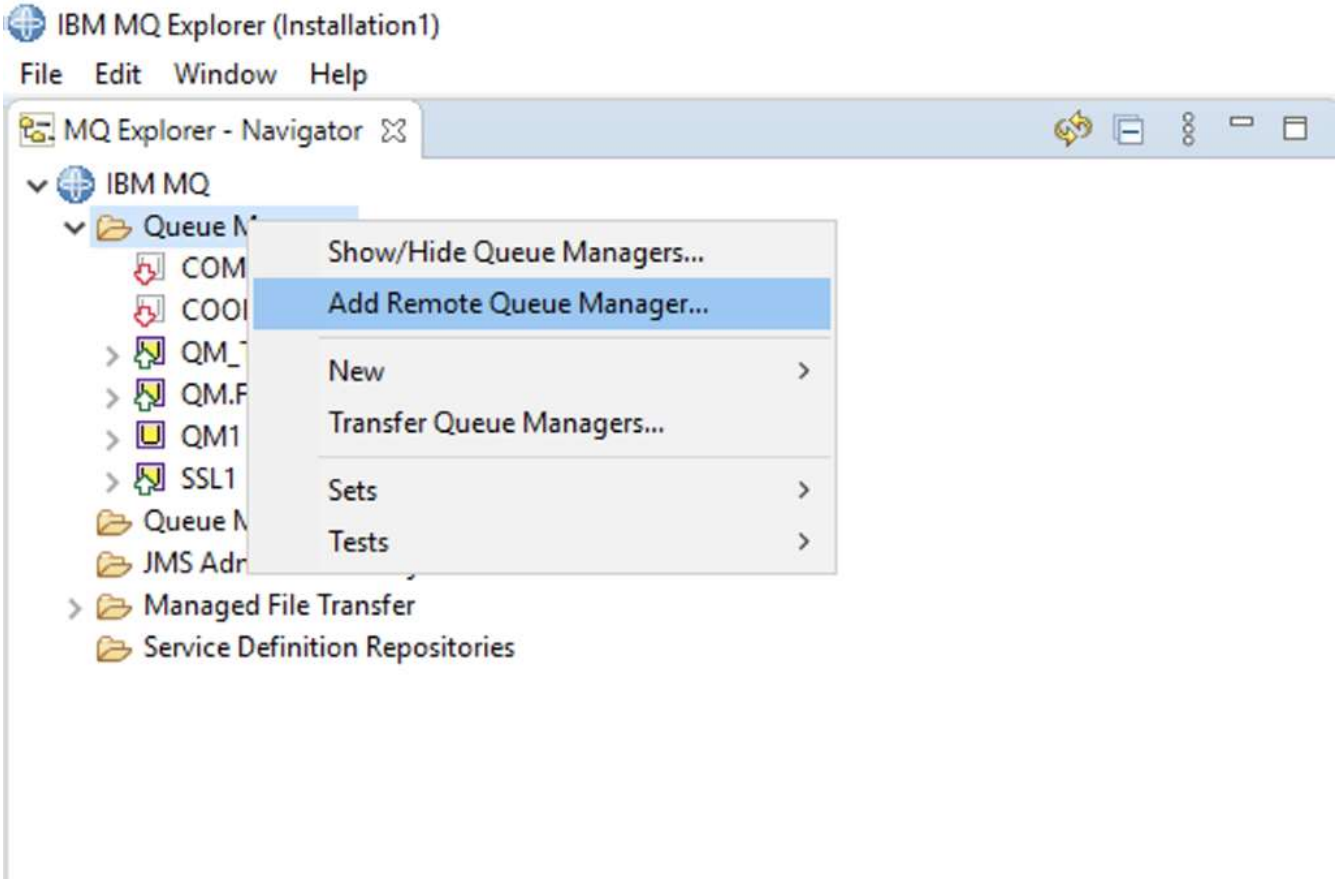
runmqsc QM3

DEFINE QLOCAL(SOURCE) REPLACE
DEFINE QLOCAL(TARGET) REPLACE
DEFINE CHANNEL(CHANNEL1) CHLTYPE(SVRCONN) TRPTYPE(TCP) MCAUSER('mqm') REPLACE
DEFINE CHANNEL(CHANNEL1) CHLTYPE(CLNTCONN) TRPTYPE(TCP) CONNAME('9.46.78.22 (1414), 9.46.83.145(1414)') QMNAME(QM3) REPLACE
START CHANNEL(CHANNEL1)

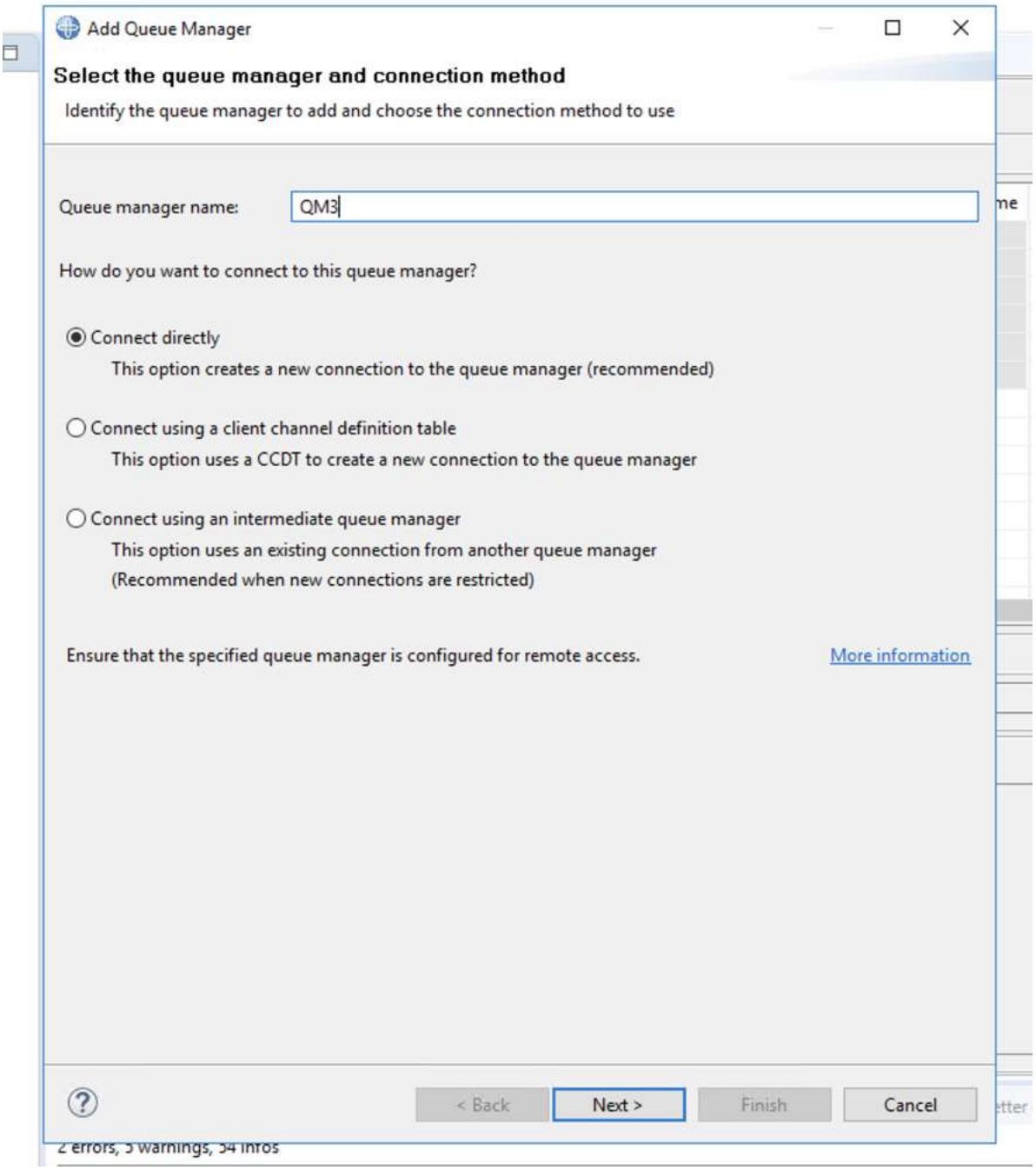
DEFINE LISTENER(LISTENER.TCP) TRPTYPE(TCP) CONTROL(QMGR)
DISPLAY LISTENER(LISTENER.TCP) CONTROL
START LISTENER(LISTENER.TCP)
DISPLAY LSSTATUS(LISTENER.TCP) STATUS
alter authinfo(SYSTEM.DEFAULT.AUTHINFO.IDPWOS) AUTHTYPE(IDPWOS)
CHCKCLNT(OPTIONAL)
SET CHLAUTH('CHANNEL1') TYPE (BLOCKUSER) USERLIST(NOBODY)
refresh security(*)

Add QM3 on MQExplorer

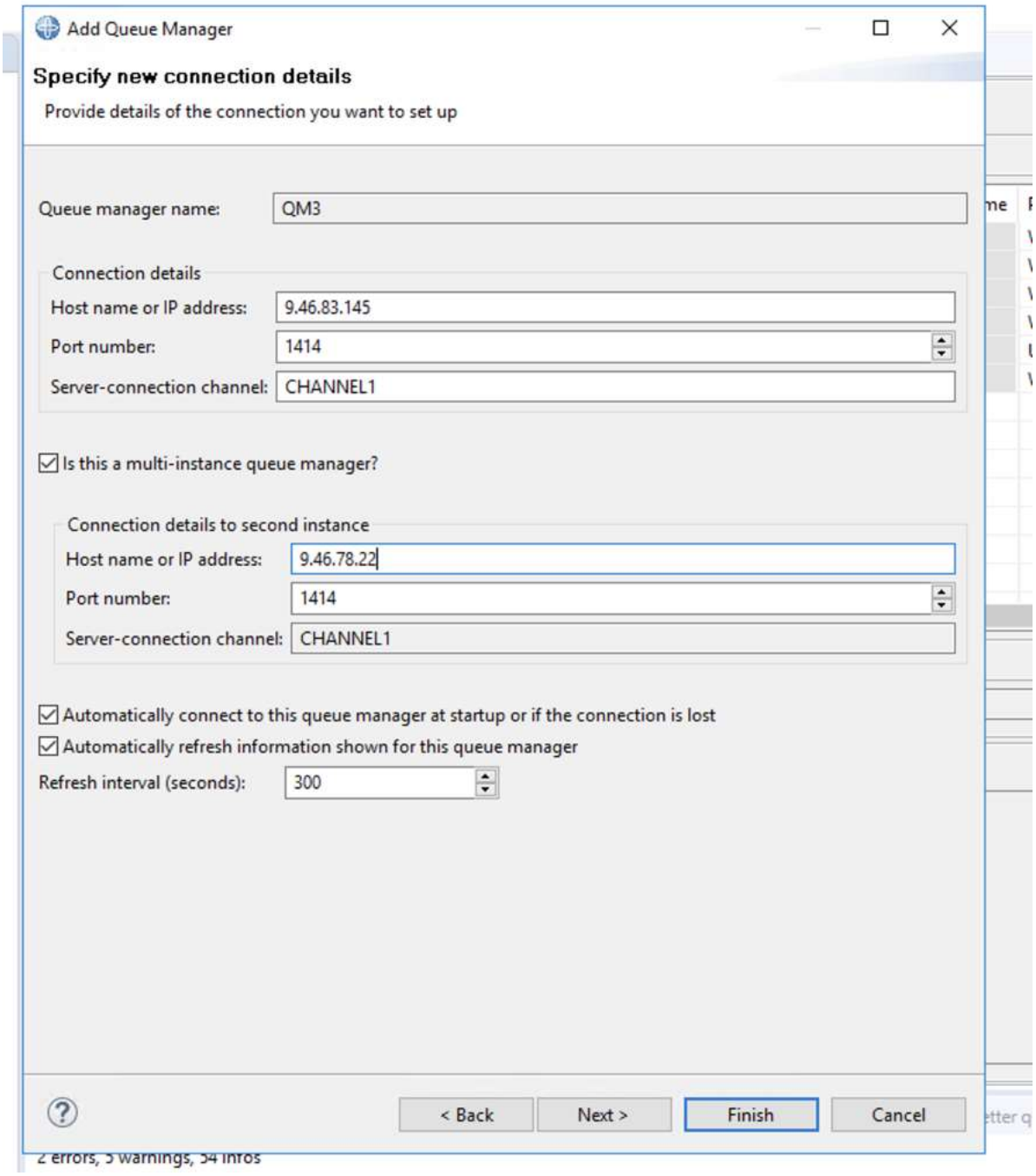
1) Select 'Add Remote Queue Manager'



2) Mention queue manager name

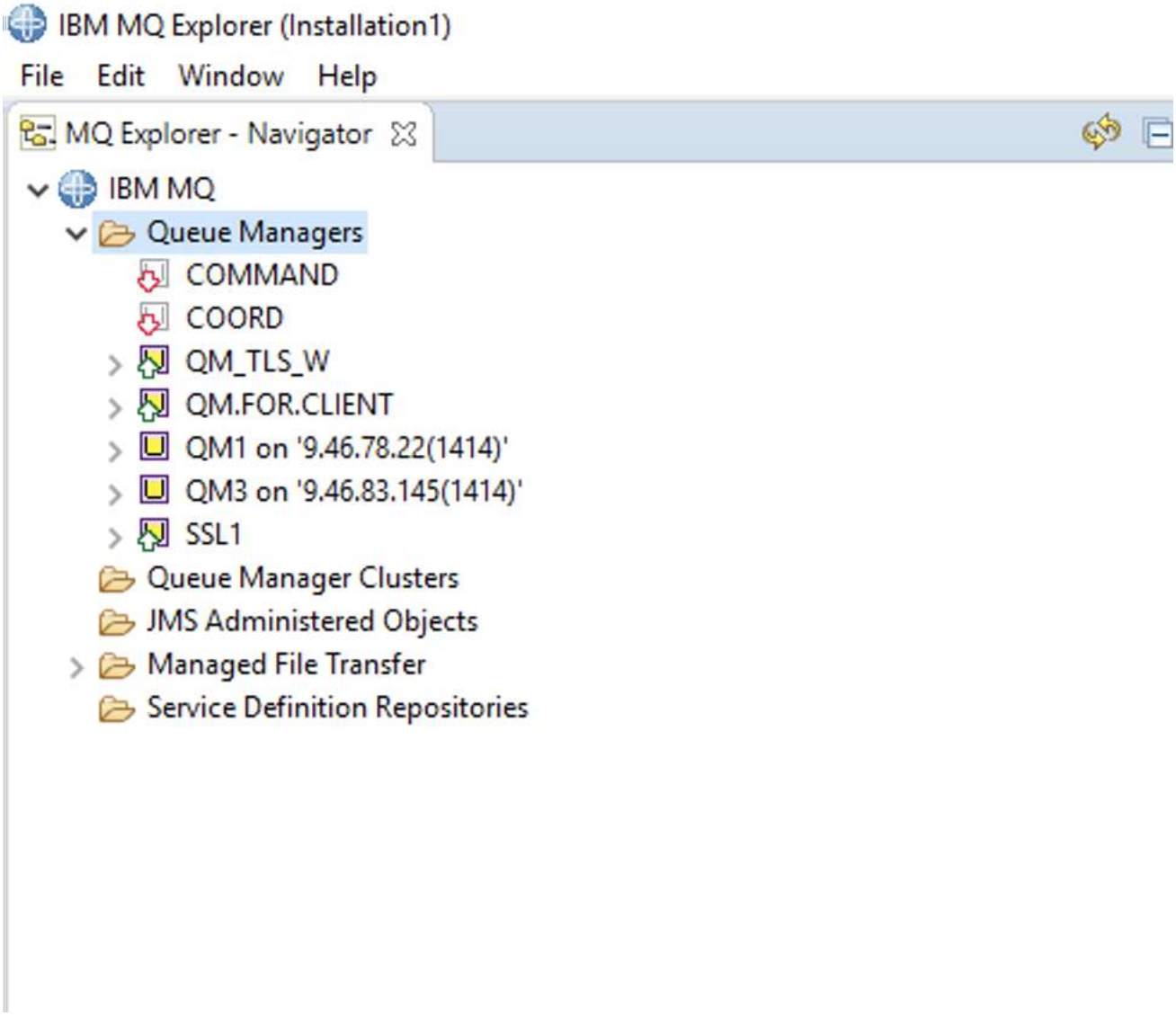


3) Mention the running instance IP first. Select check box "Is this a multi-instance queue manager" then mention IP of standby instance. Fill 'Port number' and 'server-connection channel' field.



4) Click next...next...next...finish

5) QM3 added successfully



Run only in MQ server2 (sketcher1):

Here, the status of QM is "Running". And in the other MQ server, status is "Running as standby"

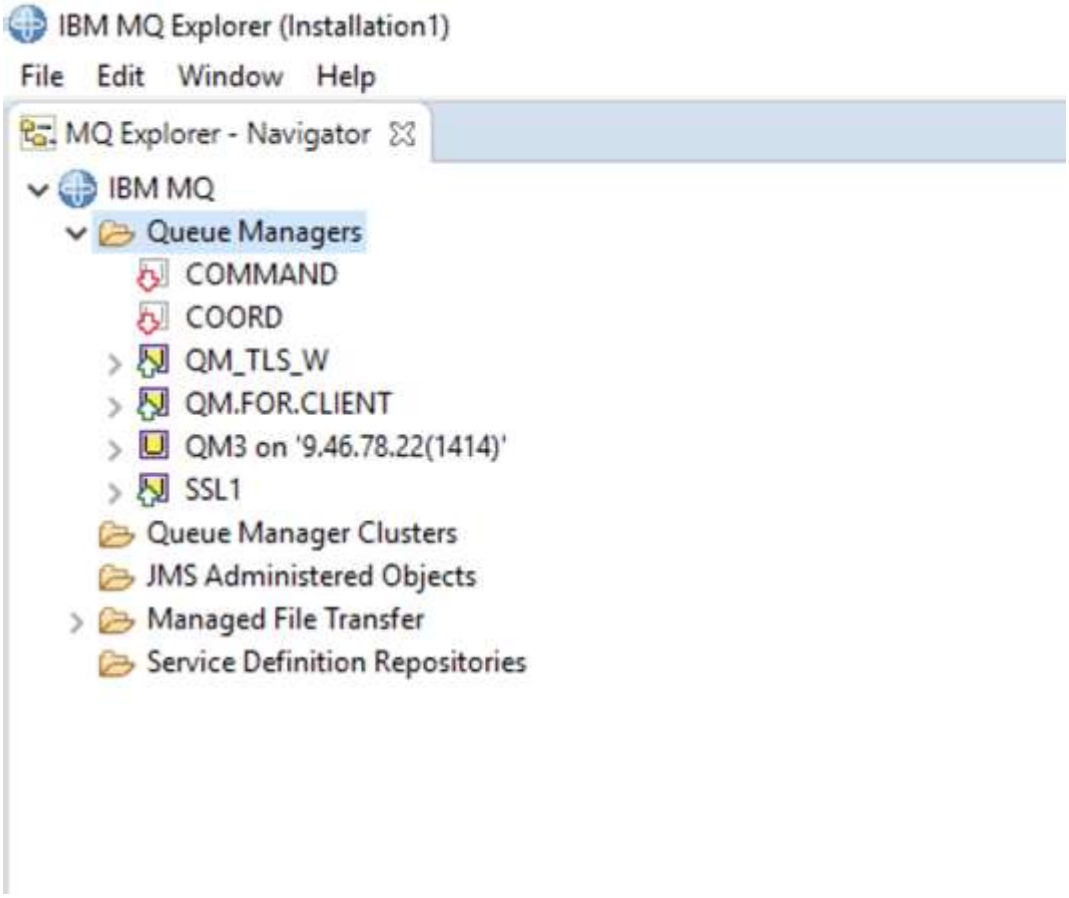
1)
Switchover to the other MQ server: **endmqm -is QM3**

```
[[mqm@sketcher1 /]$  endmqm -s QM3
Quiesce request accepted. The queue manager will stop when all outstanding work
is complete, permitting switchover to a standby instance.
[[mqm@sketcher1 /]$
[[mqm@sketcher1 /]$ dspmq
QMNAME(QM1)                                               STATUS(Running as standby)
QMNAME(QM2)                                               STATUS(Running as standby)
QMNAME(QM3)                                               STATUS(Running elsewhere)
[mqm@sketcher1 /]$
```

QM3 is now running in Server1(whelk1).

```
[[mqm@whelk1 /]$ dspmq
QMNAME(QM1)                                               STATUS(Running)
QMNAME(QM2)                                               STATUS(Running)
QMNAME(QM3)                                               STATUS(Running)
[mqm@whelk1 /]$
```

Status in MQ Explorer:
The IP address is switched to a server having running instance.



2) Start the queue manager instance: **strmqm -x QM3**
This will start the queue manager as a standby on this MQ server.

```
[[mqm@sketcher1 /]$ strmqm -x QM3
 IBM MQ queue manager 'QM3' starting.
 The queue manager is associated with installation 'Installation1'.
 Plain text communication is enabled.
 A standby instance of queue manager 'QM3' has been started. The active instance
 is running elsewhere.
[[mqm@sketcher1 /]$
[[mqm@sketcher1 /]$ dspmq
 QMNAME(QM1)                                               STATUS(Running as standby)
 QMNAME(QM2)                                               STATUS(Running as standby)
 QMNAME(QM3)                                               STATUS(Running as standby)
[[mqm@sketcher1 /]$
```


[[mqm@whelk1 /]$ dspmq
QMNAME(QM1) STATUS(Running)
QMNAME(QM2) STATUS(Running)
QMNAME(QM3) STATUS(Running)
[mqm@whelk1 /]$

3. Verifying failover using the sample programs

1) Copy AMQCLCHL.TAB file from MQ HA server to client server. Use FileZilla or other software to transfer file from one server to other.

2) Open three sessions/terminal for the same client server.

3) Set below environmental variables in each:

```
export MQCHLLIB=/var/mqm/mq_server_details_for_client_connection/whelk1_sketcher1_HA_server/QM3
export MQCHLTAB=AMQCLCHL.TAB
unset MQSERVER
cd /opt/mqm/samp/bin
```

4) Check the status of queue manager in both the MQ servers

4.1) In active server:

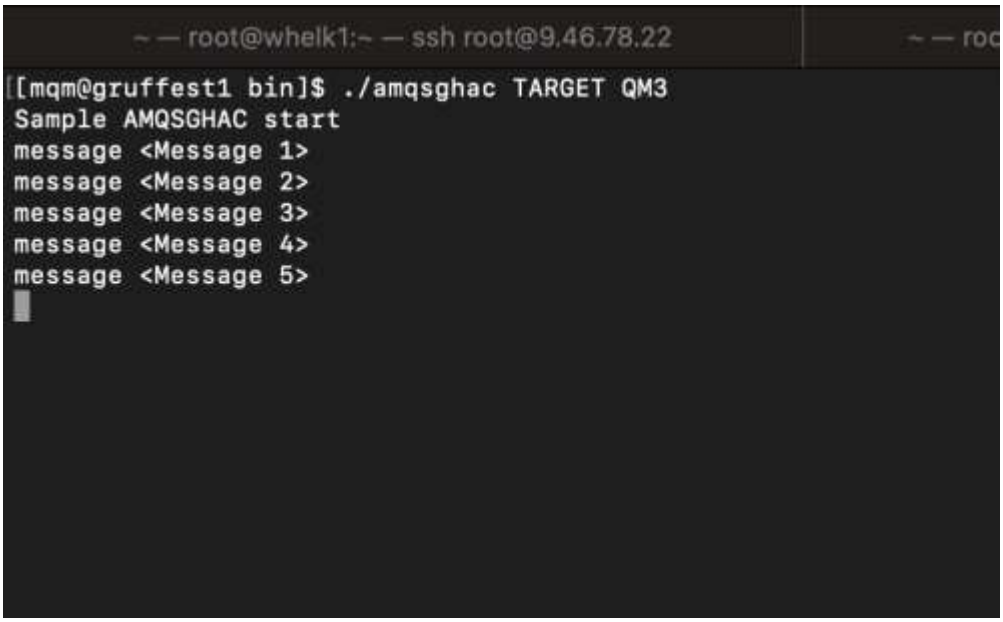
```
[root@whelk1 ~]# dspmq
QMNAME(QM3)                    STATUS(Running)
```

4.2) In standby server:

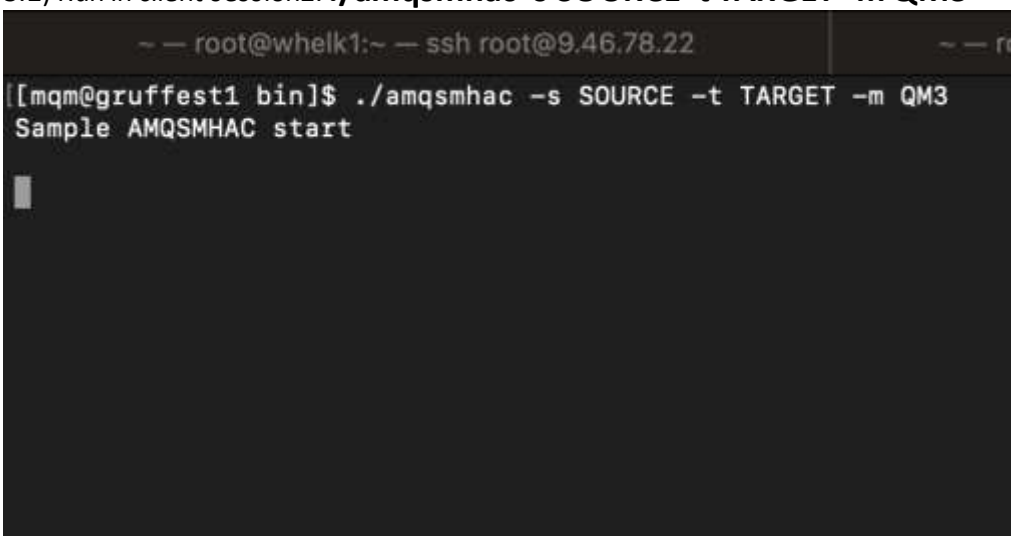
```
[root@sketcher1 ~]# dspmq
QMNAME(QM3)                    STATUS(Running as standby)
```

5)

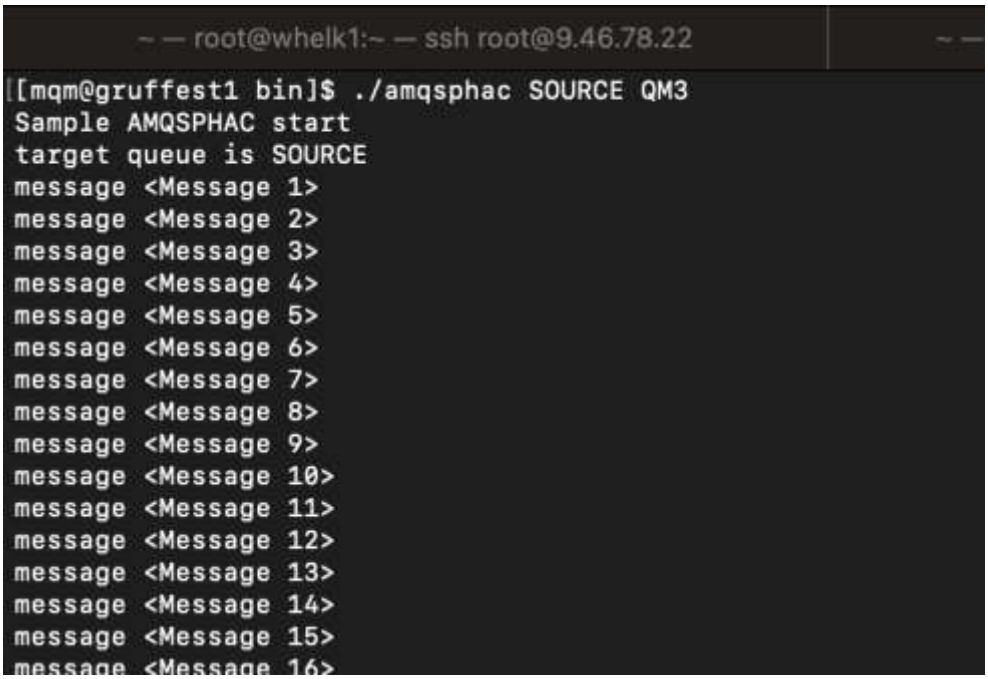
5.1) Run in client session1: **./amqsghac TARGET QM3**



5.2) Run in client session2: **./amqsmhac -s SOURCE -t TARGET -m QM3**



5.3) Run in client session3: **./amqsphac SOURCE QM3**



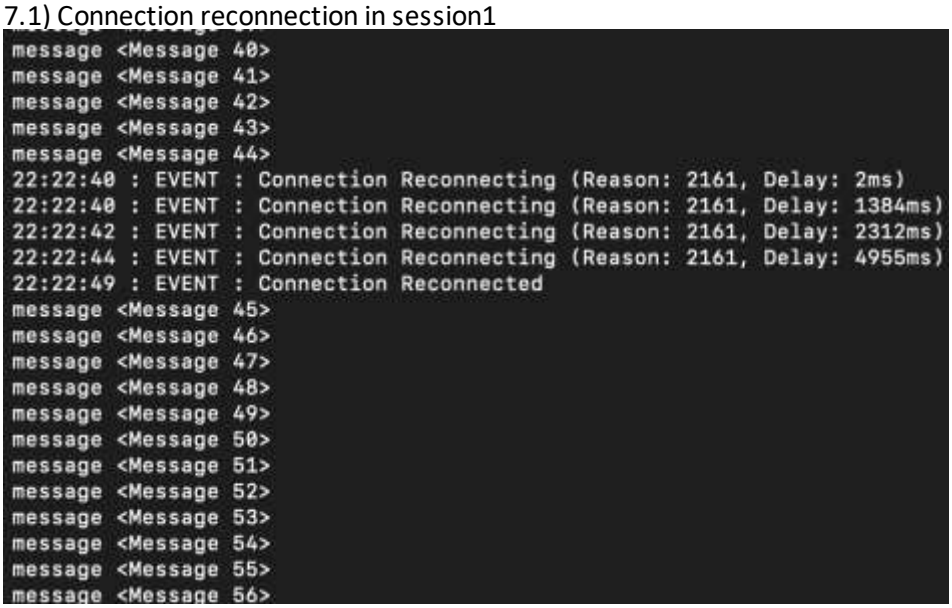
6) In active MQ instance, ran this command for switchover to another MQ server
endmqm -is QM3

[mqm@whelk1 root]$ endmqm -is QM3
Quiesce request accepted. The queue manager will stop when all outstanding work
is complete, permitting switchover to a standby instance.

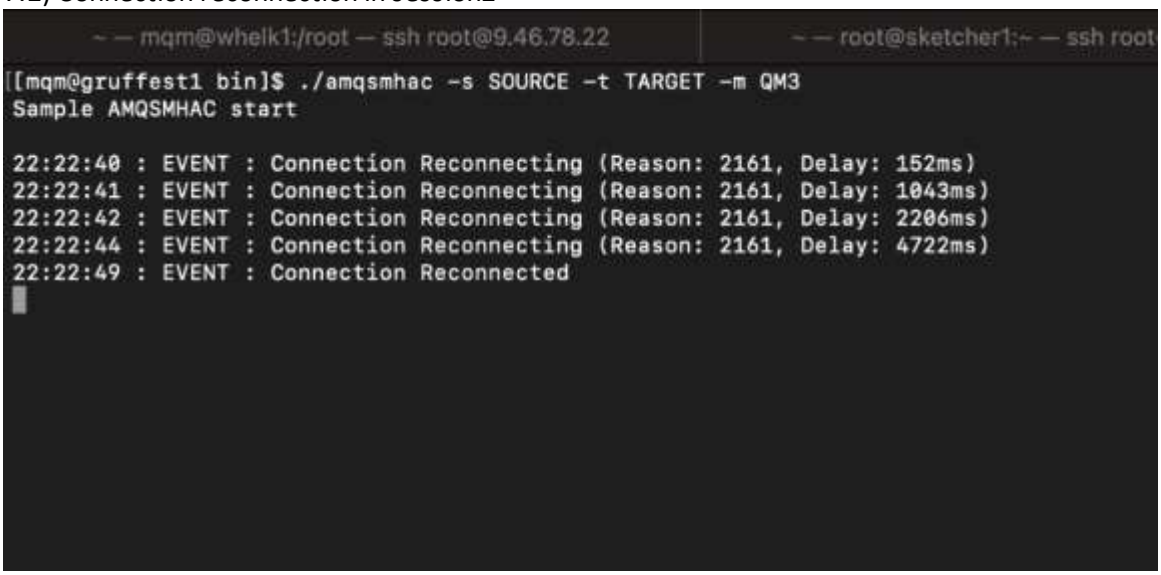
The queue manager instance running on another MQ server.

7)

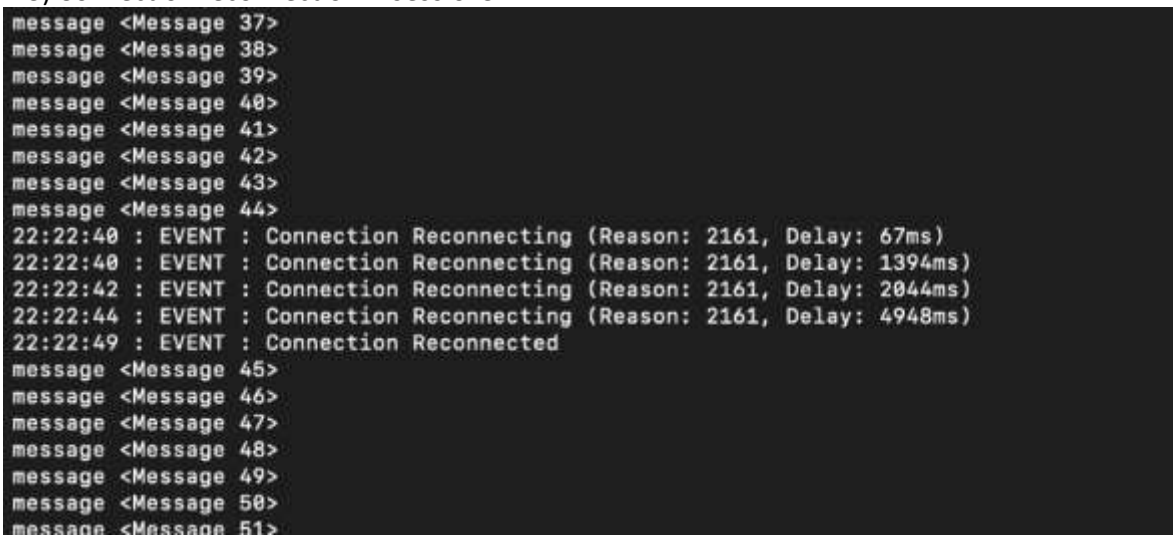
7.1) Connection reconnection in session1



7.2) Connection reconnection in session2



7.3) Connection reconnection in session3



Client successfully switched from one MQ sever to another. No messages were lost after switchover. Connection reestablished after message sequence 44 and again consumed from 45, means no loss of messages.

+++ end +++