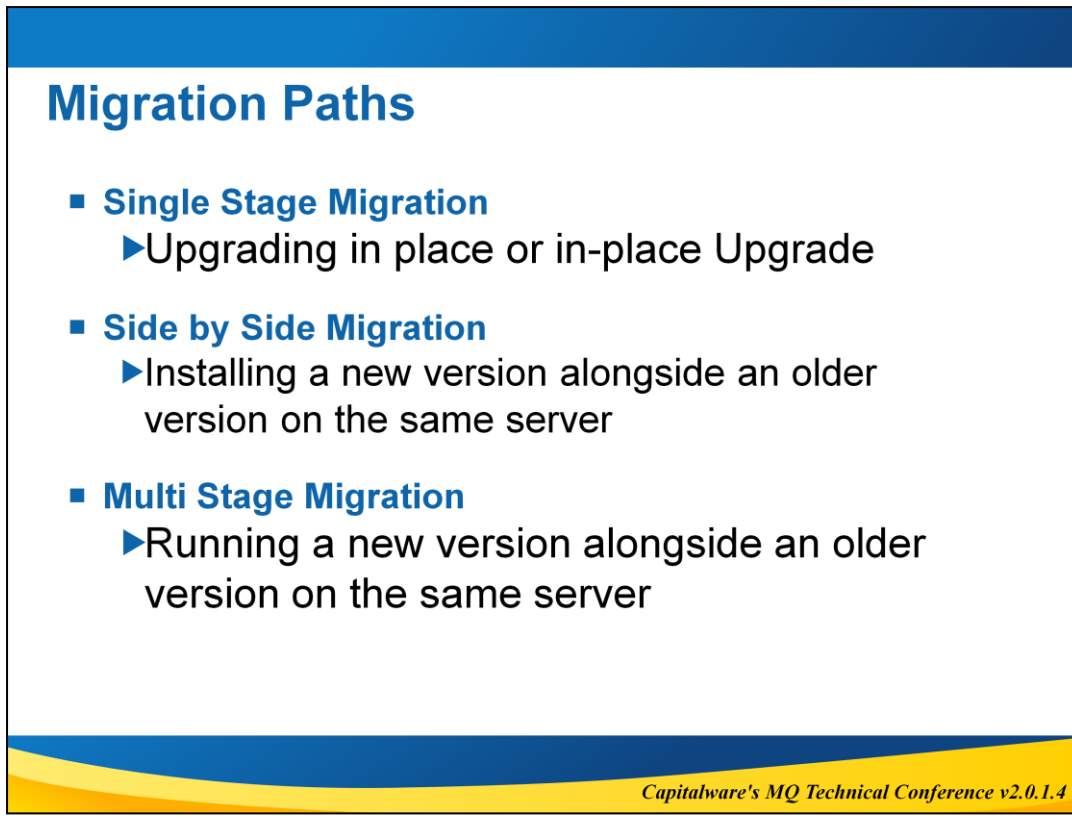
WebSphere MQ Upgrade

With a few migration tips

Capitalware's MQ Technical Conference v2.0.1.4

Agenda

- Planning your Migration Path(s)
- Working with Multiple Installations
- Taking effective backups of your Queue Managers
- Installation & Configuration Verification
- Some New features of MQ V7.1 / 7.5 / 8.0
- Security - Channel authorization Settings
- Application Connectivity
- Summary



In the single-stage migration scenario, the installation of the latest version of the product replaces an earlier version in the same installation location. It is the same migration process that you would have used to upgrade the product prior to WebSphere MQ version 7.0.1.6 . It is now termed single-stage migration, in contrast to side-by-side and multi-stage migration.

The advantage of single-stage migration is that it changes the configuration of a queue manager on the earlier version as little as possible. Existing applications switch from loading the libraries from the earlier version, to loading the libraries of the latest version, automatically.

Queue managers are automatically associated with the installation on the latest version. Administrative scripts and procedures are affected as little as possible by setting the installation to be the primary installation. If you set the installation of the latest version to be the primary installation, commands such as **strmqm** work without providing an explicit path to the command.

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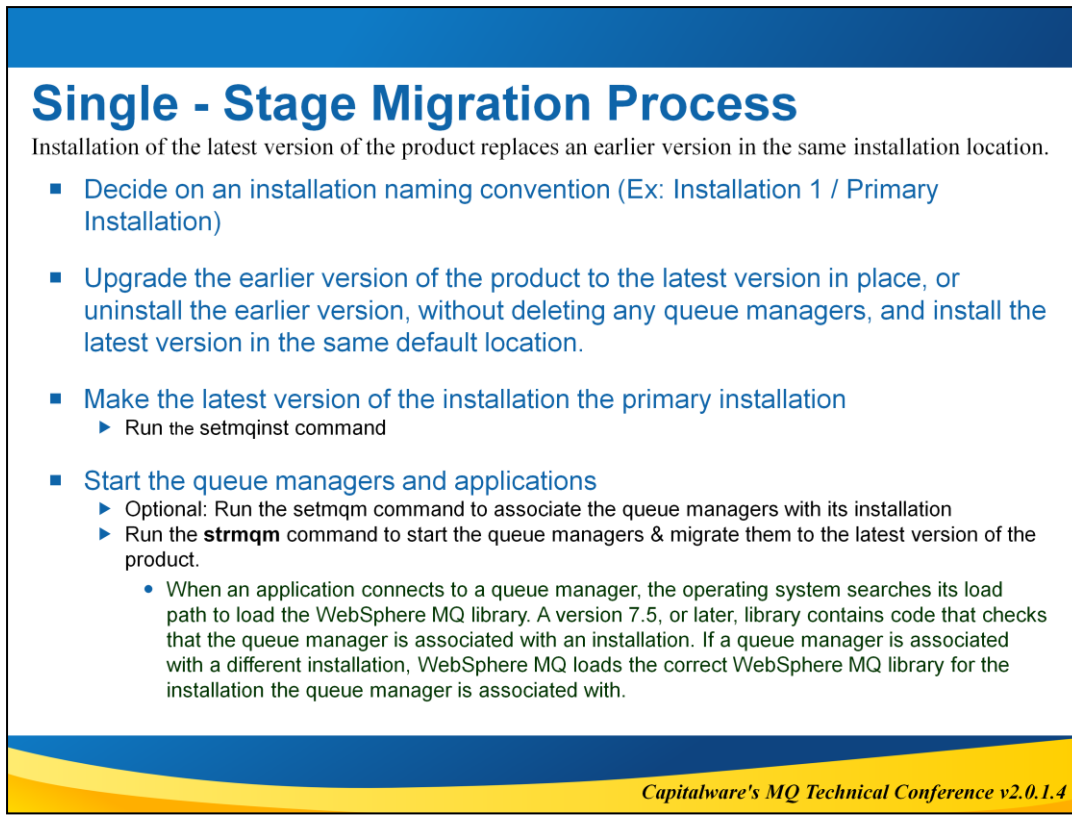
Side-by-side migration is the term used to describe installing a new version of WebSphere® MQ alongside an older version on the same server. Queue managers remain running during the installation and verification of the new version of WebSphere MQ. They remain associated with the older version of WebSphere MQ. When you decide to migrate queue managers to the new version of WebSphere MQ, you

stop all queue managers, uninstall the old version , and migrate them all to the new version of WebSphere MQ.

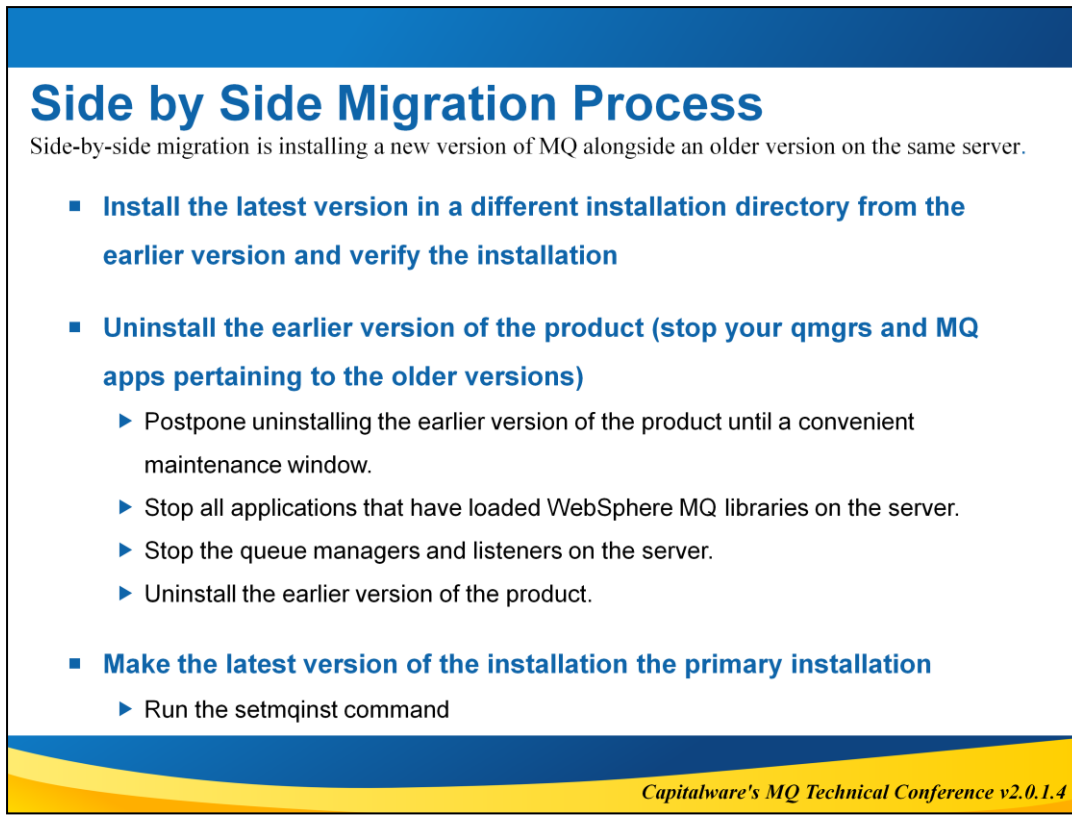


A reason for installing into the same location is to simplify application migration. If you change the installation location, you might remove WebSphere MQ libraries from an application search path. To migrate an application search path you must modify the application environment, or more rarely, the application itself.

The default installation path is specified as a load path in the WebSphere MQ build scripts for UNIX and Linux. After installation of the latest version, the load libraries of the latest version of WebSphere MQ are in the same location as were the libraries of the earlier version. If you built applications by following the examples in the information center for the earlier version, the applications load the correct libraries in the latest version.

“Big Bang” migration (high risk)

1. **Stop local MQ applications**
2. **Stop ALL queue managers and listeners**
3. **Uninstall previous MQ release’s fixpacks**
4. **Uninstall previous MQ release**
5. **Install new MQ release**
6. **Restart all queue managers (strmqm)**
   - Queue manager data is migrated at this point
   - No going back now
7. **Restart local MQ applications**



The step-by-step migration scenario sits half-way between the single-stage and multi-stage migration scenarios.

These topics are for planning multi-installation migration. The planning topics guide you in deciding what other tasks you must perform to migrate queue managers and applications to the latest version. For the precise sequence of commands to upgrade a queue manager to the latest version, do the migration task for the platform you are interested in. All the tasks are listed by platform in the links at the end of this topic. As part of the queue manager migration task, back up your existing queue manager data. Even on a multi-installation server, queue managers cannot be restored to a previous command level after migration.

The side-by-side migration scenario is less flexible than multi-stage migration, and might not seem to have any advantages over it. However, side-by-side migration does have advantages over the multi-stage and single-stage approaches. With the side-by-side approach, because you uninstall the earlier version before starting any queue managers, you can assign an installation on the latest version to be the primary installation.

Having the latest version installation as the primary installation has two benefits.

With the latest version having the primary installation, many applications restart without reconfiguring their environment.

WebSphere MQ commands run against the primary installation, work without providing a local search path.

The advantage the side-by-side scenario has over the single-stage scenario is that you can

install and verify the installation of the latest version of the product on the server before switching over to it.

“Streamlined” migration (medium risk)

1. Install new MQ release alongside
2. Stop local MQ applications using QM1
3. Stop queue manager QM1
4. Associate QM1 with the new installation
5. Restart QM1 (strmqm)
   - Queue manager data is migrated at this point
   - No going back now
6. Restart local MQ applications using QM1
7. Stop local MQ applications using QM2
8. Stop queue manager QM2
9. Associate QM2 with the new installation
10. Restart QM2 (strmqm)
    - Queue manager data is migrated at this point
    - No going back now
11. Restart local MQ applications using QM2
12. Uninstall previous MQ release

Multi – Stage Migration Process (low risk)

Running a new version of WebSphere MQ alongside an older version on the same server.

- **Install version 7.5 in a different installation directory to version 7.0.1 and verify the installation**
- **Configure the operating system so that applications load the version 7.5 libraries**
  - Migrate queue managers one at a time.
- **To make an application load a version 7.5 library, you have three choices:**
  - Run setmqenv to modify the local path that is searched for WebSphere MQ libraries.
  - Modify the global search path that is searched for WebSphere MQ libraries.
  - Relink applications with an additional runtime load path.
- Restart the queue manager and the applications that connect to it
  - Set up the local environment to the installation using the setmqenv command.
  - Run the setmqm command to associate QMGRs with their installations
  - Run the strmqm command to start QMGR and migrate it to version 7.5
  - Restart application: the application loads the version 7.5 library and connects to QMGR, which is associated with version 7.5.

Multi – Stage Migration Process (contd)

- **Migrate all queue managers and applications to version 7.5**
- **Uninstall older versions**
  - Stop all applications that have loaded WebSphere MQ libraries on the server.
  - Stop the queue managers and listeners on the server.
  - Uninstall the earlier version of the product.
- **Make the new version the primary installation**
  - setmqinst command

Multi – Stage Migration Process (contd)

- **You can choose between:**
  - Simplicity of maintaining a single MQ installation
  - Flexibility of multiple MQ installations
- **Up to 128 installations of MQ on a system**
  - One of them can be v7.0.1.6 (or later)
    - Some restrictions apply while v7.0.1 is installed
  - Multiple installations of the same release are supported too
    - You can use multiple installations to help with fixpack migration
- **Single data directory for all installations**
  - All queue managers share the same name-space

Some Changes…

- **Previously:**
  - MQ installed into a fixed place (except on Windows)
  - MQ resources had machine-scope preventing >1 installation
- **Now:**
  - MQ installations are relocatable
    - Each installation has a separate installation path
  - MQ resources have installation-scope
    - Resource isolation so operations on one installation do not affect the others
  - Queue managers are “associated” with an installation
    - You can move them, but you can’t migrate data back to earlier releases

Working with Multiple Installations

- **To work with a queue manager, you need to use the commands from its installation**
  - If you get the wrong installation, you'll see:
    - AMQ5691: Queue manager 'MYQM' is associated with a different installation (Inst1).
- **You can:**
  - Use the full path to the commands
    - $ MQ_INSTALLATION_PATH\bin\strmqm MYQM
  - Set the environment variables for an installation with one of:
    - $ MQ_INSTALLATION_PATH/bin/setmqenv –s
    - $ setmqenv -m MYQM
    - $ setmqenv –n InstallationName
    - $ setmqenv –p MQ_INSTALLATION_PATH

Commands across installations

- **In most cases, you need to use the commands from the right installation**

- **A few commands can work across installations:**
  - dspmq: displays status of all queue managers
  - dspmqver: displays information about all installations
  - dspmqinst: displays information about all installations
  - setmqinst: can modify other installations

New control commands for multiple installations

Command	Purpose
setmqm	Set the associated installation of a queue manager `setmqm –m QMgrName –n InstallationName`

setmqenv	Set up MQ environment
	`setmqenv –s`
	`setmqenv –m QMgrName`
	`setmqenv –n InstallationName`
	`setmqenv –p InstallationPath`

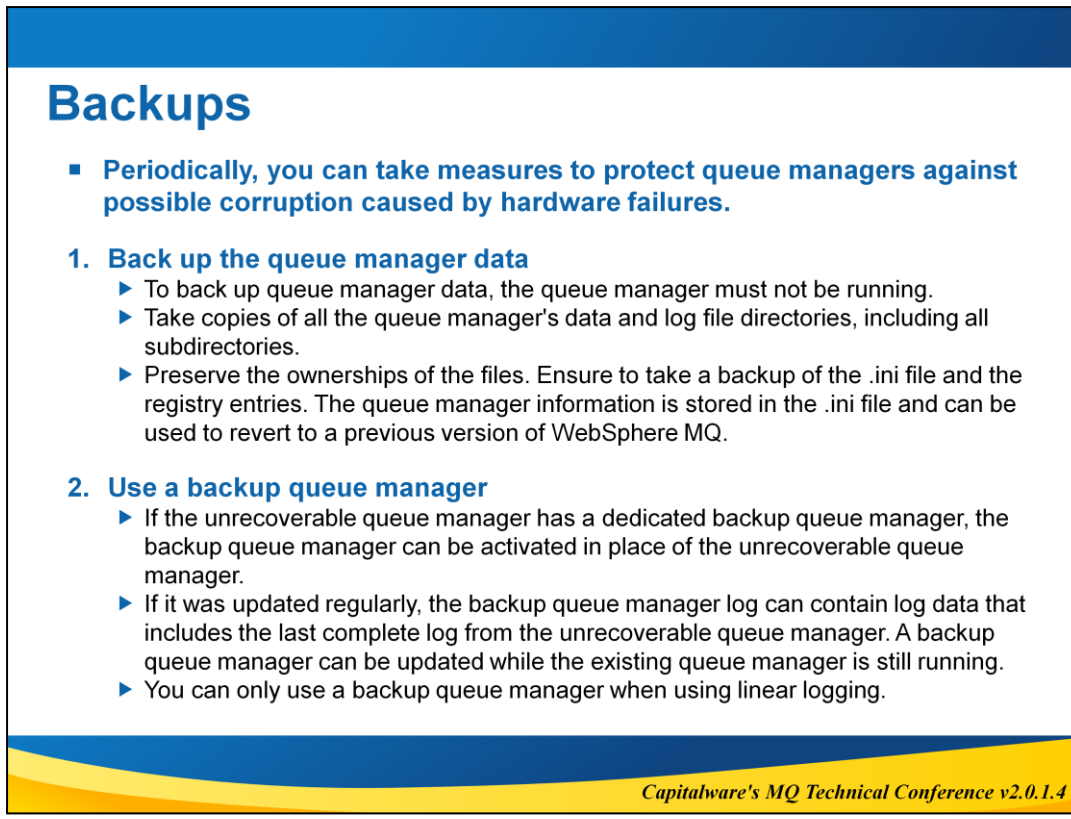
setmqinst	Set MQ installation properties `setmqinst –n InstallationName –i|-x`
dspmqinst	Display MQ installation entries `dspmqinst`

Where's my installation?

- Use platform installation tools to query what's installed where
- Use dspmqver to display the installations
- Use dspmqinst to display the installations
- On UNIX and Linux:
  - cat /etc/opt/mqm/mqinst.ini
- On Windows, you can query the registry:
  - reg.exe query "HKLM\Software\[Wow6432Node\]IBM\WebSphere MQ\Installation" /s

The “normal” checks

- Choosing an installation name
- Making multiple installations
- Choosing a primary installation
- Uninstalling, upgrading, and maintaining the primary installation
- Choosing an installation location
- Choosing what to install
- Check that you have the latest info on hardware & software requirements
- Check that your systems have sufficient disk space for the installation
- Check that you have the correct license requirements



There are three ways of protecting a queue manager: Steps 1, 2 and 3 on the slide

Make sure that you do not miss any files, especially the log control file. Some of the directories might be empty, but you need them all to restore the backup at a later date.

2. Creating a backup qmgr

- **Create a backup queue manager for the existing queue manager using the control command crtmqm. The backup queue manager requires the following:**
  - To have the same attributes as the existing queue manager, for example the queue manager name, the logging type, and the log file size.
  - To be on the same platform as the existing queue manager.
  - To be at an equal, or higher, code level than the existing queue manager.
- **Take copies of all the existing queue manager's data and log file directories, including all subdirectories.**
- **Overwrite the backup queue manager's data and log file directories, including all subdirectories, with the copies taken from the existing queue manager.**
- **Execute the following control command on the backup queue manager:**
  - strmqm -r *BackupQMName*
  - This flags the queue manager as a backup queue manager within WebSphere® MQ, and replays all the copied log extents to bring the backup queue manager in step with the existing queue manager.

3. Back up the queue manager configuration only

- **Backing up queue manager configuration can help you to rebuild a queue manager from its definitions.**
- **To take a backup copy of a queue manager's configuration:**
  - Ensure that the queue manager is running.
  - On AIX®, HP-UX, Linux, Solaris, or Windows: Execute the Dump MQ Configuration command (dmpmqcfg) using the default formatting option of (-f mqsc) MQSC and all attributes (-a), use standard output redirection to store the definitions into a file.
  - dmpmqcfg -m MYQMGR -a > /mq/backups/MYQMGR.mqsc

Installation Verification

- **Log in as a user in the mqm group (for UNIX systems only)**
- **Set up environment variables**
  - dspmqver: The expected version number & installation name are returned, the environment is set up correctly.
- **Command for displaying MQ version: dspmqver**
- **Create a queue manager: crtmqm**
- **Start the queue manager: strmqm.**
- **Start MQSC command: runmqsc**
- **Define a local queue**
- **Put a message on the queue**
- **Get the messages from the queue**

Configuration Verification

- The **mqconfig** command is run to verify the system configuration matches or exceeds that which is required by WebSphere MQ. The configuration values are minimum values, and large installations might require values greater than those checked by this command.

```
# mqconfig -v 8.0
mqconfig: V3.7 analyzing Red Hat Enterprise Linux Server release 6.5
          (Santiago) settings for WebSphere MQ V8.0

System V Semaphores
  semmsl     (sem:1)  500 semaphores                      IBM>=32          PASS
  semmns     (sem:2)  35 of 256000 semaphores    (0%)     IBM>=4096        PASS
  semopm     (sem:3)  250 operations                      IBM>=32          PASS
  semmni     (sem:4)  3 of 1024 sets             (0%)     IBM>=128         PASS

System V Shared Memory
  shmmax              68719476736 bytes                   IBM>=268435456   PASS
  shmmni              1549 of 4096 sets           (37%)    IBM>=4096        PASS
  shmall              7464 of 2097152 pages       (0%)     IBM>=2097152     PASS

System Settings
  file-max            4416 of 524288 files        (1%)     IBM>=524288      PASS

Current User Limits (root)
  nofile       (-Hn)  10240 files                          IBM>=10240       PASS
  nofile       (-Sn)  10240 files                          IBM>=10240       PASS
  nproc        (-Hu)  11 of 30501 processes        (0%)     IBM>=4096        PASS
  nproc        (-Su)  11 of 4096 processes         (1%)     IBM>=4096        PASS
```


Any values listed in the Current User Limits section are resource limits for the user who ran **mqconfig**. If you normally start your queue managers as the mqm user, you should switch to mqm and run **mqconfig** there.If other members of the mqm group (and perhaps root) also start queue managers, all those members should all run**mqconfig**, to ensure that their limits are suitable for WebSphere MQ.

What's new?

- These attributes are common to new queue managers created in MQ 7.1, 7.5 and 8.0, or to migrated queue managers created in previous versions and then upgraded to MQ 7.1, 7.5 and 8.0:

ACTVCONO(DISABLED) < - New in 7.1
ACTVTRC(OFF) < - New in 7.1
CERTLABL('ibmwebspheremqqm_X') < - - - New in 8.0
CERTVPOL(ANY) < - New in 7.1
CHLAUTH() < - New in 7.1 feature is DISABLED for migrated Queue Mgr
But it is ENABLED for new Queue Managers
CONNAUTH('SYSTEM.DEFAULT.AUTHINFO.IDPWOS') < - - - New in 8.0
CUSTOM( ) < - New in 7.1
DEFCLXQ(SCTQ) < - - New in 7.5
PSCLUS(ENABLED) < - New in 7.1
SPLCAP(DISABLED) < - - New in 7.5
SUITEB(NONE) < - New in 7.1
VERSION() < - New in 7.1
XRCAP(NO) < - New in 7.1

What's New?

- This is a new attribute added to upgraded queue managers:
  CHLAUTH(DISABLED) => Channel Authority Records feature is DISABLED.
- By default, when creating a new queue manager in MQ 7.1, the following attribute is ENABLED:
  CHLAUTH(ENABLED) => Channel Authority Records feature is ENABLED.
- Attribute ACTVTRC (New in 7.1):
  Use the queue manager attribute ACTVTRC to control the collection of MQI application activity trace information
- Attribute CERTLABL (New in 8.0):
  This attribute specifies the certificate label of the channel definition.
  The label identifies which personal certificate in the key repository is sent to the remote peer. The certificate is defined as described in Digital certificate labels.

What's New?

- Attribute CONNAUTH('SYSTEM.DEFAULT.AUTHINFO.IDPWOS') (New in 8.0):
  - Turning on connection authentication on a queue manager
    On a queue manager object, the CONNAUTH attribute can be set to the name of an authentication information object. This object can be one of two types:
    - IDPWOS Indicates that the queue manager uses the local operating system to authenticate the user ID and password.
    - IDPWLDAP Indicates that the queue manager uses an LDAP server to authenticate the user ID and password.

What's New?

- Attribute REVDNS (New in 8.0):
  Security: Reverse lookup host names in CHLAUTH rules
  - The WebSphere MQ CHLAUTH rules have been enhanced so that CHLAUTH definitions can use Domain Name Server (DNS) host names instead of IP addresses.
  - The queue manager REVDNS attribute controls whether reverse lookup of the hostname from a Domain Name Server is done for the IP address from which a channel has connected.
  - If this attribute is enabled, DNS host names are reverse looked-up for the IP addresses of inbound channels when this information is required.
  - If the REVDNS attribute is not enabled, DNS host names are not reverse looked-up for the IP addresses of inbound channels.

Channel Authorizations

- **Channel authentication is enabled for new queue managers.**
- **The following exceptions are to prevent privileged access to the queue manager and access to system channels.**
  - Privileged user IDs asserted by a client-connection channel are blocked by means of the special value*MQADMIN.

```
SET CHLAUTH('*') TYPE(BLOCKUSER) USERLIST('*MQADMIN') +
DESCR('Default rule to disallow privileged users')
```

- **Except for the channel used by MQ Explorer, all SYSTEM.* channels are blocked.**

```
SET CHLAUTH('SYSTEM.*') TYPE(ADDRESSMAP) ADDRESS('*') USERSRC(NOACCESS) +
DESCR('Default rule to disable all SYSTEM channels')

SET CHLAUTH(SYSTEM.ADMIN.SVRCONN) TYPE(ADDRESSMAP) ADDRESS('*') USERSRC(CHANNEL) +
DESCR('Default rule to allow MQ Explorer access')
```

- **Note:** This behavior is default for all new WebSphere MQ version 7.5 queue managers on startup. You can disable channel authentication checking: **ALTER QMGR CHLAUTH(DISABLED)**

Application Connectivity

- **When a local application connects to a queue manager, it needs to load the libraries from the installation associated with the queue manager**
- **With multiple installations this introduces some complexity:**
  - When setmqm is used to change the installation associated with a queue manager, the libraries that need to be loaded change
  - When an application connects to multiple queue managers owned by different installations, multiple sets of libraries need to be loaded
- **If you link your applications to MQ v7.1 libraries, they automatically load the appropriate libraries when the application connects to a queue manager**
  - MQ v7.1 libraries can “switch” to the right libraries for the QM’s installation

Loading MQ libraries in a multi-version environment

- **How libraries are located depends on your environment**
  - If MQ v7.1 is installed in the default location, existing applications continue to work as before
  - Otherwise, you may need to rebuild the application or change configuration
- **On Windows, libraries are searched for in this order:**
  - The application's directory
  - The current directory
  - The global and the user's PATH variables
- **On other platforms, libraries are searched for in this order:**
  - LD_LIBRARY_PATH (or LIBPATH/SHLIB_PATH)
  - An embedded search path
  - The default library path

Options for loading libraries

Platform	Option	Benefits	Drawbacks
UNIX and Linux	Set/change the embedded runtime search path (RPath)	▪The path is explicit in the way the application is built	▪You need to recompile/link ▪If you move MQ, you must change RPath
UNIX and Linux	Set LD_LIBRARY_PATH or equivalent using setmqenv	▪No changes to existing applications ▪Overrides RPath ▪Easy to change if you move MQ	▪Depends on environment vars ▪Possible impacts on other applications
Windows	Set PATH using setmqenv	▪No changes to existing applications ▪Easy to change if you move MQ	▪Depends on environment vars ▪Possible impacts on other applications
All	Set the primary installation to v7.1 or later	▪No changes to existing applications ▪Easy to change the primary installation ▪Similar behavior to previous versions of MQ	▪While v7.0.1 is installed, you cannot make v7.1 primary ▪UNIX and Linux: Relies on /usr/lib in the default search path

Dates

MQ V8 Dates

- **Announce: 22 April 2014**
- **Availability:**
  - 23 May 2014 (eGA Distributed)
  - 13 June 2014 (z/OS and pGA Distributed)

- **End of Service for old platforms and versions**
  - MQ V7.0.0 and V7.0.1 for multiplatforms – EOM, EOS effective **September 2015**
    - V7.0 will have had more than 7 years of support
  - MQ V7.0.1 for z/OS – EOM, EOS effective **September 2015**
    - V7.0 .0 already out of service

Summary

The options for version-to-version migration are greatly increased by support for multiple installations

- No more big-bang migrations
- Side-by-side installation, particularly helpful for fix packs
- Granular application migration
- Relocatable installations

Questions & Answers