An Introduction to WebSphere MQ Multi-Instance Queue Managers

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Agenda

- Overview

- WebSphere MQ changes

- UNIX systems

- Windows systems

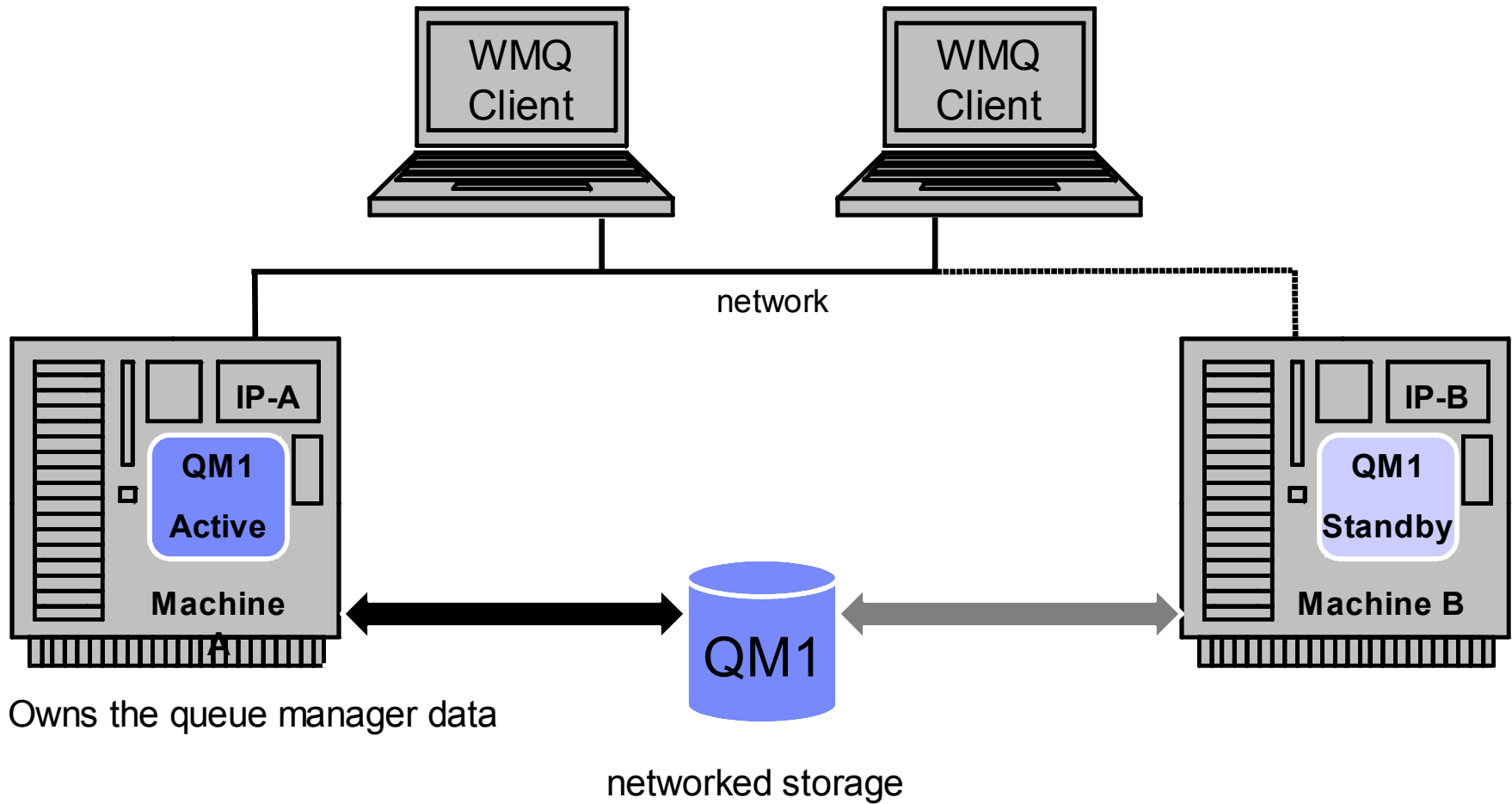- Explorer updates

- Traditional HA

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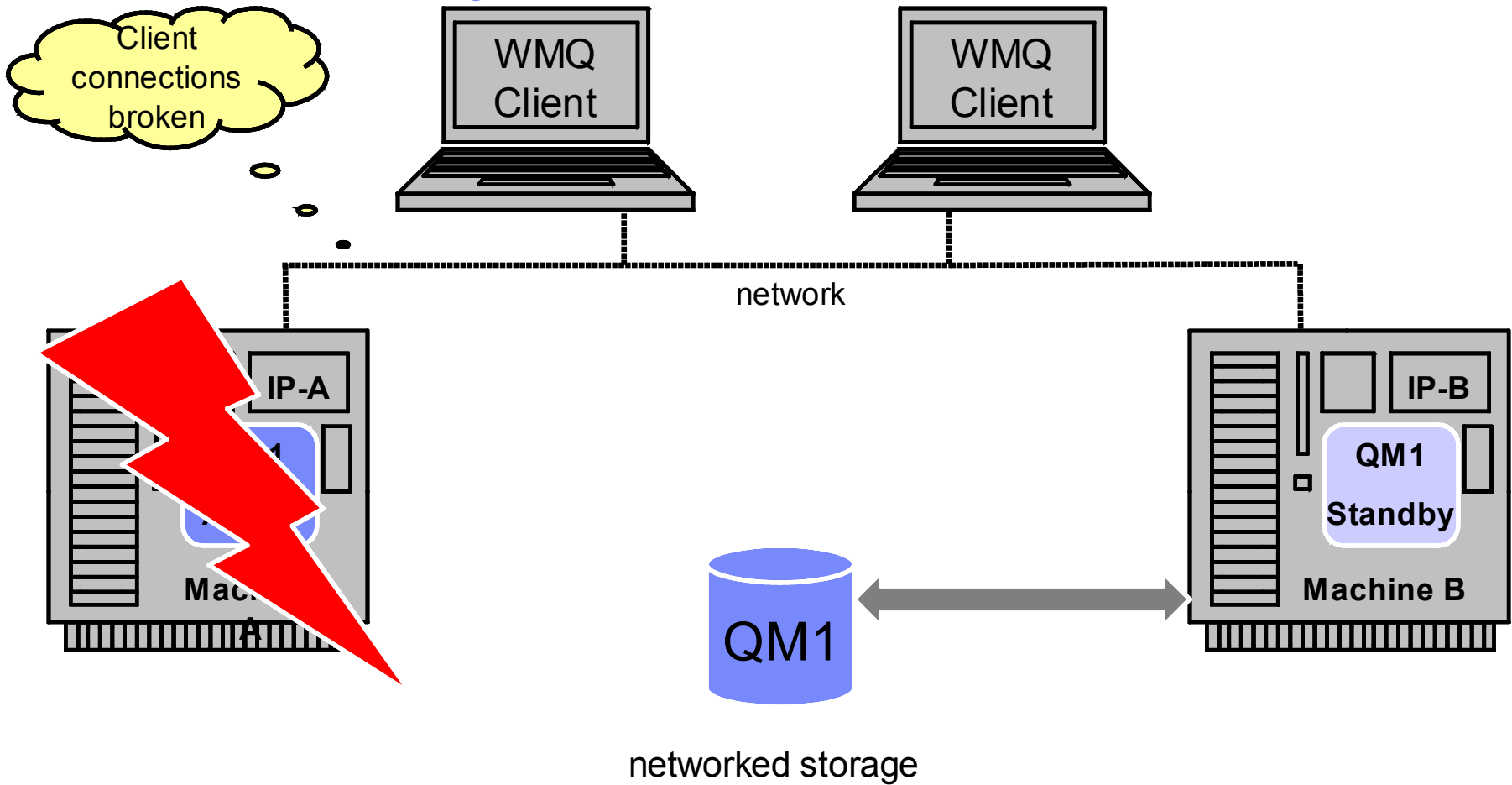- Explorer updates

- Traditional HA

Overview

- Basic failover support

- Not intended to replace HA coordinators

- Data retained on network storage

- Queue manager can be started on different machines
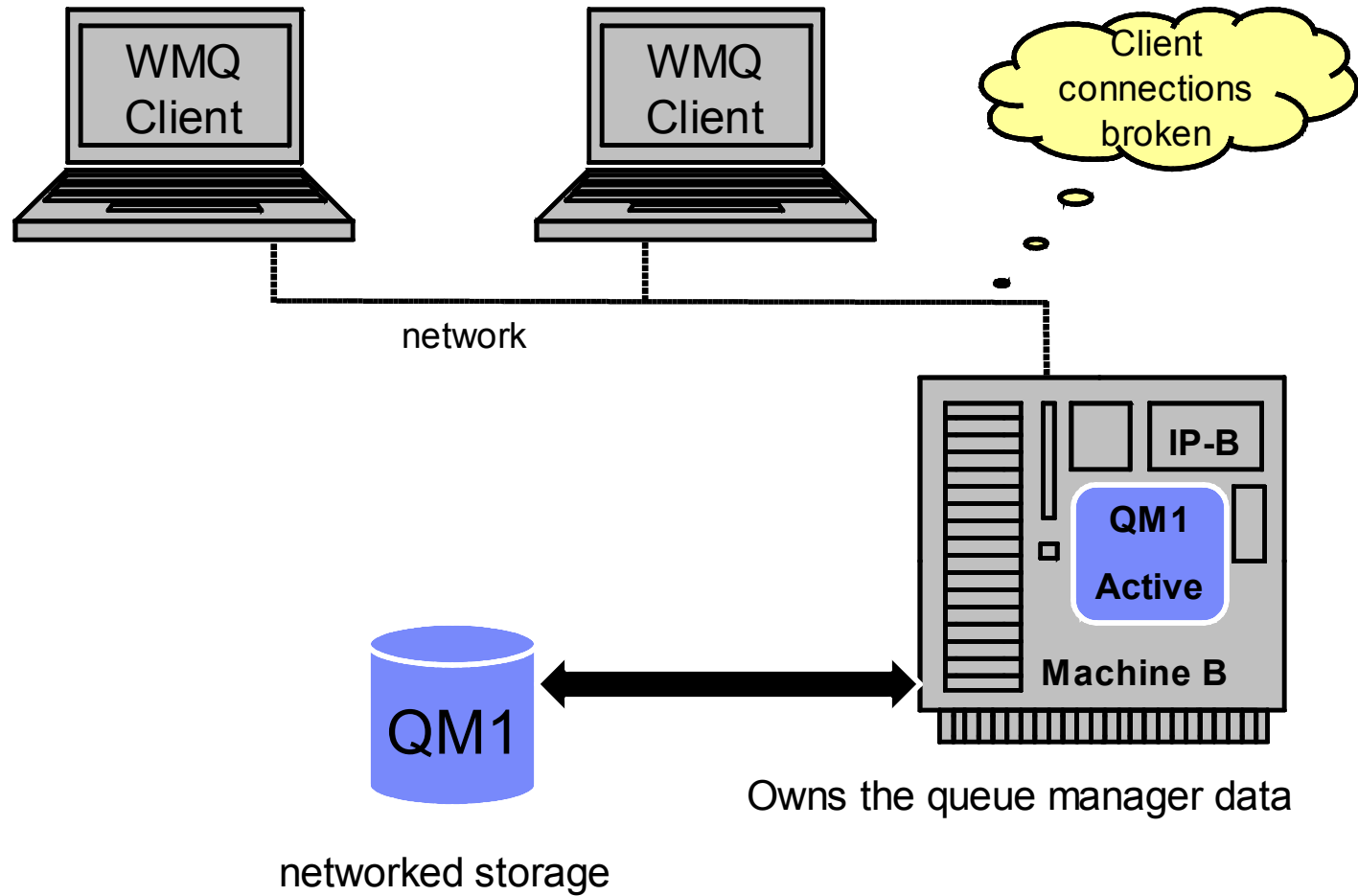 - ▶ Active instance
  - ▶ Standby instance

Basic multi-instance operation

WMQ Client

WMQ Client

network

IP-A

QM1

Active

Machine A

Owns the queue manager data

QM1

networked storage

IP-B

QM1

Standby

Machine B

Machine A system failure

Client connections broken

WMQ Client

WMQ Client

network

IP-A

IP-B

QM1 Standby

Mac... A

Machine B

QM1

networked storage

Standby instance becomes active

WMQ Client

WMQ Client

Client connections broken

network

IP-B

QM1 Active

Machine B

QM1

Owns the queue manager data

networked storage

Clients reconnect – recovery complete

WMQ Client

WMQ Client

Client connections reconnect

network

IP-B

QM1

Active

Machine B

QM1

Owns the queue manager data

networked storage
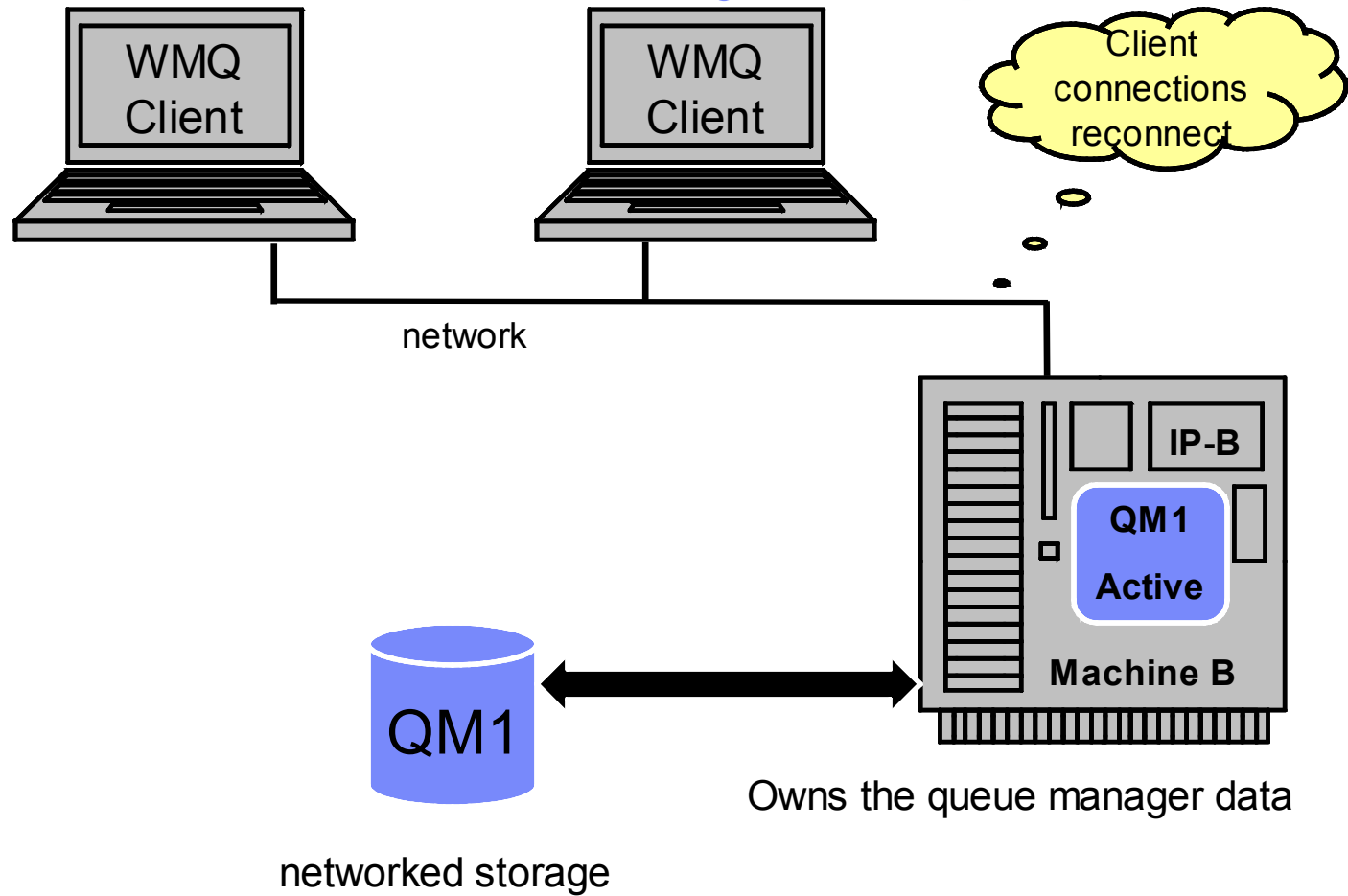
Supported WebSphere MQ platforms

- Currently available at 7.0.1.0 for the following:
    - ▶ AIX
    - ▶ Linux® (Power, X86-32, X86-64, System z)
    - ▶ HP (both HP-UX Itanium and PA-RISC)
    - ▶ Windows®

- i5/OS and Solaris planned

- Not available for z/OS

Considerations

- Not intended to manage resources beyond MQ

- System IP address not assumed as part of failover

- Support for networked storage over modern network file system protocols
  - ▸ NFS V4
  - ▸ Windows CIFS (Common Internet File System)
  - ▸ Must ensure that any caching is turned OFF to ensure data integrity

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New Commands

- Network storage validation command
    - ▶ amqmfsck (UNIX® only)

- Commands to modify mqs.ini
    - ▶ addmqinf
    - ▶ dspmqinf
    - ▶ rmvmqinf

Updated Commands

- crtmqm

  ▶ md – message data

  ▶ ld – transaction log data

  ▶ sax – create the queue manager, start the queue manager, set the queue manager to autostart, start it with the 'x' flag (Windows)

- strmqm

  ▶ x – starting of multi instance queue manager

  ▶ f – rebuild queue manager objects

Updated Commands (continued)

- endmqm

    ▸ x – stop the standby instance

    ▸ s – switch to failover instance

    ▸ r – Start trying to reconnect reconnectable clients

Updated Commands (continued)

- amqmdain (Windows)
    - alter /x <set | unset> - modify the start type of a multi-instance queue manager
    - end /s /r /x – same as endmqm
    - Registry operation is restricted for multi-instance queue managers.

Updated Commands (continued)

- dspmq

  - ▶ n – display output in English

  - ▶ o standby – display standby state

  - ▶ x – display instance information

- Updates to runmqsc

  - ▶ DISPLAY QMSTATUS ALL

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UNIX walkthrough

- **Ensure that matching user and group ids for mqm exist on both systems**

- **Test the network storage using amqmfsck**

  - ▸ `amqmfsck /shared/qmdata`
    - Checks basic POSIX file locking behaviour
  - ▸ `amqmfsck -w /shared/qmdata`
    - Use on two machines at once to ensure that the locks are handed off correctly when a process ends.
  - ▸ `amqmfsck -c /shared/qmdata`
    - Use on two machines at once to attempt concurrent writes.

UNIX walkthrough(continued)

- ■ **Create the queue manager on machine A**

```
crtmqm –md /shared/qmdata –ld /shared/qmlog QM1
```

- ■ **Define the queue manager on machine B (or edit mqs.ini)**

```
addmqinf –v Name=QM1 –v Directory=QM1 –v Prefix=/var/mqm
  –v DataPath=/shared/qmdata/QM1
```

- ▸ note that the above can be carried out on additional systems

UNIX walkthrough(continued)

- **Start the active instance of the queue manager on machine A**

  ```
  strmqm –x QM1

  WebSphere MQ queue manager 'QM1' started.
  ```

- **Start the standby instance of the queue manager on machine B**

  ```
  strmqm –x QM1

  WebSphere MQ queue manager 'QM1' started as a
      standby instance.
  ```

- **Only one active and one standby instance operational at a time**

Observing a multi-instance queue manager

- **On machine A:**

  - ```
    dspmq -x -o standby -o status
    QMNAME(QM1) STANDBY(Permitted) STATUS(Running)
         INSTANCE(machineA) MODE(Active)
         INSTANCE(machineB) MODE(Standby)
    ```

- **On machine B:**

  - ```
    dspmq -x -o standby -o status
    QMNAME(QM1) STANDBY(Permitted) STATUS(Running as standby)
         INSTANCE(machineA) MODE(Active)
         INSTANCE(machineB) MODE(Standby)
    ```

- **If defined on an additional system (machine C, D, etc....):**

  - ```
    dspmq -x -o standby -o status
    QMNAME(QM1) STANDBY(Permitted) STATUS(Running elsewhere)
         INSTANCE(machineA) MODE(Active)
         INSTANCE(machineB) MODE(Standby)
    ```

MQSC

- Queue manager status enhanced to show whether standby instances are permitted

```
DISPLAY QMSTATUS ALL

     1 : DISPLAY QMSTATUS ALL

AMQ8705: Display Queue Manager Status Details.

   QMNAME(QM1)                          STATUS(RUNNING)

   CONNS(27)                            CMDSERV(RUNNING)

   CHINIT(RUNNING)                      STANDBY(PERMIT)
```

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Windows mqm Group

- Members of the local mqm group of the primary (creating) node will have access

- Unlike UNIX systems, local groups on different nodes can not be made to match

- Modifying file permissions at failover is too costly – Different from MSCS

- Answer – create a mini-domain

Defining Network Shares

- Universal Naming Convention (UNC) share names should be used to avoid session boundaries

- Queue Manager log path cannot be the same as the data path

- Read/Write access must be granted for :
  - ▶ SYSTEM ID

  - ▶ mqm Group

  - ▶ Administrators Group

Configuration Data

- Queue manager configuration data can either be in the Windows registry or in INI files

- crtmqm /md flag indicates that the queue managers data is not in the default location (registry)

- DataPath attribute used to control location of queue manager configuration data - Windows registry or INI files

- Standard crtmqm will continue to use the Windows registry

Configuration Data (continued)

Queue Managers Configuration	WebSphere MQ Release		
	V7.0	V7.0.1	
		Standard	Multi-Instance
mqs.ini	Registry	Registry	Registry
qm.ini	Registry	Registry	INI File
qmstatus.ini	Registry	Registry	INI File

```
QueueManager
    QM_INI
    QM_REG
        ExitPath
        InstanceData
        Log
        Service
        ServiceComponent
    Services
    Trace
    WebAdministration
Maintenance Applied
Status
    QueueManager
        QM_REG
```
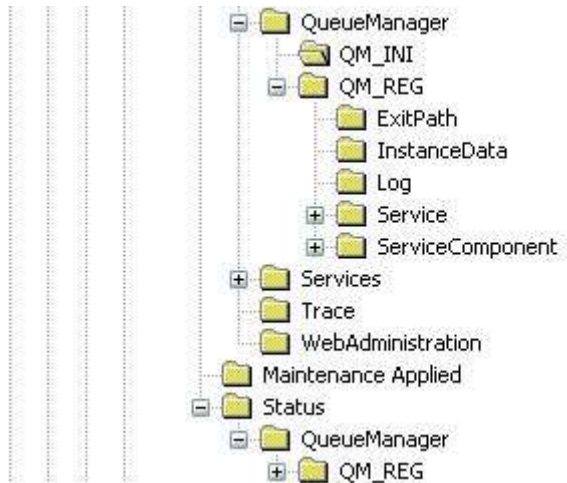
Name	Type	Data
(Default)	REG_SZ	(value not set)
DataPath	REG_SZ	\\Shannara\MQSeries\qmgrs\QM_INI
Directory	REG_SZ	QM_INI
Name	REG_SZ	QM_INI
Prefix	REG_SZ	D:\MQSeries

Windows Walkthrough

- Configure a pair of Windows servers as domain controllers

- The WMQ service needs to run as a domain user who is a member of the mqm group
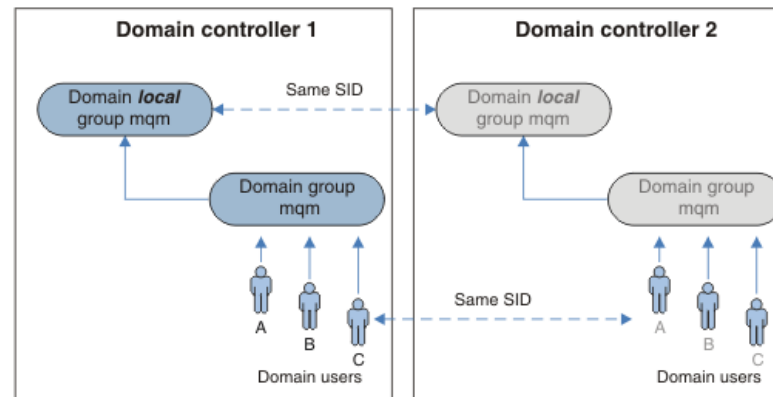
Windows Walkthrough (continued)

- Create a shared directory for the queue manager data

- The network share must be within the domain

- Modify both the share and file permissions

- Create the queue manager using the appropriate flags, specifying the data and log path. Use UNC format for network locations

Windows Walkthrough (continued)

Active Queue Manager Node	Standby Queue Manager Node
crtmqm /md \\host\share\data /ld \\host\share\log QM1	
	addmqinf /s QueueManager /v Name=QM1 /v Directory=QM1 /v Prefix="c:\mqm" /v DataPath=\\host\share\data
strmqm /x QM1	
	strmqm /x QM1
…	…

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MQ Explorer
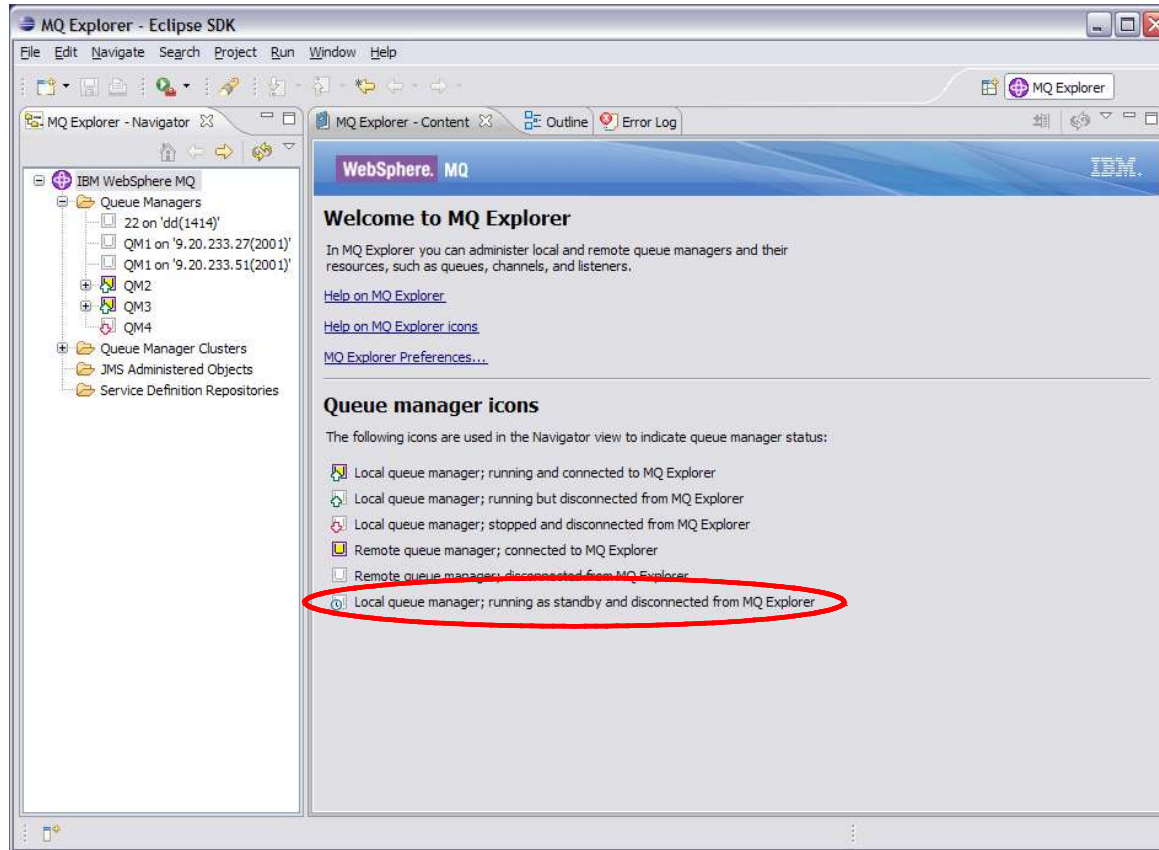
▸ only 1 new icon

Create Queue Manager wizard (continued)

▸ Default data and log paths can be changed (previously just log path)

▸ Checks for valid directory

▸ Checks for same path name

Create Queue Manager wizard (continued)

▸ Queue manager can be started to permit failover

▸ Automatic and Permit standby will use "–sax" option

Add Remote Queue Manager wizard

▶ Connect to single or multi instance queue manager using "Connect directly"

▶ Using a Client Channel Definition Table (CCDT) used to be on second page

Add Queue Manager

Select the queue manager and connection method

Identify the queue manager to add and choose the connection method to use

Queue manager name: HB

How do you want to connect to this queue manager?

◉ Connect directly
  This option creates a new connection to the queue manager (recommended)

◯ Connect using a client channel definition table
  This option uses a CCDT to create a new connection to the queue manager

◯ Connect using an intermediate queue manager
  This option uses an existing connection from another queue manager
  (Recommended when new connections are restricted)
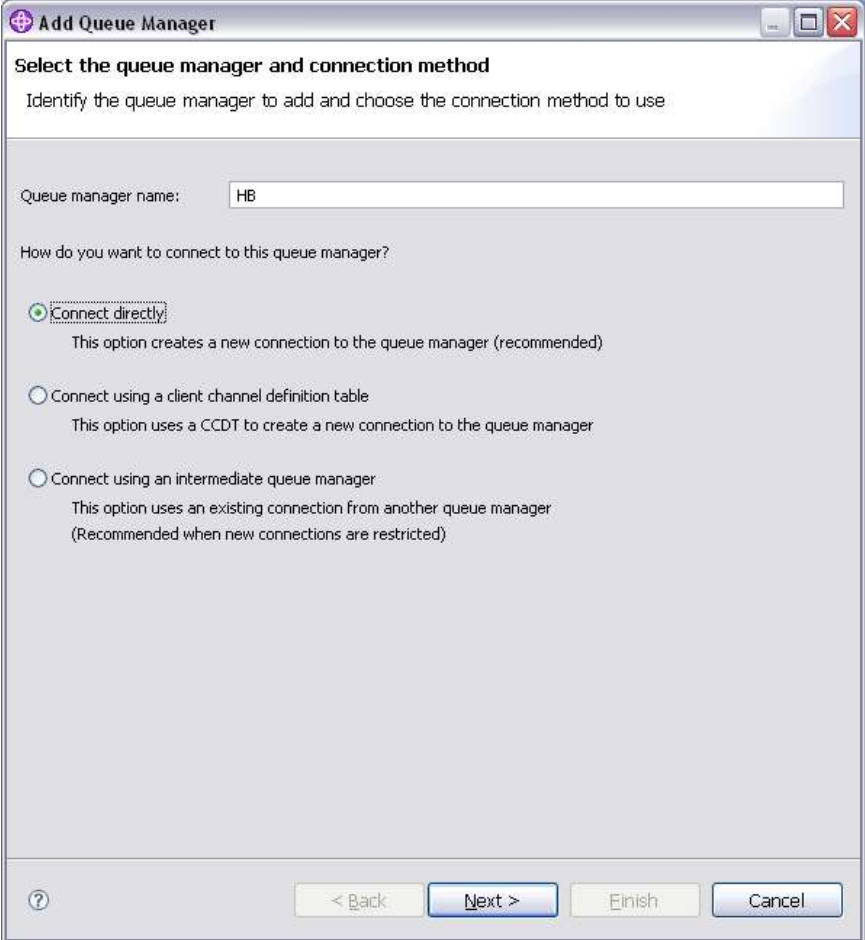
< Back   Next >   Finish   Cancel

Add Remote Queue Manager wizard (continued)

▶ CCDT details moved to own page

▶ Use for single or multi instance

▶ Multi instance
  - same channel name used for each instance
  - auto-reconnect enabled (can be reset)
  - further instances can be added using the Manage Instances dialog

Add Queue Manager

Specify new connection details
Provide details of the connection you want to set up

Queue manager name:	HB

Connection details
Host name or IP address: |
Port number: 1414
Server-connection channel: SYSTEM.ADMIN.SVRCONN

☑ Is this a multi-instance queue manager?

Connection details to second instance
Host name or IP address:
Port number: 1414
Server-connection channel: SYSTEM.ADMIN.SVRCONN

☑ Autoreconnect
☑ Automatically refresh information shown for this queue manager
Refresh interval (seconds): 300

⑦   < Back   Next >   Finish   Cancel

Queue Manager content page

Manage Instances

Manage Instances dialog
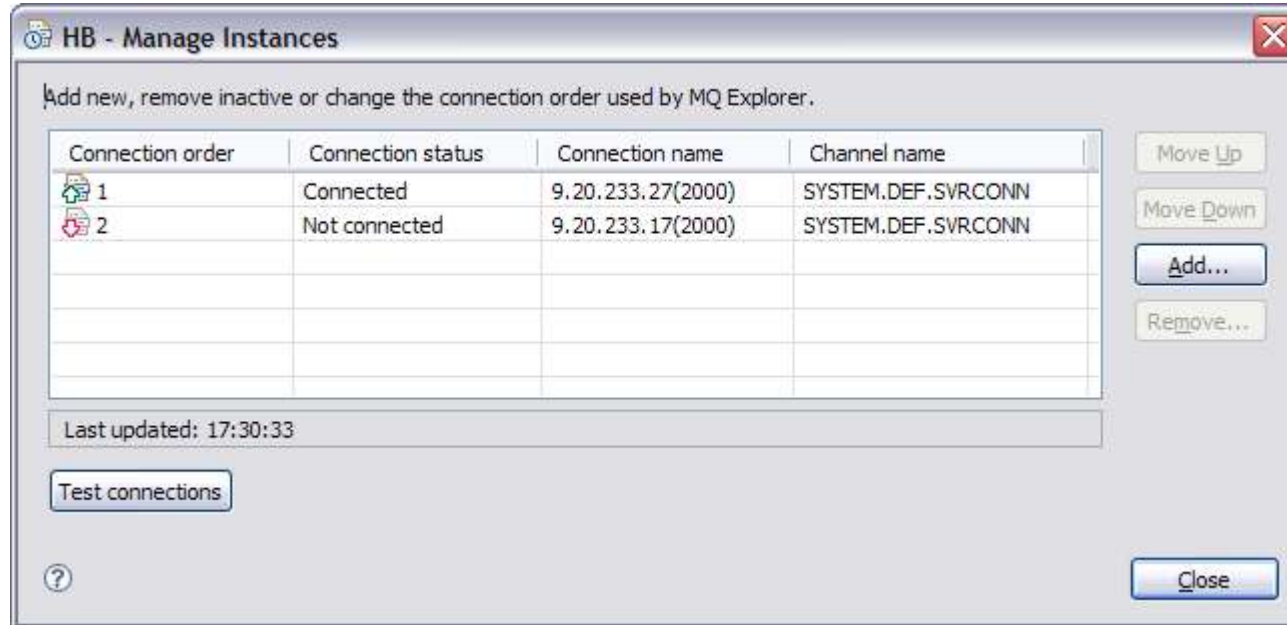
- Connection order used by MQ Explorer
  - cannot remove connected instance details

Manage Instances – connection details

Add Connection Details

Specify new connection details

Provide details for the connection to the multi-instance queue manager

Queue manager name: ss

Instance
Host name or IP address: zzzzzzzz
Port number: 1414
Server-connection channel: SYSTEM.ADMIN.SVRCONN

Finish   Cancel

IBM WebSphere MQ

Please confirm 'ss' is a multi-instance queue manager. (AMQ4613)

Yes   No   Details

IBM WebSphere MQ

You are about to remove the connection details 'aaaaaaa(1414)' to 'ss'. Are you sure that you want to continue? (AMQ4829)

Yes   No   Details

- **Single page wizard for adding new connection details**

Start/Stop Queue Manager dialogs
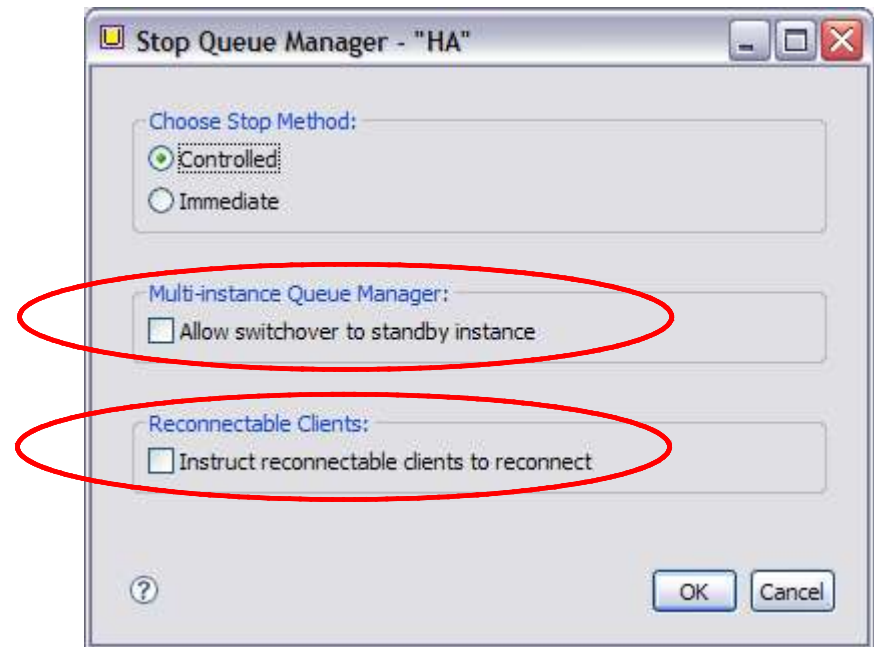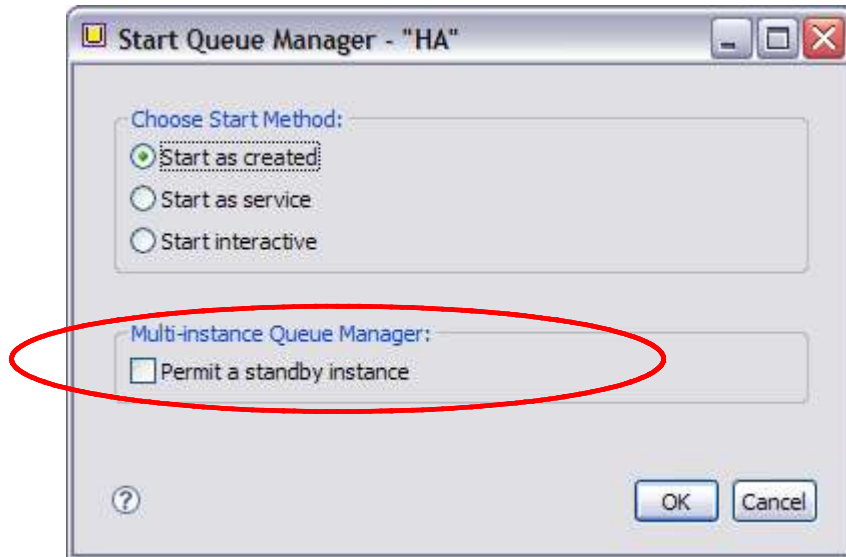
- ▪ Windows/Linux start dialog slightly different
- ▪ New control command flags "-x", "-s", "-r"

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➢ Traditional HA

7.0.1 and advanced HA products

- Microsoft® Cluster Services (MSCS)
  - ▸ No effect

- IBM® PowerHA for AIX, Veritas Cluster Server and HP Serviceguard, etc
  - ▸ Impacts/alters the usefulness of the HA SupportPac (MC91)

MC91 SupportPac

- Scripts for IBM PowerHA for AIX, Veritas Cluster Server and HP Serviceguard
  - The scripts are easily adaptable for other HA cluster products

- Scripts provided include:
  - hacrtmqm – Create queue manager
  - hadltmqm – Delete queue manager
  - halinkmqm – Link queue manager
  - hamqm_start – Start queue manager
  - hamqm_stop – Stop queue manager
  - hamigmqm – Migrate from V5.3 to V6

Why withdraw MC91?

- MC91 was provided 'as-is'

- MQ 7.0.1 can separate node-specific and shared data without environment variables and shell scripts
  - New DataPath attribute controlled by `crtmqm -md`
  - Much of what MC91 does is now redundant

- Each version of MQ means a new version of MC91
  - Gives customers an extra job when upgrading MQ

- Integrated product support preferable

Creating a QM in an HA cluster with MQ 7.0.1

- Create filesystems on the shared disk, for example
  - ▸ /MQHA/QM1/data for the queue manager data
  - ▸ /MQHA/QM1/log for the queue manager logs

- On one of the nodes:
  - ▸ Mount the filesystems
  - ▸ Create the queue manager

```
crtmqm –md /MQHA/QM1/data –ld /MQHA/QM1/log QM1
```

Creating a QM in an HA cluster with MQ 7.0.1

- **Print out the configuration information for use on the other nodes**

```
dspmqinf -o command QM1
```

- **On the other nodes:**
  - ▸ Mount the filesystems

  - ▸ Add the queue manager's configuration information

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

Filesystem organisation

- **Files located on the shared disk**

```
/MQHA/QM1/log/QM1/amqhlctl.lfh
                 /active/S0000000.LOG

/MQHA/QM1/data/QM1/qm.ini
                  /qmstatus.ini
                  /qmanager
                  /queues/...
                  /...
```

- **Files on the local disk**

```
/var/mqm/sockets/QM1/@ipcc
                    /@app
                    /...
```

Equivalents to MC91 facilities

MC91	Using MQ 7.0.1
hacrtmqm to create queue manager on shared disk and point symbolic links back to node's /var/mqm	New crtmqm –md option
halinkmqm	New addmqinf command
hadltmqm	New rmvmqinf command to remove queue manager from a node, dltmqm to delete the queue manager
hamqm_start	Use the MC91 hamqm_start
hamqm_stop	Use the MC91 hamqm_stop
rc.local script	Part of MC91 hamqm_start
hamqm_applmon	Use the MC91 hamqm_applmon, or a script more tailored to your needs

What does MC91 still bring?

- Queue manager start and stop scripts are more resilient than vanilla strmqm/endmqm

  ▶ For example, endmqm could get stuck in extreme cases

- Monitoring script for health-checking of queue manager by HA cluster

  ▶ Uses runmqsc `PING QMGR`

  ▶ A new alternative is `dspmq -n <qmname> | grep "RUNNING"`

Summary

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Useful Links

- MC91

http://www.ibm.com/support/docview.wss?uid=swg24011869

- Webcast : WebSphere MQ V7.0 Client Enhancements

http://www.ibm.com/support/docview.wss?uid=swg27016801

Additional WebSphere Product Resources

- Discover the latest trends in WebSphere Technology and implementation, participate in technically-focused briefings, webcasts and podcasts at:
http://www.ibm.com/developerworks/websphere/community/

- Learn about other upcoming webcasts, conferences and events:
http://www.ibm.com/software/websphere/events_1.html

- Join the Global WebSphere User Group Community:
http://www.websphere.org

- Access key product show-me demos and tutorials by visiting IBM Education Assistant:
http://www.ibm.com/software/info/education/assistant

- View a webcast replay with step-by-step instructions for using the Service Request (SR) tool for submitting problems electronically:
http://www.ibm.com/software/websphere/support/d2w.html

- Sign up to receive weekly technical My Notifications emails:
http://www.ibm.com/software/support/einfo.html

Questions and Answers