



IBM Software Group

IBM WebSphere MQ – An Introduction to Logging

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Agenda

- What are logs and what are they used for
- Logging parameters
- Logging configuration
- Creation of logs
- Log usage
- Log management
- Recovery
- Summary and questions

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What are transaction logs

- Provide the write ahead logging for WebSphere® MQ
- Transaction logs consist of two components
 - ▶ Three or more files of log data
 - S0000000.LOG – S99999999.LOG
 - ▶ Log control file
 - amqhlctl.lfh
- Default location of logs

UNIX: /var/mqm/log/<qmname>

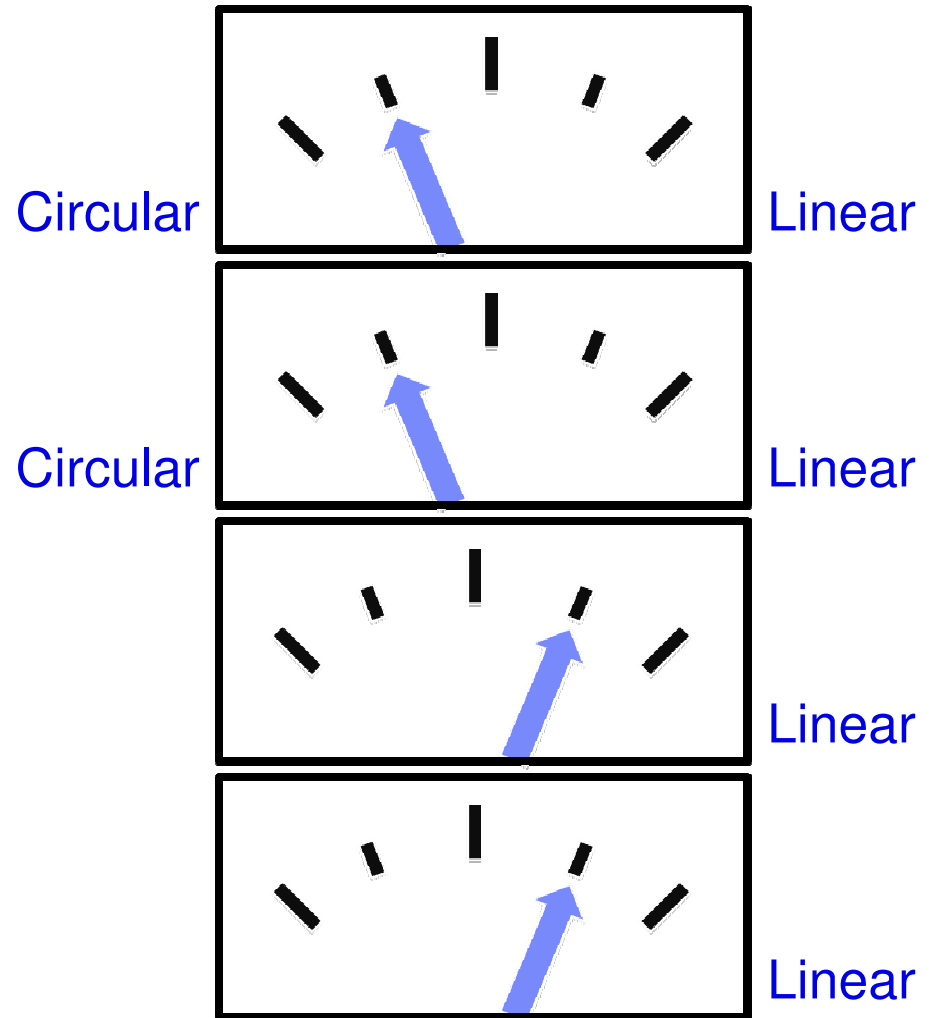
Windows: C:\Program Files\IBM\WebSphere MQ\log\<qm name>

MQ transaction logs contain

- Transaction activity(Units of Work) and persistent messages
- Internal data about queue manager objects
- Persistent channel status

Types of logging

- Performance
- Administration
- Ability to archive
- Media recovery



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Logging parameters

- There are several WMQ parameters which control operation of logging
- Logging parameters can have a significant effect on performance characteristics
- Some logging parameters can only be set at queue manager creation
- Parameters changeable after creation require a queue manager restart

Log type

- Linear or circular logging must be selected at queue manager creation time
- Logging type is specified on the crtmqm command
 - ▶ `-lc` option circular logging (default)
 - ▶ `-ll` option linear logging

Primary log files

- Specifies the initial, minimum number of log files
- Primary log files specified by the `-lp` parameter of the `crtmqm` command
 - ▶ Default 3
 - ▶ Minimum 2
 - ▶ Maximum 510 Unix
 - ▶ Maximum 254 Windows
- Can be altered after queue manager creation

Secondary log files

- Specifies the additional log files which can be created should primary logs become full
- Secondary log files specified by the `-ls` parameter of the `crtmqm` command
 - ▶ Default 2
 - ▶ Minimum 1
 - ▶ Maximum 509 Unix
 - ▶ Maximum 253 Windows
- Can be altered after queue manager creation

Log file constraints

- Primary + secondary log files
 - ▶ Maximum 511 Unix
 - ▶ Maximum 255 Windows
 - ▶ Minimum 3

- The maximum of 511/255 *active* log files is a key constraint for a single queue manager

Log file size

- Size of log file is specified as a number of 4KB pages
- Log file size may not be altered after queue manager creation
- Log file size specified by the `-lf` parameter of the `crtmqm` command

Log file size (cont)

| | No. of Pages | File Size | Maximum Active Windows | Maximum Active Unix |
|-----------------|--------------|-----------|------------------------|---------------------|
| Default Windows | 256 | 1MB | 256MB | |
| Default Unix | 1024 | 4MB | | 2GB |
| Minimum Windows | 32 | 128KB | 32MB | |
| Minimum Unix | 64 | 256KB | | 128MB |
| Maximum | 65535 | 256MB | 64GB | 128GB |

Log path

- Location of log files
 - ▶ Default
 - Unix
/var/mqm/log
 - Windows
C:\Program Files\IBM\WebSphere MQ\log
- Log file path specified via the `-ld` parameter of the `crtmqm` command


Log buffer size

- The log buffer size specifies the number of 4 KB pages WMQ uses to buffer log file writes
- The log buffer size is specified via the MQ configuration files
 - ▶ Default 128
 - Represented by the value 0
 - ▶ Minimum 18
 - ▶ Maximum 4096

Log write integrity

- Log write integrity selects the algorithm used to ensure log integrity
- The default integrity algorithm is TripleWrite
- The value SingleWrite can be specified via the MQ configuration files
- For most environments TripleWrite integrity should be used
- TripleWrite does not indicate a 3x write

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Default logging configuration

- UNIX
 - ▶ /var/mqm/mqs.ini

- Windows
 - ▶ HKEY_LOCAL_MACHINE\SOFTWARE\IBM\MQSeries\
CurrentVersion\Configuration\LogDefaults

Default logging configuration – cont'd

- UNIX

mqs.ini:

LogDefaults:

LogPrimaryFiles=3

LogSecondaryFiles=2

LogFilePages=1024

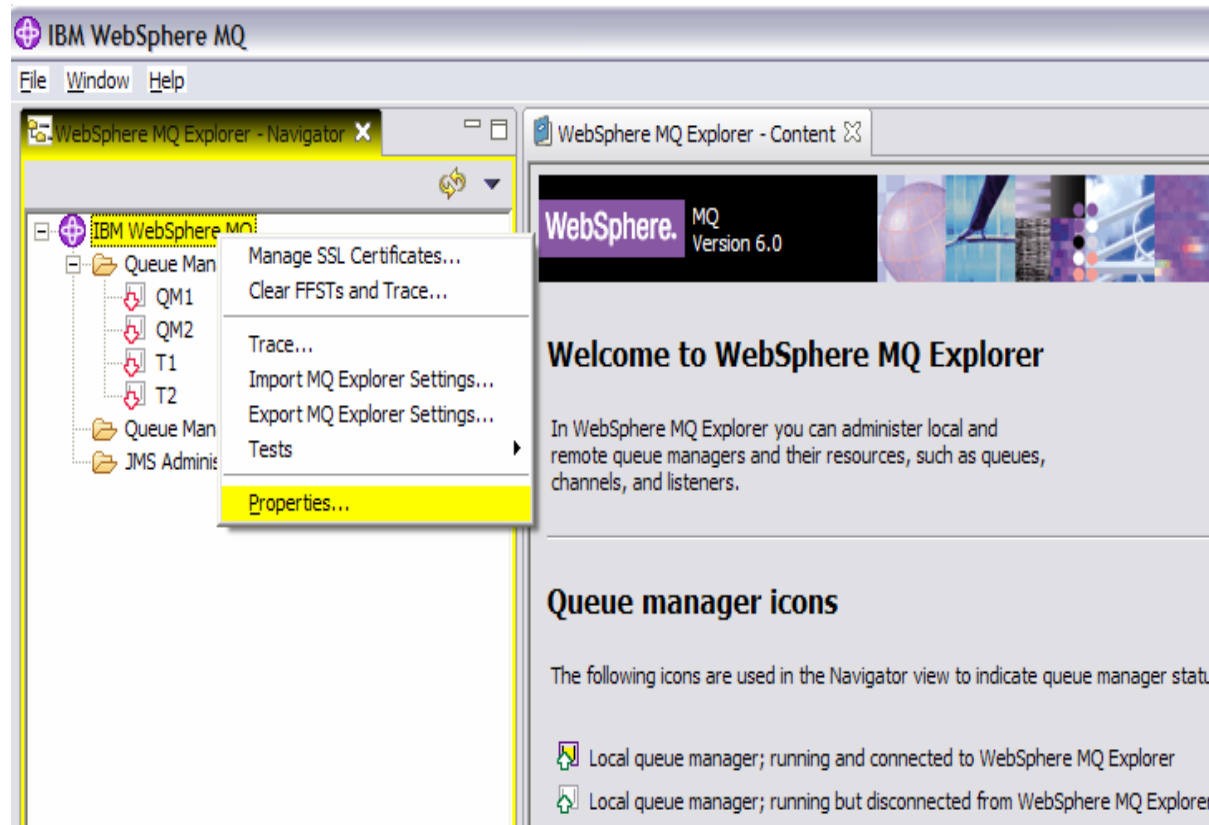
LogType=CIRCULAR

LogBufferPages=0

LogDefaultPath=/var/mqmqm/log

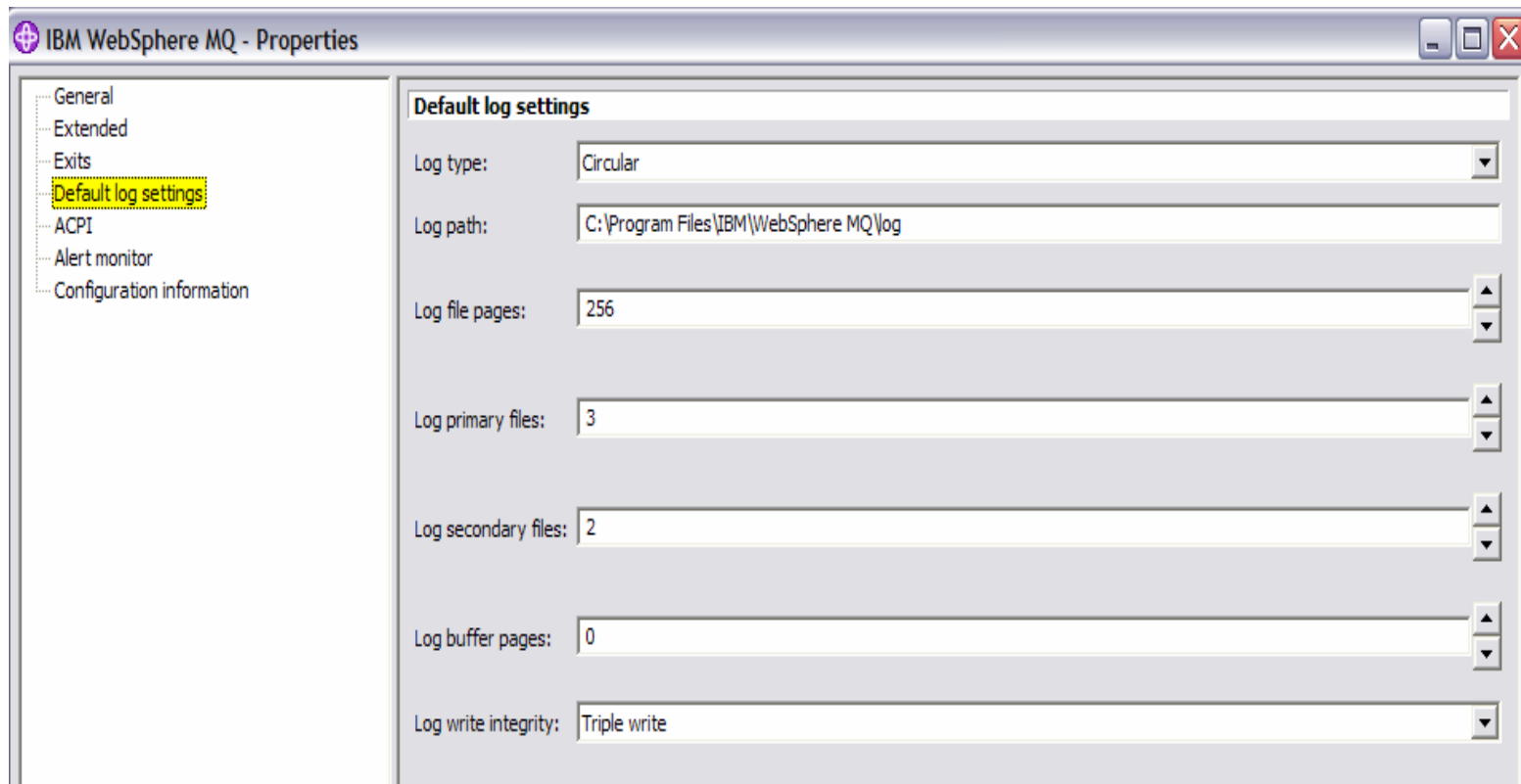
Default logging configuration – cont'd

- How to get to Log Default parameters in MQ Explorer?



Default logging configuration – cont'd

- MQ Explorer view of Default Log Settings



Effective logging configuration

- UNIX
 - ▶ `/var/mqm/qmgrs/QueueManagerName/qm.ini`

- Windows
 - ▶ `HKEY_LOCAL_MACHINE\SOFTWARE\IBM\MQSeries\
CurrentVersion\Configuration\QueueManager\
QueueManagerName\Log`

Effective logging configuration – cont'd

- UNIX:

qm.ini

Log:

LogPrimaryFiles=10

LogSecondaryFiles=5

LogFilePages=2048

LogType=CIRCULAR

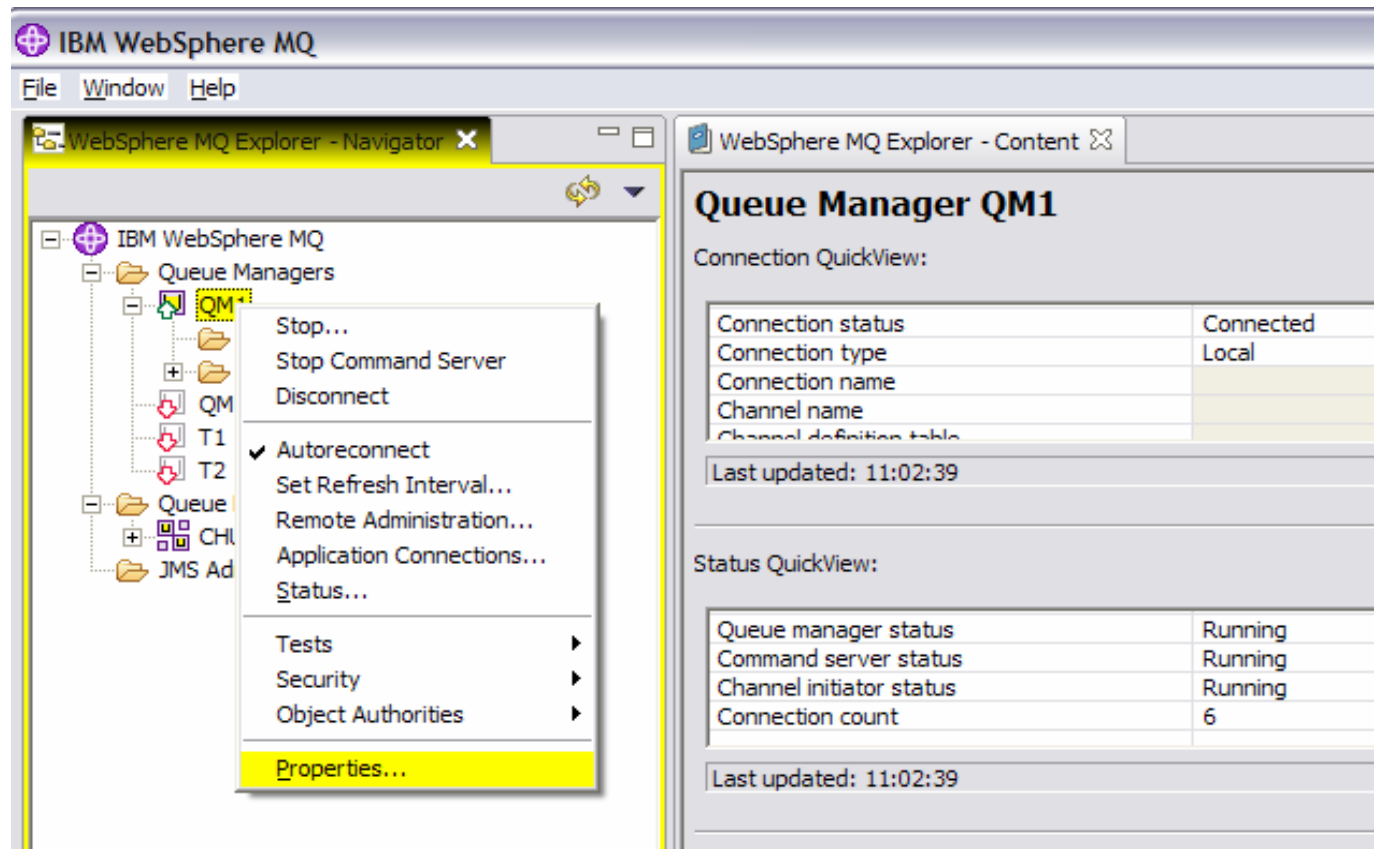
LogBufferPages=0

LogPath=/var/mqm/log/QM1/

LogWriteIntegrity=TripleWrite

Effective logging configuration – cont'd

- How to get to queue manager's logging parameters?



The screenshot shows the IBM WebSphere MQ Explorer interface. The left pane displays the navigation tree with 'Queue Managers' expanded, and 'QM1' selected. A context menu is open over 'QM1', with 'Properties...' highlighted. The right pane displays the 'Queue Manager QM1' configuration page, which includes two tables: 'Connection QuickView' and 'Status QuickView'.

Queue Manager QM1

Connection QuickView:

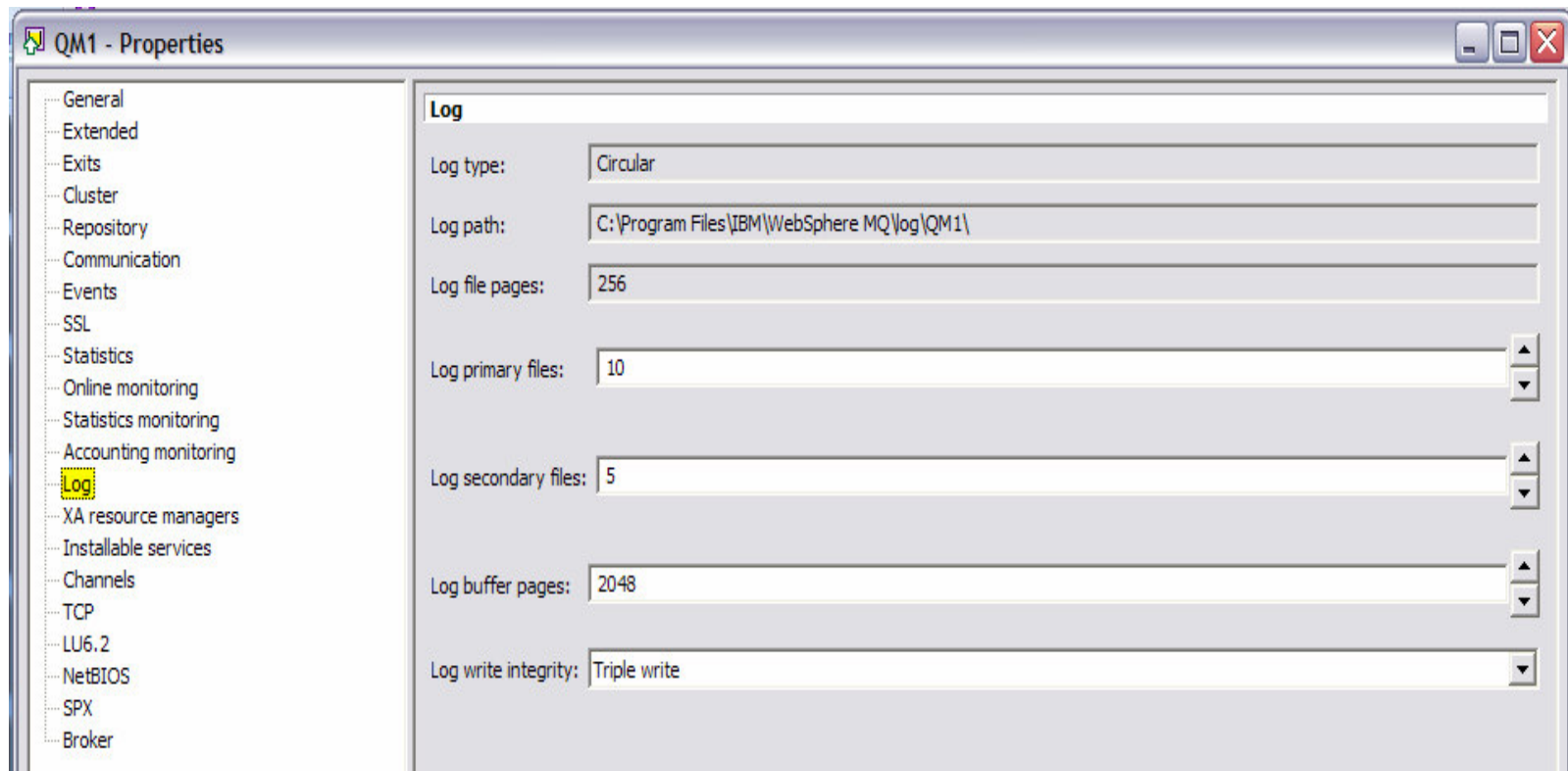
| | |
|--------------------------|-----------|
| Connection status | Connected |
| Connection type | Local |
| Connection name | |
| Channel name | |
| Channel definition table | |
| Last updated: 11:02:39 | |

Status QuickView:

| | |
|--------------------------|---------|
| Queue manager status | Running |
| Command server status | Running |
| Channel initiator status | Running |
| Connection count | 6 |
| Last updated: 11:02:39 | |

Effective logging configuration – cont'd

- MQ Explorer view of queue manager's logging configuration



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When and how are transaction logs created?

- Transaction logs are created at the same time as the queue manager
- crtmqm contains flags that dictate which logging configuration to create
 - ▶ Flags:
 - -lc Use circular logging
 - -ll Use linear logging
 - -ld LogPath
 - -lf LogFilePages
 - -lp LogPrimaryFiles
 - -ls LogSecondaryFiles

crtmqm examples – command line

- Circular

- ▶ Creating with defaults

- ```
crtmqm QM1
```

- ▶ Creating with options

- ```
crtmqm -ld /LOGFS/MQPROD/mqm/log -lf 2048 -lp 10 -ls 5 QM1
```

- Linear logging

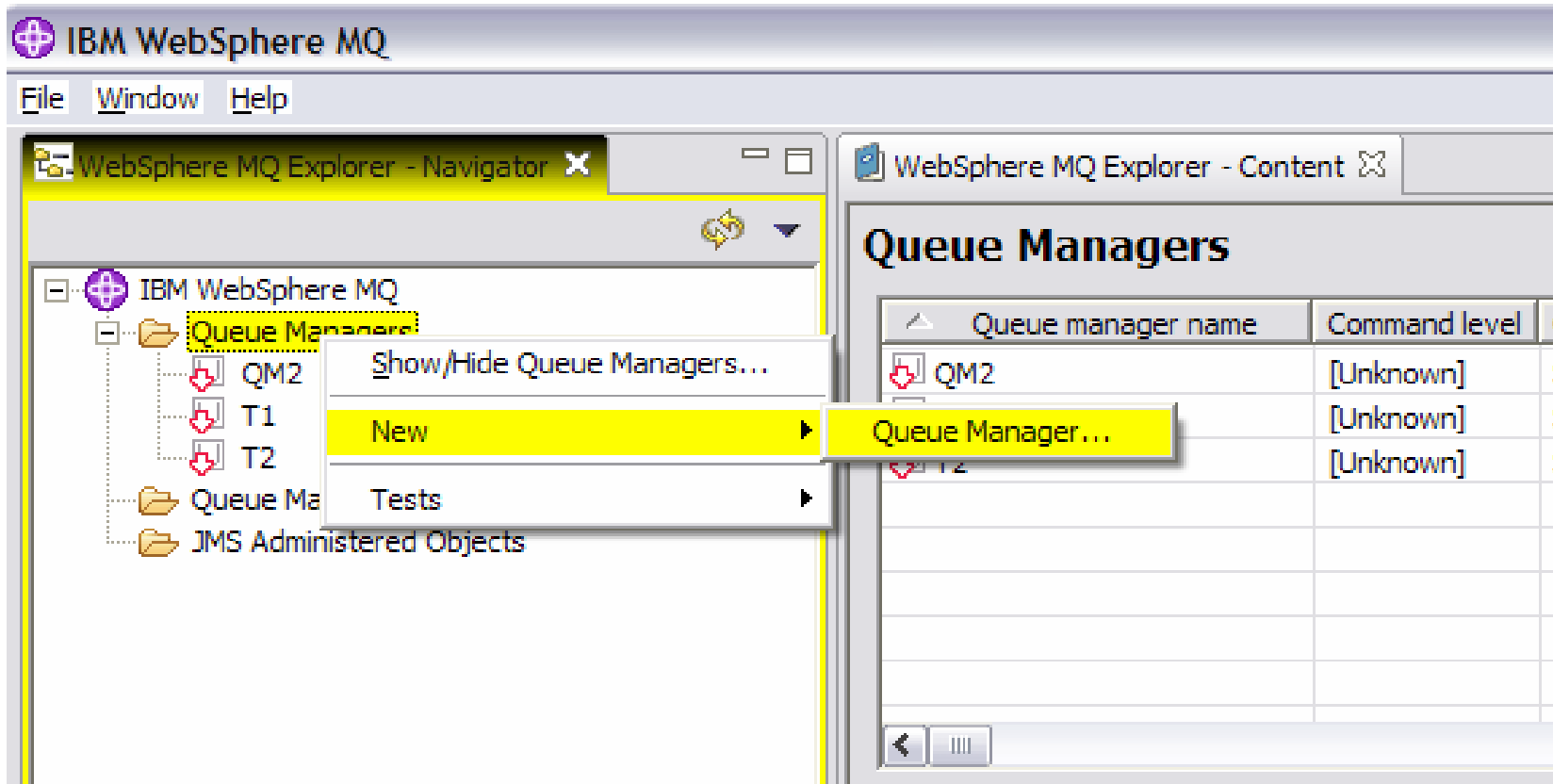
- ▶ Creating with defaults

- ```
crtmqm -ll QM1
```

- ▶ Creating with options

- ```
crtmqm -ll -ld /LOGFS/MQPRD/mqm/log -lf 2048 -lp 10 -ls 5 QM1
```

Creating queue manager and logging configuration using MQ Explorer



Creating queue manager and logging configuration using MQ Explorer – cont'd

Create Queue Manager

Queue Manager
Enter basic values (Step 1)

Queue manager name: QM1

Make this the default queue manager

Default transmission queue:

Dead letter queue:

Max handle limit: 256

Trigger interval: 999999999

Max uncommitted messages: 10000

< Back Next > Finish Cancel

Creating queue manager and logging configuration using MQ Explorer – cont'd

Create Queue Manager

Queue manager
Enter log values (Step 2)

Queue manager name: QM1

Use circular logging
 Use linear logging

Log path: C:\Program Files\IBM\WebSphere MQ\c Browse...

Log file size: (x4KB) 256

Log primary files: 3

Log secondary files: 2

< Back Next > Finish Cancel

Agenda

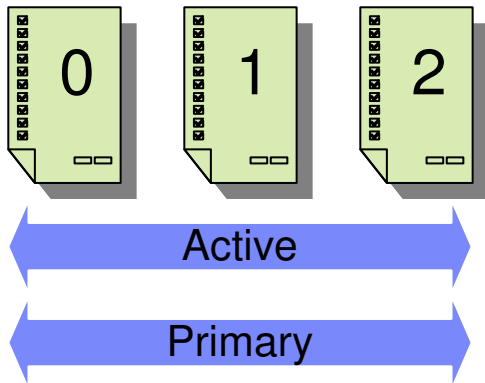
- What are logs and what are they used for
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Side-by-side comparisons

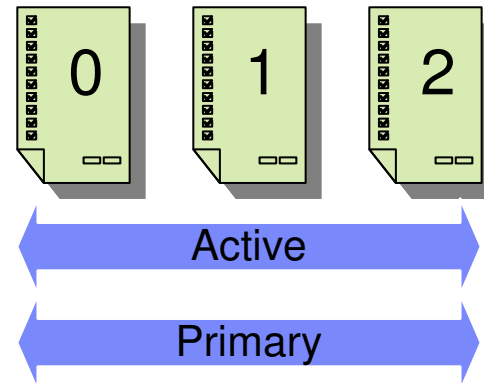
- The following slides compare circular and linear logging in action, illustrating:
 - ▶ Primary and secondary log files
 - ▶ Active log files – those required for restart recovery
 - ▶ Inactive log files – log files no longer needed for restart recovery

Log files after initial start of queue manager

Circular Logging

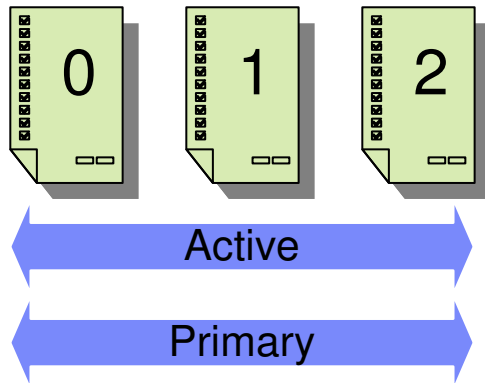


Linear Logging

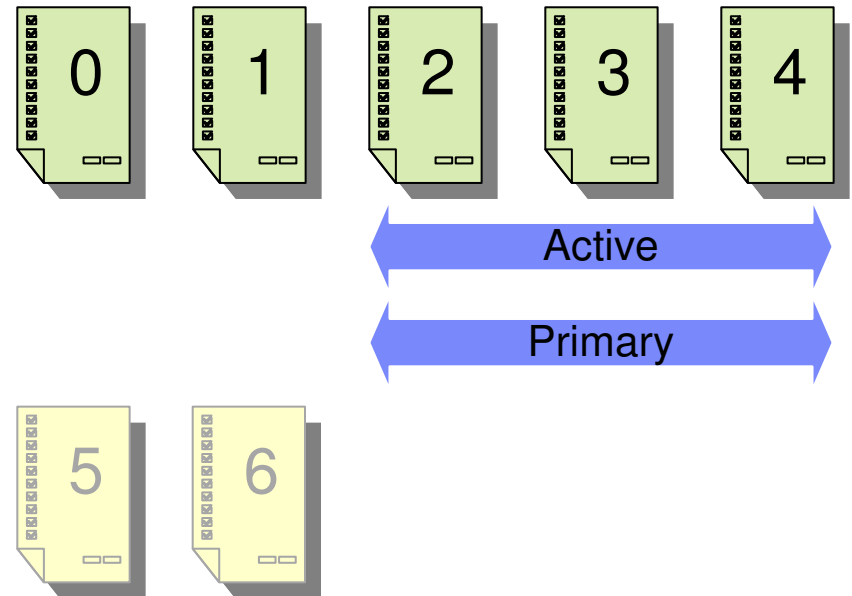


Working within primary logs

Circular Logging

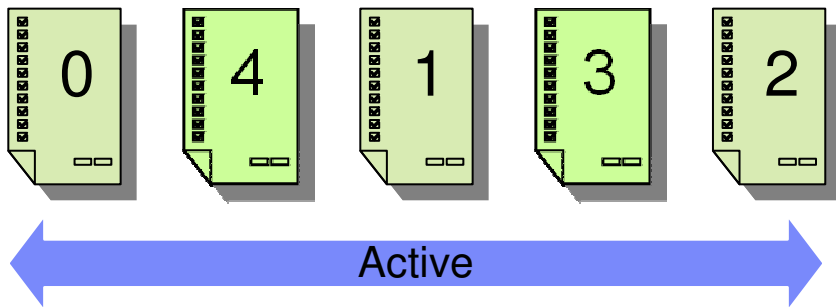


Linear Logging



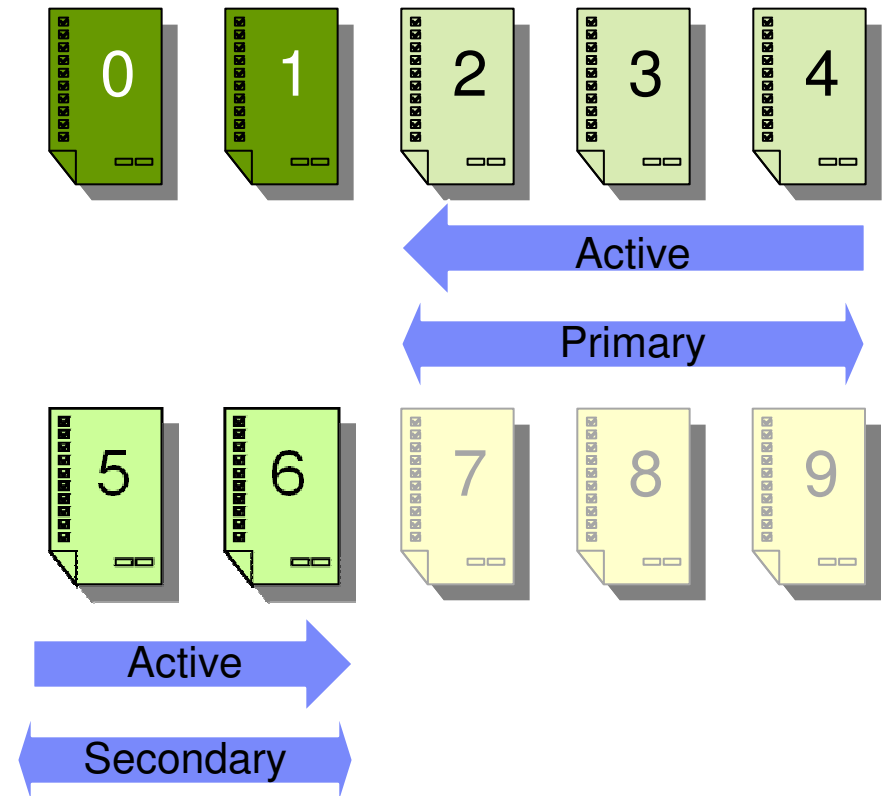
Expanding to secondary logs

Circular Logging



Note: The addition of the secondary logs into the active set depends on the location of the current write point in the active log set (called the head)

Linear Logging



Linear Logging inactive files

- What about log file 0 and 1 in the example?
 - ▶ Although not required for restart they may be required for recovery

AMQ7467: The oldest log file required to start queue manager MYQMGR is S0000002.LOG.

AMQ7468: The oldest log file required to perform media recovery of queue manager MYQMGR is S0000000.LOG.

Additional logger startup messages

- Reported in the queue manager error logs


AMQ5037: The Queue Manager task 'LOGGER-IO' has started.

- For linear logging only

AMQ5037: The Queue Manager task 'LOG-FORMAT' has started.

AMQ5037: The Queue Manager task 'LOGGEREV' has started.

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Log Management linear logging

- Physical file management
 - ▶ Space management
 - ▶ Moving/removing unnecessary files
- Recording object images
 - ▶ rcdmqimg command
 - ▶ Review qmgr error logs
 - AMQ7467 - restart
 - AMQ7468 - recovery


Log Management

- Circular
 - ▶ No log management required by the user
- Linear
 - ▶ Windows
 - MO73 (cat. 4): WebSphere MQ Linear Log Clean Up Utility
 - ▶ UNIX and Windows
 - MS62 (cat. 4): MQSeries - Linear log clean-up script
 - MS0L (cat. 2): WebSphere MQ Linear Logfile Maintenance In Java

Managing transaction rollback

- Reported in the queue manager error logs
 - ▶ AMQ7469: Transactions rolled back to release log space.
- Increasing log numbers may not be the correct answer

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Log Recovery Scenarios

- Power loss/Reboot/Queue Manager Failure
 - ▶ Restart Queue manager
 - Queues are restored to their committed state at the time of the failure
 - Persistent data is NOT lost
 - Non-persistent messages will be discarded

Log Recovery Scenarios

- Disk Failures

- ▶ Circular logging

- Restore queue manager and log files from latest back up
 - Rebuild queue manager using SupportPac MS03

- ▶ Linear logging

- Recover damaged objects with rcrmobj

or

- Restore queue manager from latest back up

Log Recovery

- Recovery of damaged objects
 - ▶ Circular
 - No object recovery is available
 - ▶ Linear
 - Media recovery function
 - rcdmqimg to record media image
 - rcrmobj to recover/recreate object from media image

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 **▪ Summary and questions**

Summary - General

- Transaction logs
- Parameters and configuration
- Steps in creating the logs
- How they are used and function
- Management of the physical files
- Recovery

Summary - Tuning considerations

- Logging type
- Log page size
- Log buffer size
- Primary/secondary log file numbers

Links

- WebSphere MQ Support site

<http://www.ibm.com/software/integration/wmq/support/>

- WebSphere MQ SupportPac page

<http://www.ibm.com/support/docview.wss?rs=977&uid=swg27007205>

- Link to WebSphere MQ Manuals

<http://www.ibm.com/software/integration/wmq/library/>

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 Flash replay with step-by-step instructions for using the Electronic Service Request (ESR) tool for submitting problems electronically:
<http://www.ibm.com/software/websphere/support/d2w.html>
- Sign up to receive weekly technical My support emails:
<http://www.ibm.com/software/support/einfo.html>

Questions and Answers

