IBM Advanced Technical Skills (ATS)

**WebSphere MQ V7 and WebSphere Message Broker V7
Linux on System z Installation Experiences**

Version V1.0

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Document Overview

The objective of this document is to share our experiences installing WebSphere MQ Series (WMQ) and WebSphere Message Broker (WMB) under Linux for System z. Included throughout this document are technical hints and tips that we hope will be useful while working with these and other products on this platform.

This document was written so it could be used a guide for you to use to install WMQ and WMB on other Linux on System z images. There may be other ways to accomplish a particular task described in this document and where other options exist they are presented for your consideration.

Please note that Tech Tips (yellow boxes) are included throughout this document to provide suggestions regarding Linux, background information or other information which may be useful.

WMQ and WMB Installation Overview

This is a step by step guide for installing WebSphere MQ (WMQ) V7 and WebSphere Message Broker (WMB) V7 on Linux on System z. The intent is to provide a step-by-step how-to-guide for those who are new to WMQ and WMB and need to understand everything from what tools are needed, what products must be installed, how to install the products, and how to verify the installation.

The Linux system used to develop this document is a guest under z/VM and has *SUSE Linux Enterprise Server version 10 SP3 (64-bit) for s390x* installed. The procedure outlined in this document should be similar to when installing Message Broker under Linux for System z running under RedHat Linux.

WMB V7.0 is a 64-bit only product and therefore requires a 64-bit version of WMQ.

Sources of Additional WMQ and WMB Installation Information

Refer to the product documentation and other resources for details about hardware, memory and storage requirements.

o To view the WMQ V7 InfoCenter go to URL:
   http://publib.boulder.ibm.com/infocenter/wmqv7/v7r0/index.jsp

o To view the WMB V7 InfoCenter go to URL:
   http://publib.boulder.ibm.com/infocenter/wmbhelp/v7r0m0/index.jsp

o To view a complete list of system requirements for WebSphere Message MQ V7.0 on Linux for System z go to URL:
   http://www-01.ibm.com/support/docview.wss?uid=swg27011925

o To view a complete list of system requirements for WebSphere Message Broker V7.0 on Linux for System z go to URL:
   http://www-01.ibm.com/support/docview.wss?rs=849&uid=swg27017130&wv=1

Preparing the Linux image

Remote Access to Linux images

Most (if not all) Linux on System z images will not have local access so remote access will have to be used to install these products. Also Linux on System z images do not have a Desktop so there is no default XWindows (GUI) interface which can be used to install products. So this document will describe how to install WMQ and WMB using only a command line interface.

- The installation files for WMQ and WMB will usually have to be moved from one a remote system to a Linux on System z image filesystem using a FTP client. Verify that a FTP server is listening on port 21 or a SSH (Secure Shell) FTP server is listening on port 22.

   Note: Standard FTP clients connect to port 21. If FTP is disabled on port 21 or if the FTP service is not active for security reasons you may have to use a SSH client like **psftp** (see the PuTTY URL below) and use SSH to connect to port 22 to transfer files to and from Linux on System z. In this case verify the SSH service is active and listening on port 22.

> **Tech-Tip:** Use command *netstat –an | grep :21* to determine if a standard FTP client can be used. If the output from the above command includes a line like the one below then use a standard FTP client..
>
> **tcp   0   0 0.0.0.0:21   0.0.0.0:*   LISTEN**
>
> If port 21 is not being listened on the use command *netstat –an | grep :22* to determine if an SSH FTP client can be used. If the output from the above command includes a line like the one below then use an SSH FTP client.
> **tcp   0   0 :::22   :::*   LISTEN**

- Obtain a telnet or SSH client that will allow terminal access to Linux on System z.

   o This can be used for most of the installation process as most of the required products can be installed in a terminal session using a command line interface.

   o In this document, PuTTY was used for the client console access. The PuTTY executables (**putty** and FTP client **psftp**) can be downloaded from: http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

- *(Optional)* Configure use of VNC (Virtual Network Computing) Server and VNC Client.
  - o Examples of a VNC Server/Client: RealVNC, TightVNC, UltraVNC

> **Tech-Tip:** To access information about using *VNC Server* go to URL
> http://www.walkernews.net/2007/07/05/how-to-setup-linux-vnc-server/
>
> To obtain VNC client code for Windows go to URL
> http://www.realvnc.com/products/free/4.1/index.html
>
> We were able to start a VNC Server instance on our system using the commands below:
>
> *vncpasswd*   Used to set a VNC login password
> *vncserver :2 -rfbport 5902*   Used to start a VNC server listener on port 5902
> *vncserver -kill :2*   Used to stop the VNC server

  - o In lieu of a VNC client/server, you can use any xWindows client such as Hummingbird to access the remote Linux on System z desktop to open terminal sessions, etc.

Linux Command Quick Summary

The tables below provide a summary of what I consider to be useful Linux command. Most of these commands will be used in this document.

General Linux Commands:

Command	Description
df	Displays mounted file systems
echo $PATH	Displays value of environment variable PATH
exit	Exit the UNIX shell (or exit Super User State)
export PATH=$PATH:/u	Export environment variable PATH
gzip –d filename.gz	Unzip (decompress) a zipped file (the .gz extension does not have to be explicitly specified)
man *cmd*	Display "help" for command *cmd*
printenv	List all environment variables
set –o vi	In a telnet sessions enables vi editor handle command mode (i.e., use Esc j/k to traverse up/down command stack)
su	Switch to privileges of a superuser
su - *userid*	Switch to privileges and environment of userid
su *userid*	Switch to privileges of another userid
tar –xvfz filename.tar	Untar(-x) and unzip(-z) an archived file
id	Display current userid

General Commands for Managing Directories and Files

Command	Description
cat *filename*	List the contents of the file
cd *directory*	Change location to directory
chmod 755 *resource*	Change permissions bits (represented by 3 octal numbers) of a resource (file or directory). The first octal value specifies the access of the owner, the second octal value specifies the group access and the third octal value specifies the access of others (not the owner or a member of the owning group). The octal values are 4 for read access, 2 for write access and 1 for execute access. The sum (i.e. 5 equals read (4) plus execute (1)) determines the permission allowed. For example 755 indicates that the owner has read, write and execute access, the member of the owning group and other also read and execute access.
chmod g+w *resource*	Give write access to the group (g)
chmod o+r *resource*	Give read access to others (o)
chmod o-x *resource*	Remove execute access from non-group members
chown userid:group *resource*	Change ownership of a resource (file or directory). For recursion in a subdirectory, add the -R option.
cp *filename tofilename*	Copy a file, specify from/to
find . –name *xy**	List all files starting with character xy* in this directory or any lower level directories
ls -al	List contents of the current directory
mkdir -p *directory*	Create directories
mv *filename tofilename*	Move a file, specify from/to (rename a file)
pwd	Display current directory path
rm *filename*	Remove (delete) file filename
rmdir -r *dirname*	Remove (delete) a directory dirname

FTP Sub Commands:

Command	Description
open hostname	Connect to remote host
bin <or> ascii	Set Binary or ASCII/EBCDIC mode
lcd local-dir	Change local directory
cd remote-dir	Change remote directory
pwd	Display present working directory
prompt on/off	Sets prompting mode on/off (toggle)
get filename	Get a remote filename from the remote host
mget filename*	Get multiple files
put filename	Put file onto remote host
mput filename	Put multiple files
quit	Exit FTP

Useful Hidden Files in a User's Home Directory:

File Name	Description
.profile	Used to pre configure terminal session (i.e. export PS1='$LOGNAME':'$PWD':' > '
.exrc	Used to configure defaults for vi editor (i.e. set nu on)
.kshrc	Used to configure a Korn Shell runtime environment (i.e. set –o vi)
.bashrc	Used to configure a BASH runtime environment (i.e. set –o vi)

Useful software package management commands:

Command	Description
rpm –ivh MQSeriesSDK.rpm	Install package MQSeriesSDK
rpm –e MQSeriesSDK.rpm	Remove package MQSeries
rpm –qa | grep MQSeries	List all of the installed packages but only display the packages where the string MQSeries appears in the name of the package

Useful Environment Variables:

Variable	Description
DISPLAY	XWindows display (i.e. export DISPLAY=192.37.216.50:0)
ENV	Environment configuration file (i.e. export ENV=$HOME/.kshrc)
HOME	Default home directory for current user (set in OMVS segment)
LIBPATH	List of directory list used to load dynamically loaded executables
LOGNAME	Current userid
PATH	List of directories used to search for executables
PS1	Command prompt string
PWD	Current directory location

Environment Setup

Before starting the installation of WMQ and WMB some environment setup should be performed in order to simplify the installation and subsequent use of these products.

1. Create three hidden files in your user's home directory. The first should be *.profile* which can be used to set environment variables. In *.profile* file export the **PATH** environment variable adding the directory which will contain the WMQ executables and the **PS1** environment variable which will set the command prompt string to the current host name and current directory. Also add a test for the existence of the WMB profile script. If the test indicates the file exists (i.e. WMB is installed) then this script will be executed to set the environment variables required access WMB.

```
export PATH=$PATH:/opt/mqm/bin
export PS1=$(hostname)":"'$PWD> '
test -s /opt/ibm/mqsi/7.0/bin/mqsiprofile && . /opt/ibm/mqsi/7.0/bin/mqsiprofile
```

> **Tech-Tip:** Hidden Linux files begin with a period (.). They are hidden since a normal **ls** command will not display these files. They are displayed when –al parameter is included with the **ls** command. Also if you are not comfortable with the the vi editor you can always create these files on another system and FTP them to the Linux image.

The second file should be *.bashrc* or *.kashrc* which can be used to customize the *Bash* shell environment. (If we were in a *Korn* shell environment we would have created a .kshrc file instead). This command turns on **vi** editing of the command line in the shell environment. This will allow us to use the *Esc-K* key sequence to retrieve previously entered commands. (Once the *Esc* key is pressed the *J* and *K* keys can be used to scroll forward and backward through the command history and other vi commands can be used to modify a previously entered command).

```
set -o vi
```

> **Tech-Tip:** The shell's environment can be determined by displaying the **SHELL** environment variable. If **SHELL** is set to */bin/bash* then the Bash shell is active. Use the *echo $SHELL* command to display this variable. If **SHELL** is set to */bin/sh* then the Korn shell is active.

The third file should be *.exrc* which will be used to customize the *vi editor* environment. These settings enables the displaying of whether or not the editor is in insert mode, enabling the display of line numbers, redrawing of the screen after changes and the setting of the line wrap margin to 4 characters.

```
set showmode
set nu
set redraw
set wrapmargin=4
```

2. Next locate a filesystem with sufficient space to hold the original and expanded product packages, fixes, etc. and create an installation working directory (e.g. install) in this filesystem. *For example our root filesystem had sufficient space, so new directory structure (/install) was created in the root filesystem for this purpose. Please note that examples used in the remainder of this document assume space was available in the root filesystem.* Use the **mkdir** command to create directory **install** and in your filesystem and create two subdirectories **wmq** and **wmb**. In each of these subdirectories use the **mkdir** command to create **fixes** subdirectories.

```
mqlnx1:/home/mitchj> mkdir /install
mqlnx1:/home/mitchj> mkdir /install/wmq
mqlnx1:/home/mitchj> mkdir /install/wmb
mqlnx1:/home/mitchj> mkdir /install/wmq/fixes
mqlnx1:/home/mitchj> mkdir /install/wmb/fixes
```

> **Tech-Tip:** In examples like the one above, the color is red is used to identify commands, responses, etc. which need to be entered. This convention is used for the remainder of this document. Be aware that sometimes responses to prompts may not be obvious.

3. Use FTP to move the WMQ base installation package *WebSphere MQ V7.0.1.3 for Linux on System z 64bit Multilingual (CZJ41ML)*, installation file *CZJ41ML.tar.gz* , to directory */install/wmq* and to move the WMB installation package *WebSphere Message Broker V7.0.0.1 Linux on zSeries Multilingual (CZEE1ML),* installation file *CZEE1ML.tar.gz* , to directory */install/wmb.*

4. Go to URL http://www-01.ibm.com/support/docview.wss?rs=171&uid=swg27006037&wv=1 and download the latest maintenance pack for WMQ V7 for *Linux on zSeries s390x* and go to URL http://www-01.ibm.com/support/docview.wss?uid=swg27006041 and download the latest maintenance pack available for *Linux s390x (zSeries)* for WMB. Move each of these downloaded files to their respective *fixes* subdirectories.

Note: The fix pack names that appear in the examples of commands in this document were based on the fix pack level currently available at the time this document was written. The names of fix pack available at the above URL will more than likely be different when this URL is accessed later.

5. Use the cd command to go to directory **/install/wmq** and unzip and then untar the product file, e.g. *CZJ41ML.tar.gz* file.tar , using the **gzip –dv** and **tar –xvf** commands (see below):

```
mqlnx1:/home/mitchj> cd /install/wmq
mqlnx1:/install/wmq> gzip -dv CZJ41ML.tar.gz
CZJ41ML.tar.gz:  12.9% -- replaced with CZJ41ML.tar
mqlnx1:/install/wmq> tar -xvf CZJ*
copyright
gsk7bas64-7.0-4.27.s390x.rpm
gsk7bas-7.0-4.27.s390.rpm
lap/
lap/LAPApp.jar
lap/jre/

(output truncated)
```

6. Use the **cd** command to go to the **/install/wmq/fixes** directory and then untar maintenance pack file, e.g. *7.0.1-WS-MQ-LinuxS390X-FP0005.tar,* file using the **tar –xvf** command (see below):

```
mqlnx1:/install/wmq> cd fixes
mqlnx1:/install/wmq/fixes> tar -xvf *.tar
./
./MQSeriesClient-U839624-7.0.1-5.s390x.rpm
./MQSeriesJRE-U839624-7.0.1-5.s390x.rpm
./MQSeriesJava-U839624-7.0.1-5.s390x.rpm
./MQSeriesKeyMan-U839624-7.0.1-5.s390x.rpm
./MQSeriesMan-U839624-7.0.1-5.s390x.rpm
./MQSeriesMsg_Zh_CN-U839624-7.0.1-5.s390x.rpm

(output truncated)
```

7. Change directory to **/install/wmb** directory and unzip and then untar the WMB product file, e.g., *CZEEML.tar.gz,* using the *gzip –dv* and *tar –xvf* commands (see below):

```
mqlnx1:/install/wmq/fixes> cd ../../wmb
mqlnx1:/install/wmb> gzip -dv CZEE1ML.tar
CZEE1ML.tar.gz:   1.6% -- replaced with CZEE1ML.tar
mqlnx1:/install/wmb> tar -xvf *.tar
messagebroker_runtime1/
messagebroker_runtime1/IE02/
messagebroker_runtime1/IE02/install-ie02.bin
messagebroker_runtime1/IE02/ie02.pdf
messagebroker_runtime1/readmes/

(output truncated)
```

8. Use the **cd** command to go to the **/install/wmb/fixes** directory and then untar the maintenance pack file, e.g.,*7.0.0-WS-MB-LINUXZ64-FP0002.tar with the **tar –xvf** command (see below):*

```
mqlnx1:/install/wmb> cd fixes
mqlnx1:/install/wmb/fixes> tar -xvf *.tar
./
./disk1/
./disk1/media.inf
./disk1/setup.jar
./disk1/IE02/
./disk1/IE02/install-ie02.bin
./disk1/IE02/ie02.pdf


(output truncated)
```

Installing WebSphere MQ Series

1. After all of the files has been untarred and unziped the first action is to review and accept the WMQ license agreement. Go back to directory */install/*wmq and use the *su* command to switch to root authority and invoke the *mqlicense.sh* shell script with the *–text_only* parameter. This will display the output below where you will be given the option to *accept the terms of the license* (1) , *decline the terms of the license* (2), *print the license* (3), *read the non-IBM terms* (4), or *redisplay the previous screen* (99). Enter option *1* (see in red below at the bottom of the example) to accepted the license terms.

```
Mqlnx1:/install/wmq> su
Password:
mqlnx1:/install/wmq # ./mqlicense.sh -text_only

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Press Enter to continue viewing the license agreement, or
enter "1" to accept the agreement, "2" to decline it, "3"
to print it, "4" to read non-IBM terms, or "99
to the previous screen.
1
```

Tech-Tip: Installation should be done with root authority. Use the *su* command to switch to this authority. Note that the command prompt changes with the switch to root. At any time the *id* command can be used to display the current user identity.

2. Next use the ***rpm*** command to install the individual WMQ packages. Install the packages in the order below to ensure that package dependencies are satisfied. (Some packages required that other packages must already be installed before installation will be allowed).

```
mqlnx1:/install/wmq # rpm -ivh MQSeriesRuntime*
Preparing...                ######################################### [100%]
Creating group mqm
Creating user mqm
   1:MQSeriesRuntime         ######################################### [100%]
mqlnx1:/install/wmq # rpm -ivh MQSeriesJava*
Preparing...                ######################################### [100%]
   1:MQSeriesJava            ######################################### [100%]
mqlnx1:/install/wmq # rpm -ivh MQSeriesServer*
Preparing...                ######################################### [100%]
   1:MQSeriesServer          ######################################### [100%]
mqlnx1:/install/wmq # rpm -ivh MQSeriesSDK*
Preparing...                ######################################### [100%]
   1:MQSeriesSDK             ######################################### [100%]
mqlnx1:/install/wmq # rpm -ivh MQSeriesJRE*
Preparing...                ######################################### [100%]
   1:MQSeriesJRE             ######################################### [100%]
mqlnx1:/install/wmq # rpm -ivh MQSeriesSamples*
Preparing...                ######################################### [100%]
   1:MQSeriesSamples         ######################################### [100%]
mqlnx1:/install/wmq # rpm -ivh MQSeriesClient*
Preparing...                ######################################### [100%]
   1:MQSeriesClient          ######################################### [100%]
mqlnx1:/install/wmq # rpm -ivh MQSeriesMan*
Preparing...                ######################################### [100%]
   1:MQSeriesMan             ######################################### [100%]
```

Tech-Tip: Note that the MQSeriesKeyMan and GSK packages provided with the base product will not installed at this time. This is because there is maintenance for both the base MQSeriesKeyMan package and the GSK package. The GSK maintenance packages do not to properly supersede the GSK packages provided with the base MQSeries packages.

If the base GSK packages were installed then the maintenance GSK packages could not be installed until the base GSK package were removed. And removing the base GSK packages would have required removing the base MQSeriesKeyMan package. Therefore to avoid unnecessary installation and subsequent removal of these packages, the maintenance GSK package should be installed then the base MQSeriesKeyMan package and then the maintenance MQSeriesKeyMan package.

3. To simplify the installation of these fixes and subsequent fixes we created the ***instWMQ.sh*** script file containing the commands below:

```
rpm -ivh MQSeriesRuntime*
rpm -ivh MQSeriesJava*
rpm -ivh MQSeriesServer*
rpm -ivh MQSeriesSDK*
rpm -ivh MQSeriesJRE*
rpm -ivh MQSeriesClient*
rpm -ivh MQSeriesSamples*
rpm -ivh MQSeriesMan*
```

4. Change the permission bits of this file to 755 (e.g. ***chmod 755 instWMQ.sh)*** and then executed as a script (see below). This script is useful regardless of the differences of the fix pack names in the rpm package names.

```
mqlnx1:/install/wmq/fixes # . instWMQ.sh
Preparing...                    ######################################### [100%]
   1:MQSeriesRuntime-U839624######################################### [100%]
Preparing...                    ######################################### [100%]
   1:MQSeriesJava-U839624    ######################################### [100%]
Preparing...                    ######################################### [100%]
   1:MQSeriesServer-U839624 ######################################### [100%]
Preparing...                    ######################################### [100%]
   1:MQSeriesSDK-U839624     ######################################### [100%]
Preparing...                    ######################################### [100%]
   1:MQSeriesClient-U839624 ######################################### [100%]
Preparing...                    ######################################### [100%]
   1:MQSeriesSamples-U839624######################################### [100%]
Preparing...                    ######################################### [100%]
   1:MQSeriesSamples-U839624######################################### [100%]
Preparing...                    ######################################### [100%]
   1:MQSeriesMan-U839624     ######################################### [100%]
```

5. Now the GSK packages can be install along with the base MQSeriesKeyMan package and its maintenance. While still in the fixes subdirectory use the **rpm** command to install the two GSK packages. Change back one level to the directory where the base packages exist and used the **rpm** command to install the base MQSeriesKeyMan package. Finally change back to the fixes subdirectory and retrieved the previous **rpm** command (***ESC-K***) and installed the MQSeriesKeyMan fix package. See the sequence of command and output below.

```
mqlnx1:/install/wmq/fixes # rpm -ivh gsk7*
Preparing...                    ######################################### [100%]
   1:gsk7bas                 ######################################### [ 50%]
   2:gsk7bas64               ######################################### [100%]
mqlnx1:/install/wmq/fixes # cd ..
mqlnx1:/install/wmq # rpm -ivh MQSeriesKeyMan*
Preparing...                    ######################################### [100%]
   1:MQSeriesKeyMan          ######################################### [100%]
mqlnx1:/install/wmq  # cd fixes
mqlnx1:/install/wmq/fixes # rpm -ivh MQSeriesKeyMan*
Preparing...                    ######################################### [100%]
   1:MQSeriesKeyMan-U839624 ######################################### [100%]
```

6. Finally use the *rpm –qa* and *grep* commands to display all the *MQSeries* software packages just installed.

```
mqlnx1:/install/wmq/fixes # rpm -qa | grep MQSeries
MQSeriesSDK-7.0.1-3
MQSeriesMan-7.0.1-3
MQSeriesSDK-U839624-7.0.1-5
MQSeriesServer-7.0.1-3
MQSeriesClient-7.0.1-3
MQSeriesServer-U839624-7.0.1-5
MQSeriesMan-U839624-7.0.1-5
MQSeriesKeyMan-U839624-7.0.1-5
MQSeriesJava-7.0.1-3
MQSeriesSamples-7.0.1-3
MQSeriesJava-U839624-7.0.1-5
MQSeriesSamples-U839624-7.0.1-5
MQSeriesKeyMan-7.0.1-3
MQSeriesRuntime-7.0.1-3
MQSeriesJRE-7.0.1-3
MQSeriesRuntime-U839624-7.0.1-5
MQSeriesClient-U839624-7.0.1-5
MQSeriesJRE-U839624-7.0.1-3
```

7. To permit other users access to the WMQ they must be added to the **mqm** group (created in by the installation of the MQSeries runtime in Step 2 above. Use the ***usermod –G mqm*** command to add any additional users to the group (see example below). Repeat the command for each user to be added to the mqm group.

```
/usr/sbin/usermod –G mqm mitchj
```

Installing WebSphere Message Broker

1. The installation of WMB and its initial configuration is done by a WMB provided script. But before the script is executed a new group needs to be added. Use the ***groupadd*** command to create WMB administration group ***mqbrkrs.***

```
/usr/sbin/groupadd mqbrkrs
```

2. Change back to directory */install/wmb/messagebroker_runtime1* and invoke the *setuplinux390* shell script with the *–console* parameter. This will display the output below where you will be given the option to display the next screen (1) , cancel the installation (3) or redisplay the screen (4). Take the default action (display the Next screen) indicated by the value in the brackets [1] by pressing **Enter**.

```
mqlnx1:/install/wmb/messagebroker_runtime1 # ./setuplinux390 -console
InstallShield Wizard

Searching for Java(tm) Virtual Machine...
.
Preparing Java(tm) Virtual Machine...
..................................3
..................................
..................................
..................................
..................................
..................................
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..................................
...............
--------------------------------------------------------------------------------
Welcome to the InstallShield Wizard for IBM WebSphere Message Broker 7.0

The InstallShield Wizard will install IBM WebSphere Message Broker 7.0 on your
computer.
To continue, choose Next.

IBM WebSphere Message Broker
Version: 7.0.0.1
http://www.ibm.com/


Press 1 for Next, 3 to Cancel or 4 to Redisplay [1]
```

3. This will display the screen below where you will be given the option to accept the agreement (1), decline the agreement (2), go back to the previous screen (99), or print the agreement (3). Enter *1* to accept the agreement and then press ***Enter*** twice to continue.

```
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      BUTTON, OR USE THE PROGRAM; AND


Press Enter to continue viewing the license agreement, or, Enter "1" to accept
the agreement, "2" to decline it or "99" to go back to the previous screen, "3"
 Print.

1

Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

4. This will display the output below where you will be given the option to perform a typical installation (1) or a customer installation (2). A typical setup is already selected as indicated by the X in the brackets beside **1 – Typical**. Do a typical installation, but if you wanted to perform a custom installation you could have entered 2 and pressed **Enter** to change the setup type to *Custom*. Since no changes are required to select the typical setup take the default action 0 (finished) and press **Enter** twice to display the next screen.

```
-------------------------------------------------------------------------------
Choose the setup type that best suits your needs.

[X] 1 - Typical
        The program will be installed with all features.
        Recommended for most users.

[ ] 2 - Custom
        The program will be installed with the features you choose.
        Recommended for advanced users.

To select an item enter its number, or 0 when you are finished: [0] 0


Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

5. This will display the output below where you will be given the option to install the WMB ODBC Extender SupportPac. Install this SupportPac by entering *1* and pressing **Enter** to have the box beside **1** - **Yes** marked with an X and then press **Enter** twice to continue.

```
--------------------------------------------------------------------------------
The IBM WebSphere Message Broker ODBC Database Extender Category 3 SupportPac
(IE02) extends the ability of the IBM WebSphere Message Broker to support
additional databases on the UNIX and Linux Platforms. Refer to the Message
Broker documentation for a list of supported databases.

You can launch the installer for IE02 at the end of the product installation by
selecting the check box above. Alternatively, you can also install the IE02
SupportPac at a later date. The latest version of the SupportPac can be
downloaded from the IBM WebSphere Message Broker SupportPac website.

Would you like to launch IBM WebSphere Message Broker ODBC Database Extender
Category 3 SupportPac (IE02) installer after this install wizard finishes?

[ ] 1 - Yes

To select an item enter its number, or 0 when you are finished: [0] 1


[X] 1 - Yes

To select an item enter its number, or 0 when you are finished: [0]


Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

6. This will display the screen below. Press **Enter** to continue.

```
Please wait...

Please wait...

Please wait...

--------------------------------------------------------------------------------
IBM WebSphere Message Broker 7.0 will be installed in the following location:

/opt/ibm/mqsi/7.0




for a total size:

 432.7 MB

Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

7. This will display the screen below which shows a progress bar indicating the status of the installation. When the installation is complete press **Enter** to finish the installation of WMB and start the installation of the SupportPac.

```
Installing IBM WebSphere Message Broker 7.0. Please wait...


|-----------|-----------|-----------|-----------|
0%         25%         50%         75%        100%
||||||||||||||||||||||||||||||||||||||||||||||||||

Creating WorkPath...

Please wait...

-------------------------------------------------------------------------------
The InstallShield Wizard has successfully installed IBM WebSphere Message
Broker 7.0. Choose Finish to exit the wizard.

Press 3 to Finish or 4 to Redisplay [3]
```

8. This will display the screen below which shows the starting of the *ODBC Database Extender* installer. Once the installer is initialized press **Enter** to continue.

```
Preparing to install...
Extracting the JRE from the installer archive...
Unpacking the JRE...
Extracting the installation resources from the installer archive...
Configuring the installer for this system's environment...

Launching installer...

Preparing CONSOLE Mode Installation...

===============================================================================
WebSphere Message Broker ODBC Database Extender  (created with InstallAnywhere)
-------------------------------------------------------------------------------




===============================================================================
Introduction
------------


WebSphere Message Broker ODBC Database Extender Installer.

Respond to each prompt to proceed to the next step in the installation.  If you
want to change something on a previous step, type 'back'.

You may cancel this installation at any time by typing 'quit'.

PRESS <ENTER> TO CONTINUE:
```

9. This will display the screen below shows the staring of the *ODBC Database Extender* license agreement screen. Accept the license by entering *1* and pressing **Enter** to continue.

```
================================================================================


    International Program License Agreement

    Part 1 - General Terms

    BY DOWNLOADING, INSTALLING, COPYING, ACCESSING, CLICKING ON AN
    "ACCEPT" BUTTON, OR OTHERWISE USING THE PROGRAM, LICENSEE AGREES TO
    THE TERMS OF THIS AGREEMENT. IF YOU ARE ACCEPTING THESE TERMS ON
    BEHALF OF LICENSEE, YOU REPRESENT AND WARRANT THAT YOU HAVE FULL
    AUTHORITY TO BIND LICENSEE TO THESE TERMS. IF YOU DO NOT AGREE TO
    THESE TERMS,

    - DO NOT DOWNLOAD, INSTALL, COPY, ACCESS, CLICK ON AN "ACCEPT" BUTTON,
    OR USE THE PROGRAM; AND

    - PROMPTLY RETURN THE UNUSED MEDIA, DOCUMENTATION, AND PROOF OF
    ENTITLEMENT TO THE PARTY FROM WHOM IT WAS OBTAINED FOR A REFUND OF THE
    AMOUNT PAID. IF THE PROGRAM WAS DOWNLOADED, DESTROY ALL COPIES OF THE
    PROGRAM.


Press Enter to continue viewing the license agreement, or enter "1" to
   accept the agreement, "2" to decline it, "3" to print it, or "99" to go back
   to the previous screen.: 1
```

10. This will display the installation folder screen. Accept the default location by pressing **Enter**.

```
================================================================================
Choose Install Folder
--------------------

Where would you like to install?

  Default Install Folder: /opt/ibm/IE02

ENTER AN ABSOLUTE PATH, OR PRESS <ENTER> TO ACCEPT THE DEFAULT
      :
```

11. This will display the installation summary screen. Press **Enter** to continue

```
================================================================================
Pre-Installation Summary

-----------------------

Please Review the Following Before Continuing:

Product Name:
    WebSphere Message Broker ODBC Database Extender

Install Folder:
    /opt/ibm/IE02

Disk Space Information (for Installation Target):
    Required:  84,862,610 bytes
    Available: 33,615,581,184 bytes


PRESS <ENTER> TO CONTINUE:
```

12. Press **Enter** on the next screen to continue.

```
================================================================================
Ready To Install
----------------

The installer is now ready to install WebSphere Message Broker ODBC Database
Extender onto your system at the following location:

   /opt/ibm/IE02

PRESS <ENTER> TO INSTALL:
```

13. When the SupportPac is successfully installed the screen below will be displayed. Press **Enter**
    to exit the installation script.

```
================================================================================
Installation Complete
---------------------

WebSphere Message Broker ODBC Database Extender has been successfully installed
to:

/opt/ibm/IE02

For most scenarios, no additional configuration is required to configure the
WebSphere Message Broker ODBC Database Extender (IE02) SupportPac.  All of the
necessary configuration is performed at installation time.  Please refer to the
WebSphere Message Broker Information Center for additional information
regarding configuration of your chosen database.

Refer to the WebSphere Message Broker Supported Software page for the list of
supported databases:
http://www-01.ibm.com/support/docview.wss?rs=849&uid=swg27016972




PRESS <ENTER> TO EXIT THE INSTALLER:
```

14. The next step is to apply the WMB maintenance. Go to directory */install/wmb/fixes/disk1* and execute the ***setuplinux390*** script with the *–console* parameter. Press **Enter** to continue.

```
mqlnx1:/install/wmb/fixes/disk1 # ./setuplinux390 -console
InstallShield Wizard

Initializing InstallShield Wizard...

Searching for Java(tm) Virtual Machine...
.
Preparing Java(tm) Virtual Machine...
..................................
..................................
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..............
-------------------------------------------------------------------------------
Welcome to the InstallShield Wizard for IBM WebSphere Message Broker 7.0

The InstallShield Wizard will install IBM WebSphere Message Broker 7.0 on your
computer.
To continue, choose Next.

IBM WebSphere Message Broker
Version: 7.0.0.2
http://www.ibm.com/


Press 1 for Next, 3 to Cancel or 4 to Redisplay [1]
```

15. The next steps are to select the setup type (*Typical* or *Custom*). Press **Enter** to take the default of the already selected *Typical* setup and press **Enter** again to continue.

```
-----------------------------------------------------------------------------
Choose the setup type that best suits your needs.

[X] 1 - Typical
        The program will be installed with all features.
        Recommended for most users.

[ ] 2 - Custom
        The program will be installed with the features you choose.
        Recommended for advanced users.

To select an item enter its number, or 0 when you are finished: [0]


Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

16. The screen deals with the *ODBC Database Extender* SupportPac. Enter *1* to check the box beside *Ye*s and then press **Enter** twice to continue.

```
------------------------------------------------------------------------------
The IBM WebSphere Message Broker ODBC Database Extender Category 3 SupportPac
(IE02) extends the ability of the IBM WebSphere Message Broker to support
additional databases on the UNIX and Linux Platforms. Refer to the Message
Broker documentation for a list of supported databases.

You can launch the installer for IE02 at the end of the product installation by
selecting the check box above. Alternatively, you can also install the IE02
SupportPac at a later date. The latest version of the SupportPac can be
downloaded from the IBM WebSphere Message Broker SupportPac website.

Would you like to launch IBM WebSphere Message Broker ODBC Database Extender
Category 3 SupportPac (IE02) installer after this install wizard finishes?

[ ] 1 - Yes

To select an item enter its number, or 0 when you are finished: [0] 1


[X] 1 - Yes

To select an item enter its number, or 0 when you are finished: [0]


Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

17. The next screen shows the starting of the installation of the SupportPac. When complete press **Enter** to continue.

```
Please wait...

Please wait...

Please wait...

-------------------------------------------------------------------------------
IBM WebSphere Message Broker 7.0 will be installed in the following location:

/opt/ibm/mqsi/7.0

for a total size:

 316.8 MB

Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

18. The next screen shows the progress of the installation of the WMB maintenance. When complete press **Enter** to continue.

```
Installing IBM WebSphere Message Broker 7.0. Please wait...


|-----------|-----------|-----------|------------|
0%         25%         50%         75%         100%
|||||||||||||||||||||||||||||||||||||||||||||||||||

Creating uninstaller...


Creating WorkPath...

Please wait...

-------------------------------------------------------------------------------
The InstallShield Wizard has successfully installed IBM WebSphere Message
Broker 7.0. Choose Finish to exit the wizard.

Press 3 to Finish or 4 to Redisplay [3]

PRESS <ENTER> TO CONTINUE:
```

19. The next screen shows the starting of the installer for the ODBC Database Extender component. When prompted press **Enter** to continue.

```
Preparing to install...
Extracting the JRE from the installer archive...
Unpacking the JRE...
Extracting the installation resources from the installer archive...
Configuring the installer for this system's environment...

Launching installer...

Preparing CONSOLE Mode Installation...

===============================================================================
WebSphere Message Broker ODBC Database Extender  (created with InstallAnywhere)
-------------------------------------------------------------------------------




===============================================================================
Introduction
------------

WebSphere Message Broker ODBC Database Extender Installer.

Respond to each prompt to proceed to the next step in the installation.  If you
want to change something on a previous step, type 'back'.

You may cancel this installation at any time by typing 'quit'.

PRESS <ENTER> TO CONTINUE:
```

20. The next screen shows the license agreement for the SupportPac. Enter *1* to accept the agreement and press **Enter** to continue.

```
===============================================================================


     International Program License Agreement

     Part 1 - General Terms

     BY DOWNLOADING, INSTALLING, COPYING, ACCESSING, CLICKING ON AN
     "ACCEPT" BUTTON, OR OTHERWISE USING THE PROGRAM, LICENSEE AGREES TO
     THE TERMS OF THIS AGREEMENT. IF YOU ARE ACCEPTING THESE TERMS ON
     BEHALF OF LICENSEE, YOU REPRESENT AND WARRANT THAT YOU HAVE FULL
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     THESE TERMS,

     - DO NOT DOWNLOAD, INSTALL, COPY, ACCESS, CLICK ON AN "ACCEPT" BUTTON,
     OR USE THE PROGRAM; AND

     - PROMPTLY RETURN THE UNUSED MEDIA, DOCUMENTATION, AND PROOF OF
     ENTITLEMENT TO THE PARTY FROM WHOM IT WAS OBTAINED FOR A REFUND OF THE
     AMOUNT PAID. IF THE PROGRAM WAS DOWNLOADED, DESTROY ALL COPIES OF THE
     PROGRAM.


 Press Enter to continue viewing the license agreement, or enter "1" to
    accept the agreement, "2" to decline it, "3" to print it, or "99" to go back
    to the previous screen.: 1
```

21. The next screen displays the installation folder. Accept the default by pressing **Enter** and press **Enter** again to continue.

```
===============================================================================
Choose Install Folder
---------------------

Where would you like to install?

  Default Install Folder: /opt/ibm/IE02

ENTER AN ABSOLUTE PATH, OR PRESS <ENTER> TO ACCEPT THE DEFAULT
      :



===============================================================================
Pre-Installation Summary
------------------------

Please Review the Following Before Continuing:

Product Name:
    WebSphere Message Broker ODBC Database Extender

Install Folder:
    /opt/ibm/IE02

Disk Space Information (for Installation Target):
    Required:  84,862,610 bytes
    Available: 32,036,278,272 bytes

PRESS <ENTER> TO CONTINUE:
```

22. Press **Enter** on the *Ready to Install* screen and when the installation completes press **Enter** again to exit the installer.

```
===============================================================================
Ready To Install
---------------

The installer is now ready to install WebSphere Message Broker ODBC Database
Extender onto your system at the following location:

   /opt/ibm/IE02

PRESS <ENTER> TO INSTALL:




===============================================================================
Installing...
-------------

 [=================|=================|=================|=================]
 [-----------------|-----------------|-----------------|-----------------]



===============================================================================
Installation Complete
---------------------

WebSphere Message Broker ODBC Database Extender has been successfully installed
to:

/opt/ibm/IE02

For most scenarios, no additional configuration is required to configure the
WebSphere Message Broker ODBC Database Extender (IE02) SupportPac.  All of the
necessary configuration is performed at installation time.  Please refer to the
WebSphere Message Broker Information Center for additional information
regarding configuration of your chosen database.

Refer to the WebSphere Message Broker Supported Software page for the list of
supported databases:
http://www-01.ibm.com/support/docview.wss?rs=849&uid=swg27016972




 PRESS <ENTER> TO EXIT THE INSTALLER:
```

23. Finally use the *rpm –qa* and **grep** command to display all the *mqsi* software packages just installed.

```
mqlnx1:/install/wmb/fixes # rpm -qa | grep mqsi
mqsi70.mrm-7.0-0.1
mqsi70.data-7.0-0.1
mqsi70.is-7.0-0.2
mqsi70.links-7.0-0.2
mqsi70.tsc-7.0-0.1
mqsi70.core-7.0-0.1
mqsi70.samples-7.0-0.1
mqsi70.remover-7.0-0.2
mqsi70.mrm-7.0-0.2
mqsi70.profiles-7.0-0.2
mqsi70.data-7.0-0.2
mqsi70.brokerc-7.0-0.1
mqsi70.tsamples-7.0-0.1
mqsi70.datadirect-7.0-0.1
mqsi70.la-7.0-0.2
mqsi70.tsc-7.0-0.2
mqsi70.core-7.0-0.2
mqsi70.samples-7.0-0.2
mqsi70.remover-7.0-0.1
mqsi70.is-7.0-0.1
mqsi70.itlm-7.0-0.1
mqsi70.links-7.0-0.1
mqsi70.brokerc-7.0-0.2
mqsi70.tsamples-7.0-0.2
mqsi70.datadirect-7.0-0.2
mqsi70.la-7.0-0.1
mqsi70.profiles-7.0-0.1
mqsi70.itlm-7.0-0.2
```

24. To permit other users access to the WMB they must be added to the **mqbrkrs** group. Use the *usermod –G mqbrkrs,mqm* command to add any additional users to the group (see an example below). Repeat the command for each user to be added to the mqm and mqbrkrs group.

```
/usr/sbin/usermod –G mqbrkrs,mqm mitchj
```

Creating a WebSphere MQ Series Queue Manager

1. Now that all of the products have been installed ensure all WMQ and WMB environment variables are properly set. Terminate your current session and log back in. This will execute the command added to the .profile command earlier. Use the *id* and *printenv* commands to confirm the user is a member of groups **mqm** and **mqbrkrs** and that the WMQ (mqm) and WMB (mqsi) additions and updates to environment variables are effective (see an example of the expected output below).

```
mqlnx1:/home/mitchj> id
uid=1001(mitchj) gid=100(users) groups=1001(mqbrkrs),100(users),1000(mqm)
mqlnx1:/home/mitchj> printenv | grep mqsi
ICU_DATA=/opt/ibm/mqsi/7.0/xml4c/data
MIBDIRS=/opt/ibm/mqsi/7.0/snmp-mib:
MQSI_REGISTRY=/var/mqsi
LD_LIBRARY_PATH=/opt/ibm/mqsi/7.0/jre16/lib/s390x:/opt/ibm/mqsi/7.0/jre16/lib/s3
90x/classic:/opt/mqm/java/lib64:/opt/ibm/mqsi/7.0/xml4c/lib:/opt/mqm/lib64:/opt/
ibm/mqsi/7.0/lib:/opt/ibm/mqsi/7.0/bin:/opt/ibm/mqsi/7.0/ODBC/V6.0/lib:/opt/ibm/
mqsi/7.0/xlxpc/libMQSI_JREPATH=/opt/ibm/mqsi/7.0/jre16
MQSI_WORKPATH=/var/mqsi
MQSI_SECURITY_PROVIDER_PATH=/opt/ibm/mqsi/7.0/SecurityProviders
MQSI_CATALINA_HOME=/opt/ibm/mqsi/7.0/catalina
NLSPATH=/opt/ibm/mqsi/7.0/messages/%L/%N:/opt/ibm/mqsi/7.0/messages/En_US/%N:
PATH=/opt/ibm/mqsi/7.0/jre16/bin:/opt/ibm/mqsi/7.0/bin:/usr/local/bin:/usr/bin:/
usr/X11R6/bin:/bin:/usr/games:/opt/gnome/bin:/usr/lib/mit/bin:/usr/lib/mit/sbin:
/opt/mqm/bin:
MQSI_JARPATH=/opt/ibm/mqsi/7.0/classes:/opt/ibm/mqsi/7.0/messages
MQSI_DEVELOPMENT=/var/mqsi/registry
MQSI_FILEPATH=/opt/ibm/mqsi/7.0
MQSI_LILPATH=/opt/ibm/mqsi/7.0/lil:/opt/ibm/mqsi/7.0/jplugin
CLASSPATH=/opt/ibm/mqsi/7.0/classes/ConfigManagerProxy.jar:/opt/ibm/mqsi/7.0/cla
sses/brokerutil.jar:/opt/mqm/java/lib/com.ibm.mq.commonservices.jar:/opt/mqm/jav
a/lib/com.ibm.mq.headers.jar:/opt/mqm/java/lib/com.ibm.mq.jar:/opt/mqm/java/lib/
com.ibm.mq.jmqi.jar:/opt/mqm/java/lib/com.ibm.mq.pcf.jar:/opt/mqm/java/lib/conne
ctor.jar:/opt/mqm/java/lib/com.ibm.mqjms.jar:/opt/ib
```

> **Tech-Tip:** The environment variables displayed above were added to the runtime environment by the execution of the *test –s /opt/ibm/mqsi/7.0/bin/mqsiprofile && . /opt/ibm/mqsi/7.0/bin/mqsiprofile* in the user's login profile (.profile). This command first test to see if the mqsiprofile file exists in the WMB installation directory (e.g., Has WMB been installed or not?). If WMB has been installed then execute the WMQ script which configures the WMQ and WMB runtime environment variables.

2. Create and start a broker queue manager using WMQ commansd ***crtmqm*** and ***strmqm***,

```
mqlnx1:/home/mitchj> crtmqm BrkrQmgr
WebSphere MQ queue manager created.
Directory '/var/mqm/qmgrs/BrkrQmgr' created.
Creating or replacing default objects for BrkrQmgr.
Default objects statistics : 65 created. 0 replaced. 0 failed.
Completing setup.
Setup completed.
mqlnx1:/home/mitchj> strmqm BrkrQmgr
WebSphere MQ queue manager 'BrkrQmgr' starting.
5 log records accessed on queue manager 'BrkrQmgr' during the log replay phase.
Log replay for queue manager 'BrkrQmgr' complete.
Transaction manager state recovered for queue manager 'BrkrQmgr'.
WebSphere MQ queue manager 'BrkrQmgr' started.
mqlnx1:/home/mitchj> runmqsc BrkrQmgr < qmgr.cmds
5724-H72 (C) Copyright IBM Corp. 1994, 2009.  ALL RIGHTS RESERVED.
Starting MQSC for queue manager BrkrQmgr.
```

Tech-Tip: Adding a *–q* parameter to the ***crtmqm*** command would have set this queue manager as the default queue manager.

Other useful MQ commands are:
dspmqver   displays the current WMQ service level
dspmq   displays the currently configured queue managers and their status
endmqm qmgr   stops the specified queue manager
dltmqm qmgr   deletes the specified queue manager

3. Now make this queue manager accessible from the network by defining a TCP/IP listener port and a SYSTEM.ADMIN.SVRCONN server connection channel. This can easily be done by creating a file, e.g. qmgr.cmds, in the user's home directory containing the MQSC commands (see the commands below).

```
define listener(TCP) trptype(TCP) port(1414) control(STARTONLY) replace
start listener(TCP)
define channel(SYSTEM.ADMIN.SVRCONN) chltype(SVRCONN) trptype(TCP)
```

4. Use the ***runmqsc*** command to update the broker queue manager using the commands stored in the file create in the previous for input.

```
mqlnx1:/home/mitchj> runmqsc BrkrQmgr < qmgr.cmds
5724-H72 (C) Copyright IBM Corp. 1994, 2009.  ALL RIGHTS RESERVED.
Starting MQSC for queue manager BrkrQmgr.


     1 : define listener(TCP) trptype(TCP) port(1414) control(STARTONLY) replace
AMQ8626: WebSphere MQ listener created.
     2 : start listener(TCP)
AMQ8021: Request to start WebSphere MQ Listener accepted.
     3 : define channel(SYSTEM.ADMIN.SVRCONN) chltype(SVRCONN) trptype(TCP)
AMQ8014: WebSphere MQ channel created.
3 MQSC commands read.
No commands have a syntax error.
All valid MQSC commands were processed.
```

This queue manager should now be accessible using the MQExplorer from a Windows or Linux desktop platform.

Creating a WebSphere Message Broker instance

1. Use the WMB *mqsicreatebroker* command to create a broker instance names MyB roker using the BrkrQmgr queue manager.

```
mqlnx1:/home/mitchj> mqsicreatebroker MyBroker -q BrkrQmgr
AMQ8110: WebSphere MQ queue manager already exists.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
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The setmqaut command completed successfully.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
The setmqaut command completed successfully.
BIP8071I: Successful command completion
```

2. Start the message broker using the *mqsistart* command and then use the *mqsilist* command to display its current status.

```
mqlnx1:/home/mitchj> mqsistart MyBroker
BIP8096I: Successful command initiation, check the system log to ensure that the
 component started without problem and that it continues to run without problem.

mqlnx1:/home/mitchj> mqsilist
BIP1284I: Broker 'MyBroker' on queue manager 'BrkrQmgr' is running.
BIP8071I: Successful command completion.
```

Mitch Johnson (mitchj@us.ibm.com)

3. Create an execution group using the ***mqsicreateexecutiongroup*** command.

```
mqlnx1:/home/mitchj> mqsicreateexecutiongroup MyBroker -e GROUP1
BIP1124I: Creating execution group 'GROUP1' on broker 'MyBroker'...
BIP1117I: The execution group was created successfully.

The broker has initialized the execution group.
```

4. Stop the broker with an ***mqsistop*** command.

```
mqlnx1:/opt/ibm/mqsi/7.0/bin> mqsistop MyBroker
BIP8071I: Successful command completion.
```