



IBM Software Group

# WebSphere MQ: Getting started with Statistics and Accounting

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# Agenda

- Introduction
- Accounting messages
- Statistics messages
- Displaying messages
- Additional resources for Statistics and Accounting
- APAR's and Technotes
- Summary
- Other Resources

## Introduction to accounting and statistics

- Accounting and statistics messages are generated to record information about the MQI operations performed by WebSphere® MQ applications (accounting), or to record information about the activities occurring in a WebSphere MQ system (statistics).
- New in WebSphere MQ 6.0.
- NOTE: Accounting and statistics messages as described here are not available on WebSphere MQ for z/OS® . Equivalent functionality is available through the System Management Facility (SMF).

# Accounting messages

- Used to record information about the MQI operations performed by WebSphere MQ applications.
- Generated at configured intervals (default of 1800 seconds), and when an application disconnects from a queue manager
- Messages are delivered to the `SYSTEM.ADMIN.ACCOUNTING.QUEUE`

## Uses for accounting message information

- Account for application resource use.
- Record application activity.
- Detect problems in your queue manager network.
- Assist in determining the causes of problems in your queue manager network.
- Improve the efficiency of your queue manager network.
- Confirm your queue manager network is running correctly.

# Accounting message types

- **MQI accounting messages**  
contain information relating to the number of MQI requests executed using a connection to a queue manager
- **Queue accounting messages**  
contain information relating to the number of MQI requests executed using connections to a queue manager, with respect to specific queues.

## Collecting MQI accounting information

- The collection of MQI accounting information is controlled by the queue manager attribute **ACCTMQI**.
- This parameters can have the following values:
  - ON** MQI accounting information is collected for every connection to the queue manager.
  - OFF** MQI accounting information is not collected. This is the default value.

Example: ALTER QMGR ACCTMQI(ON)

## Collecting queue accounting information

- The collection of queue accounting information is controlled by the queue or queue manager attribute **ACCTQ**.
- The ACCTQ parameter can have the following values:  
For a queue:
  - ON** Queue accounting information for this queue is collected for every connection to the queue manager that opens the queue.
  - OFF** Queue accounting information for this queue is not collected.
  - QMGR** The collection of queue accounting information for this queue is controlled according to the value of the queue manager attribute, ACCTQ. This is the default value.

Example: ALTER QLOCAL(Q1) ACCTQ(ON)



# Collecting queue accounting information

**ACCTQ** parameter values continued:

For a queue manager:

- ON** Queue accounting information is collected for queues that have the queue attribute **ACCTQ** set as **QMGR**.
- OFF** Queue accounting information is not collected for queues that have the queue attribute **ACCTQ** set as **QMGR**. This is the default value.
- NONE** The collection of queue accounting information is disabled for all queues, regardless of the queue attribute **ACCTQ**.

Example: `ALTER QMGR ACCTQ(ON)`

# Controlling accounting information collection

Additional MQSC accounting command:

```
ALTER QMGR ACCTCONO(ENABLED)
```

- allows you to override the value of the queue manager attributes ACCTMQI and ACCTQ at the connection level
- alter the value of ConnectOpts in the MQCONN call  
MQCONN (QMgrName, ConnectOpts, Hconn, CompCode, Reason)
- ConnectOpts can have the following values:
  - MQCNO\_ACCOUNTING\_MQI\_ENABLED
  - MQCNO\_ACCOUNTING\_MQI\_DISABLED
  - MQCNO\_ACCOUNTING\_Q\_ENABLED
  - MQCNO\_ACCOUNTING\_Q\_DISABLED

# Format of accounting messages

Accounting messages are constructed as a set of PCF fields that consist of the following:

## **A message descriptor**

- ▶ An accounting message MQMD (message descriptor)

## **Accounting message data**

- ▶ An accounting message MQCFH (PCF header)
- ▶ Accounting message data that is always returned
- ▶ Accounting message data that is returned if available

# Format of accounting messages

For more details on the accounting message format, see Chapter 17, *Accounting and statistics message reference*, in the Monitoring WebSphere MQ manual:

<http://publibfp.boulder.ibm.com/epubs/pdf/csqzax05.pdf>

# Statistics messages

- Used to record information about the activities occurring in a WebSphere MQ system
- Generated at configured intervals (default of 1800 seconds), and when a queue manager shuts down in a controlled fashion.
- Messages are delivered to the `SYSTEM.ADMIN.STATISTICS.QUEUE`

## Uses for statistic message information

- Account for application resource use.
- Record application activity.
- Capacity planning.
- Detect problems in your queue manager network.
- Assist in determining the causes of problems in your queue manager network.
- Improve the efficiency of your queue manager network.
- Confirm your queue manager network is running correctly.

# Statistics message types

- **MQI statistics messages**  
contain information relating to the number of MQI requests executed during a configured interval.
- **Queue statistics messages**  
contain information relating to the activity of a queue during a configured interval.
- **Channel statistics messages**  
contain information relating to the activity of a channel during a configured interval.

## Collecting MQI statistics information

- The collection of MQI statistics information is controlled by the queue manager attribute **STATMQI**.
- This parameters can have the following values:
  - ON** MQI statistics information is collected for every connection to the queue manager.
  - OFF** MQI statistics information is not collected. This is the default value.

Example: ALTER QMGR STATMQI(ON)



## Collecting queue statistics information

- The collection of queue statistics information is controlled by the queue or queue manager attribute **STATQ**.
- The STATQ parameter can have the following values:  
For a queue:
  - ON** Queue statistics information is collected for every connection to the queue manager that opens the queue.
  - OFF** Queue statistics information for this queue is not collected.
  - QMGR** The collection of queue statistics information for this queue is controlled according to the value of the queue manager attribute, STATQ. This is the default value.

Example: ALTER QLOCAL(Q1) STATQ(ON)

# Collecting queue statistics information

**STATQ** parameter values continued:

- For a queue manager:
  - ON** Queue statistics information is collected for queues that have the queue attribute STATQ set as QMGR
  - OFF** Queue statistics information is not collected for queues that have the queue attribute STATQ set as QMGR. This is the default value.
  - NONE** The collection of queue statistics information is disabled for all queues, regardless of the queue attribute STATQ.

Example: ALTER QMGR STATQ(ON)

## Collecting channel statistics information

- The collection of channel statistics information is controlled by the channel or queue manager attribute **STATCHL**.
- The channel parameter can have the following values:
  - LOW** Channel statistics information is collected with a low level of detail.
  - MEDIUM** Channel statistics information is collected with a medium level of detail.
  - HIGH** Channel statistics information is collected with a high level of detail.
  - OFF** Channel statistics information is not collected for this channel. This is the default value.
  - QMGR** The channel attribute is set as QMGR. The collection of statistics information for this channel is controlled by the value of the queue manager attribute, STATCHL

Example: ALTER CHANNEL(QM1.TO.QM2) CHLTYPE(SDR)  
STATCHL(MEDIUM)

# Collecting channel statistics information

## STATCHL parameter values continued:

- The queue manager parameter can have the following values:
  - LOW** Channel statistics information is collected with a low level of detail, for all channels that have the channel attribute STATCHL set as QMGR.
  - MEDIUM** Channel statistics information is collected with a medium level of detail, for all channels that have the channel attribute STATCHL set as QMGR.
  - HIGH** Channel statistics information is collected with a high level of detail, for all channels that have the channel attribute STATCHL set as QMGR.
  - OFF** Channel statistics information is not collected for all channels that have the channel attribute STATCHL set as QMGR. This is the default value.
  - NONE** The collection of channel statistics information is disabled for all channel, regardless of the channel attribute STATCHL.

Example: ALTER QMGR STATCHL(MEDIUM)

## Collecting channel statistics information

Additional queue manager parameter for automatically defined cluster sender channels: **STATACLS**.

- This queue manager parameter can have the following values:
  - LOW** Statistics information is collected with a low level of detail for automatically defined cluster-sender channels.
  - MEDIUM** Statistics information is collected with a medium level of detail for automatically defined cluster-sender channels.
  - HIGH** Statistics information is collected with a high level of detail for automatically defined cluster-sender channels.
  - OFF** Statistics information is not for automatically defined cluster-sender channels. This is the default value.
  - QMGR** The collection of statistics information for automatically defined cluster-sender channels is controlled by the value of the queue manager attribute, STATCHL.

Example: ALTER QMGR STATACLS(MEDIUM)

# Collecting channel statistics information

What do the values for **STATCHL** / **STATACLS** mean?

Level	Description	Usage
Low	Measure a small sample of the data at regular intervals	For objects that process a high volume of messages
Medium	Measures a sample of the data at regular intervals	For most objects
High	Measures all data at regular intervals	For objects that process only a few messages per second

# Collecting channel statistics information

Additional MQSC statistics command:

```
RESET QMGR TYPE(STATISTICS)
```

- Writes the currently collected statistics data to the statistics queue before the statistics collection interval expires.
- Causes a new statistics data collection interval to start.

# Format of statistics messages

Statistics messages are constructed as a set of PCF fields that consist of the following:

## **A message descriptor**

- ▶ A statistics message MQMD (message descriptor)

## **Statistics message data**

- ▶ A statistics message MQCFH (PCF header)
- ▶ Statistics message data that is always returned
- ▶ Statistics message data that is returned if available



## Format of statistics messages

For more details on the statistic message format, see Chapter 17, *Accounting and statistics message reference*, in the Monitoring WebSphere MQ manual:

<http://publibfp.boulder.ibm.com/epubs/pdf/csqzax05.pdf>

## Displaying the Output

- Can use a program to display messages from the `SYSTEM.ADMIN.STATISTICS.QUEUE` and `SYSTEM.ADMIN.ACCOUNTING.QUEUE`
  - ▶ Sample Program – `amqsmon`
  - ▶ Write your own program
- MQ Explorer Plug-in
  - ▶ MS0P: WebSphere MQ Events and Statistics Plug-in

## Controlling the output

- There are several options to control the output you get. If you are not selective you may get much more output than you want.
  - ▶ System Queues
  - ▶ Dynamic Queues
  - ▶ High Detail
  - ▶ Frequency of collection
  - ▶ Control at queue level or queue manager level

## Amqsmon sample program

- Sample program amqsmon
  - ▶ Use it to display accounting or statistics information to the screen
  - ▶ Options to control what to display
    - queue info
    - channel info
    - limit the number of messages to display
    - specify certain time frames (start/stop times)
    - select which fields you want to see

## Amqsmon sample program

- cmqcfc header file
  - ▶ declarations for PCF and Events
- cmqc header file
  - ▶ declarations for Main MQI
- Modify the source to meet your specific needs
- Detailed in Monitoring WebSphere MQ manual

## Amqsmon example (1 of 2)

- Example using amqsmon to only view the accounting data showing the application name, the queue name, puts and gets.
- From cqmcfc.h header file
  - ▶ #define MQCACF\_APPL\_NAME 3024
  - ▶ #define MQIAMO\_GETS 722
  - ▶ #define MQIAMO\_PUTS 735
- From cmqc.h header file
  - ▶ #define MQCA\_Q\_NAME 2016

## Amqsmon example (2 of 2)

```
C:\>amqsmon -m qmgrname -t accounting -b -l  
3024,2016,735,722  
MonitoringType: QueueAccounting  
ApplicationName: 'WebSphere MQ\bin\amqsput.exe'  
QueueAccounting: 0  
QueueName: 'STATS01'  
PutCount: [5, 0]  
GetCount: [0, 0]
```

```
MonitoringType: QueueAccounting  
ApplicationName: '30\eclipse\jre\bin\javaw.exe'  
QueueAccounting: 0  
QueueName: 'STATS01'  
PutCount: [0, 0]  
GetCount: [5, 0]
```

## SupportPac MS0P

- SupportPac MS0P: WebSphere MQ Events and Statistics Plug-in
  - ▶ Category 2 SupportPac provided in good faith and AS-IS
  - ▶ Another way to view Statistics and Accounting data
  - ▶ Reports are aggregate of records for a queue or program



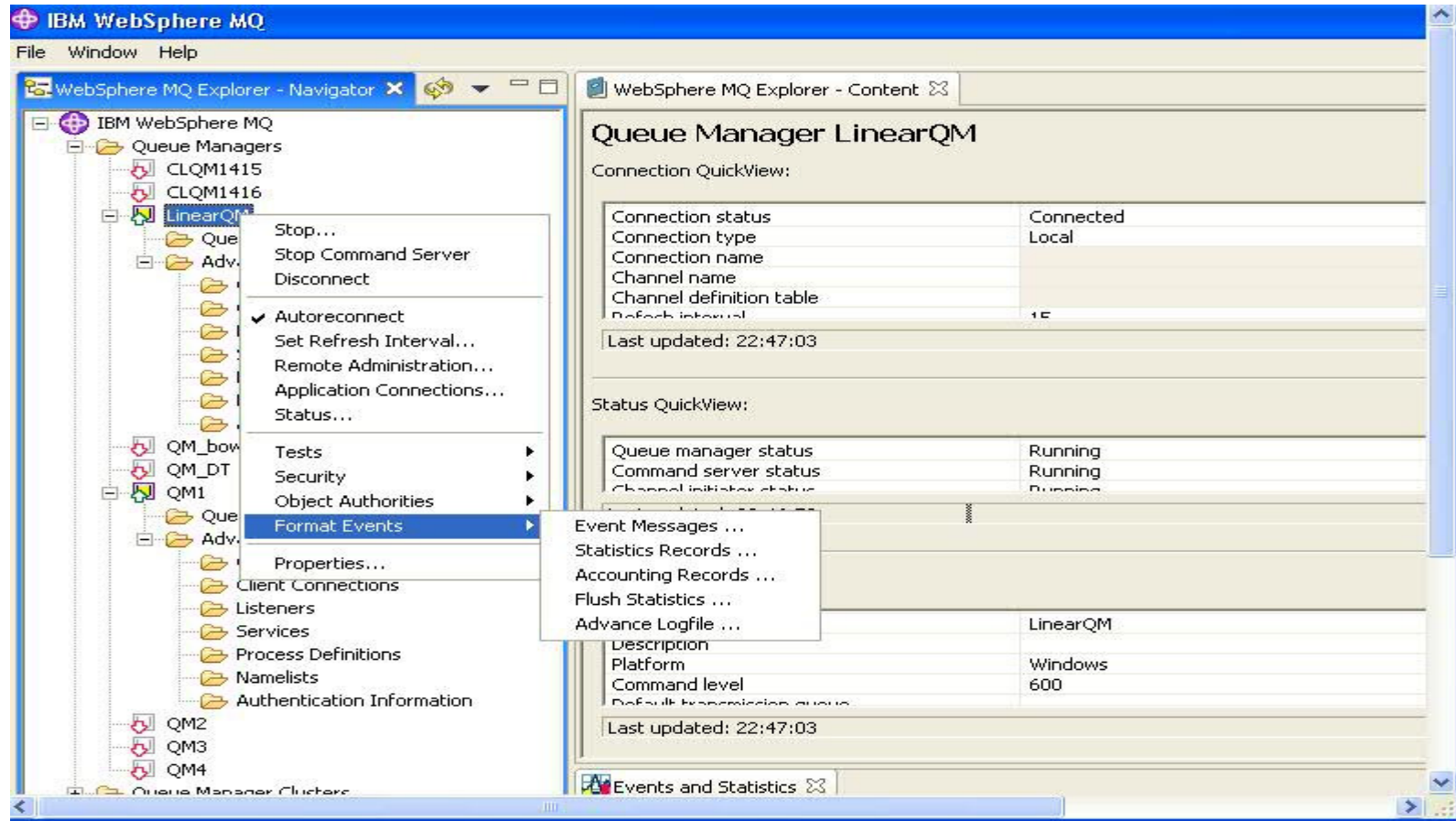
## SupportPac MS0P

- Plug-in for MQ Explorer or command line interface (amqsjmon)
- When installed in default directories the amsjmon.bat file is located in:
  - ▶ C:\Program Files\IBM\WebSphere MQ\ eclipse\plugins\com.ibm.mq.explorer.events.stats\_4.0.0
  - ▶ May need to modify some path statements to make it work on your machine

## SupportPac MS0P

- MQ Explorer Plugin lets you display
  - ▶ Event Messages
  - ▶ Statistics Records
  - ▶ Accounting Records
  - ▶ Flush statistics
  - ▶ Advance logfiles if using linear logging

# SupportPac MS0P – screenshots (1 of 3)



# SupportPac MS0P – screenshots (2 of 3)

Events and Statistics x

Queue Manager: LinearQM  
Last Operation: Reading from SYSTEM.ADMIN.STATISTICS.QUEUE

Statistics for Queue Manager LinearQM

Not showing TDQ details  
From 2008-05-19 22.36.49 to 2008-05-19 22.40.49

- Connections : 0
- Disconnects : 0
- Other Actions
- Messages
- Used Queue Count: 1**
  - Queue Name : T1
    - Created : 2007-05-24 02.25.45
    - Queue Type : Local
    - Def Type : Predefined
    - Max Q Depth : 5
    - Min Q Depth : 0

Messages	Non-persistent	Persistent
Put	: 0	10
Put1	: 0	0
Get	: 0	10
Browse	: 0	0
Put Bytes	: 0	34
Get Bytes	: 0	34
Browse Bytes	: 0	0
Average Life	: 0	8923963
Failed Put	: 0	
Failed Put1	: 0	
Failed Get	: 0	
Failed Browse	: 2	
Expired Msg	: 0	
Non-Queued Messages	: 0	

# SupportPac MS0P – screenshots (3 of 3)

Events and Statistics

**Queue Manager: LinearQM**  
 Last Operation: Reading from SYSTEM.ADMIN.ACCOUNTING.QUEUE

**Statistics for Queue Manager LinearQM**

Not showing TDQ details  
 From 2008-05-19 22.36.49 to 2008-05-19 22.40.49

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- Used Queue Count: 1**
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Put1	: 0	0
Get	: 0	10
Browse	: 0	0
Put Bytes	: 0	34
Get Bytes	: 0	34
Browse Bytes	: 0	0
Average Life	: 0	8923963
Failed Put	: 0	
Failed Put1	: 0	
Failed Get	: 0	
Failed Browse	: 2	
Expired Msg	: 0	

## Additional Resources for Stats and Acct

- **Monitoring WebSphere MQ**

<http://www.elink.ibm.link.ibm.com/publications/servlet/pbi.wss?CTY=US&FNC=SRX&PBL=SC34659300>

- **WebSphere MQ Constants**

<http://www.elink.ibm.link.ibm.com/publications/servlet/pbi.wss?CTY=US&FNC=SRX&PBL=SC34660700>

- **MS0P: WebSphere MQ Events and Statistics Plug-in**

[http://www-1.ibm.com/support/docview.wss?rs=171&uid=swg24011617&loc=en\\_US&cs=utf-8&lang=en](http://www-1.ibm.com/support/docview.wss?rs=171&uid=swg24011617&loc=en_US&cs=utf-8&lang=en)

## APARS for Statistics and Accounting (1 of 7)

- Fix Pack 6.0.1.1
  - ▶ IC48310: XCSREFRESHMTIME CUTS AN FDC WITH PROBE ID XC457010 - only on Windows
  - ▶ IY79663: XC130004 SIGSEGV OUT OF kpiSyncPoint during an xa\_commit call
- Refresh Pack 6.0.2.0
  - ▶ IC49197: PERFORMANCE PROBLEM ON MACHINES WHERE MQ FAILS TO CALCULATE A REQUIRED ACCURACY FROM THE PERFORMANCE COUNTERS.

## APARS for Statistics and Accounting (2 of 7)

- Fix Pack 6.0.2.1
  - ▶ IY86361: WEBSPHERE MQ V6.0 ACCOUNTING MESSAGES DISPLAY INCORRECT INFO
  - ▶ IY86822: TIMEONQAVG, TIMEONQMIN AND TIMEONQMAX ACCOUNTING MESSAGES VALUES ARE ALWAYS SET TO ZERO (0)
  - ▶ IY86600: ACCOUNTING MESSAGES ARE NOT GENERATED AFTER EXCEEDING ACCOUNT COUNT INTERVAL



## APARS for Statistics and Accounting (3 of 7)

- Fix Pack 6.0.2.2
  - ▶ IY95508: CHANNEL STATISTICS getting COLLECTED AT THE end of the CONFIGURED STATINT AFTER HAVING TURNED OFF THE STATCHL ATTRIBUTE
- Fix Pack 6.0.2.3
  - ▶ IC53429: amqsmon shows 0 in PutBytes field despite having put messages with MQPUT1 call
  - ▶ IC53676: ERROR MESSAGES AMQ7315 OR AMQ7316 ARE LOGGED WHEN ANY ACCOUNTING OR STATISTICS MESSAGE IS PUT TO THE ACCOUNTING/STATISTICS QUEUE

## APARS for Statistics and Accounting (4 of 7)

- Fix Pack 6.0.2.3
  - ▶ IZ00349: LOCKING PROBLEM WHERE WE TRY TO WRITE AN ACCOUNTING RECORD WHILST ALREADY HOLDING A LOCK ON A NON-QUEUE OBJECT
  - ▶ IZ03209: WHEN MESSAGE IS GOTTEN BY APPLICATION WITH RC=2079, LGETTIME/LGETDATE FIELDS DO NOT GET UPDATED
- Fix Pack 6.0.2.4
  - ▶ IC54608: CHANNEL STATISTICS MESSAGES HAVE QUEUE MANAGER NAME PADDED WITH ZEROS INSTEAD OF BLANKS

## APARS for Statistics and Accounting (5 of 7)

- Fix Pack 6.0.2.4 (continued)
  - ▶ IZ05653: AMQZMUR0 FAILS WITH XC006001 AND XECS\_I\_PRIVATE\_MEMORY\_ERROR
  - ▶ IZ09338: IN THE CASE OF QUEUE MANAGER RECYCLED INFREQUENTLY, THE NUMBER OF ACCUMULATED CHANNEL STATS RECORDS BECOMES VERY LARGE
  - ▶ IZ09339: AverageQueueTime (MQIAMO\_AVG\_Q\_TIME) displays negative values
  - ▶ IZ12497: Probe KN272002 FDC reported from function kqiPutAccountingQueue when a connection has a large number of open objects

## APARS for Statistics and Accounting (6 of 7)

- Fix Pack 6.0.2.5
  - ▶ IC55390: SEQUENCE NUMBER ON QUEUE STATS MSG IS ALWAYS 1
  - ▶ IC56068: WEBSPHERE MQ QUEUE STATISTICS DATA FIELD BROWSEFAILCOUNT IS INCORRECTLY INCREMENTED
  - ▶ IZ14279: QUEUE MANAGER TIME CALCULATIONS MUST USE THREAD-SAFE SYSTEM CALLS
  - ▶ IZ20758: XC034002 AMQZLAA0 UNEXPECTED RESPONSE TO A
  - ▶ PTHREAD\_COND\_TIMEDWAIT() REQUEST CAUSES WAITER CHAIN CORRUPTION

# APARS for Statistics and Accounting (7 of 7)

- DOC APARS
  - ▶ IC55076: Default value of the queue manager's parameter STATCHL is wrongly documented as NONE in MQv6 Infocenter
  - ▶ IZ04453: APPLICATIONPID AND APPLICATIONTID IDENTIFIERS INCORRECT IN V6 MONITORING WEBSPHERE MQ MANUAL
  - ▶ IZ05995: QUEUE STATISTICS ARE ONLY COLLECTED IF THE MQOPEN OCCURS AFTER STATISTICS ARE SWITCHED ON
  - ▶ IZ08794: MONITORING MQ MANUAL NEEDS TO BE UPDATED
  - ▶ IZ16817: MONQ VALUES OF LOW, MEDIUM AND HIGH HAVE THE SAME EFFECT ON THE QSTATUS MONITORING DATA

## Technote and DeveloperWorks Article

- Technote 1224985 - DISPLAY QSTATUS and DISPLAY CHSTATUS commands have blank monitoring fields, such as LPUTDATE and LPUTTIME

[http://www-](http://www-1.ibm.com/support/docview.wss?rs=171&uid=swg21224985)

[1.ibm.com/support/docview.wss?rs=171&uid=swg21224985](http://www-1.ibm.com/support/docview.wss?rs=171&uid=swg21224985)

- DeveloperWorks - Mission:Messaging: If your queue manager could talk, would you hear it?  
[http://www.ibm.com/developerworks/websphere/techjournal/0801\\_mismes/0801\\_mismes.html](http://www.ibm.com/developerworks/websphere/techjournal/0801_mismes/0801_mismes.html)

# Summary

- Statistics and Accounting overview
- Uses for the messages
- Types of messages
- How to collect them
- Format structure
- Displaying Statistics and Accounting info
  - ▶ Sample Program
  - ▶ MQ Explorer Plugin
- Additional Resources for Statistics and Accounting

# 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](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

