# MQ Activity Trace

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# Agenda

- MQ Activity Tracing Introduction
- How to activate it
- How to process it
- Example through Use cases
- Gotchas to avoid

# USING ACTIVITY TRACE

# Application Activity Trace

- **Functional requirement**
  - Trace the MQ calls being made by an application

| Date | Time | Operation | CompCode | MQRC |
|---|---|---|---|---|
| 2018-09-21 | 15:41:10 | MQXF_CONNX | MQCC_OK | 0000 |
| 2018-09-21 | 15:41:10 | MQXF_OPEN | MQCC_OK | 0000 |
| 2018-09-21 | 15:41:14 | MQXF_PUT | MQCC_OK | 0000 |
| 2018-09-21 | 15:41:18 | MQXF_PUT | MQCC_OK | 0000 |
| 2018-09-21 | 15:41:18 | MQXF_CLOSE | MQCC_OK | 0000 |
| 2018-09-21 | 15:41:18 | MQXF_DISC | MQCC_OK | 0000 |

- **Can be met using MQ API before/after exits**

- **Application Activity Trace Introduced in MQ 7.1**

- **Required for the MQ Appliance**
  - Does not support users exits

- **Useful in many contexts**
  - Continuing improvements being made

- **Where to start**
  - https://www.ibm.com/support/knowledgecenter/en/SSFKSJ_9.1.0/com.ibm.mq.mon.doc/q037590_.htm

# What do you want to trace?

- **Application**
  - Perfect… Well almost…
- **Channel**
  - Use Subscriptions
- **Specific Queue**
  - Vote for https://www.ibm.com/developerworks/rfe/execute?use_case=viewRfe&CR_ID=118098
- **Anything on zOS**
  - Vote for https://www.ibm.com/developerworks/rfe/execute?use_case=viewRfe&CR_ID=56321

# Global Monitoring

- **Alter QMGR ACTVTRC(ON/OFF)**
  - Turn on/off Activity trace for “everything”
- **Activity events sent to SYSTEM.ADMIN.TRACE.ACTIVITY.QUEUE**
- **All applications are traced, except**
  - Applications excluded in mqat.ini
  - Application using MQCONNX with
    - MQCNO_ACTIVITY_TRACE_DISABLED*

# Common Mistake #1

- Thinking that Alter QMGR ACTVTRC(ON) is required to do any tracing




- And then adding an exclude for all applications in mqat.ini

# Selective Tracing using mqat.ini

- Configure mqat.ini to include specific applications to trace
- Changes apply as soon as file is saved
- “New connections” automatically applied
- “Running applications” apply changes after ALTER QMGR request
- Activity Events go into SYSTEM.ADMIN.TRACE.ACTIVITY.QUEUE

# MQAT.INI



```
#********************************************************************#
#* Module Name: mqat.ini                                            *#
#* Type       : IBM MQ queue manager configuration file             *#
#  Function   : Define the configuration of application activity    *#
#*               trace for a single queue manager.                  *#
#********************************************************************#

# Global settings stanza, default values
AllActivityTrace:
   ActivityInterval=1
   ActivityCount=100
   TraceLevel=MEDIUM
   TraceMessageData=0
   StopOnGetTraceMsg=ON
   SubscriptionDelivery=BATCHED

# Prevent the sample activity trace program from generating data
ApplicationTrace:
   ApplName=amqsact*
   Trace=OFF
```

# Global Settings (AllActivityTrace)

- **ActivityInterval=1**
  - Interval in seconds after which a trace event will be written
- **ActivityCount=100**
  - Number of trace events to include in a single trace message
- **TraceLevel=MEDIUM**
  - Level of detail in the trace events
- **TraceMessageData=0**
  - Amount of message payload to include with the trace event
- **StopOnGetTraceMsg=ON**
  - Stop tracing if applications processes a trace message
- **SubscriptionDelivery=BATCHED**
  - Controls immediate or batched delivery to subscriptions

# Application Specific (ApplicationTrace)

- **ApplName=amqsact***
  - Application to apply definition
    - Without path
  - Can be generic
    - Most specific applies
      - ABC is more specific that A* which is more specific than *
- **Trace=OFF/ON**
  - Indicates whether trace is ON or OFF
- **Other**
  - Any overrides to global settings can be included

# mqat.ini with samples added

```
#********************************************************************#
#* Module Name: mqat.ini                                            *#
#* Type       : IBM MQ queue manager configuration file             *#
#  Function   : Define the configuration of application activity    *#
#*              trace for a single queue manager.                   *#
#********************************************************************#

# Global settings stanza, default values
AllActivityTrace:
  ActivityInterval=10
  ActivityCount=1
  TraceLevel=MEDIUM
  TraceMessageData=1000
  StopOnGetTraceMsg=ON
  SubscriptionDelivery=BATCHED

# Prevent the sample activity trace program from generating data
ApplicationTrace:
  ApplName=amqsact*
  Trace=OFF

# The ones to trace

ApplicationTrace:
  ApplName=amqsput*
  Trace=ON

ApplicationTrace:
  ApplName=amqsget*
  Trace=ON

ApplicationTrace:
  ApplName=testmap.exe*
  Trace=OFF
```

# What is Low/Medium/High

**The trace level indicates the level of trace granularity that is required for the parameters to be included in the trace. The possible trace level values are:**

**1.Low**

**The parameter is included when low, medium or high activity tracing is configured for an application. This setting means that a parameter is always included in the AppActivityData group for the operation. This set of parameters is sufficient to trace the MQI calls an application makes, and to see if they are successful.**

**2.Medium**

**The parameter is only included in the AppActivityData group for the operation when medium or high activity tracing is configured for an application. This set of parameters adds information about the resources, for example, queue and topic names used by the application.**

**3.High**

**The parameter is only included in the AppActivityData group for the operation when high activity tracing is configured for an application. This set of parameters includes memory dumps of the structures passed to the MQI and XA functions. For this reason, it contains more information about the parameters used in MQI and XA calls. The structure memory dumps are shallow copies of the structures. To avoid erroneous attempts to dereference pointers, the pointer values in the structures are set to NULL.**

Source: **IBM Knowledge Center**

# Examples of MQOPEN Parameters

- **Low**
  - ObjectType: The object type passed
  - ObjectName: The name of the object passed to the MQI call before any queue name resolution is attempted.
  - ObjectQMgrName: The name of the object queue manager passed to the MQI
  - ObjectHandle: The object handle
  - CompCode: The completion code indicating the result of the operation
  - Reason: The reason code result of the operation

- **Medium**
  - AlternateUserId: Alternate user if specified
  - DynamicQName: The dynamic queue name passed as input
  - ResolvedQName: The queue name after name resolution
  - ResolvedQMgrName:  The queue manager name after name resolution
  - ObjectString: Long object name
  - ResolvedType: The type of the resolved object being opened
  - QMgrOpDuration: Approximate API call duration, in microseconds

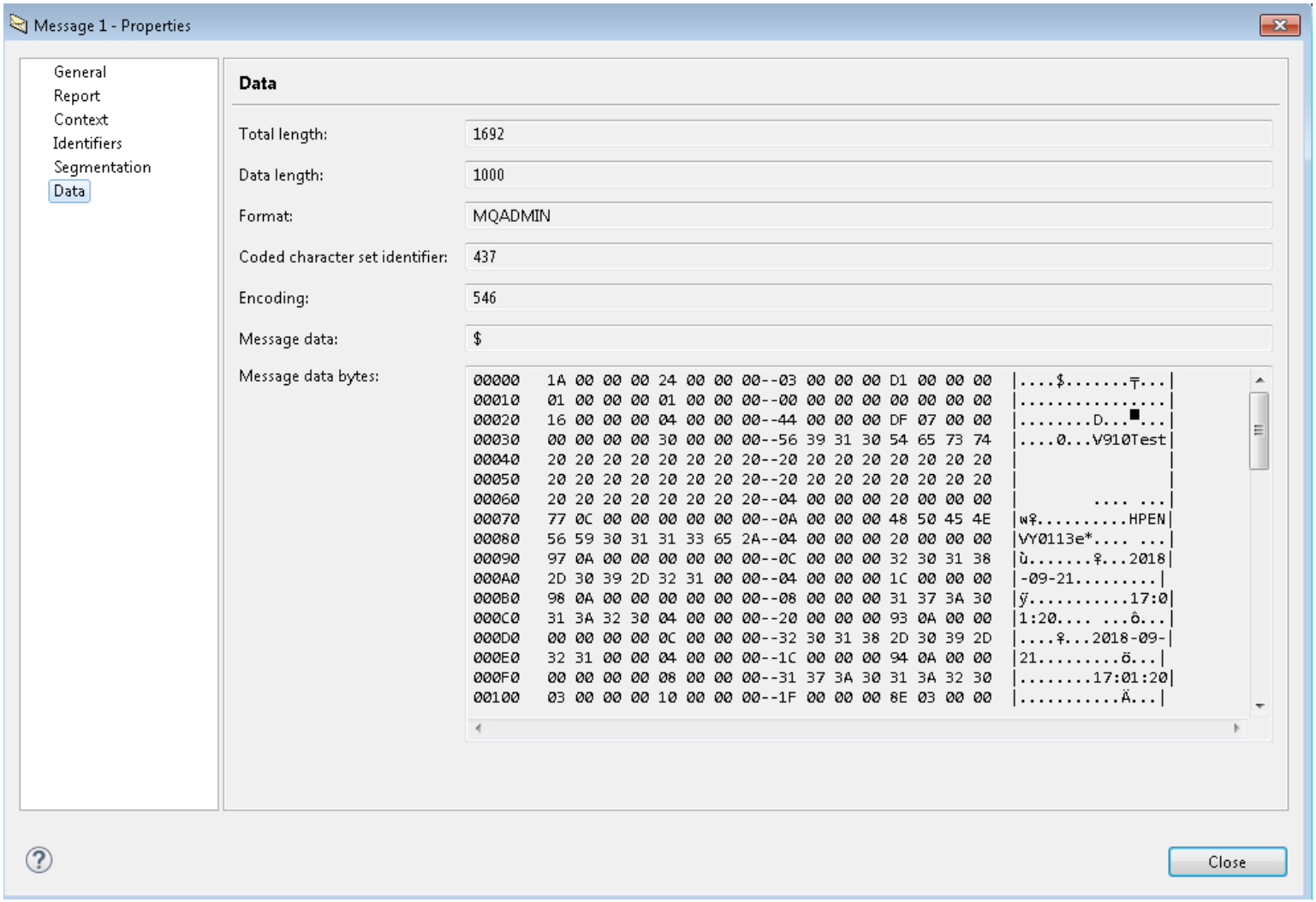
# Examples of MQPUT Parameters

- **Low**
  - ObjectHandle: The object handle
  - PutOptions: The put options
  - CompCode: The completion code indicating the result of the operation
  - Reason: The reason code result of the operation
  - MsgBuffer: Message data
  - MsgLength: Length of the message
- **Medium**
  - HighResTime: Time of operation in microseconds
  - ObjectName: The name of the object passed to the MQI call before any queue name resolution is attempted.
  - ResolvedQName: The queue name after name resolution
  - ResolvedQMgrName:  The queue manager name after name resolution
  - ResObjectString: Resolved long object name
  - ResolvedType: The type of the resolved object being opened
  - QMgrOpDuration: Approximate API call duration, in microseconds
- **High**
  - PutMsgOptsStructure: The PMO Structure

# Processing the results

- **Messages are in PCF Format**
  - Not readable in raw form
- **Sample Application amqsact(c) to process**
  - Formats in consumable form
  - Code can be modified for special cases
  - Still requires some interpretation
    - Send to file and use grep/find to look for specific details
- **Additional tooling discussed at end of presentation**

# Raw Data



# Amqsact(c)

```
Usage: amqsact(c)
   [-m QMgrName]      # Queue manager to connect to
   [-a ApplName]      # Name of application to trace
   [-c ChannelName]   # Name of channel to trace
   [-i ConnId]        # Unique connection id to trace
   [-q QName]         # Override default queue name
   [-t TopicString]   # Subscribe to event topic
   [-b]               # Only browse records
   [-v]               # Verbose output
   [-d <depth>]       # Number of records to display
   [-w <timeout>]     # Time to wait (in seconds)
   [-s <startTime>]   # Start time of record to process
   [-e <endTime>]     # End time of record to process
```

# Amqsact –m QM_A -b

```
MonitoringType: MQI Activity Trace
Correl_id:
00000000:  414D 5143 514D 5F41 2020 2020 2020 2020  'AMQCQM_A        '
00000010:  6FFE 765B 221A B701                      'o.v["...        '
QueueManager: 'QM_A'
Host Name: 'HPENVY0113'
IntervalStartDate: '2018-09-21'
IntervalStartTime: '15:41:10'
IntervalEndDate: '2018-09-21'
IntervalEndTime: '15:41:18'
CommandLevel: 902
SeqNumber: 0
ApplicationName: '\IBM\MQ905\bin64\amqsput.exe'
Application Type: MQAT_WINDOWS_NT
ApplicationPid: 2116
UserId: 'richard'
API Caller Type: MQXACT_EXTERNAL
API Environment: MQXE_OTHER
Application Function: ''
Appl Function Type: MQFUN_TYPE_UNKNOWN
Trace Detail Level: 2
Trace Data Length: 1000
Pointer size: 8
Platform: MQPL_WINDOWS_NT
================================================================================
  Tid Date       Time      Operation       CompCode       MQRC  HObj (ObjName)
  001 2018-09-21 15:41:10  MQXF_CONNX      MQCC_OK        0000  -
  001 2018-09-21 15:41:10  MQXF_OPEN       MQCC_OK        0000  2 (Q1)
  001 2018-09-21 15:41:14  MQXF_PUT        MQCC_OK        0000  2 (Q1)
  001 2018-09-21 15:41:18  MQXF_PUT        MQCC_OK        0000  2 (Q1)
  001 2018-09-21 15:41:18  MQXF_CLOSE      MQCC_OK        0000  2 (Q1)
  001 2018-09-21 15:41:18  MQXF_DISC       MQCC_OK        0000  -
================================================================================

1 Records Processed.
```

# When things don't go as Planned

```
MonitoringType: MQI Activity Trace
Correl_id:
00000000:  414D 5143 514D 5F41 2020 2020 2020 2020  'AMQCQM_A        '
00000010:  6FFE 765B 221A CB01                      'o.v["...        '
QueueManager: 'QM_A'
Host Name: 'HPENVY0113'
IntervalStartDate: '2018-09-21'
IntervalStartTime: '16:19:58'
IntervalEndDate: '2018-09-21'
IntervalEndTime: '16:20:08'
CommandLevel: 902
SeqNumber: 0
ApplicationName: 's\IBM\MQ_1\bin64\amqsput.exe'
Application Type: MQAT_WINDOWS_NT
ApplicationPid: 28396
UserId: 'richard'
API Caller Type: MQXACT_EXTERNAL
API Environment: MQXE_OTHER
Application Function:
Appl Function Type: MQFUN_TYPE_UNKNOWN
Trace Detail Level: 2
Trace Data Length: 1000
Pointer size: 8
Platform: MQPL_WINDOWS_NT
================================================================================
  Tid Date       Time     Operation       CompCode      MQRC  HObj (ObjName)
  001 2018-09-21 16:19:58 MQXF_CONNX      MQCC_OK       0000  -
  001 2018-09-21 16:19:58 MQXF_OPEN       MQCC_OK       0000  2 (QLOMAX)
  001 2018-09-21 16:20:02 MQXF_PUT        MQCC_OK       0000  2 (QLOMAX)
  001 2018-09-21 16:20:04 MQXF_PUT        MQCC_OK       0000  2 (QLOMAX)
  001 2018-09-21 16:20:08 MQXF_PUT        MQCC_FAILED   2053  2 (QLOMAX)
  001 2018-09-21 16:20:08 MQXF_CLOSE      MQCC_OK       0000  2 (QLOMAX)
  001 2018-09-21 16:20:08 MQXF_DISC       MQCC_OK       0000  -
================================================================================
```

# Amqsact –m QM_A -v

```
MonitoringType: MQI Activity Trace
Correl_id:
00000000:  414D 5143 514D 5F41 2020 2020 2020 2020  'AMQCQM_A       '
00000010:  6FFE 765B 221A B701                      'o.v["...       '
QueueManager: 'QM_A'
Host Name: 'HPENVY0113'
IntervalStartDate: '2018-09-21'
IntervalStartTime: '15:41:10'
IntervalEndDate: '2018-09-21'
IntervalEndTime: '15:41:18'
CommandLevel: 902
SeqNumber: 0
ApplicationName: '\IBM\MQ905\bin64\amqsput.exe'
Application Type: MQAT_WINDOWS_NT
ApplicationPid: 2116
UserId: 'richard'
API Caller Type: MQXACT_EXTERNAL
API Environment: MQXE_OTHER
Application Function: ''
Appl Function Type: MQFUN_TYPE_UNKNOWN
Trace Detail Level: 2
Trace Data Length: 1000
Pointer size: 8
Platform: MQPL_WINDOWS_NT
MQI Operation: 0
  Operation Id: MQXF_CONNX
  ApplicationTid: 1
  OperationDate: '2018-09-21'
  OperationTime: '15:41:10'
  ConnectionId:
  00000000:  414D 5143 514D 5F41 2020 2020 2020 2020  'AMQCQM_A       '
  00000010:  6FFE 765B 221A B701                      'o.v["...       '
  QueueManager: 'QM_A'
  QMgr Operation Duration: 377
  Completion Code: MQCC_OK
  Reason Code: 0
  Connect Options: 256
MQI Operation: 1
```

# Continued…

```
MQI Operation: 1
  Operation Id: MQXF_OPEN
  ApplicationTid: 1
  OperationDate: '2018-09-21'
  OperationTime: '15:41:10'
  Object_type: MQOT_Q
  Object_name: 'Q1'
  Object_Q_mgr_name: ''
  Hobj: 2
  QMgr Operation Duration: 70
  Completion Code: MQCC_OK
  Reason Code: 0
  Open_options: 8208
  Object_type: MQOT_Q
  Object_name: 'Q1'
  Object_Q_mgr_name: ''
  Resolved_Q_Name: 'Q1'
  Resolved_Q_mgr: 'QM_A'
  Resolved_local_Q_name: 'Q1'
  Resolved_local_Q_mgr: 'QM_A'
  Resolved_type: MQOT_Q
  Dynamic_Q_name: 'AMQ.*'
MQI Operation: 2
```

# Continued…

```
MQI Operation: 2
  Operation Id: MQXF_PUT
  ApplicationTid: 1
  OperationDate: '2018-09-21'
  OperationTime: '15:41:14'
  High Res Time: 1537558874639840
  QMgr Operation Duration: 6413
  Completion Code: MQCC_OK
  Reason Code: 0
  Hobj: 2
  Put Options: 8260
  Message Data:
  00000000:  3131 3131 3131 3131 3131 3131 3131 3131  '1111111111111111'
  00000010:  3131 3131 3131 3131 3131 3131 3131 3131  '1111111111111111'
  00000020:  3131 3131 3131 3131 3131 3131 3131 3131  '1111111111111111'
  Msg length: 48
  Known_dest_count: 1
  Unknown_dest_count: 0
  Invalid_dest_count: 0
  Object_type: MQOT_Q
  Object_name: 'Q1'
  Object_Q_mgr_name: ''
  Resolved_Q_Name: 'Q1'
  Resolved_Q_mgr: 'QM_A'
  Resolved_local_Q_name: 'Q1'
  Resolved_local_Q_mgr: 'QM_A'
  Resolved_type: MQOT_Q
  Report Options: 0
  Msg_type: MQMT_DATAGRAM
  Expiry: -1
  Format_name: 'MQSTR'
  Priority: -1
  Persistence: 2
  Msg_id:
  00000000:  414D 5120 514D 5F41 2020 2020 2020 2020  'AMQ QM_A        '
  00000010:  6FFE 765B 221A B702                      'o.v["...        '
  Correl_id:
  00000000:  0000 0000 0000 0000 0000 0000 0000 0000  '................'
  00000010:  0000 0000 0000 0000                      '........        '
  Reply_to_Q : ''
  Reply_to_Q_Mgr: ''
  Coded_char_set_id: 0
  Encoding: 546
  Put_date: '20180921'
  Put_time: '19411466'
MQI Operation: 3
```

# Continued…

```
MQI Operation: 3
  Operation Id: MQXF_PUT
  ApplicationTid: 1
  OperationDate: '2018-09-21'
  OperationTime: '15:41:18'
  High Res Time: 1537558878039327
  QMgr Operation Duration: 6409
  Completion Code: MQCC_OK
  Reason Code: 0
  Hobj: 2
  Put Options: 8260
  Message Data:
  00000000:  3232 3232 3232 3232 3232 3232 3232 3232  '2222222222222222'
  00000010:  3232 3232 3232 3232 3232 3232 3232 3232  '2222222222222222'
  00000020:  3232 3232 3232 3232 3232 3232 3232 3232  '2222222222222222'
  Msg length: 48
  Known_dest_count: 1
  Unknown_dest_count: 0
  Invalid_dest_count: 0
  Object_type: MQOT_Q
  Object_name: 'Q1'
  Object_Q_mgr_name: ''
  Resolved_Q_Name: 'Q1'
  Resolved_Q_mgr: 'QM_A'
  Resolved_local_Q_name: 'Q1'
  Resolved_local_Q_mgr: 'QM_A'
  Resolved_type: MQOT_Q
  Report Options: 0
  Msg_type: MQMT_DATAGRAM
  Expiry: -1
  Format_name: 'MQSTR'
  Priority: -1
  Persistence: 2
  Msg_id:
  00000000:  414D 5120 514D 5F41 2020 2020 2020 2020  'AMQ QM_A        '
  00000010:  6FFE 765B 221A B703                      'o.v["...        '
  Correl_id:
  00000000:  0000 0000 0000 0000 0000 0000 0000 0000  '................'
  00000010:  0000 0000 0000 0000                      '........        '
  Reply_to_Q : ''
  Reply_to_Q_Mgr: ''
  Coded_char_set_id: 0
  Encoding: 546
  Put_date: '20180921'
  Put_time: '19411806'
MQI Operation: 4
```

# Continued…

```
MQI Operation: 4
  Operation Id: MQXF_CLOSE
  ApplicationTid: 1
  OperationDate: '2018-09-21'
  OperationTime: '15:41:18'
  Hobj: 2
  Close Options: 0
  Object_type: MQOT_Q
  Object_name: 'Q1'
  Object_Q_mgr_name: ''
  Resolved_Q_Name: 'Q1'
  Resolved_Q_mgr: 'QM_A'
  Resolved_local_Q_name: 'Q1'
  Resolved_local_Q_mgr: 'QM_A'
  Resolved_type: MQOT_Q
  QMgr Operation Duration: 51
  Completion Code: MQCC_OK
  Reason Code: 0
MQI Operation: 5
  Operation Id: MQXF_DISC
  ApplicationTid: 1
  OperationDate: '2018-09-21'
  OperationTime: '15:41:18'
  Completion Code: MQCC_OK
  Reason Code: 0
========================================

1 Records Processed.
```

# Summary so far…

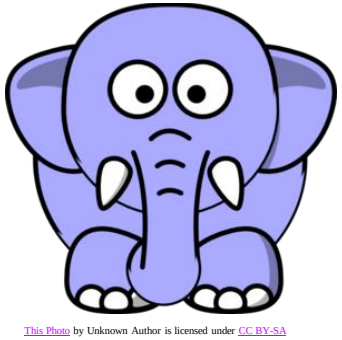
**Activate at the Queue Manager Level to trace most applications**

- Exclude applications via MQAT.INI
- Unless application connects using MQCONNX using
  - MQCNO_ACTIVITY_TRACE_DISABLED

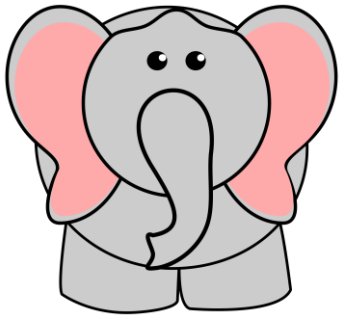


**Use MQAT.INI to limit to specific applications**

**Traces go to SYSTEM.ADMIN.TRACE.ACTIVITY.QUEUE**







- **How do I know which applications to trace?**
- **What if you want to run 2 traces at the same time?**

# What Applications to trace?

- **When the application is running, issue**
  - dis conn(*) type(conn) all where(objname eq 'Q1')

```
AMQ8276: Display Connection details.
   CONN(6FFE765B221CC601)
   EXTCONN(414D5143514D5F412020202020202020)
   TYPE(CONN)
   PID(42960)                              TID(1)
   APPLDESC( )
   APPLTAG(f:\nastel\aptm\bin\nsget.exe)
   APPLTYPE(USER)                          ASTATE(NONE)
   CHANNEL( )                              CLIENTID( )
   CONNAME( )                              CONNOPTS(MQCNO_SHARED_BINDING)
   USERID(richard)                         UOWLOG( )
   UOWSTDA(2018-09-22)                     UOWSTTI(12.09.52)
   UOWLOGDA( )                             UOWLOGTI( )
   URTYPE(QMGR)
   EXTURID(XA_FORMATID[] XA_GTRID[] XA_BQUAL[])
   QMURID(0.25600)                         UOWSTATE(ACTIVE)
```

  - dis qstatus(Q1) type(handle)

- **If you don’t know, set ACTVRC(ON)**
  - Gather data, exclude applications you don’t want
  - Repeat
  - Be “very, very careful”

- **Some applications are not very granular**
  - Broker, Datapower, …

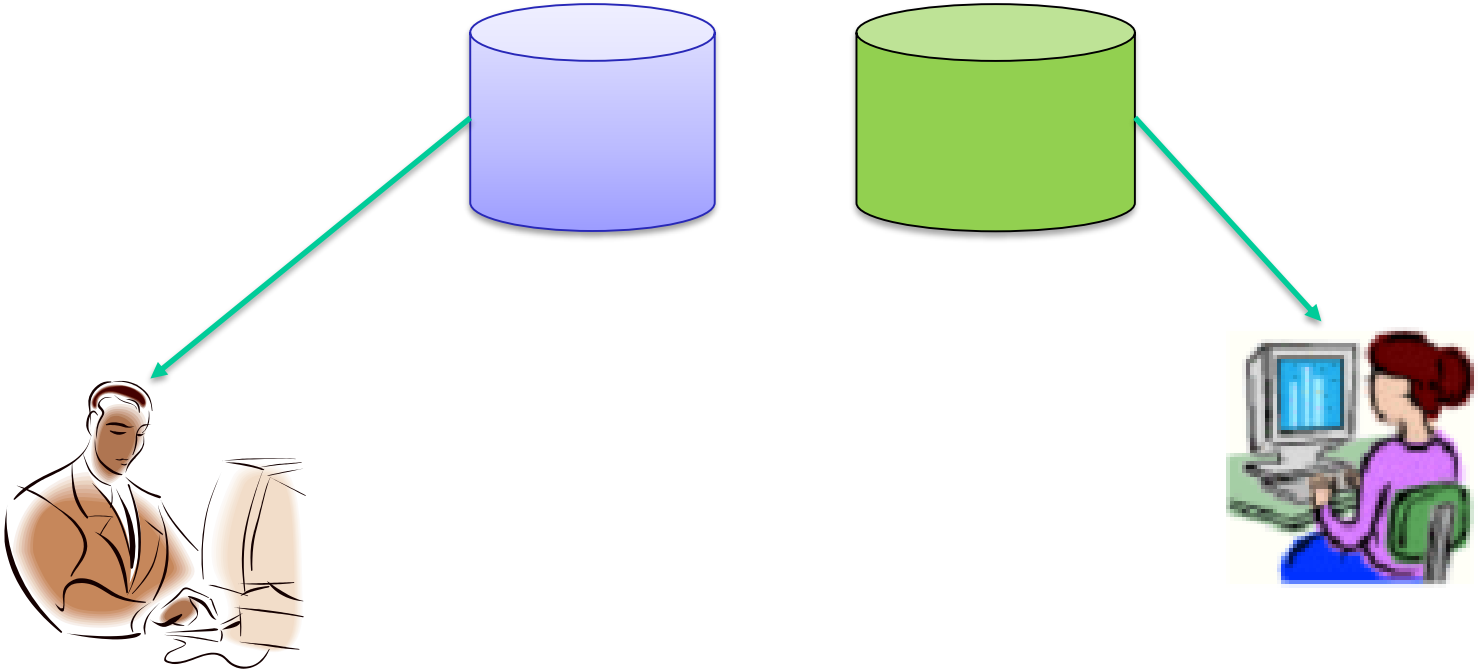
# Activating Activity Trace Using Subscriptions

- Opens up new use cases

- Tracing is no longer just an administration function



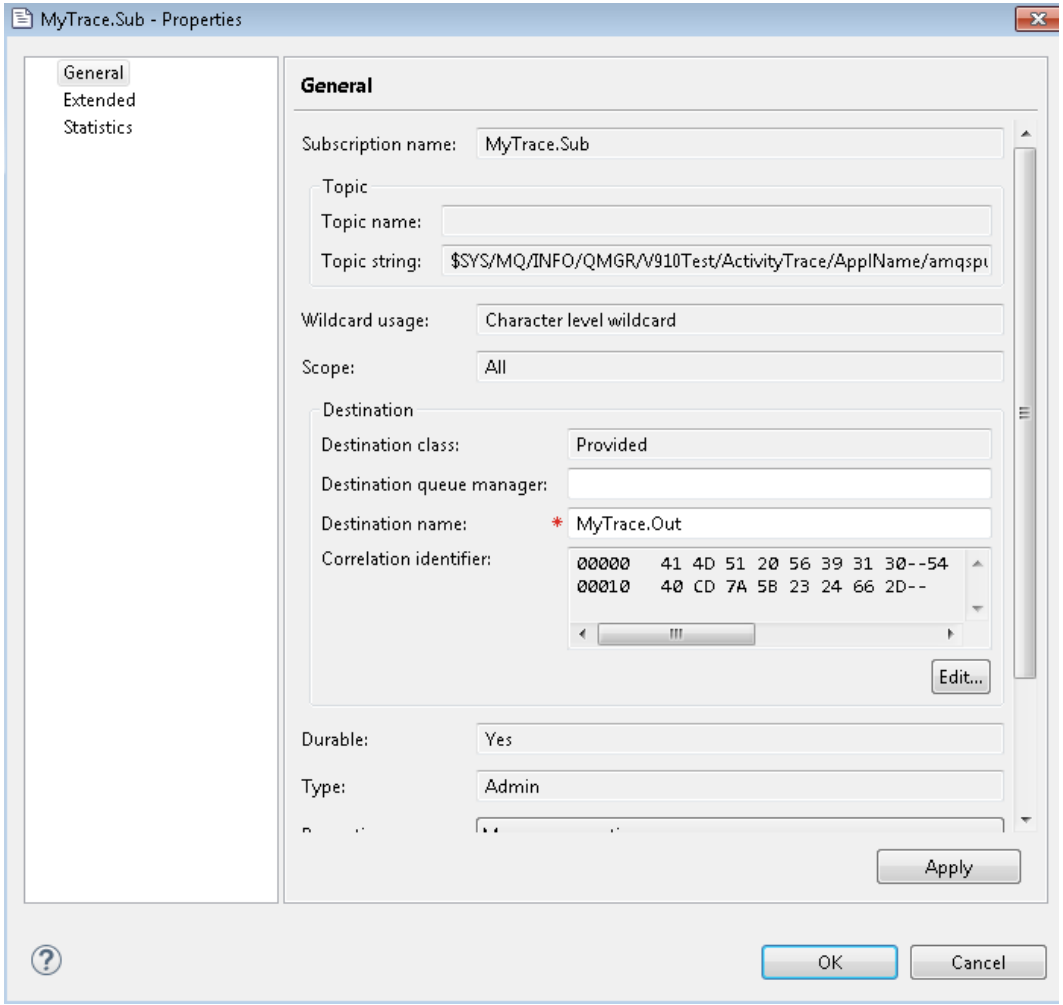
- Can be done at individual developer level



# Subscription

- $SYS/MQ/INFO/QMGR/*qmgr_name*/ActivityTrace/*type*/*identifier*
  - *Type*
    - ApplName to specify an application
    - ChannelName to specify an IBM MQ channel
    - ConnectionId to specify an IBM MQ connection
  - Identifer
    - Applname – same as in mqat.ini
    - Channel – the name of the channel (mostly)
    - ConnectionId – the connection id from DISPLAY CONN
- **The subscription acts as a switch to activate the trace and creates subscribes to the resultant data**
  - Has immediate effect for active applications
  - Independent of any other traces active
- **Generic support using**
  - Topic style # can only be used to trace all
  - Character style * when used with subscriptions indicating character wildcards
    - OpenOptions: MQSO_WILDCARD_CHAR

# Manual Subscription



# amqsact -m V910Test -b -q MyTrace.Out

```
MonitoringType: MQI Activity Trace
Correl_id:
00000000:  414D 5120 5639 3130 5465 7374 2020 2020  'AMQ V910Test    '
00000010:  40CD 7A5B 2324 662D                      '@.z[#$f-        '
QueueManager: 'V910Test'
Host Name: 'HPENVY0113'
IntervalStartDate: '2018-09-21'
IntervalStartTime: '17:05:05'
IntervalEndDate: '2018-09-21'
IntervalEndTime: '17:05:06'
CommandLevel: 910
SeqNumber: 0
ApplicationName: 's\IBM\MQ_1\bin64\amqsput.exe'
Application Type: MQAT_WINDOWS_NT
ApplicationPid: 44644
UserId: 'richard'
API Caller Type: MQXACT_EXTERNAL
API Environment: MQXE_OTHER
Application Function: ''
Appl Function Type: MQFUN_TYPE_UNKNOWN
Trace Detail Level: 2
Trace Data Length: 1000
Pointer size: 8
Platform: MQPL_WINDOWS_NT
================================================================================
  Tid Date       Time     Operation       CompCode      MQRC   HObj (ObjName)
  001 2018-09-21 17:05:05 MQXF_CONNX      MQCC_OK       0000   -
  001 2018-09-21 17:05:05 MQXF_OPEN       MQCC_OK       0000   2 (Q1)
  001 2018-09-21 17:05:06 MQXF_PUT        MQCC_OK       0000   2 (Q1)
  001 2018-09-21 17:05:06 MQXF_CLOSE      MQCC_OK       0000   2 (Q1)
  001 2018-09-21 17:05:06 MQXF_DISC       MQCC_OK       0000   -
================================================================================
```

# Amqsact(c) Refresher

```
Usage: amqsact(c)
   [-m QMgrName]      # Queue manager to connect to
   [-a ApplName]      # Name of application to trace
   [-c ChannelName]   # Name of channel to trace
   [-i ConnId]        # Unique connection id to trace
   [-q QName]         # Override default queue name
   [-t TopicString]   # Subscribe to event topic
   [-b]               # Only browse records
   [-v]               # Verbose output
   [-d <depth>]       # Number of records to display
   [-w <timeout>]     # Time to wait (in seconds)
   [-s <startTime>]   # Start time of record to process
   [-e <endTime>]     # End time of record to process
```

# amqsact -m V910Test -a amqsget* -w 600

```
Subscribing to the activity trace topic:
  '$SYS/MQ/INFO/QMGR/V910Test/ActivityTrace/ApplName/amqsget*'

MonitoringType: MQI Activity Trace
Correl_id:
00000000:  414D 5120 5639 3130 5465 7374 2020 2020  'AMQ V910Test    '
00000010:  40CD 7A5B 2324 8A04                      '@.z[#$..        '
QueueManager: 'V910Test'
Host Name: 'HPENVY0113'
IntervalStartDate: '2018-09-21'
IntervalStartTime: '17:15:00'
IntervalEndDate: '2018-09-21'
IntervalEndTime: '17:15:00'
CommandLevel: 910
SeqNumber: 0
ApplicationName: 's\IBM\MQ_1\bin64\amqsget.exe'
Application Type: MQAT_WINDOWS_NT
ApplicationPid: 42516
UserId: 'richard'
API Caller Type: MQXACT_EXTERNAL
API Environment: MQXE_OTHER
Application Function: ''
Appl Function Type: MQFUN_TYPE_UNKNOWN
Trace Detail Level: 2
Trace Data Length: 1000
Pointer size: 8
Platform: MQPL_WINDOWS_NT
================================================================================
  Tid Date       Time      Operation       CompCode       MQRC   HObj (ObjName)
  001 2018-09-21 17:15:00  MQXF_CONNX      MQCC_OK        0000   -
  001 2018-09-21 17:15:00  MQXF_OPEN       MQCC_OK        0000   2 (Q1)
  001 2018-09-21 17:15:00  MQXF_GET        MQCC_OK        0000   2 (Q1)
  001 2018-09-21 17:15:00  MQXF_GET        MQCC_OK        0000   2 (Q1)
  001 2018-09-21 17:15:00  MQXF_GET        MQCC_OK        0000   2 (Q1)
  001 2018-09-21 17:15:00  MQXF_GET        MQCC_OK        0000   2 (Q1)
================================================================================
```

# THE MQ APPLIANCE

# MQ Appliance

- Supports Activity Trace only via subscriptions
- Changes to mqat.ini via system commands
- Only Global options can be specified
  - http://www.ibm.com/developerworks/rfe/execute?use_case=viewRfe&CR_ID=125162
- Use amqsactc to connect via client
- Suited to tracking by channel since all communication is channel based

# dspmqini



```
M2001(mqcli)# dspmqini -m MQAPP_QM1
AllActivityTrace:
  ActivityInterval     = 1
  ActivityCount        = 100
  TraceLevel           = MEDIUM
  TraceMessageData     = 0
  StopOnGetTraceMsg    = ON
  SubscriptionDelivery = BATCHED
```

# Setmqini

**M2001(mqcli)# setmqini**

Usage: setmqini -m QMgrName -s StanzaName -k KeyName [-d | -v Value]



-d Delete the attribute.
-k Key name of attribute to set.
-m Queue manager name.
-s Stanza name.
-v Attribute value to set.

**Example**:

setmqini -m QMAPP_QM1 -s AllActivityTrace -k TraceLevel -v HIGH

# CHANNEL TRACING

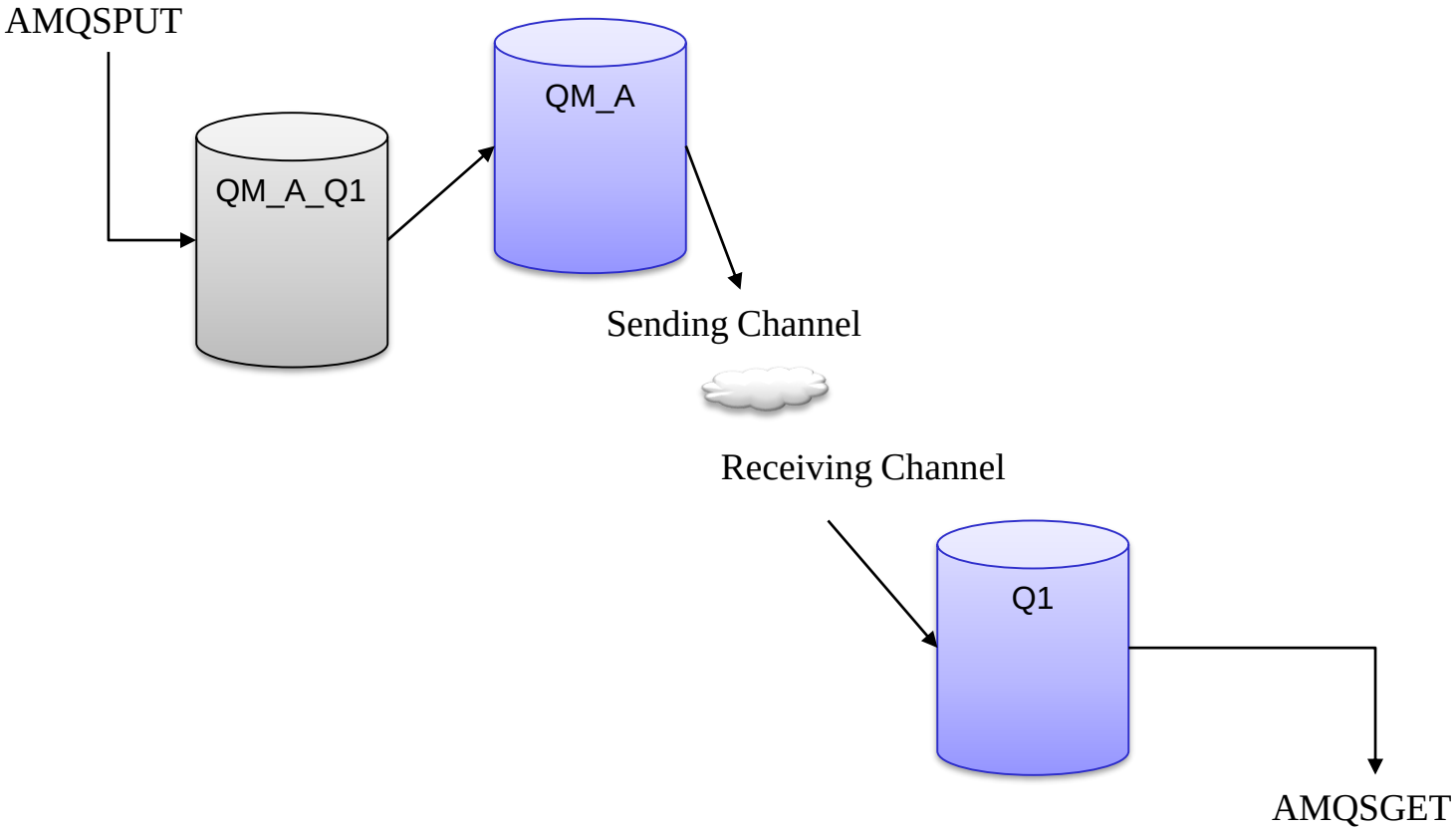
# Tracking activity from a Business Partner

**amqsactc -m RemoteQM1 -w 60 -c From.BP0302.Primary -v**
Subscribing to the activity trace topic:
'$SYS/MQ/INFO/QMGR/RemoteQM1/ActivityTrace/ChannelName/From.BP0302.Primary



MonitoringType: MQI Activity Trace
Correl_id:
00000000: 414D 5120 5265 6D6F 7465 514D 3120 2020 'AMQ.RemoteQM1...'
00000010: 0D4D 6B55 0429 0020 '.MkU.).. '
QueueManager: 'RemoteQM1'
ApplicationName: 'amqrmppa'
Application Type: MQAT_QMGR
ApplicationPid: 14666
UserId: 'mqsystem'
API Caller Type: MQXACT_INTERNAL
API Environment: MQXE_MCA
Channel Name: 'From.BP0302.Primary'
ConnName: '192.168.75.1'
Channel Type: MQCHT_RECEIVER

# Outbound Channel Tracking



# Tracing amqsput

```
MQI Operation: 0
  Operation Id: MQXF_PUT
  ApplicationTid: 1
  OperationDate: '2018-09-22'
  OperationTime: '17:58:55'
  High Res Time: 1537653535137241
  QMgr Operation Duration: 63
  Completion Code: MQCC_OK
  Reason Code: 0
  Hobj: 2
  Put Options: 8260
  Message Data:
  00000000:  4752 4545 5449 4E47 5320 4D51 5443       'GREETINGS MQTC  '
  Msg length: 14
  Known_dest_count: 0
  Unknown_dest_count: 1
  Invalid_dest_count: 0
  Object_type: MQOT_Q
  Object_name: 'QM_A_Q1'
  Object_Q_mgr_name: ''
  Resolved_Q_Name: 'Q1'
  Resolved_Q_mgr: 'QM_A'
  Resolved_local_Q_name: 'QM_A'
  Resolved_local_Q_mgr: 'V910Test'
  Resolved_type: MQOT_Q
  Report Options: 0
  Msg_type: MQMT_DATAGRAM
  Expiry: -1
  Format_name: 'MQSTR'
  Priority: -1
  Persistence: 2
  Msg_id:
  00000000:  414D 5120 5639 3130 5465 7374 2020 2020  'AMQ V910Test    '
  00000010:  40CD 7A5B 2335 4D02                      '@.z[#5M.        '
  Correl_id:
  00000000:  0000 0000 0000 0000 0000 0000 0000 0000  '................'
  00000010:  0000 0000 0000 0000                      '........        '
  Reply_to_Q : ''
  Reply_to_Q_Mgr: ''
  Coded_char_set_id: 0
  Encoding: 546
  Put_date: '20180922'
  Put_time: '21585515'
```

# Sending Channel

```
MonitoringType: MQI Activity Trace
Correl_id:
00000000:  414D 5120 5639 3130 5465 7374 2020 2020  'AMQ V910Test    '
00000010:  40CD 7A5B 2335 4904                      '@.z[#5I.        '
QueueManager: 'V910Test'
Host Name: 'HPENVY0113'
IntervalStartDate: '2018-09-22'
IntervalStartTime: '17:58:55'
IntervalEndDate: '2018-09-22'
IntervalEndTime: '17:58:55'
CommandLevel: 910
SeqNumber: 3
ApplicationName: 'IBM\MQ905\bin64\runmqchl.exe'
Application Type: MQAT_QMGR
ApplicationPid: 44636
UserId: 'MUSR_MQADMIN'
API Caller Type: MQXACT_INTERNAL
API Environment: MQXE_MCA
Channel Name: 'TO_QM_A'
ConnName: '127.0.0.1(8014)'
Channel Type: MQCHT_SENDER
3561: ''
3560: ''
Application Function: ''
Appl Function Type: MQFUN_TYPE_UNKNOWN
Trace Detail Level: 2
Trace Data Length: 1000
Pointer size: 8
Platform: MQPL_WINDOWS_NT
```

# Sending Channel Continued

```
MQI Operation: 0
  Operation Id: MQXF_GET
  ApplicationTid: 1
  OperationDate: '2018-09-22'
  OperationTime: '17:58:34'
  QMgr Operation Duration: 20868127
  Completion Code: MQCC_OK
  Reason Code: 0
  Hobj: 2
  Get Options: 33566721
  Message Data:
  00000000:  5851 4820 0100 0000 5131 2020 2020 2020  'XQH ....Q1      '
  00000010:  2020 2020 2020 2020 2020 2020 2020 2020  '                '
  00000020:  2020 2020 2020 2020 2020 2020 2020 2020  '                '
  00000030:  2020 2020 2020 2020 514D 5F41 2020 2020  '        QM_A    '
  00000040:  2020 2020 2020 2020 2020 2020 2020 2020  '                '
  00000050:  2020 2020 2020 2020 2020 2020 2020 2020  '                '
  00000060:  2020 2020 2020 2020 4D44 2020 0100 0000  '        MD  ....'
  00000070:  0000 0000 0800 0000 FFFF FFFF 0000 0000  '................'
  00000080:  2202 0000 B501 0000 4D51 5354 5220 2020  '".......MQSTR   '
  00000090:  0000 0000 0000 0000 414D 5120 5639 3130  '........AMQ V910'
  000000A0:  5465 7374 2020 2020 40CD 7A5B 2335 4D02  'Test    @.z[#5M.'
  000000B0:  0000 0000 0000 0000 0000 0000 0000 0000  '................'
  000000C0:  0000 0000 0000 0000 0000 0000 2020 2020  '............    '
  000000D0:  2020 2020 2020 2020 2020 2020 2020 2020  '                '
  000000E0:  2020 2020 2020 2020 2020 2020 2020 2020  '                '
  000000F0:  2020 2020 2020 2020 2020 2020 5639 3130  '            V910'
  00000100:  5465 7374 2020 2020 2020 2020 2020 2020  'Test            '
  00000110:  2020 2020 2020 2020 2020 2020 2020 2020  '                '
  00000120:  2020 2020 2020 2020 2020 2020 7269 6368  '            rich'
  00000130:  6172 6420 2020 2020 1601 0515 0000 00BA  'ard     ........'
  00000140:  2DF6 8ED3 4356 99DE 84E6 0FE8 0300 0000  '-...CV..........'
  00000150:  0000 0000 0000 000B 2020 2020 2020 2020  '........        '
  00000160:  2020 2020 2020 2020 2020 2020 2020 2020  '                '
  00000170:  2020 2020 2020 2020 0B00 0000 5C49 424D  '        ....\IBM'
  00000180:  5C4D 5139 3035 5C62 696E 3634 5C61 6D71  '\MQ905\bin64\amq'
  00000190:  7370 7574 2E65 7865 3230 3138 3039 3232  'sput.exe20180922'
  000001A0:  3231 3538 3535 3135 2020 2020 4752 4545  '21585515    GREE'
  000001B0:  5449 4E47 5320 4D51 5443                 'TINGS MQTC      '
  Msg length: 442
```

# Sending Channel Continued

```
Msg length: 442
High Res Time: 1537653535137304
Object_type: MQOT_Q
Object_name: 'QM_A'
Object_Q_mgr_name: 'V910Test'
Resolved_Q_Name: 'QM_A'
Resolved_Q_mgr: 'V910Test'
Resolved_local_Q_name: 'QM_A'
Resolved_local_Q_mgr: 'V910Test'
Resolved_type: MQOT_Q
Transmit Header Msg_id:
00000000:  414D 5120 5639 3130 5465 7374 2020 2020  'AMQ V910Test    '
00000010:  40CD 7A5B 2335 4D02                      '@.z[#5M.        '
Transmit Header Correl_id:
00000000:  0000 0000 0000 0000 0000 0000 0000 0000  '................'
00000010:  0000 0000 0000 0000                      '........        '
Transmit Header Put_date: '20180922'
Transmit Header Put_time: '21585515'
Transmit Header RemoteQName: 'Q1'
Transmit Header RemoteQMgr: 'QM_A'
Buffer Length: 32700
Report Options: 0
Msg_type: MQMT_DATAGRAM
Expiry: -1
Format_name: 'MQXMIT'
Priority: 0
Persistence: 0
Msg_id:
00000000:  414D 5120 5639 3130 5465 7374 2020 2020  'AMQ V910Test    '
00000010:  40CD 7A5B 2335 4D03                      '@.z[#5M.        '
Correl_id:
00000000:  414D 5120 5639 3130 5465 7374 2020 2020  'AMQ V910Test    '
00000010:  40CD 7A5B 2335 4D02                      '@.z[#5M.        '
Reply_to_Q : '                                                    ♦'
Reply_to_Q_Mgr: 'V910Test'
Coded_char_set_id: 437
Encoding: 546
Put_date: '20180922'
Put_time: '21585515'
--------------------------------------------------------------------------------
```

# Receiving channel

```
API Caller Type: MQXACT_INTERNAL
API Environment: MQXE_MCA
Channel Name: 'TO_QM_A'
ConnName: '127.0.0.1'
Channel Type: MQCHT_RECEIVER
Application Function: ''
Appl Function Type: MQFUN_TYPE_UNKNOWN
Trace Detail Level: 2
Trace Data Length: 1000
Pointer size: 8
Platform: MQPL_WINDOWS_NT
MQI Operation: 0
  Operation Id: MQXF_PUT
  ApplicationTid: 1174
  OperationDate: '2018-09-22'
  OperationTime: '17:58:55'
  High Res Time: 1537653535137287
  QMgr Operation Duration: 50
  Completion Code: MQCC_OK
  Reason Code: 0
  Hobj: 2
  Put Options: 272388
  Message Data:
  00000000:  4752 4545 5449 4E47 5320 4D51 5443       'GREETINGS MQTC  '
  Msg length: 14
  Recs_present: 0
  Known_dest_count: 1
  Unknown_dest_count: 0
  Invalid_dest_count: 0
  Object_type: MQOT_Q
  Object_name: 'Q1'
  Object_Q_mgr_name: 'QM_A'
  Resolved_Q_Name: 'Q1'
  Resolved_Q_mgr: 'QM_A'
  Resolved_local_Q_name: 'Q1'
  Resolved_local_Q_mgr: 'QM_A'
  Resolved_type: MQOT_Q
  Report Options: 0
  Msg_type: MQMT_DATAGRAM
  Expiry: -1
  Format_name: 'MQSTR'
  Priority: 0
  Persistence: 0
  Msg_id:
  00000000:  414D 5120 5639 3130 5465 7374 2020 2020  'AMQ V910Test    '
  00000010:  40CD 7A5B 2335 4D02                      '@.z[#5M.        '
  Correl_id:
  00000000:  0000 0000 0000 0000 0000 0000 0000 0000  '................'
  00000010:  0000 0000 0000 0000                      '........        '
                                                                  ◆'
  Reply_to_Q : '
  Reply_to_Q_Mgr: 'V910Test'
  Coded_char_set_id: 437
  Encoding: 546
  Put_date: '20180922'
  Put_time: '21585515'
```

# WRAPPING UP

# Other Use Cases

- **Track individual application calls**
  - Identify application doing “unnecessary” calls
    - Inefficient logic
  - Identify applications not conforming to “standards”
    - Not providing expiry
    - Not resetting message id
  - Observe timings of calls based on different scenarios
    - Default persistence
    - Different environments
  - Verify correct processing of error conditions
    - Queue Full, Queue not found, etc.
- **Summarize application calls**
  - Identify Patterns
- **Problem determination**
  - What is the application actually doing

# “Gotcha’s”

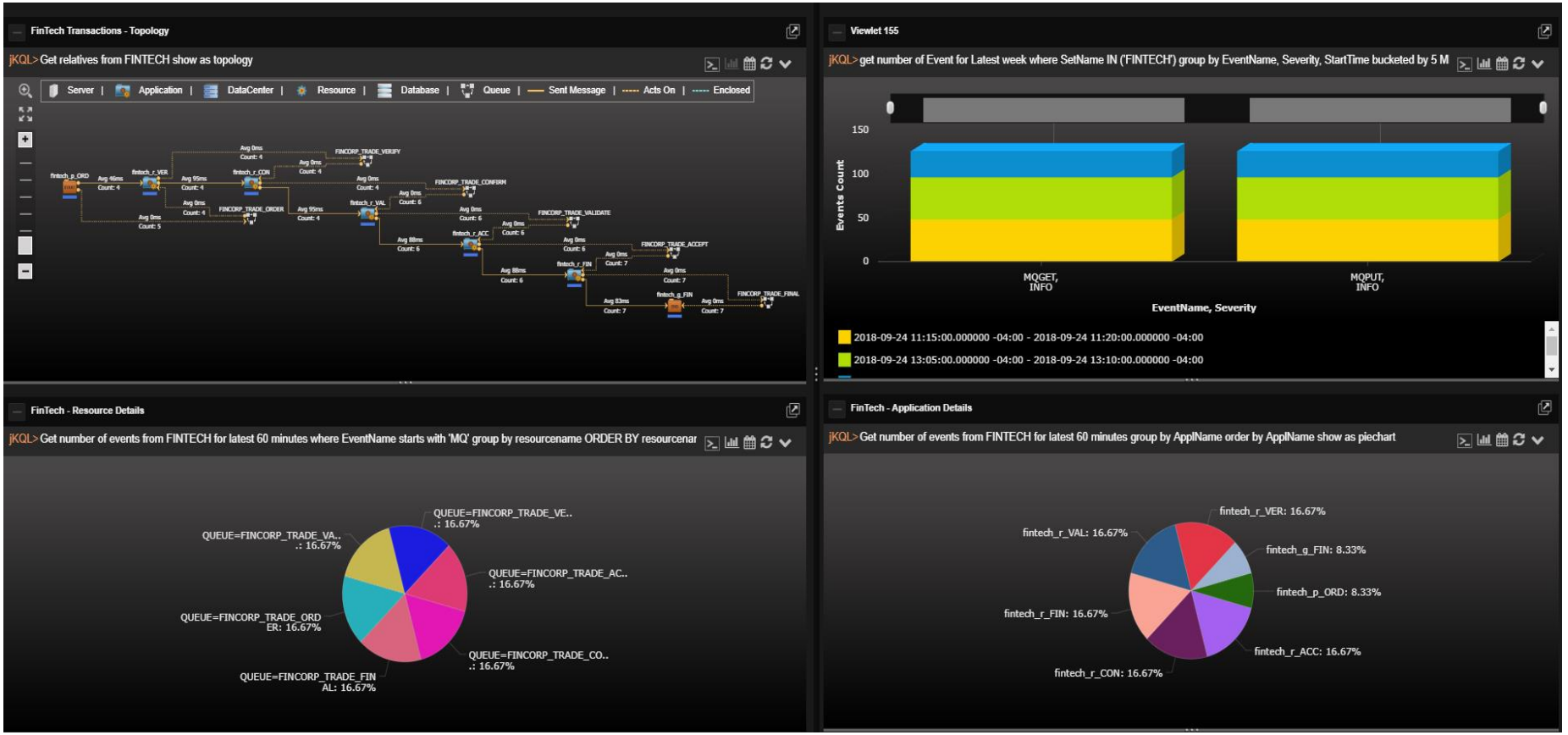
- **Your trace entries do not show up when I expect**
  - Working as designed if ActivityInterval is set to 0 or a high value, could be waiting for additional data
  - The trace is generated when activity happens after the ActivityInterval expires, it can have a delay if nothing is happening
- **You are getting too many trace messages**
  - Check that ActivityCount=1 isn’t specified
  - Did someone turn on ACTVRC at the queue manager level
  - Are you tracing an application that is reading activity events (StopOnGetTraceMsg=OFF)
- **SYSTEM.ADMIN.TRACE.ACTIVITY.QUEUE or application queue**
  - Max Depth Default 3000 “messages”
  - Needs to be large enough to handle spikes
  - Use dynamic subscription so messages not collected when not needed
- **I added an entry to mqat.ini but I don’t see any events being generated**
  - If application was already active, issue ALTER QMGR
  - For windows, add .exe or * to application name

# More “Gotcha’s”

- **The message content in the message isn’t what I expect**
  - AMS may have encrypted the content
  - The message may be in a different code page than where you are viewing it
  - Other exits may have altered the message
  - Maybe your expectations are not correct
- **The application team said they didn’t fill in a “message id” but I see a value**
  - The traces are generated on the queue manager after some of these fields have been filled in by other processing (or exits)
  - The application team may have gave you incorrect information
- **I see my message(s) being put to the queue but I don’t see them read**
  - Reading application may not be traced
  - Messages are still on the queue?
- **If all of your applications are called JAVA**
  - they are still running old client versions

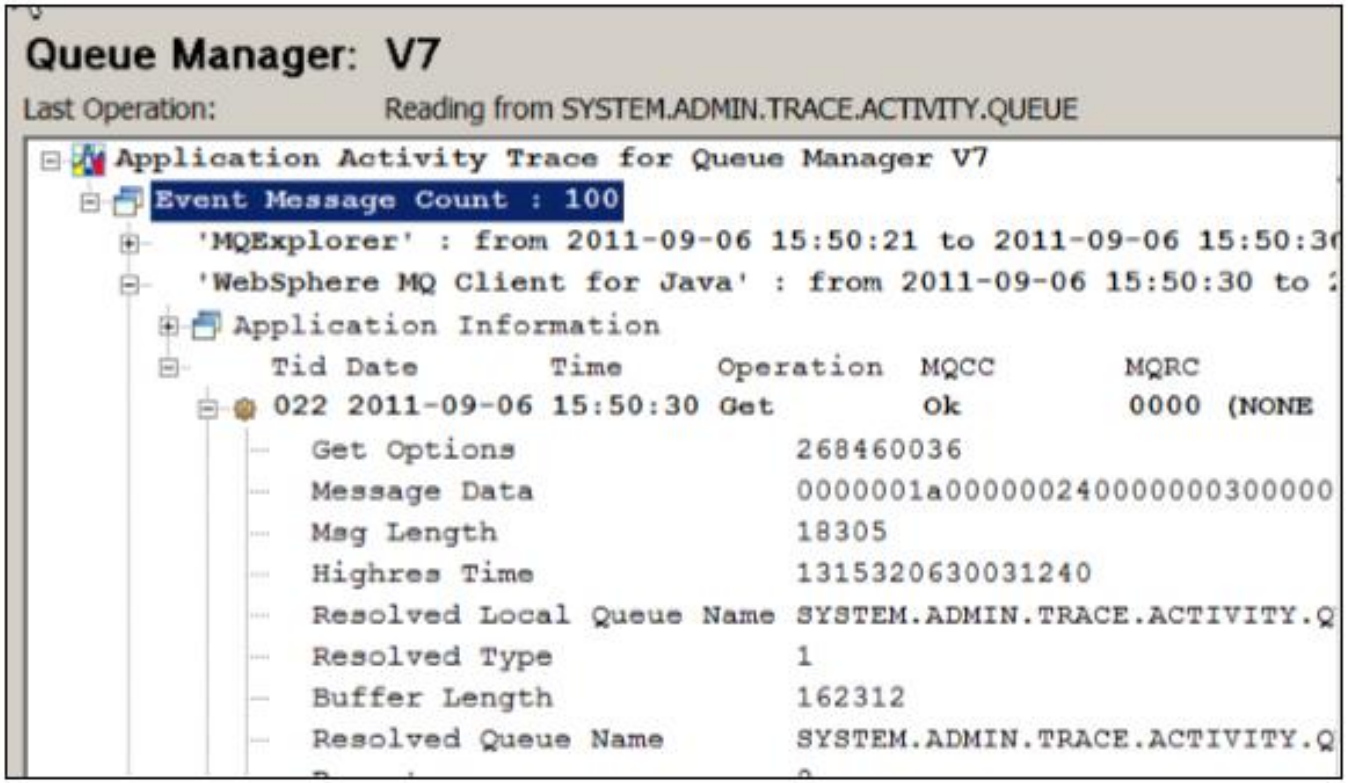
# Tools to Analyze

- Nastel Xray for MQ



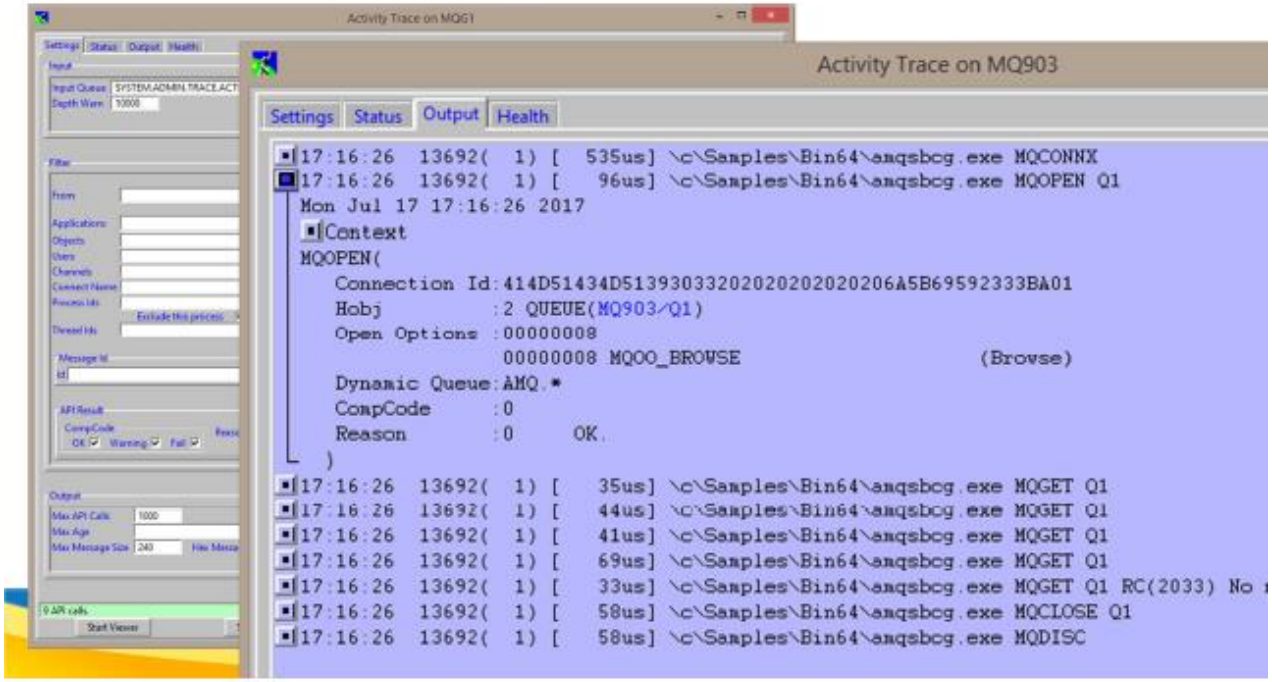
# Other tools to Analyze

- **MS0P: SupportPac courtesy Mark Taylor**



# Other tools to Analyze

- **MQGem Application Activity Trace Viewer**




- **Amqsactz – Tim Zielke modified version of amqsact**
  - On capitalware website

# Questions & Answers