

DataPower-MQ Integration Deep Dive

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Capitalware's MQ Technical Conference v2.0.1.6

Your Presenter: Robin Wiley

- **Senior Instructor, IBM Messaging Products**
 - ▶ MQ Administration & Application Development
 - ▶ DataPower Administration & Service Development
 - ▶ Integration Bus Administration & Message Flow Development
- **IBM Certified:**
 - ▶ MQ Administrator
 - ▶ MQ Solution Designer
 - ▶ DataPower Solution Implementer
- **Over 40 years IT Industry Experience**
 - ▶ Network Integration
 - ▶ Managing Software Development
- **Experience: 20 years with MQ; 10 with DataPower**
 - ▶ Technical Architecture, Project Management, Installation, Training
- **Effective Instructor**
 - ▶ Over 35 years experience in corporate training and adult education
 - ▶ Brings magic to the classroom (Member, Academy of Magical Arts)



2
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Agenda

Focus:

- MQ 8 & DP 7.5

Topics:

- Queue Manager Object
- MQ Front Side Handler
- MQ URL
- Message Headers
- Error Handling
- Transaction Management

Queue Manager Object

Queue Manager Object

 **Configure MQ Queue Manager**
 This configuration has been added and not yet saved.

Main
Connections
CCSI
MQCSP

MQ Queue Manager: DEVQMGR [up]

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

General Configuration

Administrative State enabled disabled

Comments

Host Name *

Queue Manager Name

5
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Queue Manager Object

- **Host Name (IPv4)**
 - ▶ address:port 192.168.57.1:1414
 - ▶ address(port) 192.168.57.1(1414)
 - ▶ address 192.168.57.1 *default port 1414*
- **Host Name (IPv6)**
 - ▶ [address]:port [2202::148:248]:1414
 - ▶ address(port) 2202::148:248(1414)
 - ▶ address 2202::148:248 *default port 1414*
- **Host Name (DNS)**
 - ▶ hostname:port myserver:1414
 - ▶ hostname(port) myserver(1414)
 - ▶ hostname myserver *default port 1414*

6
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Queue Manager Object

Configure MQ Queue Manager

This configuration has been added and not yet saved.

Main
Connections
CCSI
MQCSP

MQ Queue Manager: **DEVQMGR** [up]

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

General Configuration

Administrative State: enabled disabled

Comments:

Host Name: *

Queue Manager Name:

7
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Queue Manager Object

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:

8
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Queue Manager Object

- **Channel Name**
 - ▶ SVRCONN name as defined on the Queue Manager

- **Channel Heartbeat (seconds)**
 - ▶ Approximate time between heartbeat flows on the channel
 - ▶ 0 = no heartbeat flow exchanged
 - ▶ Does not set the heartbeat on the channel
 - ▶ Negotiates heartbeat value with channel definition -- greater is used

- **Cache Timeout (seconds)**
 - ▶ How long the appliance keeps alive a dynamic connection in the connection cache
 - ▶ Must be greater than the negotiated heartbeat interval but less than the Queue Manager keep alive interval (defined on the host)

9

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Queue Manager Object

- **User Name**
 - ▶ Supplied to Queue Manager at connection
 - ▶ Maximum 12 characters

- **Alternate User**
 - ▶ Enables or disables MQOD.AlternateUserId
 - ▶ Off = use Message Descriptor User Identifier for queue authorization
 - ▶ On (default) = use Object Descriptor Alternate User Identifier for queue authorization (need to create Object Descriptor)

- **XML Manager**
 - ▶ Recommend using a dedicated XML Manager per QM object

10

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Queue Manager Object

- **Maximum Message Size**
 - ▶ Limit the size of the MQ message payload

- **Units of Work**
 - ▶ Controls syncpoint processing (transaction management)
 - ▶ Affects MQ Front Side Handlers only
 - ▶ Two values: 0 or 1

- **Units of Work = 0**
 - ▶ No syncpoint control
 - ▶ Front Side Handler MQGET is immediate and irrevocable
 - ▶ If error, message integrity is responsibility of DataPower

- **Units of Work = 1**
 - ▶ Enables syncpoint control
 - ▶ Front Side Handler MQGET has an implied MQGMO_SYNCPOINT
 - ▶ If error, message is rolled back via implied MQBACK

11

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Queue Manager – Connections Tab

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

12

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Queue Manager – Connections Tab

- **Total Connection Limit:**
 - ▶ Connection pool size of the QM object
 - ▶ Default value is 250
 - ▶ Can tune the total connection limit for performance

- **Initial Connections:**
 - ▶ Maximum simultaneous initial connection requests
 - ▶ Default value is 1
 - ▶ If too high, may flood the Queue Manager

- **Local Address**
 - ▶ Local address for outbound connections
 - ▶ Specific local interface and port
 - ▶ For a range of ports, use (1414,1420) or x.x.x.x(1414,1420)

13

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Queue Manager – Connections Tab

- **Automatic Retry**
 - ▶ On: Attempt to reconnect to the Queue Manager if connection dropped
 - ▶ Off: Disable and re-enable the Queue Manager object to reconnect

- **Retry Interval**
 - ▶ Time interval between attempts to retry failed connections
 - ▶ Recommend 10 to 15 seconds (default is 1 second)
 - ▶ Low value can spike CPU and memory usage

- **Retry Attempts**
 - ▶ Number of attempts to retry the failed connections
 - ▶ After threshold reached, the Long Retry Interval is used instead
 - ▶ Default value of 0 (zero) disables Long Retry Interval
 - ▶ Recommend non-zero value

14

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Queue Manager – Connections Tab

▪ Long Retry Interval

- ▶ Interval in seconds to retry connection after Retry Attempts
- ▶ Recommend 600 seconds (default is 1800)
- ▶ Must be greater than the Retry Interval (if less, ignored)

▪ Reporting Interval

- ▶ How often to log retries (seconds)
- ▶ Suppresses duplicate log entries
- ▶ Recommend setting this the same as Retry Interval

15

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Queue Manager – Connections Tab

▪ Sharing Conversations

- ▶ Maximum conversations sharing single TCP/IP connection
- ▶ Value is negotiated between SVRCONN SHARECNV setting and DataPower (lower value takes effect)
- ▶ Value of 0 means **NO** Shared Conversations
 - Suppresses MQ V7+ features (Administrator stop-quiet; Heartbeating; Read ahead; Client asynchronous consume)
- ▶ Value of 1 means **NO** Shared Conversations
 - Allows MQ V7+ features (Administrator stop-quiet; Heartbeating; Read ahead; Client asynchronous consume)
- ▶ Value > 1 means Shared Conversations permitted
 - Allows MQ V7+ features (Administrator stop-quiet; Heartbeating; Read ahead; Client asynchronous consume)
- ▶ Can impact performance of clients (unless V7+ features used)

16

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Queue Manager – Connections Tab

Security

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

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

SSL client type	Proxy Profile ▾	SSL client type	Client Profile ▾
SSL Proxy Profile (deprecated)	(none) ▾ + ...	SSL client profile	(none) ▾ + ...
SSL Key Repository	cert:/// ▾ (none) ▾ Upload... Fetch...		
Permit SSL v3	<input type="radio"/> on <input checked="" type="radio"/> off		
SSL Cipher Specification	None ▾		

17

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Queue Manager – Connections Tab

- **SSL Client Type: Client Profile**
 - ▶ Select the SSL Client Profile object to use from the pick list
 - ▶ Must be used for connection to a z/OS host
- **SSL Client Type: Proxy Profile**
 - ▶ Deprecated – recommend using Client Profile instead
 - ▶ Select the SSL Proxy Profile object to use from the pick list
- **SSL Key Repository**
 - ▶ Select the location of the key database file
- **SSL Version 3 Support**
 - ▶ Permit SSL v3 or not
- **SSL Cipher Specification**
 - ▶ Choose the Cipher Spec to use

18

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Client Profile Object

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Client Profile – Main Tab

Protocols

- Enable SSL version 3
- Enable TLS version 1.0
- Enable TLS version 1.1
- Enable TLS version 1.2

Ciphers

ECDHE_ECDSA_WITH_AES_256_GCM_SHA384	↑ ↓ ✕
ECDHE_RSA_WITH_AES_256_GCM_SHA384	↑ ↓ ✕
ECDHE_ECDSA_WITH_AES_256_CBC_SHA384	↑ ↓ ✕
ECDHE_RSA_WITH_AES_256_CBC_SHA384	↑ ↓ ✕
ECDHE_ECDSA_WITH_AES_256_CBC_SHA	↑ ↓ ✕

Features

- Use SNI
- Permit connections to insecure SSL servers
- Enable compression

Use custom SNI Hostname: *

Credential

Identification credentials: + ...

Validate server certificate: on off

Validation credentials: + ... *

20

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Client Profile – Main Tab

- **Protocols:**
 - ▶ Choose the protocols to be supported
- **Ciphers:**
 - ▶ Choose the ciphers to be supported
- **Use SNI:**
 - ▶ Send the Server Name Indication (SNI) TLS extension in the client hello message
- **Permit connections to insecure SSL servers:**
 - ▶ Allow connection to potentially vulnerable servers
- **Enable compression:**
 - ▶ Allow SSL compression
 - ▶ Not recommended – can allow CRIME or BREACH attacks
- **Identification credentials:**
 - ▶ If mutual authentication requested by server
- **Validate server certificate:**
 - ▶ Check the credentials presented by the server (Default: On)
- **Validation credentials:**
 - ▶ Crypto Validation Credential object used for server certificate validation

Use custom SNI Hostname	Yes ▾ *
Custom SNI hostname	<input type="text"/> *

21

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Client Profile – Session Caching Tab

Main **Session Caching** Advanced

SSL Client Profile

Apply Cancel

Name *

Enable session caching on off

Session cache timeout seconds

Session cache size entries

22

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Client Profile – Session Caching Tab

- **Enable session caching:**
 - ▶ Allow SSL session caching
- **Session Cache Timeout:**
 - ▶ How long before cache is flushed
 - ▶ Maximum: 86,400 seconds (24 hours)
- **Session Cache Size:**
 - ▶ How many entries to be cached
 - ▶ Maximum: 500,000

23

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Client Profile – Advanced Tab

Main Session Caching **Advanced**

SSL Client Profile

Apply Cancel

Name *

Elliptic Curves

secp521r1 - NIST/SECG curve over a 521 bit prime field	↑	↓	✕
secp384r1 - NIST/SECG curve over a 384 bit prime field	↑	↓	✕
secp256k1 - SECG curve over a 256 bit prime field	↑	↓	✕
secp256r1 - NIST/SECG curve over a 256 bit prime field	↑	↓	✕

add

- **Elliptical Curves:**
 - ▶ Build a list of acceptable Elliptical Curve algorithms (RFC 4492)
 - ▶ Allows equivalent security to current cryptosystems like RSA but smaller key size
 - ▶ Favored for mobile technology

24

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Back to the Queue Manager Object

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Queue Manager – CCSI Tab

Coded Character Set ID

Convert Input on off

- **Coded Character Set ID**
 - ▶ Presented to the SVRCONN channel during connection
 - ▶ Same as setting MQCCSID Environment Variable
- **Convert Input**
 - ▶ On: Ask the Queue Manager to convert messages using the CCSID (default)
 - ▶ Off: No conversion

26
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Queue Manager – MQCSP Tab

The screenshot shows the 'MQCSP' tab in the IBM MQ Queue Manager configuration. At the top, there are tabs for 'Main', 'Connections', 'CCSI', and 'MQCSP'. Below the tabs, the text 'IBM MQ Queue Manager: DEVQMGR [up]' is displayed. There are four buttons: 'Apply', 'Cancel', 'Delete', and 'Undo'. Below these buttons, there are two input fields: 'MQCSP User ID' with the value 'admin' and 'MQCSP Password Alias' with a dropdown menu showing 'admin' and a '+' button followed by a '...' button and an asterisk.

27
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Queue Manager – MQCSP Tab

- **Defines the MQCSP Data Structure**
 - ▶ Simulates passing MQCSP using MQCONN
- **MQCSP User ID**
 - ▶ Sent via MQCSP if present
 - ▶ If blank (and Password Alias set to "none"), no MQCSP is sent
- **MQCSP Password Alias**
 - ▶ Points to the encrypted password stored within DataPower
 - ▶ Password is sent in clear text in MQCSP after retrieval from the Alias

28
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MQ Front Side Handler Object

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MQ Front Side Handler

General

Administrative state	<input checked="" type="radio"/> enabled <input type="radio"/> disabled
Comments	<input type="text"/>
Queue Manager	DEVQMGR ▼ + ... *
Get Queue	DPIN *
Put Queue	DPOUT
The number of concurrent IBM MQ conversations	1
Get Message Options	1
Polling Interval	30 seconds
Retrieve Backout Settings	<input type="radio"/> on <input checked="" type="radio"/> off
Use Queue Manager in URL	<input type="radio"/> on <input checked="" type="radio"/> off
CCSI	0

30

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MQ Front Side Handler

- **Get Queue**
 - ▶ Name of queue to get messages from
 - ▶ Mandatory, unless Pub/Sub being used
- **Put Queue**
 - ▶ Optional, because:
 - May be "one-way" messaging (fire and forget)
 - May be using Reply-To Queue
 - May be dynamically allocated by Response Rule code
- **The number of concurrent MQ conversations:**
 - ▶ Number of parallel active and pending MQGETs for the Get Queue
 - ▶ Recommend value of 1 (in high throughput situations, may use up to 5)
 - ▶ Regardless of this setting, multiple FSH threads will still use multiple connections
 - ▶ If greater than 1, monitor Queue Manager for workload
 - ▶ If greater than 1, Backout Threshold must be this value plus 1
 - ▶ If using message ordering (MQGMO_LOGICAL_ORDER), set it to 1

31

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MQ Front Side Handler

- **Get Message Options**
 - ▶ Allows the use of any MQGMO_Options parameters
 - ▶ Overrides any specific parameters set elsewhere
- **Polling Interval**
 - ▶ How long to wait on an empty queue (seconds)
 - ▶ Equivalent to Wait Interval with conventional MQ applications
 - ▶ Low value increases network traffic
 - ▶ Recommend default of 30
- **Retrieve Backout Settings**
 - ▶ Get BOTHRESH and BOQUEUE from the Get Queue
 - ▶ Issues MQINQ before **every** MQGET – potential performance hit
 - ▶ Only relevant if queue parameters were set by MQ administrator
 - ▶ Recommend set "off" and use Queue Manager Object settings

32

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Some MQGMO Options

0	MQGMO_NONE
1	MQGMO_WAIT
2	MQGMO_SYNCPOINT
4	MQGMO_NO_SYNCPOINT
8	MQGMO_SET_SIGNAL
16	MQGMO_BROWSE_FIRST
32	MQGMO_BROWSE_NEXT
64	MQGMO_ACCEPT_TRUNCATED_MSG
128	MQGMO_MARK_SKIP_BACKOUT
256	MQGMO_MSG_UNDER_CURSOR
512	MQGMO_LOCK
1024	MQGMO_UNLOCK
2048	MQGMO_BROWSE_MSG_UNDER_CURSOR
4096	MQGMO_SYNCPOINT_IF_PERSISTENT
8192	MQGMO_FAIL_IF QUIESCING
16384	MQGMO_CONVERT
32768	MQGMO_LOGICAL_ORDER
65536	MQGMO_COMPLETE_MSG
131072	MQGMO_ALL_MSGS_AVAILABLE
262144	MQGMO_ALL_SEGMENTS_AVAILABLE

33

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MQ Front Side Handler

■ Use Queue Manager in URL

- ▶ Defines the behavior of var://service/URL-in when a QM Group is specified
- ▶ If on, the variable returns the name of the chosen Queue Manager
- ▶ If off, the variable returns the name of the Queue Manager Group
- ▶ Default off

■ CCSI

- ▶ Sets the CCSID in the MQ Message Descriptor
- ▶ If blank or zero, default is ISO-8859-1 (latin-1)
- ▶ For MQCCSI_EMBEDDED enter 4294967295
- ▶ For MQCCSI_INHERIT enter 4294967294

34

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MQ Front Side Handler

Publish and Subscribe

Subscribe Topic String

Subscription Name

Publish Topic String

Properties and Headers

Parse Properties on off

Selector

Exclude Message Headers

- CICS Bridge Header (MQCIH)
- Dead Letter Header (MQDLH)
- IMS Information Header (MQIIH)
- Rules and Formatting Header (MQRFH)
- Rules and Formatting Header (MQRFH2)
- Work Information Header (MQWIH)

Header to extract Content-Type

Advanced

Async Put on off

Batch Size

35
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- ## MQ Front Side Handler
- **Subscribe Topic String**
 - ▶ Pub/Sub topic string for subscription
 - ▶ If Get Queue also defined, this is ignored
 - **Subscription Name**
 - ▶ Used to establish or resume a Durable Subscription
 - **Publish Topic String**
 - ▶ Pub/Sub topic string for response publication
 - ▶ If Put Queue also defined, this is ignored
 - **Parse Properties**
 - ▶ Extracts MQ V7 (and above) Message Properties into Node Set
 - ▶ Minor overhead, so leave off unless needed
- 36
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MQ Front Side Handler

- **Selector**
 - ▶ Allows selective retrieval of messages based on properties
 - ▶ Forces sequential search of queue so may be inefficient
- **Exclude Message Headers**
 - ▶ Strip off selected MQ header types
- **Header to extract Content-Type**
 - ▶ Can obtain Content-Type from

- MQMD
 - RFH
 - RFH2
- Header to extract Content-Type

XPath expression to extract Content-Type from IBM MQ header XPath Tool *

37

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MQ Front Side Handler

- **Async Put**
 - ▶ Put message to queue without waiting for a response
 - ▶ Do not use when Queue Manager units-of-work is 1
 - ▶ Recommend only use where performance is an issue
- **Batch Size**
 - ▶ Number of messages to handled as a single commit or rollback operation
 - ▶ Recommend leave this as zero – each message is a separate transaction

38

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MQ Back-End URL

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MQ Back-End URL

- **General Syntax:**
 - ▶ `dpmq://mqQueueManagerObject/URI?<parameters>`
- **RequestQueue=*requestQueueName***
 - ▶ Name of the backend MQ request queue
- **ReplyQueue=*replyQueueName***
 - ▶ Name of the backend MQ reply queue
- **Sync=true**
 - ▶ Issues a Commit call when a message is put on Request Queue
- **GMO=*optionsValue***
 - ▶ MQGMO_Options parameter value when getting from Reply Queue
- **PMO=*optionsValue***
 - ▶ MQPMO_Options parameter value when putting to Request Queue

40

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MQ Back-End URL

- **ParseHeaders={true|false}**
 - ▶ Specifies whether to parse and strip headers from message
- **SetReplyTo={true|false}**
 - ▶ Specifies whether to set MD ReplyToQ during Put
- **AsyncPut={true|false}**
 - ▶ Specifies whether to use Asynchronous Put
 - ▶ Only valid when using MQ V7 (and above)
- **Browse={first|next|current}**
 - ▶ Controls non-destructive retrieval of messages

41

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MQ Back-End URL

- **ContentTypeHeader=header**
 - ▶ Which MQ header identifies the content type of the message
- **ContentTypeXPath=expression**
 - ▶ XPath expression to extract the content type of message
- **ParseProperties={on|off}**
 - ▶ Parse message properties
- **PublishTopicString=string and SubscribeTopicString=string**
 - ▶ Specifies topic to use with Pub/Sub (MQ V7 and above)
- **SubscriptionName=string**
 - ▶ Specifies name for a durable subscription (MQ V7 and above)
- **Selector=expression**
 - ▶ SQL92 style query filtering on message properties
 - ▶ Performance hit

42

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Multi-Protocol Gateway Parameter Settings

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MPGW Headers Tab – MQ Headers

Options Policy SLA Policy Details 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]

Header Injection Parameters

Direction	Header Name	Header Value
-----------	-------------	--------------

Add

Header Suppression Parameters

Direction	Header Tag
-----------	------------

Add

44

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MPGW Headers Tab – MQ Headers

Add a New Header Injection Parameter

Direction *

Header Name *

Header Value *

- Using Header Injection (Header Tab)
- Example setting Format and Persistence:
 - ▶ Direction: Front (for FSH MQPUT)
 - ▶ Direction: Back (for Backend MQPUT)
 - ▶ Header Name: MQMD
 - ▶ Header Value:
`<MQMD><Format>MQSTR</Format><Persistence>1</Persistence></MQMD>`

45

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MQ Programmatic Control

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MQ Headers – Programmatic Manipulation

- Using the Stylesheet method (page 1 of 2)

```
<?xml version="1.0" encoding="UTF-8"?>
<xsl:stylesheet version="1.0"
  xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
  xmlns:dp="http://www.datapower.com/extensions"
  extension-element-prefixes="dp"
  exclude-result-prefixes="dp">

  <xsl:output method="xml"/>
  <xsl:template match="/">
    <xsl:variable name="newMQMDStr">
      <MQMD>
        <Format>MQSTR</Format><Persistence>1</Persistence>
      </MQMD>
    </xsl:variable>
    <xsl:variable name="mqmdStr">
      <dp:serialize select="$newMQMDStr" omit-xml-decl="yes"/>
    </xsl:variable>
    <xsl:message dp:priority="debug">
      <xsl:value-of select="concat('The New MQMD : ', $mqmdStr)"/>
    </xsl:message>
  </xsl:template>
</xsl:stylesheet>
```

47

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MQ Headers – Programmatic Manipulation

- Using the Stylesheet method (page 2 of 2)

```
</xsl:message>
<!-- for request rule -->
<dp:set-request-header name="MQMD" value="$mqmdStr"/>
<!-- for response rule -->
<!-- dp:set-response-header name="MQMD" value="$mqmdStr"/> -->
<!-- adding MQ header when MQ URL open call is used for MQPUT -->
<!--
  <xsl:variable name="mqHeaders">
    <header name="MQMD"><xsl:value-of select="$mqmdStr"/></header>
  </xsl:variable>
  <xsl:variable name="sendMessage">
    <dp:url-open
      target="dpmq://DP4/?RequestQueue=QUEUE6"
      http-headers="$mqHeaders"
      response="responsecode-ignore">
      <xsl:copy-of select="." />
    </dp:url-open>
  </xsl:variable>
-->
</xsl:template>
</xsl:stylesheet>
```

48

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MQ Headers – Programmatic Manipulation

- Context variable method to inject the MQMD header

- ▶ For the following code to work:
- ▶ Set Transform Action's OUTPUT context to "EVENTS"
- ▶ Set Result Action's INPUT context to "EVENTS"

```
<xsl:variable name="MQMDStr">
  <MQMD>
    <Expiry>8000</Expiry>
    <Priority>0</Priority>
    <Format>MQSTR</Format>
  </MQMD>
</xsl:variable>
<xsl:variable name="MQMDStr2">
  <dp:serialize select="$MQMDStr" omit-xml-decl="yes"/>
</xsl:variable>
<dp:set-variable name="'var://context/EVENTS/_extension/header/MQMD'"
  value="$MQMDStr2"/>
```

49

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MQ Headers – Programmatic Manipulation

- JMS Headers as Message Properties

- ▶ Must set FSH "Parse Properties" to be "on"
- ▶ Must set "Exclude RFH2" to be "off"
- ▶ Message Properties appear as "MQMP" header

Protocol Headers:

```
<MQMD><StrucId>MD </StrucId><Version>1</Version><Report>0</Report><MsgType>8</MsgType>
<Expiry>-1</Expiry><Feedback>0</Feedback><Encoding>546</Encoding>
<CodedCharSetId>819</CodedCharSetId><Format>MQSTR </Format><Priority>4</Priority>
<Persistence>1</Persistence><MsgId>414d5120444556514d4752202020209637e75722087c02</MsgId>
<CorrelId>0000000000000000000000000000000000000000000000000000000000000000</CorrelId><BackoutCount>0</BackoutCount>
<ReplyToQ> </ReplyToQ><ReplyToQMgr>DEVQMGR </ReplyToQMgr><UserIdentifier>virtuser </UserIdentifier>
<AccountingToken>1601051500000dd7a5d8bea372ba8a0058899e8030000000000000000000b</AccountingToken>
<AppIdentityData> </AppIdentityData><PutApplType>11</PutApplType>
<PutApplName>C:\Windows\System32\java.exe</PutApplName><PutDate>20160926</PutDate>
<PutTime>20093683</PutTime><ApplOriginData> </ApplOriginData></MQMD>
```

[View Parsed]

```
<MQMP><Property name="mcd.Msd" type="string">jms_text</Property><Property name="jms.Dst"
type="string">queue://DEVQMGR/DPIN</Property><Property name="jms.Tms"
type="string">1474920576830</Property><Property name="jms.Div" type="string">2</Property></MQMP>
```

MQMP

50

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MQ Headers – Programmatic Manipulation

■ JMS Headers as RFH2

- ▶ Must set FSH “Parse Properties” to be “off”
- ▶ Must set “Exclude RFH2” to be “on”
- ▶ Message Properties appear as “MQRFH2” headers

```
X-MQRFH2-Data-0 <mcd><Msd>jms_text</Msd></mcd>
X-MQRFH2-Data-1 <jms><Dst>queue://DEVQMGR/DPIN</Dst><Tms>1474922529242</Tms><Dlv>2</Dlv></jms>
MQRFH2 <MQRFH2><StrucId>RFH </StrucId><Version>2</Version><Encoding>546</Encoding>
<CodedCharSetId>819</CodedCharSetId><Format>MQSTR </Format><Flags>0</Flags>
<NameValueCCSID>1208</NameValueCCSID><NameValueData><NameValue><mcd><Msd>jms_text</Msd>
</mcd> </NameValue><NameValue><jms><Dst>queue://DEVQMGR/DPIN</Dst><Tms>1474922529242</Tms>
<Dlv>2</Dlv></jms> </NameValue></NameValueData></MQRFH2>
```

51

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MQ Error Handling

■ MQ error handling example:

```
<xsl:template match="/">
  <xsl:variable name="mqrc" select="dp:response-header('x-dp-response-code')"/>
  <xsl:variable name="ecode" select="dp:variable('var://service/error-code')"/>
  <xsl:variable name="errMsg" select="concat('** The Response Code ** : ', $mqrc, ' and ** Error
Code ** : ', $ecode)"/>
  <xsl:choose>
    <xsl:when test="(starts-with($mqrc, '2') and (string-length(normalize-space($mqrc)))= 4) or
($ecode != '0x00000000')">
      <xsl:message dp:priority="debug">
        <xsl:value-of select="$errMsg"/>
      </xsl:message>
      <dp:set-variable name="var://context/ERROR/err-msg" value="$errMsg"/>
      <dp:reject override="true"><xsl:value-of select="$errMsg"/></dp:reject>
    </xsl:when>
    <xsl:otherwise>
      <xsl:message dp:priority="debug">
        <xsl:value-of select="$errMsg"/>
      </xsl:message>
      <dp:accept/>
    </xsl:otherwise>
  </xsl:choose>
</xsl:template>
```

52

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MQ Conversational Processing

- **Backend application must copy MsgId to CorrelId**
 - ▶ DataPower Back-End retrieves reply using CorrelId
- **MQPUT1 Simulation**
 - ▶ Create MQ Object Descriptor header with Queue Manager name in it
 - ▶ Request Rule issues MQOPEN/MQPUT/MQCLOSE to back end Queue Manager
- **ReplyToQ Usage**
 - ▶ If set, Response Rule sends message there
- **ReplyToQmgr Usage**
 - ▶ Can be set to send to a different Queue Manager
 - ▶ If destination is a Cluster, no need to supply ReplyToQmgr

53

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MQ Conversational Processing

- **XSL code snippet to set ReplyToQ and ReplyToQmgr in a Request Rule:**

```
<xsl:variable name="rule-type" select="dp:variable('var://service/transaction-rule-type')"/>
<xsl:choose>
  <!-- Request Rule only -->
  <xsl:when test="$rule-type = 'request'">
    <xsl:variable name="entries" select="dp:request-header('MQMD')"/>
    <xsl:variable name="header" select="dp:parse($entries)"/>
    <!-- save ReplyToQ and ReplyToQmgr values -->
    <dp:set-variable name='var://context/MYMQMD/ReplyToQ' value='"$header//ReplyToQ"/>
    <dp:set-variable name='var://context/MYMQMD/ReplyToQmgr' value='"$header//ReplyToQmgr"/>
    <xsl:message dp:priority="debug">
      <xsl:value-of select="concat ('Request MQMD : ', dp:request-header('MQMD'))"/>
    </xsl:message>
  </xsl:when>
</xsl:choose>
```

54

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MQ Conversational Processing

- XSL code snippet to set ReplyToQ and ReplyToQmgr in a Response Rule:

```
<!-- Response rule only -->
<xsl:when test="$rule-type = 'response'">
  <xsl:variable name="custMQODStr">
    <MQOD>
      <Version>2</Version>
      <ObjectName>
        <xsl:value-of select="dp:variable('var://context/MYMQMD/ReplyToQ')"/>
      </ObjectName>
      <ObjectQMgrName>
        <xsl:value-of select="dp:variable('var://context/MYMQMD/ReplyToQmgr')"/>
      </ObjectQMgrName>
    </MQOD>
  </xsl:variable>
  <xsl:variable name="mqodStr">
    <dp:serialize select="$custMQODStr" omit-xml-decl="yes"/>
  </xsl:variable>
  <xsl:message dp:priority="debug">
    <xsl:value-of select="concat('Response MQOD : ', $mqodStr)"/>
  </xsl:message>
  <dp:set-response-header name="MQOD" value="$mqodStr"/>
</xsl:when>
</xsl:choose>
</xsl:template>
</xsl:stylesheet>
```

55

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Transactional Processing

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MQ Transactional Processing

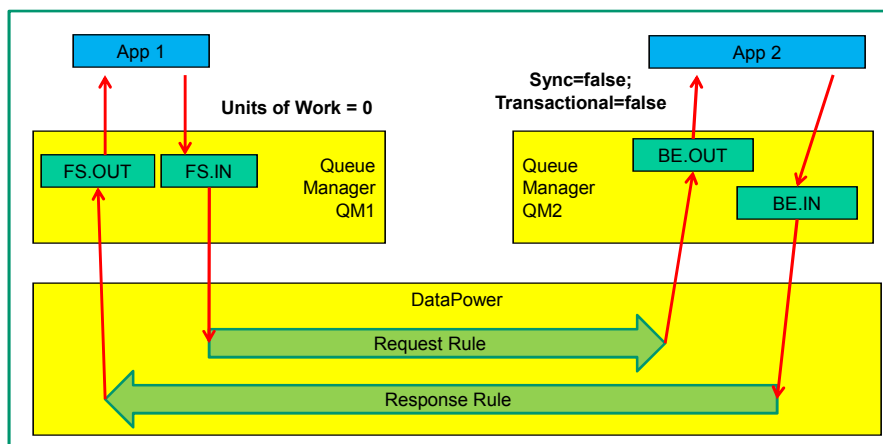
- **DataPower is a standard MQ Client**
 - ▶ It does **NOT** offer Extended Transactional Client functionality
 - ▶ **NO** XA two-phase commit
- **DataPower is considered an application by MQ**
 - ▶ Therefore, no inherent message integrity
- **If the same Queue Manager at front and back:**
 - ▶ True message integrity
 - ▶ Once and once-only delivery
- **If different Queue Managers at front and back**
 - ▶ No possibility of two-phase commit
 - ▶ Message integrity assured if DataPower configured properly
 - ▶ Possibility of messages sent more than once

57

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Scenario: Two Different Queue Managers

No Transactional Control

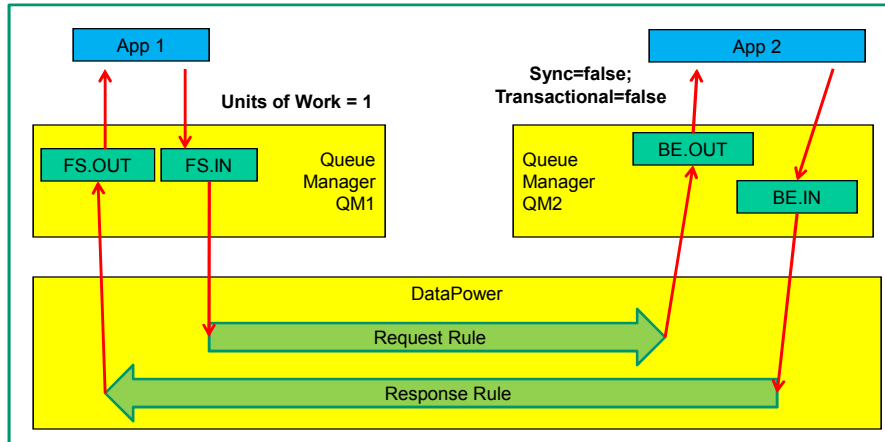


58

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Scenario: Two Different Queue Managers

Front Side Transactional Control only

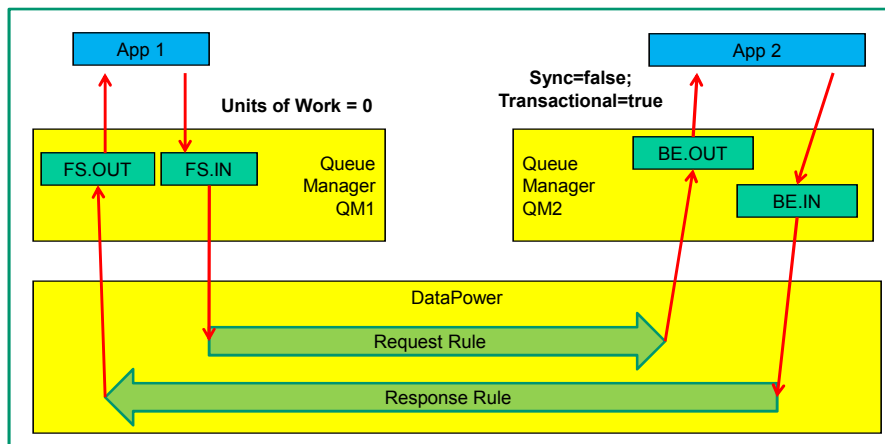


59

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Scenario: Two Different Queue Managers

Back End Transactional Control only

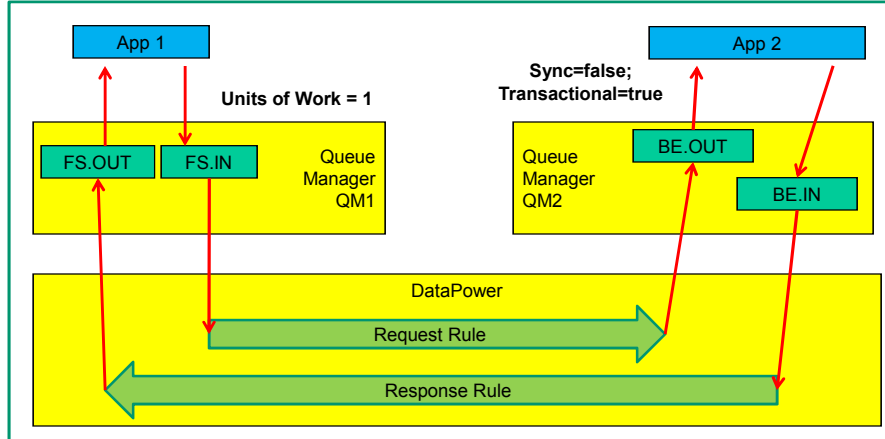


60

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Scenario: Two Different Queue Managers

Front Side and Back End Transactional Control

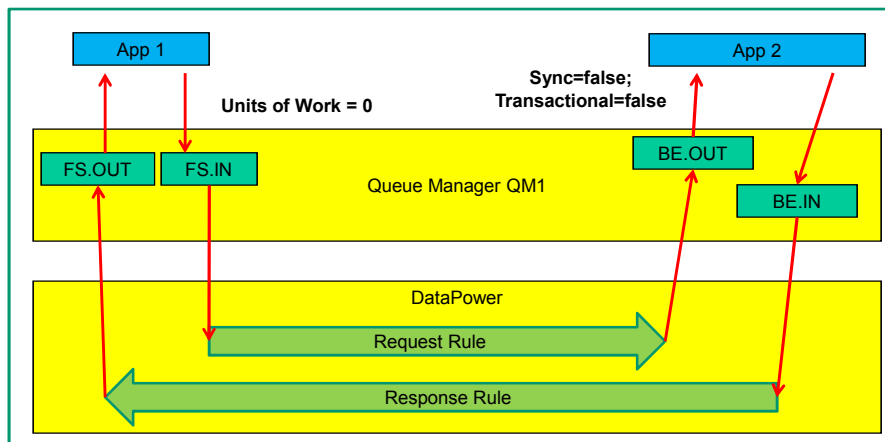


61

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Scenario: One Queue Manager (Front & Back)

No Transactional Control

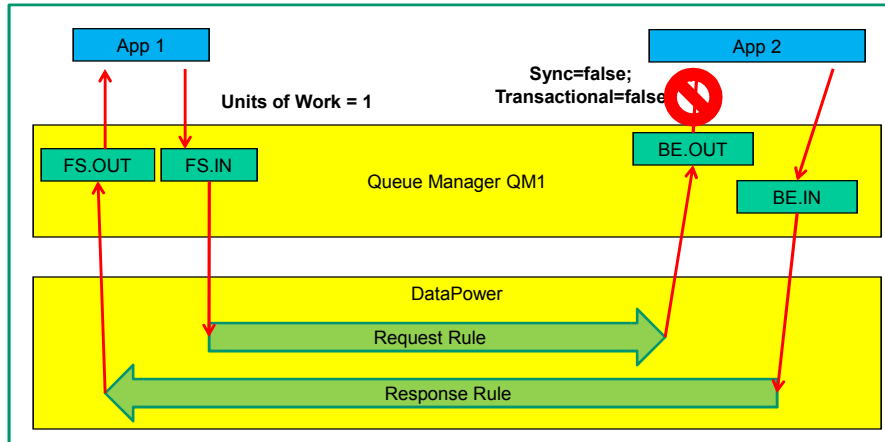


62

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Scenario: One Queue Manager (Front & Back)

Front Side Transactional Control only

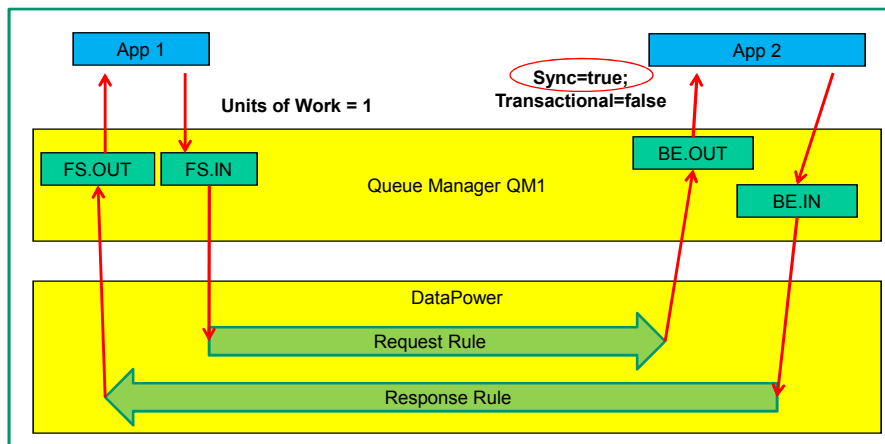


63

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Scenario: One Queue Manager (Front & Back)

Front Side Transactional Control only

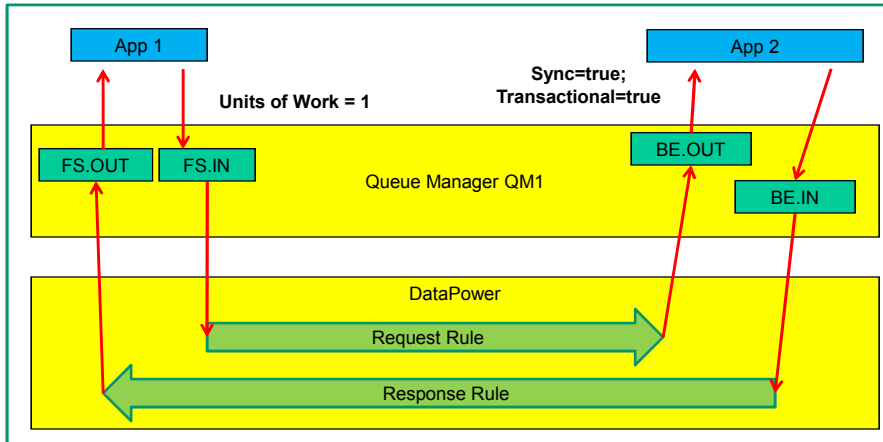


64

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Scenario: One Queue Manager (Front & Back)

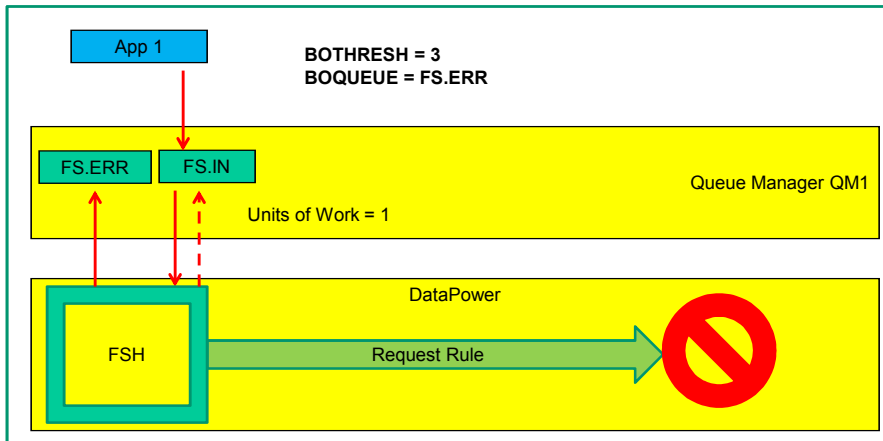
Front Side *and* Back End Transactional Control



65

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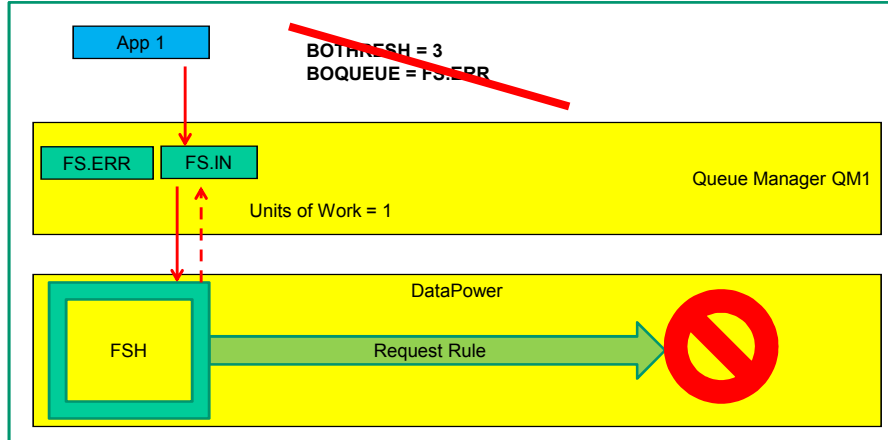
Poison Message



66

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Poison Message



67

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Poison Message

DataPower Knowledge Center Documentation

https://www.ibm.com/support/knowledgecenter/en/SS9H2Y_7.5.0/com.ibm.dp.doc/retrieve-backout-setting_mqfsh.html

~~“If there are no backout settings, the backout action is abandoned.”~~

68

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Questions & Answers



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End of Session

Thank You!

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