# How to Cook With the IBM MQ Appliance

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## **Summary**

- From the top...
- Tools for Administration
- Getting Started
- HA and the MQ Appliance
- MQ Console Views and Widgets
- Monitoring
- Odds and Ends
- Summary

### From the Top... What is the IBM MQ Appliance?

- New Offering (March 2015)
   New Offering (March 2015)
   Urackmount system
   192 GB memory
   2 1200 GB HDDs (RAID 1 configured)
   In an appliance form factor
  - The convenience, fast time-to-value and low total cost of ownership of an appliance
    - Integrates seamlessly into MQ networks and clusters
    - Familiar administration model for administrators with MQ skills

## **Physical configuration**





# **Notes: Physical configuration**

- When racking/cabling a new appliance consider the following things:
- Who will be allowed to manage? From where private network(s)?
  - Best practice is probably to limit management traffic (SSH and WebUI) to mgt0/mgt1 interface(s). However on a secure internal network may choose to enable management via all interfaces for simplicity. No technical reason either mgt interface HAS to be cabled.
- Where will MQ traffic come from? To? Via multiple networks? Is this system going to act as an MQ 'router'?
  - The appliance has 8x1GB 'general' Ethernet interfaces and 2x10GB.
  - MQ Traffic can be locked to particular interfaces by IP using listener configuration
  - Are you (will you be) using HA?

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- Will need to configure/reserve one of the 10GB networks and 2x1GB for this purpose
- These should be configured on dedicated, independent, and ideally directly connected (no routing) private subnets.

## **Notes - First time setup**

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- Initial power on presents a fairly straightforward wizard via serial connection. See the Knowledgecenter getting started section for support in completing this.
  - Some particular things to think about:
    - Setting up user for password recovery really matters... No factory reset mechanism without at least one working login!
    - Are you going to use DNS (probably)? DHCP (probably not)?
    - Remember to use CIDR format for IP/subnet
    - MUST assign a 'unique identifier' (similar to hostname) if planning to use HA
    - MUST configure at least one IP address and enable the WebUI service on it to accept license. Probably easiest to just set up one management interface for now and complete the rest later (e.g. through the WebUI)

## **Implications of an Appliance**

### Based on the DataPower hardware and firmware platform

- No operating system in the traditional sense
- Standard Unix shells not available (no C, KSH, etc)
- Familiar tools are not available (no top, vmstat, nmon, etc)

### On the bright side...

- No OS maintenance simple firmware upgrades
- No tuning, kernel parameters, system services...
- No (traditional) file system
  - Other than limited URIs for transfer on and off

### As an appliance, it's self-contained

- Everything required to manage and monitor queue managers is provided directly
- Which is good, because nothing can be installed on the appliance!
  - No exits, local applications, monitoring agents, DLQ handlers/Trigger monitors
  - Files can be uploaded but only to restricted areas

### **Administration**



### Many Options for Appliance Administration! Which one will you use?



## **Notes: Which interface is right for me?**

- Serial: First time setup and 'emergency' use. Various forms of serial-over-lan KVM exist which may be useful for remote recovery. Probably not an everyday tool.
  - SSH everyday interface for 'power users', full system administrators. CLI control over everything from network settings to individual object definitions
    - Remember not a full OS shell!
- WebUI currently best seen as graphical equivalent to SSH highly privileged power users. Particularly useful for 'overview' dashboards and monitoring widgets.
  - Note: HTTP interfaces used by the WebUI are currently not published and considered subject to change. Interested in RFEs!
  - Remote MQSC granular authority for remote access (e.g. power user for a particular queue manager, or lower privileges). Also the simplest way to script MQ object maniplulation (definition and display), including migration or restore from backups.
    - Requires MQ V8 Client.
  - MQ Explorer ideal for users experienced with this tooling, and again for granularity of access.
  - Other PCF based tools many possibilities and niche specialities. As for MQSC/Explorer, does required initial channel setup.

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### **Command-line interface**

Required for certain tasks, more convenient for others

- Available over SSH or local serial connections
- After initial setup (network settings, etc) administrators likely to spend most time in the *mqcli* subshell
  - Just type 'mqcli' at the top level to enter, and 'exit' to go back to top
  - 'help' is surprisingly helpful!
- Includes interactive runmqsc

2				abea	ards@oc47
File Edit	View	Search	Terminal	Help	
Jnauthor: login: ac Password:	Lzed ac imin	cess pr	ohibited	1.	
Velcome t Copyright	TO IBM	MQ Appl Corporat	iance M2 ion 1999	2000A -2015	console c
/ersion: Serial nu	MQ00.8 Imber:	3.0.0 bu 7800318	ild 2575	576mq c	on Feb 26 <sub>5</sub>
12000# he	elp				
clear int	rusion	-detect	ed		
clock			Sets	the da	ate or tim
configure	e termi	inal	Enter	s Glob	oal Config
diagnost	LCS		Provi	des di	Lagnostic
disable			Enter	s User	Mode
disconnec	t		Termi	nates	a user se
echo			Echoe	es text	t to the c
exec			Execu	tes a	configura
exit			Termi	nates	the CLI c
nelp			Displ	ays ge	eneral or
login			Logs	in as	a specifi

## **Controlling Access – Who Does What?**

2000# macli

#### Messaging Administrators

- Manages the MQ resources
- Administers MQ objects
  - Qmgrs, queues, topics, channels, listeners, channel authentication records, etc
  - Can browse messages on queues and put messages on queues
- Creates and manages user access for messaging users
- HA administration
- Channel certificate management

#### Messaging Users

- Different class of users than Messaging Administrators
- MQ connections do <u>not</u> use the same user pool as Administrators
- Separation provides a way to have less privileged management of a particular QM
  - e.g. by giving someone a 'messaging' account and connecting in over channel using MQ Explorer, MQSC, etc.

2000(mqc he follo nformati	li)# help wing help topics are available. Type help <topic name=""> for mor on.</topic>
q	General MQ administration commands
ert	Channel security certificate administration commands
iag	MQ problem diagnosis commands
a	High availability administration commands
ser	Messaging user and group administration
2000 (	1.1.1.4

### Some Installable MQ commands not available

### Some because they are not applicable

- No external listeners, no linear logging
- Some rolled into MQSC
  - Which is now clientenabled
- Others client-enabled as well
  - So they are available
  - Just cannot run on the appliance

Command	Alternative
setmqaut, dspmqaut, dmpmqaut	MQSC AUTHREC
dmpmqmsg, runmqtrm, runmqdlq	Use client connections
rcdmqimg, rcrmqobj	Linear logging is not supported on the appliance.
runmqlsr	Listeners must be started by way of queue manager administration
setmqspl, dspmqspl	Replaced by the SET/DISPLAY POLICY configuration using runmqsc

## **Getting Started**



## **Example – Create a Queue Manager**

Using crtmqm

From mqcli subshell

#### Familiar options

Largely unchanged

#### Some options missing

- e.g. Logging type
- Data and Log path

#### M2000(mqcli)# help crtmqm

Usage: crtmqm [-c Text] [-d DefXmitQ] [-h MaxHandles] [-p Port] [-t TrigInt] [-u DeadQ] [-x MaxUMsgs] [-lp LogPri] [-ls LogSec] [-lf LogFileSize] [-fs FileSystemSize] [-sx] QMgrName

- -c Descriptive text.
- -d Default transmission queue name.
- -fs File system size in gigabytes (GB).
- -h Maximum number of handles per connection handle.
- -lf Log file size, specified in units of 4 KB pages.
- -lp Primary log files allocated when the queue manager is created.
- -ls Secondary log files allocated when the primary files are exhausted. -p Port number for the managed TCP listener.
- -sx Make this queue manager a high availability (HA) queue manager.
- -t Trigger interval in milliseconds.
- -u Dead-letter queue name.
- × Maximum number of uncommitted messages under any one syncpoint.

#### Some new/changed options

- -fs (file system) defaults to 64GB
- -p (port) Convenience option (which you'll probably want!)

#### Other mqcli commands similar

Review carefully to know what options are new/removed/changes

## **Web-based Administration**

### Browser-based Web UI for Administration

- For management of the appliance
- For management of the MQ queue managers
- MQ Console allows customizable views of MQ resources
  - Configurable through the use of various widgets



### Example – Create a Queue Manager Using the Web UI

### Far fewer options

- Name and port
- All others default
  - File system can be overridden

### Some options missing

- e.g. Log file sizes and number
- HA disposition
- These and others will take defaults

### Started immediately on creation

Use command line if not desired

### Multi-select is supported

Similar to queue manager groups with MQExplorer

#### Create a queue manager

Enter a name and port for the new queue manager

Queue Managers $\ref{eq: Constraint}$ (i) (i)				
🕀 🖂 🚍	▶ ● More		Filter	
Name 🔺	Running TCP listener ports	Status	High Availability	
QM1	1414	<b>R</b> unning		
QM2	2414	<b>1</b> Running		
Total: 2 Selected: 1	← 1	2	Last updated: 9:53:27 AM	

## **Modify an Existing Queue Manager**

### e.g. more log files needed

- Can't edit qm.ini
- New commands provided
  - Viewing qm.ini
  - Viewing environment variables
  - Commands to set as well

### Example - Change LogPrimaryFiles:

M2000(mqcli)# dspmqini -m QM2 -s Log Log: LogPrimaryFiles = 3 LogSecondaryFiles = 2 LogFilePages = 4096 LogType = CIRCULAR LogBufferPages = 0 LogPath = /var/mqm/vols/QM2/log/QM2/ LogWriteIntegrity = TripleWrite

M2000(mqcli)# setmqini -m QM2 -s Log -k LogPrimaryFiles -v 10 Key LogPrimaryFiles was successfully updated in stanza Log for queue manager QM2.

#### Display new values:

2000(mqcli)# dspmqi on:	ini	i -m QM2 -s Log
LogPrimaryFiles	=	10
LogSecondaryFiles	=	2
LogFilePages	=	4096
LogType	=	CIRCULAR
LogBufferPages	=	0
LogPath	=	/var/mgm/vols/QM2/log/QM2/
LogWriteIntegrity	=	TripleWrite

### **Appliance environment/file commands**

- No (traditional) file system
   No editor (vi, etc)
- Very limited support for moving files on or off the appliance

#### New commands provided

- Viewing MQ ini files
- Viewing environment variables
- Commands to set as well
- Command to display the MQ error log

Commond	Description
Command	Description
dspmgerr	Display the IBM MQ error log
· · ·	files.
dspmqini	Display attributes from the qm.ini
	or mqat.ini file of a specified
	queue manager.
dspmqvar	Display environment variables set
	for a specified queue manager.
setmqini	Add or remove an attribute from
	the qm.ini file of a specified queue
	manager. Set a value for an
	attribute in the mqat.ini file.
setmqvar	Add or remove an environment
	variable for the appliance or for a
	specified queue manager

# **High Availability**





# **High Availability**



### IBM MQ Appliances can be deployed in HA pairs

- Primary instance of a queue manager runs on one
- Secondary instance on the other for HA protection

### Primary and secondary work together

- Operations on primary automatically replicated to secondary
- Appliances monitor one another and perform local restart/failover

### Much simpler config than other HA solutions

- e.g. no shared file system/shared disks
- Much of the setup is preconfigured in the appliance

### Replication is synchronous over Ethernet, for 100% fidelity

- Routable but not intended for long distances
- Supports manual failover, e.g. for rolling upgrades

# **HA Terminology**

### MQ Appliance HA feature is akin to an HA product

- Such as Veritas, PowerHA, etc
- It is <u>not</u> an implementation of Multi-Instance Queue Managers

### HA Group

- A configuration of MQ Appliances that monitor each other
  - Try and ensure that each HA queue manager runs on one appliance but can fail over to the other if necessary
- An Appliance can be in at most one HA Group
- An HA Group consists of exactly two Appliances
- Not all queue managers must be members of an HA Group

### HA Queue Manager

A queue manager that is under the control of the HA Group and which has its data replicated between the appliances

### Preferred Location

- > Appliance where the HA implementation will run the queue manager, all else being equal
- Initially the appliance on which the HA Queue Manager is created

# **Designing a group**

- This image is straight from the Infocenter
- Gives a good overview of the possible combinations of queue managers in an HA Group

IBM MQ Appliance Cas	tor		IBM MQ Appliance	Pollux
Queue manager cicero1 Queue manager cicero2 Queue manager terentia1 HA group		HA group primary interface HA group secondary interface replication interface	Queue manager Queue manager Queue manager	terentia1 cicero1 cicero2
Queue manager tullia2				

# **Setting up HA**



Implementing HA is a snap with the MQ Appliance!

- 1. Connect two appliances together
- 2. On Appliance #1 issue the following command:

prepareha -s <some random text> -a <address of appliance2>

- 3. On Appliance #2 issue the following command: crthagrp -s <the same random text> -a <address of appliance1>
- 4. Then create an HA queue manager: *crtmqm* -sx HAQM1
- That's it!
- Note:
  - crtmqm creates queue managers on both appliances
  - No need to run strmqm. Queue managers will start and keep running unless explicitly ended with endmqm

### HA Queue managers in MQ Console

#### HA Group Appliance #1

Queue Mana	gers			C 🔅 i 🗵
$\oplus$ $\bigcirc$		More •		Filter
Name	-	Running TCP listener ports	Status	High Availability
HAQM1		1511	1 Running	REPLICATED
HAQM2			Running elsewhere	REPLICATED
QM1		1414	1 Running	
Total: 3 Selected	d: 0		1 ⊨	Last updated: 4:09:57 PM

#### HA Group Appliance #2

Queue Managers  C    (+)  (-)    More      Filter						
Name	Running TCP listener ports	Status	High Availability			
HAQM1		Running elsewhere	REPLICATED			
HAQM2	1512	<b>1</b> Running	REPLICATED			
QM2	1415	<b>P</b> Running				
Total: 3 Selected: 0		I ≻	Last updated: 4:12:06 PM			

### HA Queue managers in MQ Console: After Failover

- Appliance #1 is now in *Standby*
- All HA queue managers are now *running* on Appliance #2
- The console shows the High Availability alert, and a menu to allow you to see the status and to suspend or resume the appliance in the HA group.



### **HA** failover

On Appliance #2:

- HAQM2 is running there, on its primary and preferred location
- HAQM1 is running on its primary Appliance #1, so is secondary on Appliance #2

M2000(mgcli)# status HADM2	
QM(HAQM2)	Status(Running)
CPU:	0.00%
Memory:	198MB
Queue manager file system:	118MB used, 3.0GB allocated [4%]
HA role:	Primary
HA status:	Normal
HA control:	Enabled
HA preferred location:	This appliance
M2000(mgcli)# status HAQM1	
QM(HAQM1)	Status(Running elsewhere)
HA role:	Secondary
HA status:	Norma l
HA control:	Enabled
HA preferred location:	Other appliance
M2000(mqcli)# _	

### Before failover

#### **On Appliance #2 – after failover:**

#### HAQM1 is now running on Appliance #1

	M2000(mocli)# status HADM1	
	QM(HAQM1)	Status(Running)
	CPU:	0.09%
After failover	Memory:	199MB
	Queue manager file system:	118MB used, 3.0GB allocated [4%]
	HA role:	Primary
	HA status:	Secondary appliance unavailable
	HA control:	Enabled
	HA preferred location:	Other appliance
	M2000(mqcli)# _	

### **Appliance HA commands**

Command	Description
crthagrp	Create a high availability group of appliances.
dsphagrp	Display the status of the appliances in the HA group.
makehaprimary	Specifies that an appliance is the 'winner' when resolving a partitioned situation in the HA group.
prepareha	Prepare an appliance to be part of an HA group
sethagrp	Pause and resume an appliance in an HA group.
status	Not exclusively HA related, but a lot of the key info is displayed using this command.



## **Notes: Designing a group**

- This image is straight from the Infocenter and gives a good overview of the possible combinations of Queue managers in an HA Group.
  - As long as IP Addresses etc. for the three HA interfaces are correctly pre-configured, defining a group is as simple as executing the 'crthagrp/prepareha' commands.
    - Appliances can only be in exactly one group of exactly two appliances
  - Queue managers may be added to the group at crtmqm time, or after creation using the 'sethagrp' command
    - Queue managers can be active on either appliance (both appliances can simultaneously be running different active queue managers). Up to 16 active/passive instances per appliance are permitted.
  - Unlimited (other than by storage capacity etc.) non-HA queue managers may also be present on either appliance.
    - This might be desirable for example if you have applications/queue managers with different QOS agreements, or Test and production environments on the same system.

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### Web UI / MQ Console





## Web UI and MQ Console

### Browser-based Web UI for Administration

- For management of the appliance
- For management of the MQ queue managers

#### MQ Console allows customizable views of MQ resources

Configurable through the use of various widgets



### Web UI – Manage Appliance

- Appliance administration
  - Familiar to Datapower administrators
    - 'Blueprint' UI based
    - For managing the *platform*
  - No MQ-specific controls

#### Relatively terse

 Most appliance management done from command console

em Settings	Status:up	
Settings	ourus.up	
juage	Main	
	Enable administrative state: (?)	$\checkmark$
	Comments: (?)	
	Product OID: 🕐	1.3.6.1.4.1.14685.1.8
	Description: 🕐	IBM MQ Appliance
	Serial number: 🕐	0000000
	Entitlement serial number: 🕐	0000000
	Product ID: 🕐	5725 [Rev None]
	Contact: (?)	
	Appliance name: 🕐	MQApp11
	Location: 🕐	
	Services: 🕐	72
	Backup mode: 🕐	Normal
	Product Mode: 🥐	Normal
	Custom user interface file: 🕐	store:///
		dp-user-interface-demo xml

### Web UI – Manage MQ

### The MQ Console offers a much richer interface

- Currently a subset of MQ Explorer function
- At present only manages appliance Qmgrs
  - SOD to support IBM MQ in general
- Configurable layout and content
  - Enables admins to create their own "views"
  - Customized through the use of Tabs and Widgets

#### Basic layout:

- Welcome Tab
  - Queue Managers widget
    - Displayed by default
    - Shows all Qmgrs on the appliance
- Additional widgets can be added
  - MQ Object widget
    - Queues, Topics, Channels, etc
  - Chart widget
    - Resource monitors
    - CPU, memory, I/O, etc

IBM MQ Console	Dashboard	Appliance		
Welcome 🗸	<b>(+)</b>			
+ Add MQ Obje	ect Widget 🔶 A	Add Queue Mar	nager Widget 🔶 Add	Chart Widget
Queue Manage	rs		Ç 🕸 i ⊗	
$\oplus$ $\bigcirc$ $\blacksquare$	More	*	Filter	
Name 🔺	Running TCP listener ports	Status	High Availability	
QM1	1414	Running		
QM2	2414	Running		
Total: 2 Selected: c	i 1	L >	Last updated: 8:08:06 PM	

MQ Console



### **Queue Managers Widgets**

- Shows all queue managers
  - Can use filters to reduce
- For each queue manager, shows:
  - Name, Port, Status, HA status
- Can manage queue managers
  - Create, Delete, Start, Stop
  - Show properties
  - Retrieve error logs
  - Manage authority records

#### Queue manager properties

- Layout similar to MQ Explorer
  - Note the Platform type
- Editable properties have Edit hotspot
- Image: Image: Image: Image: Image: mage: Image: Image:

Name       Running Tilistener pc       Manage authority records       Iability         QM1       1414       Manage create authority records       Iability         QM2       Properties for 'QM1'       View Logs       View and edit the object properties         Cotal       • General	Name Running T listener po QM1 1414 Manage authority records View Logs QM1 1414 Running QM2 Properties for 'QM1' View and edit the object properties • General Queue manager name: QM1 Platform: MQPL_APPLIANCE Coded character set ID: 819 Description: Edit @ Command level: 801 Version: 08000003 © Command server control: Queue Manager Channel init control: Queue Manager Edit @ Command server control: Queue Manager Channel init control: Queue Manager Status • Extended	<b>+ (</b>			More • Filter	
QM2       Properties for 'QM1'         Total       View and edit the object properties         * General <ul> <li>Queue manager name:</li> <li>QM1</li> <li>Platform:</li> <li>MQPL_APPLIANCE</li> <li>O</li> <li>Coded character set ID:</li> <li>819</li> <li>O</li> <li>Description:</li> <li>Edit</li> <li>Command level:</li> <li>801</li> <li>Version:</li> <li>08000003</li> <li>O</li> <li>Command server control:</li> <li>Queue Manager</li> <li>Channel init control:</li> <li>Queue Manager</li> <li>Edit</li> <li>Status</li> </ul>	CM2       Properties for 'QM1'         Total       View and edit the object properties         Total       • General         Queue manager name:       QM1         Platform:       MQPL_APPLIANCE         Coded character set ID:       819         Description:       Edit @         Command level:       801         Version:       08000003         Command server control:       Queue Manager         Channel init control:       Queue Manager         Status       • Extended         Chuster       • Chuster	Name QM1	•	Runnin listen 1414	Manage authority records Manage create authority records View Logs Running	lability
✓ General         Queue manager name:       QM1         Platform:       MQPL_APPLIANCE         Coded character set ID:       819         Description:       Edit ?         Command level:       801         Version:       08000003         Command server control:       Queue Manager         Channel init control:       Queue Manager         Status	General   Queue manager name: QM1   Platform: MQPL_APPLIANCE   Coded character set ID: 819   Description: Edit ?   Command level: 801   Version: 08000003   Command server control: Queue Manager   Channel init control: Queue Manager   Status	2M2 Pr Total	roperties for w and edit the o	r 'QM1' bject proper	ties	
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Command server control:       Queue Manager         Channel init control:       Queue Manager         Edit       ?	Command server control: Queue Manager Channel init control: Queue Manager Edit ()  Status  Extended  Chrotor		Platform: Coded characte	r set ID:	MQPL_APPLIANCE 819	• •
> Status			Platform: Coded characte Description: Command level Version:	r set ID:	MQPL_APPLIANCE 819 Edit 801 08000003	0         1           0         0           0         0           0         0           0         0
	Extended		Platform: Coded characte Description: Command level Version: Command serve Channel init con	r set ID: : er control: trol:	MQPL_APPLIANCE 819 Edit 801 08000003 Queue Manager Queue Manager Edit	?

## **MQ Object Widgets**

- Use to display various MQ object types
- To create, click hotspot
- Configure the widget
- Choose Queue Manager
- Choose object type
  - Queues
  - Topics
  - Channels
  - Listeners
  - CHLAUTH records
- We'll create a Queue widget

#### + Add MQ Object Widget

MQ Object Widget 👌 🖒 🤅					$\otimes$
Choose the configur	ation options for the object widge	et			
MQ Object Widget	Ċ	: ٤	<b>\$</b>	$(\mathbf{i})$	$(\!$
Queue manager:	QM1	-	]		
Object: 🥐	Queues	•			
Object type: 🥐	Queues				
Objects per page: ? Widget title: ?	Topics Channels Client-connection channels				
Show system objects:	Listeners Channel authentication record	S	Car	ncel	

## **MQ Queue Widget**

- On creation, shows all queues for specified queue manager
  - Can use filters to limit numbers
- Manage queues on designated queue manager
  - Create, Delete, Start, Stop
  - Show properties and Status
  - Put message
  - Browse queue
- Click Q to browse queue

#### With Browse widget you can

- See message contents and properties
- Put messages
- Clear queue
- Can do the same for other object types
  - Topics, Channels, Listeners, etc

Queues on QM1 C 🔅 🤅				
🕂 🗇 🧮 🖄 🔍 More	)▼	Filter		
Name	Queue type	Queue depth		
TEST.IN	Local	3		
TEST.OUT	Local	0		
Total: 2 Selected: 1	1 →	Last updated: 8:53:35 PM		

#### Browse Messages

View the messages on the queue, and optionally add a browse widget to the dashboard. Additional message properties can be viewed from the browse widget

Messages	for queue 'TEST.IN' on QM1	C 🔅 i 🗵	Filter
ჲ 📑	More 🔻	Filter	]
Position 🔺	Message body	Date/time	, 3:50:56 PM
1	test1	Sep 24, 2015, 3:50:56 PM	i, 3:51:20 PM
2	Another test	Sep 24, 2015, 3:51:09 PM	updated: 8:54:30 PM
3	Sill another test	Sep 24, 2015, 3:51:20 PM	Close
Total: 3 Selec	ted: o	Last updated: 9:22:20 PM	

# **Other MQ Object Widgets**

#### Different widgets for different object types

- Queues
- Topics
- Channels
- Listeners
- CHLAUTH records
- Use filters
  - e.g. queues that begin with "TEST"
  - Use multiple widgets with different filters for application/LOB view
- Create/Start/Stop/Delete channels
- Create/Put/Browse/Delete queues and topics
- Show or hide system objects

Queues on QM1			Ċ II (I) ⊗
🕀 🔪 📑	🔿 🔍 More.		Filter
Name	•	Queue type	Queue depth
TEST.IN		Local	1
TEST.OUT		Local	0
Total: 2 Selected: o	ः <b>।</b> 1	E E	Last updated: 9:27:43 AM
Topics on QM1			Ċ II ⊗
• - T	🖄 🔍 More.		Filter
Name	-	Topic String	(
Monitor		\$SYS/MQ/INF	O/QMGR/QM1/Monitor
Total: 1 Selected: 0		1 🖂	Last updated: 9:31:20 AM
Channels on Q	/1		C 🔅 i 🗵
🕀 🔪 📑	More.		Filter
Name	▲ Туре		Overall channel status
USER.SVRCONN	Server-con	nection	Inactive
Total: 1 Selected: 0 <b>1</b>			Last updated: 9:27:57 AM
Channel Auther	tication Records	s on QM1	C 🔅 i 🗵
$\oplus$ $\ominus$ $\blacksquare$			Filter
Profile name	Туре	Attribute	User source
*	Block User List	User list: *MQADMIN	
* USER.SVRCONN	Block User List	User list: *MQADMIN User list: *whatever	

### **Resource Monitoring**

- The appliance lacks common OS monitoring tools
  - No vmstat, iostat, nmon, etc
- Understanding resource usage on the MQ Appliance is a must
  - Everything is self-contained
    - CPU, Memory, Disk, etc

#### To assist with this, new monitoring capabilities were added

- Along with a new style of event generation
- Provides information that would normally be accessed via OS-level monitors
- Intent is to provide insight into how appliance resources are being utilized

#### MQ Console plugs into these new performance events

- New style of event generation allows multiple consumers of the same information
- Use is not restricted to the MQ Console
  - More on this later

#### The next few slides explore how to access this data using Chart widgets

## **Chart Widgets**

- Display appliance resource use
  - Platform-wide or queue manager
  - CPU, Disk, memory, etc
- To create, click hotspot
- Configure the widget
- Select:
  - Resource class/type/element
  - Queue manager(s) to monitor
- Choose Resource class
  - CPU
  - Data stores
  - API Usage stats
- We'll look at an example





	Chart Widget	<u>نې</u> س	(i) (X)
	Resource to r	monitor	
	Resource class	S: Platform central processing 🝷	
	Resource type:	CPU nerformance - nlatform	
Chart \	Widget	🕛 🔅 i (	$\times$
Res	ource to monitor—		
Resou	irce class:	Platform central processing 🔻	
Resou	irce type:	Platform central processing units	
Resou	irce element:	Platform persistent data stores API usage statistics	
Que	ue manager(s) to n	API per-queue usage statistics	_
QM1		• •	
Ad	d queue manager		

# **MQ Console Widgets - Chart**

### Chart widgets enable monitoring

- Allow viewing of monitoring data for the appliance
- Data is collected at ten-second intervals

### Four types of resources can be monitored

- Platform central processing units
  - Monitor the usage of the CPUs on the IBM MQ Appliance
- Platform persistent data stores
  - Monitor the use of disk resource on the IBM MQ Appliance
- API usage statistics
  - Monitor MQ API calls on the IBM MQ Appliance per queue manager
  - Same type of monitoring available with IBM MQ statistics
- API per-queue usage statistics
  - Monitor MQ API calls for an individual queue as well



## **Chart Widget - CPU**

- Select CPU usage by queue manager
- Select System or User CPU usage
- Select queue manager(s) to monitor
- Result is a configured chart widget
  - Refreshed every 10 seconds
  - Different colors for each
  - Hover over for list view

#### Can monitor CPU over time as well

1, 5 and 15 min averages



## **Chart Widget – MQI Statistics**

- Programming practices often cause poor MQ performance
- Chart widget allows gathering of MQI usage
  - Queue-manager wide, or queue-specific
  - Insight into MQI usage can reveal:
    - Excessive CONN/DISC and OPEN/CLOSE
    - Use of PUT1 vs PUT
    - Persistent vs non-persistent
    - Queue avoidance
    - Queue lock contention

#### Can quickly configure chart widgets

- Focus on suspect problem areas (queues, channels, etc)
- Statistics gathered "inside" rather than outside MQ
- Overhead minimal compared to value of information
- Dashboards can be saved/shared
  - Enables creation of "what if" scenarios
  - Also repeatable monitoring profiles



## **Chart Widget – Logger Statistics**

- MQ has collected logger statistics for many releases
  - But very hard to get at
  - Not documented
- MQ Appliance makes some of this available via Chart widgets
  - Log space used, bytes written, write latency, etc
- Very useful in appliance as disk is finite
  - Knowing when log I/O is a bottleneck vital
  - Also knowing if logs are over/under allocated



11:28:00 AM 11:28:30 AM

Time

11:29:00 AM

0

11:27:30 AM

### **Chart Widgets** *Analyzing performance issues*

#### New statistics help pinpoint bottlenecks

- Scenario: Messages backing up on queue
  - Draining very slowly

#### Queue statistics help provide a clue

- Queue lock contention very high
  - Worse than 10% can be a problem
  - In this example it's at or near 100%!

#### Logger statistics provide further clue

- Write latency high
  - 25-30ms
  - Very high for a local disk
- Problem conclusion
  - Investigation showed large number of concurrent putters
  - Putting large messages outside syncpoint
  - Log write latency aggravated problem



Time

1:31:30 PM 1:32:00 PM

1:30:00 PM 1:30:30 PM 1:31:00 PM

0

### **MQ Console - Summary**

Welcome 🗸 (+)

45

📩 Import 🕁 Export 📠 Reset Dashboard

#### (+) Add MQ Object Widget (+) Add Queue Manager Widget (+) Add Chart Widget



Click the Add 🕂 button on the Queue Manager widget to create a new local queue manager.

### **MQ Console - Monitoring**

Welcome 👻

Queue Managers - Appliance Monitors -

MQ Monitors - (+)

📩 Import 🕁 Export 📠 Reset Dashboard

+ Add MQ Object Widget + Add Queue Manager Widget + Add Chart Widget



Capitalware's MQ Technical Conference v2.0.1.5

## Monitoring



# **Extending Appliance Monitoring**

- New MQ-delivered performance data provided
- Also a new style of event generation

### Four types of resources can be monitored

- Processor usage
- Disk storage usage
- API usage statistics
- Queue usage statistics

### Accessible via MQ Console Chart widgets

### Also from the mqcli console

- amqsrua command
- "Sample" program source shipped with Installable MQ fixpack 8.0.0.3
  - Possible to author custom apps to present the same information in different ways
- Performance data publications are in PCF format

# Using amqsrua for Appliance Monitoring

#### "Sample" program

- Shipped with MQ Client SupportPac
- Includes source code
- Can use as-is, or as a starting point
- Runs native or appliance
  - Or can client-connect

#### Enter amqsrua –m <qmgr>

- Returns classes of available data
  - CPU, Disk, MQI Stats, Queue Stats

#### amqsrua –m <qmgr> –c DISK –t Log

Returns Logger statistics

#### amqsrua –m <qmgr> –c CPU

- Returns processor usage
- Where does the data come from?

M2000(mqcli)# amqsrua -m QM1 -c CPU -t QMgrSummary -n 1 Publication received PutDate:20150928 PutTime:17081306 User CPU time - percentage estimate for queue manager 0.11% System CPU time - percentage estimate for queue manager 9.20% RAM total bytes - estimate for queue manager 209MB

- Log file system bytes max 3170648064
- Log physical bytes written Ø
- Log logical bytes written Ø
- Log write latency 30776 uSec
- At startup, appliance queue managers publish a set of *metatopics*
  - Describe perf classes that can be subscribed to
    - Can subscribe to one or more topics
    - When subscriptions registered, MQ will publish data on requested topic(s)

#### Topic structure is documented

- Publications non-persistent, subscriptions nondurable
- When subscriptions deregistered, MQ will stop publication to that subscriber

# **Accessing Monitoring Data**

### Performance data available via Pub/Sub

- Departure from existing MQ stats and monitoring
- Performance data offered in a highly dynamic way
- Includes new data unique to the appliance
  - e.g. Logger write latency, queue lock contention

#### Monitor application can subscribe to metatopics MQSUB("\$SYS/MQ/INFO/QMGR/<gmgrname>/Monitor/METADATA")

- Retained publications respond with what information is available
- Subscribing application can then choose to subscribe to specific topics

### MQ Console requires admin authority

- So access to chart widgets will likely be restricted
- But developers, etc could use amqsruac
  - Client-connect
  - Or modify sample to suit needs

> [Empty]	
4 (SVS	
4 MO	
A INFO	
A OMGR	
4 01	41
	Monitor
-	A CPU
	> OMorSummary
	> SystemSummary
	A DISK
	Log
	> OMorSummary
	> SystemSummary
	METADATA
	> CLASSES
	> CPU
	> DISK
	> STATMQI
	> STATQ
	▲ STATMQI
	> CONNDISC
	> GET
	> INQSET
	> OPENCLOSE
	> PUBLISH
	> PUT
	> SUBSCRIBE
	CYNCROINT

### **Miscellaneous**



## **Monitoring applications**

### **Classic use cases for dedicated/specialised exit code:**



What is coming in off this set of channels right now?

How can I keep an audit log of all messages put by a particular application?

### Monitoring applications Application Activity Trace

### Activity trace produces information about application MQI calls

- Provides a detailed view of the parameters used by an application
- Also shows the sequence of MQI calls issued by an application
- Normally configured by editing mqat.ini
- Appliance supports the MQ V8 methods of collecting activity data
  - By writing PCF messages to SYSTEM.ADMIN.TRACE.ACTIVITY.QUEUE

### • Appliance also introduces a new method of subscribing to activity trace

- Data published to special IBM MQ system topics
  - Pub/Sub approach means there can be multiple subscribers to the same data
- Basic topic is "\$SYS/MQ/INFO/QMGR/<qmgr name>/ActivityTrace"
  - Subscriber can then add "/ApplName/amqsputc.exe"
  - Or "/ChannelName/SYSTEM.DEF.SVRCONN"
  - Events in same format as on other platforms

### Very good write-up here:

http://www.ibm.com/developerworks/community/blogs/messaging/entry/Tracing\_applications\_with\_the\_MQ\_Appliance

# Working with files on the appliance

No general access to file system – everything needed is available through dedicated URIs or tooling (examples below)



## How do I apply upgrades and patches?

- MQ Appliance uses a different approach to MQ service
- Firmware updates come as 'scrypt' files which we build and contain the entire DP + MQ stack in one bundle (~800MB)
- Implications:
  - No piecemeal updating ifix means an entire update
  - No fixes to back-level firmware ifixes only built at current firmware level
- Uploaded using config copy command
  - From an FTP/SCP/HTTP server elsewhere
  - Upgrade applied using config->flash sub shell

### Summary

- From the top...
- Tools for Administration
- Getting Started
- HA and the MQ Appliance
- MQ Console Views and Widgets
- Monitoring
- Odds and Ends
- Summary

### **Questions & Answers**

