



IBM Software Group

DataPower® integration with Multi-instance MQ Queue Managers

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WebSphere® Support Technical Exchange



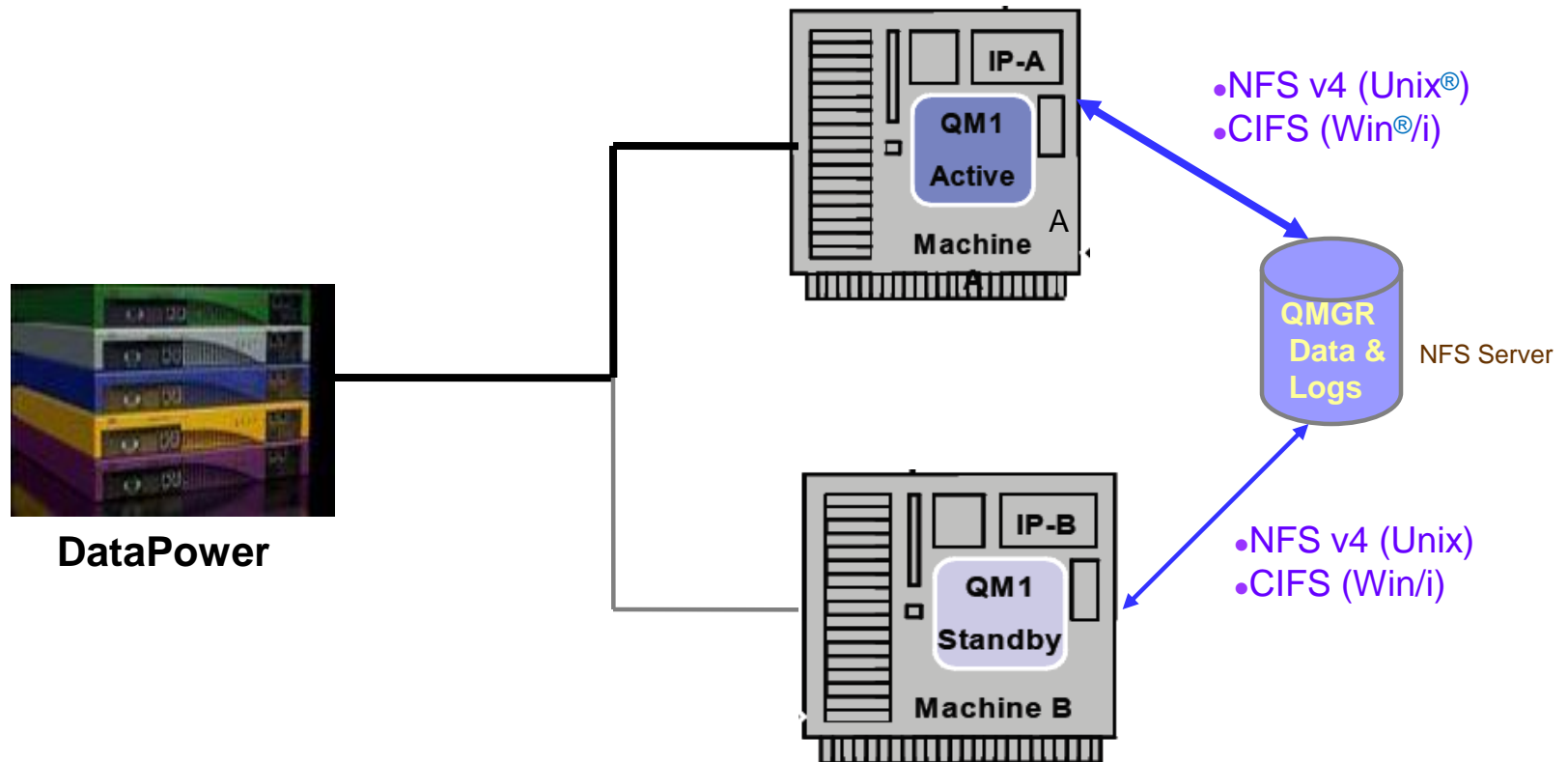
Agenda

- Key features of MQ Multi-Instance (MI) Queue Managers
- Basic MI operations and Failover mechanism
- Requirements for MI qmgrs successful implementation
- Use of Multi-instances in MQ Clusters
- MQ Failover mechanism for DataPower
- Integrating MI qmgrs with DataPower Services
- Configuration Best Practices for DataPower and MI qmgrs
- Troubleshooting
- Summary

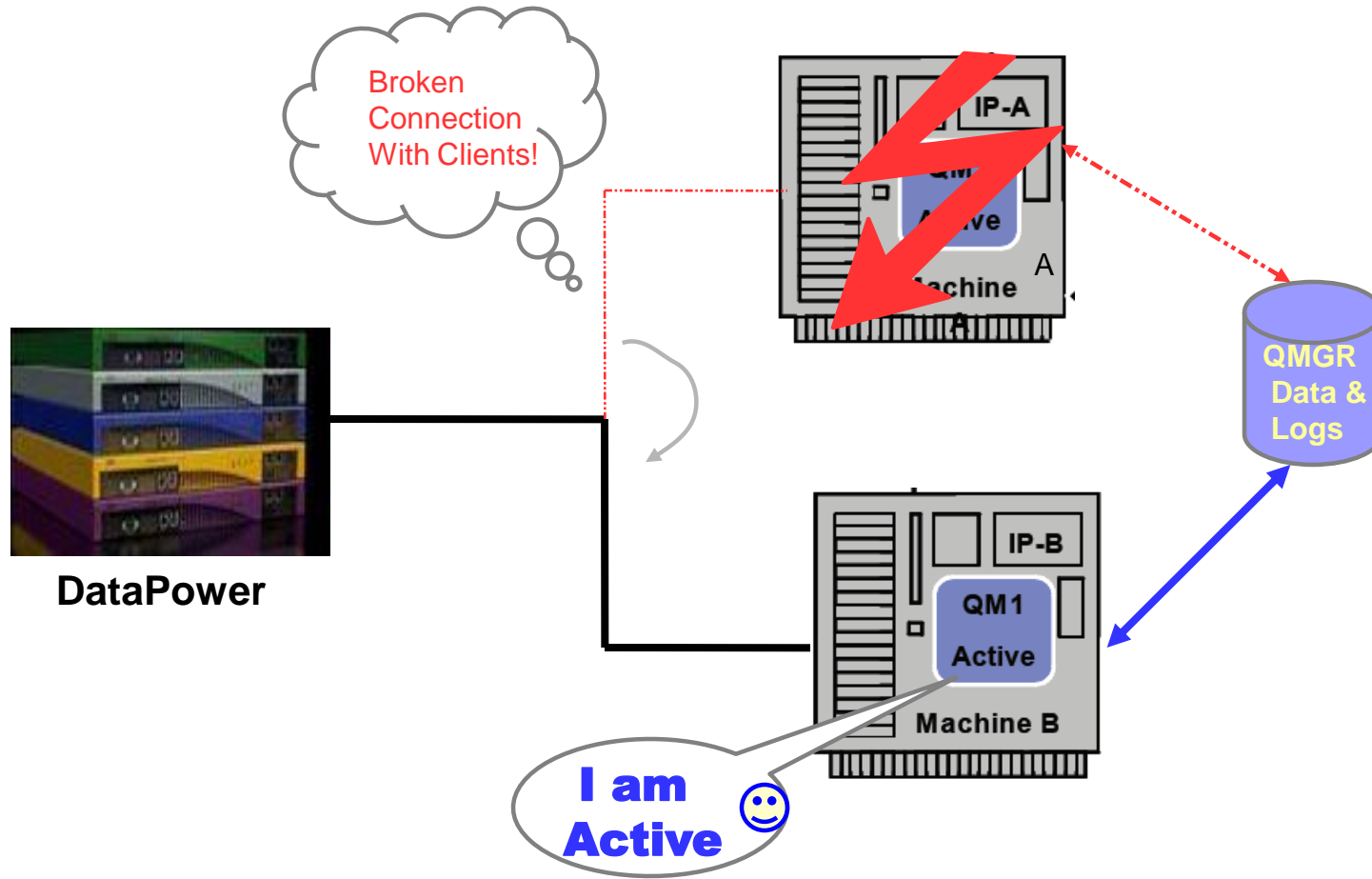
Key Features of Multi-Instances in MQ

- Multi-instance supports the basic Active, standby fail over mechanism
- Single copy of data stored on a shared network file system.
- Multiple instances of QMGRs be created on different servers with a single active instance to access the data and the remaining qmgrs are in standby state.

Basic Multi-instance MQ Operation



Active Node Failure Scenario



Requirements for Successful Implementation

- MQ install should be at a minimum level of 7.0.1
- The userid and groupid for the user “mqm” MUST be the same in all the systems involved.
- Shared file systems must provide
 - ▶ data write integrity
 - ▶ guaranteed exclusive access to files
 - ▶ release locks on failure
- A file systems such as a NAS, SAN or GPFS or NFSv4

Check the Network Shared File System

- New amqmfsc tool checks MQ directories
 - ▶ `amqmfsc /shared/qmdata`
- Checks basic POSIX file locking behavior
 - ▶ `amqmfsc -w /shared/qmdata`
- Use on two machines at once to ensure that the locks are handed off correctly when a process ends.
 - ▶ `amqmfsc -c /shared/qmdata`
- Run all three tests on all machines to avoid problems

Setup of Multi-Instance QMGRs

- 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 -vName=QM1 -vDirectory=QM1 -vPrefix=/var/mqm -vDataPath=/shared/qmdata/QM1`
- Start the active instance of the queue manager on machine A
 - ▶ `strmqm -x QM1`
- Start the standby instance of the queue manager on machine B
 - ▶ `strmqm -x QM1`

Display of Multi-Instance QMGRs

- On machine A (Active Instance), you can find the following:

- ▶ `dspmqr -x -o standby`

```
QMNAME(QM1) STANDBY(Permitted) STATUS(Running)
```

```
INSTANCE(machineA) MODE(Active)
```

```
INSTANCE(machineB) MODE(Standby)
```

- On machine B, this is what you see:

- ▶ `dspmqr -x -o standby`

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

```
INSTANCE(machineA) MODE(Active)
```

```
INSTANCE(machineB) MODE(Standby)
```

- If QM1 was also configured on a third machine with no running instances, this is what you see:

- ▶ `dspmqr -x -o standby`

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

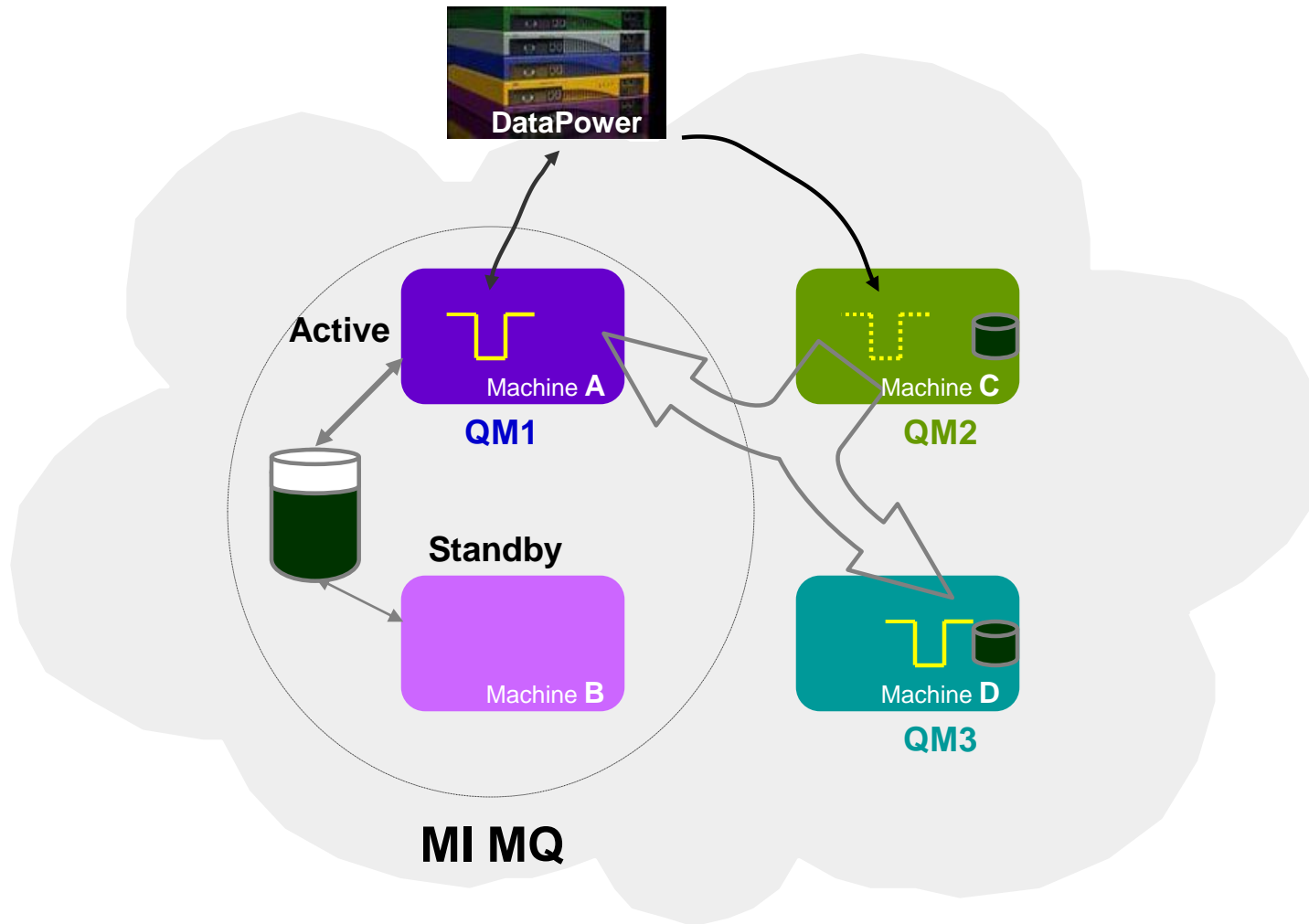
```
INSTANCE(machineA) MODE(Active)
```

```
INSTANCE(machineB) MODE(Standby)
```

Fail Over in Multi-Instance QMGRs

- To completely stop a multi-instance queue manager, issue a normal `endmqm` on the active instance on machine A:
 - ▶ `endmqm -i QM1`
WebSphere MQ queue manager 'QM1' ended.
Both instances end
- To stop just the standby instance, on machine B:
 - ▶ `endmqm -x`
QM1 WebSphere MQ standby queue manager instance 'QM1' ended.
- To switch over the active to the standby, on machine A:
 - ▶ `endmqm -is QM1`
- WebSphere MQ queue manager 'QM1' ended, permitting switchover to a standby instance
- Once the active instance has ended, the standby instance will try to become the activeinstance.

Multi-instance in MQ Cluster



MQ Failover mechanism for DataPower

- DataPower provides MQ Queue Manager (mq-qm) object as the MQ Client
- The mq-qm object works with MQ Front Side Handler and MQ URL Opener to process MQ traffic using services such as Multi-Protocol Gateway and WS-Proxy Service
- The mq-qm object provides basic connection along with retry logic for failed connection to qmgr
- The mq-qm object also defines connection pool size along with idle timeout (cache-timeout)
- The mq-qm objects participate in the MQ Queue Manager Group (mq-qm-group) to enable fail over capability

MQ Failover mechanism for DataPower Continued (MQ Queue Manager Group)

- MQ Queue Manager Group (mq-qm-group) object implements fail over capability for the DataPower Services
- Primary MQ Queue Manager is used with an existing MQ Queue Manager (mq-qm) object
- Backup MQ Queue Managers are configured with one or more backup mq-qm objects in the event the primary mq-qm object becomes unavailable
- mq-qm-group uses the primary mq-qm as the main MQ Queue Manager object for processing MQ traffic

MQ Failover mechanism for DataPower Continued.. (MQ Queue Manager Group)

- When primary mq-qm failed, mq-qm-group always picks up the first backup mq-qm object from the backup mq-qm list as the primary mq-qm
- If the selected backup mq-qm's operation state is not up, then mq-qm-group will pick the next backup mq-qm (second from the backup mq-qm list), and so on, until the selected backup mq-qm's operation state is up.
- If the original primary mq-qm comes back, mq-qm-group will switch back to use the original primary mq-qm object immediately

Integrating MI qmgrs with DataPower Service and its associated objects



DataPower Service Configuration – Best Practices

- ▶ Create Multi-Protocol Gateway Service for Datagram Traffic
- ▶ Create Style Policy, Rules and Multi-steps
- ▶ Create Front Side Handlers such as MQ and MQFTE
- ▶ Create mq-mq object and its associated parameters
- ▶ Create mq-qm-group object with primary and backup mq-qm objects
- ▶ Configure Backside MQ / MQFTE URLs

DataPower Multi-Protocol Gateway Configuration

Configure Multi-Protocol Gateway

General | Advanced | Stylesheet Params | Headers | Monitors | WS-Addressing | WS-ReliableMessaging

Apply | Cancel | Delete

Export | View Log | View Status | Show Probe | Validate Conformance | Help

Multi-Protocol Gateway status: [up]

General Configuration

Multi-Protocol Gateway Name

mq-multi-instance-test *

Summary

Type

- dynamic-backend
- static-backend

*

XML Manager

mi-qmgr-xml-mgr + ... *

Multi-Protocol Gateway Policy

mq-multi-instance-test-policy + ... *

URL Rewrite Policy

(none) + ...

Back side settings

Backend URL

dpmq://multi-instance-grp/?Reque: *

- MQHelper
- TibcoEMSHelper
- WebSphereJMSHelper
- IMSConnectHelper

Front side settings

Front Side Protocol

mq-fsh1 (MQ Front Side Handler) ✕

▼ Add + ...

*



DataPower Multi-Protocol Gateway Configuration Continued..

Back attachment processing format

- Dynamic
 MIME
 DIME
 Detect

Back Side Timeout

 *

Stream Output to Back

- Buffer Messages
 Stream Messages

HTTP Version to Server

- HTTP 1.0
 HTTP 1.1

Propagate URI

- on off

Compression

- on off

Front attachment processing format

- Dynamic
 MIME
 DIME
 Detect

Front Side Timeout

 *

Stream Output to Front

- Buffer Messages
 Stream Messages

DataPower Multi-Protocol Gateway Configuration – Advanced Tab

Configure Multi-Protocol Gateway

General **Advanced** Stylesheet Params Headers Monitors WS-Addressing WS-Reliability

Apply Cancel Delete Export | View Log | View Status | Show Probe | Validate Conformance | Help

Multi-Protocol Gateway status: [up]

Advanced settings

Persistent Connections <input checked="" type="radio"/> on <input type="radio"/> off	MIME Back Header Processing <input checked="" type="radio"/> on <input type="radio"/> off
Allow Cache-Control Header <input type="radio"/> on <input checked="" type="radio"/> off	MIME Front Header Processing <input checked="" type="radio"/> on <input type="radio"/> off
Loop Detection <input type="radio"/> on <input checked="" type="radio"/> off	Service Priority Normal ▾
Follow Redirects <input checked="" type="radio"/> on <input type="radio"/> off	Default Param Namespace <input type="text" value="http://www.datapower.com/param/config"/>
Allow Chunked Uploads <input type="radio"/> on <input checked="" type="radio"/> off	Query Param Namespace <input type="text" value="http://www.datapower.com/param/query"/>
Process Backend Errors <input type="radio"/> on <input checked="" type="radio"/> off	SOAP Schema URL <input type="text" value="store:///schemas/soap-envelope.x"/>
Front Persistent Timeout <input type="text" value="180"/> seconds *	Load Balancer Hash Header <input type="text"/>
Back Persistent Timeout <input type="text" value="180"/> seconds *	Message Processing Modes <input type="checkbox"/> Request rule in order <input type="checkbox"/> Backend in order <input type="checkbox"/> Response rule in order
	Process Messages Whose Body Is Empty <input type="radio"/> on <input checked="" type="radio"/> off

DataPower Multi-Protocol Gateway Policy and Multi-Steps Configurations

Rule:

Rule Name: Rule Direction: Client to Server

Create rule: Click New, drag action icons onto line. Edit rule: Click on rule, double-click on action

Filter Sign Verify Validate Encrypt Decrypt Transform Route AAA Results Advanced

CLIENT ORIGIN SERVER

Configured Rules				
Order	Rule Name	Direction	Actions	
↑ ↓	mq-multi-instance-test-policy_rule_0	Client to Server		delete rule



DataPower MQ Front Side Handler Configuration



Configure MQ Front Side Handler

Main

MQ Front Side Handler: mq-fsh1 [up]

Apply

Cancel

Undo

[Export](#) | [View Log](#) | [View Status](#) | [Help](#)
[Quiesce](#) | [Unquiesce](#)

General

Administrative State

enabled disabled

Comments

Queue Manager

multi-instance-grp ▼



*

Get Queue

QUEUE1

*

Put Queue

The number of concurrent MQ connections

1

DataPower MQFTE Front Side Handler Configuration



Configure MQFTE Front Side Handler

Main

MQFTE Front Side Handler: mqfte-fsh1 [up]

General

Administrative State

enabled disabled

Comments

Queue Manager

multi-instance-grp *

Get Queue

QUEUE2 *

The number of concurrent MQ connections

1

Get Message Options

36865

Polling Interval

30 seconds

Retrieve Backout Settings

on off

Use Queue Manager in URL

on off

Other Properties

Ignore backout errors

on off

DataPower mq-qm object configuration – Main Tab

Main | **Connections** | **CCSI** | **MQCSP**

MQ Queue Manager: MIDP-QM1 [up]

Apply Cancel Delete Undo

General Configuration

Administrative State enabled disabled

Comments

Host Name *

Queue Manager Name

Channel Name

Channel Heartbeat seconds

User Name

Alternate User on off

XML Manager + ... *

Maximum Message Size bytes

Cache Timeout seconds

Units of Work and Backout

Units of Work

DataPower mq-qm object configuration - Connection Tab

Retry Parameters

Main **Connections** CCSI MQCSP

MQ Queue Manager: MIDP-QM1 [up]

Apply Cancel Delete Undo

Open Connections

Total Connection Limit

Initial Connections

Local Address

Retry Behavior

Automatic Retry on off

Retry Interval seconds

Retry Attempts attempts

Long Retry Interval seconds

Reporting Interval seconds

Conversation Sharing

Sharing Conversations

SSL Configuration

Security

Secure communication with the remote queue manager in one of two ways. If both, SSL proxy profile takes precedence.

- With an SSL proxy profile: Specify the SSL proxy profile. Must use this method for MQ for z/OS.
- With artifacts from GSKit: Specify the SSL key repository and cipher specification.

SSL Proxy Profile + ...

SSL Key Repository Upload... Fetch...

SSL Cipher Specification

DataPower mq-qm-group object configuration



Configure MQ Queue Manager Group

Main

MQ Queue Manager Group: multi-instance-grp [up]

Apply

Cancel

Delete

Undo

Administrative State

enabled disabled

Comments

Primary MQ Queue Manager

MIDP-QM1



Backup MQ Queue Managers

MIDP-QM2



Add



Example DataPower MQ and MQFTE Backend URLs (Note: MQFTE URL uses “&” separator)

- Example MQFTE URL with Transactional tag:

```
dpmqfte://multi-instance-grp/?RequestQueue=QUEUE1&  
DestAgent=AGENT2&DestQM=QM_LINUX&  
DestFile=test2.xml&Transactional=true
```

- Example MQFTE URL without Transactional tag:

```
dpmqfte://multi-instance-grp/?RequestQueue=QUEUE1&  
DestAgent=AGENT2&DestQM=QM_LINUX&DestFile=test2.xml
```

- Example MQ URL with Transactional tag:

```
dpmq://multi-instance-  
grp/?RequestQueue=QUEUE1;Transactional=true
```

- Example MQ URL without Transactional tag:

```
dpmq://multi-instance-grp/?RequestQueue=QUEUE1
```

Configuration Best Practices for DataPower mq-qm object & MI qmgrs



The mq-qm configuration best practices

- Always use a valid cache-timeout. The default value is an empty string which does not close DataPower side MQ connections. This causes stale connection and faults with MQ error code of 2009.
- Use smaller “Retry Interval” and “Long Retry Interval” values for MQ fail over to work faster.
- The “Retry Attempts” value need to be in single digit so that the mq-qm object retry logic uses the long interval quicker to establish connection with the backend qmgr

The mq-qm configuration best practices

- DataPower uses Active mode to connect mq-qm object with the backend qmgr
- For MI qmgrs, one instance is active and the other instance is standby mode. Hence, mq-qm object connecting to the standby qmgr, will generate many MQ errors in the system log.
- In order to reduce number of MQ errors, the “Reporting Interval” value needs to be set at longer interval such as 600 seconds or higher.
- There are critical MQ errors that are displayed due to connection problem with the standby qmgr

The Multi-Instance QMGRs best practices

- Do not keep any of the multi-instance QMGR nodes as an NFS server
- Configure listener as a QMGR service so that listener will start automatically as part of queue manager startup
- In the cluster, have two full repositories while avoiding a multi-instance queue manager as full repository
- Switching over to a standby instance can take anywhere from seconds to minutes, depending on configuration and load.
- Mix and Matching of OS are not allowed

Trouble Shooting : Enable Debug Logging and Probe for Service

Enable Debug logging

Troubleshooting Panel
Configuration successfully saved.

Main | Debug Probe | Conformance Validation

Networking

Ping Remote [Help](#)

Remote Host *

Use IP version default ▾

Logging

Set Log Level [Help](#)

[View System Logs](#)

Log Level debug ▾ *

Enable probe for service

Troubleshooting Panel

Main | **Debug Probe** | Conformance Validation

Multi-Protocol Gateway

Name	Op-State	Probe	Disable Probe
message-to-file-mpgw	up		<input type="button" value="Disable"/>

decrypt-group-message ▾

Web Service Proxy

Name	Op-State	Probe	Disable Probe
(no objects defined or probes enabled)			

▾

XML Firewall Service

Name	Op-State	Probe	Disable Probe
(no objects defined or probes enabled)			

loopback-test ▾

XSL Proxy Service

Name	Op-State	Probe	Disable Probe
(no objects defined or probes enabled)			

▾

XSL Coprocessor Service

Name	Op-State	Probe	Disable Probe
(no objects defined or probes enabled)			

▾

Trouble Shooting : Packet Capture from webGUI



Troubleshooting Panel

[Main](#) | [Debug Probe](#) | [Conformance Validation](#)

Networking

Ping Remote [Help](#)

Remote Host *

Use IP version

TCP Connection Test [Help](#)

Remote Host *

Remote Port *

Use IP version

Packet Capture

Start Packet Capture [Help](#)

No Packet Capture Available for Downloading

Interface Type *

Mode *

Maximum Size KB *

Maximum Packet Size bytes *

Filter Expression

Stop Packet Capture [Help](#)

Interface Type *

Logging

Set Log Level [Help](#)

[View System Logs](#)

Log Level *

Enable Internal Logging on off

Enable RBM Debug logging on off

Global IP Address Log Filter

Generate Log Event [Help](#)

Log Category + ... *

Log Level *

Log Message *

Event Code [Help](#)

Reporting

Generate Error Report [Help](#)

[View Error Report](#)

Send Error Report [Help](#)

SMTP Server *

Location *

E-mail Address *

Email Sender Address



Trouble Shooting : Custom Log Target



Configure Log Target

Main

Event Filters

Object Filters

IP Address Filters

Event Triggers

Event Subscriptions

Log Target: mq-msg-id [up]

General Configuration

Administrative State enabled disabledComments Target Type *Log Format Timestamp Format Feedback Detection on offIdentical Event Detection on off

Destination Configuration

File Name *

Archival

Log Size kilobytes *Archive Mode *Number of Rotations *

Security

Signing Mode on offEncryption Mode on off

Trouble Shooting : Custom Log Target

Security and Other properties

Security

Signing Mode

on off

Encryption Mode

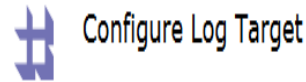
on off

Other Properties

Backup Log

(none) ▼ + ...

Event Subscriptions



Main Event Filters Object Filters IP Address Filters Event Triggers **Event Subscriptions**

Log Target: mq-msg-id {up}

Apply Cancel Delete Undo

Event Subscriptions

Event Category	Minimum Event Priority	
mgmt	debug	
mq	debug	
network	debug	

Add

Troubleshooting Continued....

- WebSphere DataPower SOA Appliance support portal URL:
http://www.ibm.com/support/entry/portal/product/websphere/websphere_datapower_soa_appliances
- Contact DataPower Support Team if problem is not resolved
- Contact DataPower Forum for help
<http://www.ibm.com/developerworks/forums/forum.jspa?forumID=1198>
- Contact DataPower Facebook Community for help
<http://www.websphereusergroup.org/go/thread/view/108057/23860133/>



Summary

- Multi-instance queue managers require network-attached storage that supports lease-based locking and should be POSIX compliant.
- Network File System 4 (NFS-4) in UNIX or CIFS in Windows OS fulfills this requirement.
- DataPower provides MQ fail over capability using mq-qm-group and mq-qm objects
- The Retry Parameters of the mq-mq object need special consideration when using with MI qmgrs

References

DataPower Information Center

<http://publib.boulder.ibm.com/infocenter/wsdatap/4mt/index.jsp>

How to Create Multi-Instance QMGRs on LINUX

<http://www.ibm.com/support/docview.wss?uid=swg27017883>

Tested and Supported FileSystems for Multi-Instance QMGRs

<http://www.ibm.com/support/docview.wss?uid=swg21433474>

Multi-Instance QMGRs implementation in MQ Cluster

<http://www.ibm.com/support/docview.wss?uid=swg27018127>



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- 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

