S09439: You think you have problems...well maybe you do. Diagnosing problems for Message Broker

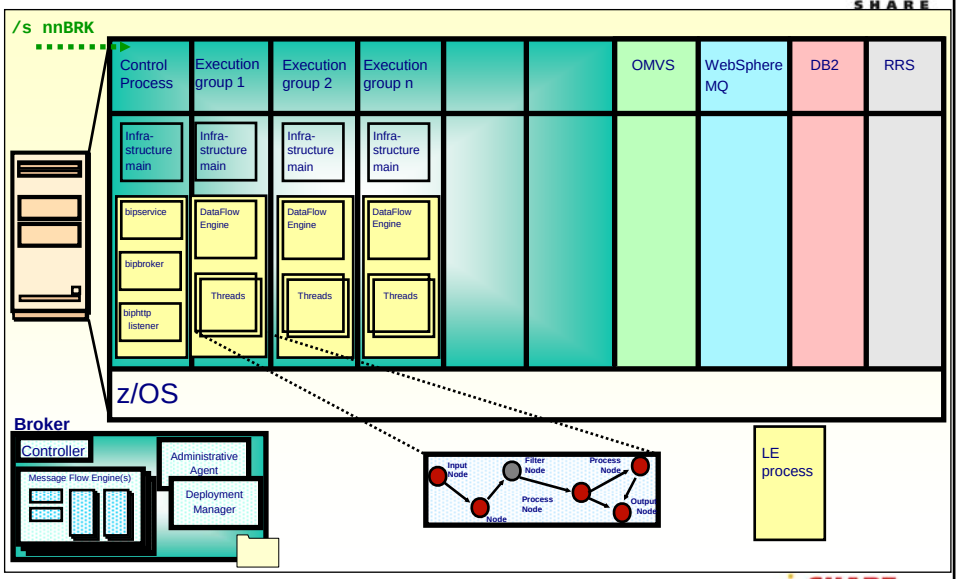
Ralph Bateman - STSM Messaging Serviceability & Support Strategy – ralph@uk.ibm.com
David Coles – WebSphere Message Broker Level 3 Technical Lead, IBM Hursley – dcoles@uk.ibm.com

Thursday 11th August 2011

Agenda

- What are the “moving” parts
- Where is the diagnostic information
  - Syslog
  - Stdout/Stderr
  - Error log
- What Trace to use
  - User Trace
  - Service Trace
- What do I do with a Dump / FFDC ?
- What are the common “Status” commands
- “Out the box” Tools available for debugging
  - Toolkit
  - MBX
- How to Diagnose Common Scenarios
  - My Broker won’t start
  - My Flow wont deploy and my EG fails
  - Where's my output message?

The “moving” parts of a z/OS Broker



The “moving” parts of a z/OS Broker

N O T E S

- Address Space and Process model.
  - The broker runtime environment is a *collection* of address spaces (AS), which allows natural isolation, recovery and scalability.
  - Each address space contains at least 2 Language Environment (LE) processes. The first, or *infrastructure* process is started authorized so that it can create z/OS components (PCs for SVC dumps etc.), and then returns to problem state. This process only exists on z/OS. After initialization, it creates and monitors a second process, which performs the main brokering function.
  - Other processes in each AS runs platform independent code using C++ and Java (publish/subscribe) to implement brokering function.
- What are the brokering function address spaces?
  - Control address space. This is the broker started task address space. The Control process within it is small and monitors for failures of the Administration Agent (AA) process. On z/OS, a console listener thread enables z/OS console interactions with users through the MODIFY interface. The AA process serves as the agent to the configuration manager and, by extension, Workbench. It manages the deployment of message flows and message sets, and manages the lifecycle and command reporting of execution groups (EG). When using WebServices nodes (HTTPInput, HTTPReply) the http listener process runs in this address space.
  - Execution Group address spaces. These are where the message flows deployed from the Configuration Manager execute. The DataFlowEngine process itself contains a number of threads and predefined flows (Configuration) to support the various brokering functions. Multiple EG address spaces remove any concern about (Virtual Storage Constraint Relief) VSCR.
- There are a large number of associated address spaces with which the broker interacts.
  - OMVS. This address space provides several industry standard interfaces (XPG4) that allow the MB processing model and code to be largely platform independent.
  - WebSphere MQ. This is one of the primary transports for dataflows, and WMQI uses it for inter-process and inter-platform communication. For example, the AA communicates with the EGs and CM using XML messages flowed over WMQ.
  - RRS. As the broker runs within regular z/OS address spaces, Resource Recovery Services (RRS) is the transaction manager that enables the coordination of resources (message queues, database tables) accessed by a dataflow.
- z/OS, Language Environment and Java provide many services.
  - The major processes (not bipimain) written in C++ and Java are supported by the LE and Java runtimes respectively. These use z/OS interfaces for much of their processing.
  - An LE process is a set of threads sharing resources (file handles etc.). An AS serves as a process container. Processes start in the same address space according to the _BPX_SHAREAS (YES,NO) environment variable, and/or authorization requirements. A thread is a unit of execution synonymous with a Task Control Block (TCB).

Where is the diagnostic information

As you'd expect from a regular z/OS subsystem, the operational output will be available from the MVS SYSLOG and JOBLOGs in the form of BIP product messages.

JOBLOGs have the advantage of partitioning messages by address space, typically execution groups. All command output is directed to the JES SPOOL as expected.

Notice the STDOUT/STDERR files to help catch those Java programmers writing to standard output devices

SYSLOG
JOBLOG


```
SDSF JOB DATA SET DISPLAY - JOB MQ91BRK   (STC04580)
COMMAND INPUT ===>
PREFIX=MQ*   DEST=(ALL)   OWNER=*   SYSNAME=*
NP    DDNAME    StepName  ProcStep  DSID  Owner     C  Dest
      JESMSGLG  JES2                 2  WMQI91    C
      JESJCL    JES2                 3  WMQI91    C
      JESYSMSG  JES2                 4  WMQI91    C
      ENVFILE   MQ91BRK            101  WMQI91    C
      DSNAOINI  MQ91BRK            102  WMQI91    C
      STDOUT    MQ91BRK            103  WMQI91    C
      STDOUT    MQ91BRK            105  WMQI91    C
      STDERR    MQ91BRK            106  WMQI91    C
```

What Trace to use and when

Trace is available for separate components which can be formatted to a text output. Held in <CO

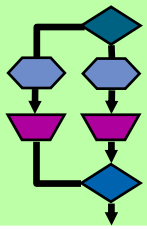
Various trace is available:

- *Flow User Trace – for you*
- *Internal "Service" Trace – for IBM Support*
- *Command traces – for all*
- *CVP trace – for all*

Trace

User

Service



```
Aug  9 15:44 MQ91BRK.c91e9b41-3101-0000-0080-c0fdd5a003a1.trace.bin.0
Aug  9 17:28 MQ91BRK.c91e9b41-3101-0000-0080-c0fdd5a003a1.trace.bin.1
Aug  9 15:44 MQ91BRK.c91e9b41-3101-0000-0080-c0fdd5a003a1.trace.bin.2
Aug  9 15:44 MQ91BRK.c91e9b41-3101-0000-0080-c0fdd5a003a1.trace.bin.3
Aug  9 16:10 MQ91BRK.c91e9b41-3101-0000-0080-c0fdd5a003a1.userTrace.bin.0
Aug  9 17:28 MQ91BRK.c91e9b41-3101-0000-0080-c0fdd5a003a1.userTrace.bin.1
Aug  9 17:28 MQ91BRK.httplistener.trace.bin.0
Aug  9 17:28 MQ91BRK.httplistener.userTrace.bin.0
Aug  9 16:06 MQ91BRK.mqsichangeflowstats.trace.bin.0
Aug  9 16:06 MQ91BRK.mqsichangeflowstats.userTrace.bin.0
Aug  9 15:44 MQ91BRK.mqsichangetrace.trace.bin.0
Aug  9 15:44 MQ91BRK.mqsichangetrace.userTrace.bin.0
Aug  9 15:33 MQ91BRK.mqsicvp.trace.bin.0
Aug  9 17:28 MQ91BRK.mqsicvp.trace.bin.1
Aug  9 17:28 MQ91BRK.mqsicvp.userTrace.bin.0
Aug  9 15:41 MQ91BRK.mqsireadlog.trace.bin.0
Aug  9 15:41 MQ91BRK.mqsireadlog.userTrace.bin.0
Aug  9 16:11 MQ91BRK.mqsireportflowstats.trace.bin.0
Aug  9 16:11 MQ91BRK.mqsireportflowstats.userTrace.bin.0
Aug  9 17:04 MQ91BRK.mqsistop.trace.bin.0
Aug  9 17:04 MQ91BRK.mqsistop.userTrace.bin.0
Aug  9 17:28 MQ91BRK.service.trace.bin.0
Aug  9 17:28 MQ91BRK.service.userTrace.bin.0
```

Example usertrace

```
Trace written by version 7002; formatter version 7002 (build S700-FP02)
2011-08-09 21:58:23.159181    6468  UserTrace  BIP2632I: Message received and propagated to 'out' terminal of MQ input node 'DebugFlow1.MQ Input'.
2011-08-09 21:58:23.159496    6468  UserTrace  BIP6060I: Parser type "Properties" created on behalf of node 'DebugFlow1.MQ Input' to handle portion of incoming message of length 0 bytes
        beginning at offset '0'.
2011-08-09 21:58:23.159585    6468  UserTrace  BIP6061I: Parser type "MQMD" created on behalf of node 'DebugFlow1.MQ Input' to handle portion of incoming message of length '364' bytes
        beginning at offset '0'. Parser type selected based on value "MQHMD" from previous parser.
2011-08-09 21:58:23.159654    6468  UserTrace  BIP6069W: The broker is not capable of handling a message of data type "MQSTR".
                        The message broker received a message that requires the handling of data of type "MQSTR", but the broker does not have the capability to handle data of this type.
                        Check both the message being sent to the message broker and the configuration data for the node. References to the unsupported data type must be removed if the
        message is to be processed by the broker.
2011-08-09 21:58:23.160024    6468  UserTrace  BIP6061I: Parser type "XMLNSC" created on behalf of node 'DebugFlow1.MQ Input' to handle portion of incoming message of length '143'
        bytes beginning at offset '364'. Parser type selected based on value "XMLNSC" from previous parser.
2011-08-09 21:58:23.160163    6468  UserTrace  BIP2537I: Node 'DebugFlow1_Compute': Executing statement   "BEGIN ... END;" at ('.DebugFlow1_Compute.Main', '2.2').
2011-08-09 21:58:23.160373    6468  UserTrace  BIP2537I: Node 'DebugFlow1_Compute': Executing statement   "CopyEntireMessage();" at ('.DebugFlow1_Compute.Main', '3.3').
2011-08-09 21:58:23.160455    6468  UserTrace  BIP2538I: Node 'DebugFlow1_Compute': Evaluating expression "CopyEntireMessage()" at ('.DebugFlow1_Compute.Main', '3.8').
2011-08-09 21:58:23.160533    6468  UserTrace  BIP2537I: Node 'DebugFlow1_Compute': Executing statement   "BEGIN ... END;" at ('.DebugFlow1_Compute.CopyEntireMessage', '1.39').
2011-08-09 21:58:23.160598    6468  UserTrace  BIP2537I: Node 'DebugFlow1_Compute': Executing statement   "SET OutputRoot = InputRoot;" at
        ('.DebugFlow1_Compute.CopyEntireMessage', '2.3').
2011-08-09 21:58:23.160839    6468  UserTrace  BIP2539I: Node 'DebugFlow1_Compute': Evaluating expression "InputRoot" at ('.DebugFlow1_Compute.CopyEntireMessage', '2.20'). This
        resolved to "InputRoot". The result was "ROW... Root Element Type=16777216 Namespace='' Name='Root' Value=NULL".
2011-08-09 21:58:23.160905    6468  UserTrace  BIP2568I: Node 'DebugFlow1_Compute': Copying sub-tree from "InputRoot" to "OutputRoot".
2011-08-09 21:58:23.161085    6468  UserTrace  BIP2537I: Node 'DebugFlow1_Compute': Executing statement   "SET OutputRoot.XMLNSC.Order.Total =
        CAST(OutputRoot.XMLNSC.Order.Item.Price AS DECIMAL) * CAST(OutputRoot.XMLNSC.Order.Item.Quantity AS INTEGER);" at ('.DebugFlow1_Compute.Main', '4.3').
2011-08-09 21:58:23.161277    6468  UserTrace  BIP2539I: Node 'DebugFlow1_Compute': Evaluating expression "OutputRoot.XMLNSC.Order.Item.Price" at ('.DebugFlow1_Compute.Main',
        '4.44'). This resolved to "OutputRoot.XMLNSC.Order.Item.Price". The result was ""3"".
2011-08-09 21:58:23.161457    6468  UserTrace  BIP2539I: Node 'DebugFlow1_Compute': Evaluating expression "CAST(OutputRoot.XMLNSC.Order.Item.Price AS DECIMAL)" at
        ('.DebugFlow1_Compute.Main', '4.39'). This resolved to "CAST('3' AS DECIMAL)". The result was "3".
2011-08-09 21:58:23.161539    6468  UserTrace  BIP2539I: Node 'DebugFlow1_Compute': Evaluating expression "OutputRoot.XMLNSC.Order.Item.Quantity" at ('.DebugFlow1_Compute.Main',
        '4.98'). This resolved to "OutputRoot.XMLNSC.Order.Item.Quantity". The result was "".
2011-08-09 21:58:23.161687    6468  UserTrace  BIP2539I: Node 'DebugFlow1_Compute': Evaluating expression "CAST(OutputRoot.XMLNSC.Order.Item.Quantity AS INTEGER)" at
        ('.DebugFlow1_Compute.Main', '4.93'). This resolved to "CAST('7' AS INTEGER)". The result was "7".
2011-08-09 21:58:23.161767    6468  UserTrace  BIP2539I: Node 'DebugFlow1_Compute': Evaluating expression "CAST(OutputRoot.XMLNSC.Order.Item.Price AS DECIMAL) *
        CAST(OutputRoot.XMLNSC.Order.Item.Quantity AS INTEGER)" at ('.DebugFlow1_Compute.Main', '4.91'). This resolved to "3 * 7". The result was "21".
2011-08-09 21:58:23.161844    6468  UserTrace  BIP2566I: Node 'DebugFlow1_Compute': Assigning value      "21" to field / variable "OutputRoot.XMLNSC.Order.Total".
2011-08-09 21:58:23.161916    6468  UserTrace  BIP2537I: Node 'DebugFlow1_Compute': Executing statement   "RETURN TRUE;" at ('.DebugFlow1_Compute.Main', '5.3').
2011-08-09 21:58:23.162040    6468  UserTrace  BIP4015I: Message propagated to the 'out' terminal of node 'DebugFlow1.Compute' with the following message trees: ".
2011-08-09 21:58:23.162214    6468  UserTrace  BIP3904I: Invoking the evaluate() method of node (class='ComIbmJavaComputeNode', name='DebugFlow1#FCMComposite_1_4').
                        About to pass a message to the evaluate() method of  the specified node.
                        No user action required.
2011-08-09 21:58:23.162866    6468  UserTrace  BIP2638I: The MQ output node 'DebugFlow1.MQ Output' attempted to write a message to queue "OUT.DEBUG" connected to queue manager
        "". The MQCC was '0' and the MQRC was '0'.
2011-08-09 21:58:23.162927    6468  UserTrace  BIP2622I: Message successfully output by output node 'DebugFlow1.MQ Output' to queue "OUT.DEBUG" on queue manager "".
Threads encountered in this trace:
6468
```

Where is the diagnostic information

- Useful Output files
  - Now that you've understood the moving parts of a z/OS broker and how to use it, here's a useful file list and a brief content description.
- Job Log and Syslog
  - This is where you'll go to for most of your local operational information on broker behaviour. Note that the Eclipse tooling or Message Broker Explorer will provide Administration Perspectives applicable for some class of users, here we are considering native operational interaction with the z/OS operating system.
  - SYSLOG (SDSF) contains all BIP messages. In the event of a problem, it's also worth looking for messages from other subsystems, e.g. End of Task messages (EOT).
  - z/OS Standard Message suppression techniques (MPFLSTxx) can be used to stop any of the commands reaching the MVS log, if you have concern about volume or message importance of messages. This is not usually applicable of Broker users (i.e. the broker doesn't generate unnecessary messages to the console.)
- FFDC/Abends
  - MiniAbends and FFDCs can be found on zFS to help get first failure information of errors
    - <Broker_HFS>/common/errors/CEEDUMP.*
- Trace files
  - Trace files are always written to the zFS, so make sure you have enough space in the mount.
    - <Broker_HFS>/common/log/*
  - Trace files should be formatted on the customer machine using BIPxxxxx JCL in component PDS.

N O T E S

stdout/stderr

NOTES

- Useful place to look for errors / debugging
  - Always worth checking for exceptions if problems are occurring
- Each major component redirects its stdout/stderr streams to files
  - Windows
    - *Admin Agent (7.0.0.2)*

    C:\Documents and Settings\All Users\Application Data\IBM\MQSI\components\<brkName>\console.txt
    - *Execution group*

    C:\Documents and Settings\All Users\Application Data\IBM\MQSI\components\<brkName>\<egUUID>\console.txt
  - Linux/Unix
    - *Admin Agent (7.0.0.2)*

    /var/mqsi/components/<brkName>/stdout & stderr
    - *Execution group*

    /var/mqsi/components/<brkName>/<egUUID>/stdout & stderr
  - z/OS
    - *STDOUT / STDERR DD cards in the joblog for both the main broker address space and for any execution groups*
- Can be useful for flow developers who use Java and code system.out.println statements for debugging

NOTES

What do I do with a DUMP / FFDC?

- We bag up as much information as possible and put it in a “DUMP” or FFDC.

- The next steps are just a puzzle waiting to be solved

Call IBM Support or not?

- The traceback is placed into a CEEDUMP file, which resides in the <component_HFS>/common/errors directory.
- Each traceback is preceded by the date, time, and unique identifier; for example, CEEDUMP file - CEEDUMP.20100924.171754.84017230

```
Traceback:
  DSA Addr  Program Unit  PU Addr   PU Offset  Entry         E Addr    E  Offset   Statement  Load Mod  Service  Status
  38F9DBD0  CEEVRONU      0707D2B8  +00001004  CEEVRONU      0707D2B8  +00001004             CEEPLPKA  HLE7730  Call
  390253A0                1DF418F8  +000000DE  ImbAbend::printStackForCurrentThread(int,bool,const void*,vo
                                                               1DF418F8  +000000DE             *PATHNAM  FP2....  Call
  39025780                1E221258  +000003C2  ImbAbend::terminateProcessInternal(const void*,const bool,vo
                                                               1E221258  +000003C2             *PATHNAM  FP2....  Call
  39026080                1DF457F8  +000005BE  IMBCOND       1DF457F8  +000005BE             *PATHNAM  FP2....  Call
  39026120                0707B2E0  +00001252  CEEVROND      0707B338  +000011FA             CEEPLPKA           Call
  38F9A928  CEEHDSP       06F7C4D0  +000024BC  CEEHDSP       06F7C4D0  +000024BC             CEEPLPKA  HLE7730  Call
  38F99DA8  CEEHRNUH      06F8B010  +00000092  CEEHRNUH      06F8B010  +00000092             CEEPLPKA  HLE7730  Call
  390261E0                38F39BB0  +000000F2  _NumCompute_evaluate
                                                               38F39BB0  +000000F2             *PATHNAM           Exception
  39027B00                33EFF078  +000004E4  ImbCniNode::evaluate(const ImbMessageAssembly&,const ImbData
                                                               33EFF078  +000004E4             *PATHNAM  FP2....  Call
  39028840                201AE2B0  +00000208  ImbDataFlowTerminal::evaluate(const ImbMessageAssembly&)
                                                               201AE2B0  +00000208             *PATHNAM  FP2....  Call
  39028920                201AE078  +000000BE  ImbDataFlowTerminal::propagateInner(const ImbMessageAssembly
                                                               201AE078  +000000BE             *PATHNAM  FP2....  Call
  39029220                201ABD70  +00000552  ImbDataFlowTerminal::propagate(const ImbMessageAssembly&)
                                                               201ABD70  +00000552             *PATHNAM  FP2....  Call
  39029360                32AC4878  +00003C2E  ImbCommonInputNode::run(ImbOsThread*)
                                                               32AC4878  +00003C2E             *PATHNAM  FP2....  Call
  3902BA00                32AD3488  +00000046  ImbCommonInputNode::Parameters::run(ImbOsThread*)
                                                               32AD3488  +00000046             *PATHNAM  FP2....  Call
  3902BA80                1DE7FD98  +00000074  ImbThreadPoolThreadFunction::run(ImbOsThread*)
                                                               1DE7FD98  +00000074             *PATHNAM  FP2....  Call
  3902C400                1E10A2E8  +000000A8  ImbOsThread::innerThreadBootStrapWrapper(void*)
                                                               1E10A2E8  +000000A8             *PATHNAM  FP2....  Call
  3902CD20                1E109E80  +0000025A  ImbOsThread::threadBootStrap(void*)
                                                               1E109E80  +0000025A             *PATHNAM  FP2....  Call
  3902D6A0                1E109E38  +00000008  threadBootStrapWrapper
                                                               1E109E38  +00000008             *PATHNAM  FP2....  Call
  3902D720                0707B2E0  +00001252  CEEVROND      0707B338  +000011FA             CEEPLPKA           Call
  38FAAEE0  CEEOPCMM      00035438  +00000908  CEEOPCMM      00035438  +00000908             CEEBINIT  HLE7730  Call
```

- The abend occurs with an Entry Point name of _NumCompute_evaluate.
- We know that Message Broker always starts Imb so this needs to be looked at by the application team or third party vendor who produced the lil.

What do I do with a DUMP / FFDC?

NOTES

Dumps are taken by the broker for a number of situations. They do not always mean a code problem.

There are some very simple things that can be done to determine if the issue needs IBM Support help, or just your application teams.

Look at the FFDC files that the Broker produces in /common/errors/CEE* to determine who is at “fault”

If the Entry Point name starts IMB then raise a PMR and contact IBM Support.

If not, then the module may be a third party product or an application node.

NOTES

Status commands

- **Non-persistent trace option** (7.0.0.3)
  - How do I find the evidence of what went wrong.
  - New ability to Enable execution group wide trace level that doesn't survive a restart
  - Helps to capture trace for abend/shutdown situations
  - Stops traces being wrapped during restart

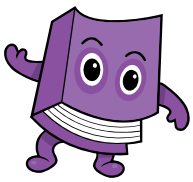
- **What traces are running** (7.0.0.3)
  - mqsireporttrace is now recursive ☺
    - mqsireporttrace <brkName>
      - *Reports all service and user traces which are active*
    - mqsireporttrace <brkName> -t
      - *Reports all service traces which are active*
    - mqsireporttrace <brkName> -u
      - *Reports all user traces which are active*

BIP8945I: Service trace settings for execution group 'test1' - mode: 'safe', size: '195' KB
BIP8946I: Service trace is enabled for execution group 'test1' with level 'debug'.
BIP8945I: Service trace settings for execution group 'EG2' - mode: 'safe', size: '195' KB
BIP8947I: Service trace is enabled for message flow 'TestFlow' with level 'debug'.
BIP8948I: User trace settings for execution group 'EG2' - mode: 'safe', size: '195' KB
BIP8949I: User trace is enabled for execution group 'EG2' with level 'debug'.

What level is my broker?

- **On z/OS look a the JOBLOG ☺**

BIP9272I MQ91BRK RALPH 0 THE DATAFLOWENGINE PROCESS HAS REGISTERED SMF 89 SUBTYPE 1 RECORD COLLECTION. RETURN CODE '0', : ImbMain(397) BIP2208I MQ91BRK RALPH 0 EXECUTION GROUP (64) STARTED: PROCESS '16909047'; THREAD '2007049624853938176'; ADDITIONAL INFORMATION: BROKERNAME 'MQ91BRK' (OPERATION MODE 'enterprise'); EXECUTIONGROUPUUID '93d22eb0-3101-0000-0080-c3ce9c5af203'; EXECUTIONGROUPLABEL 'RALPH'; QUEUEMANAGERNAME 'MQ91'; TRUSTED 'false'; USERID ''; MIGRATIONNEEDED 'false'; BROKERUUID '3e2d440a-b1e4-11e0-a4e8-000000000000'; FILEPATH '/u/wmqi91/broker/instpath'; WORKPATH '/u/wmqi91/broker'; ICU CONVERTER PATH ''. : ImbMain(605)



BIP9108I MQ91BRK RALPH 0 BROKER SERVICE VALUE IS IMBSERV.V7R0M00.FP02.... : ImbMain(614)

On distributed run the command : mqsiservice –v

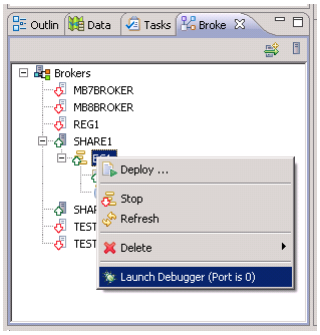
```
C:\Program Files\IBM\MQSI\7.0.0.3.L110525_P>mqsiservice -v
        BIPmsgs  en_GB
          Console OEM CP=437, ICU CCSID=5348
          Default codepage=ibm-5348_P100-1997, in ascii=ibm-5348_P100-1997
          JAVA console codepage name=cp437
        BIP8996I: Version:  7003
        BIP8997I: Product:    WebSphere Message Broker
        BIP8998I: CMVC Level: S700-L110525
        BIP8999I: Build Type: Production, 32 bit, x86_nt_4
        BIP8071I: Successful command completion.
```

What “out the box” Tools are available?

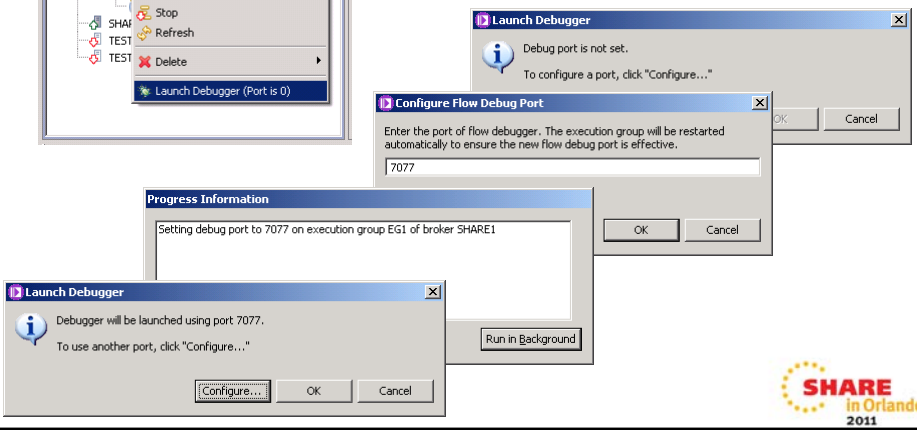
- Message Broker Toolkit
  - Flow debugger
    - Useful for debugging message flows during their development
- Message Broker Explorer
  - Flow statistics
    - Useful for highlighting the cause of performance problems
    - Baseline good operation
  - Resource stats
    - Useful for highlighting areas of concern in message flows or performance bottlenecks.

N O T E S

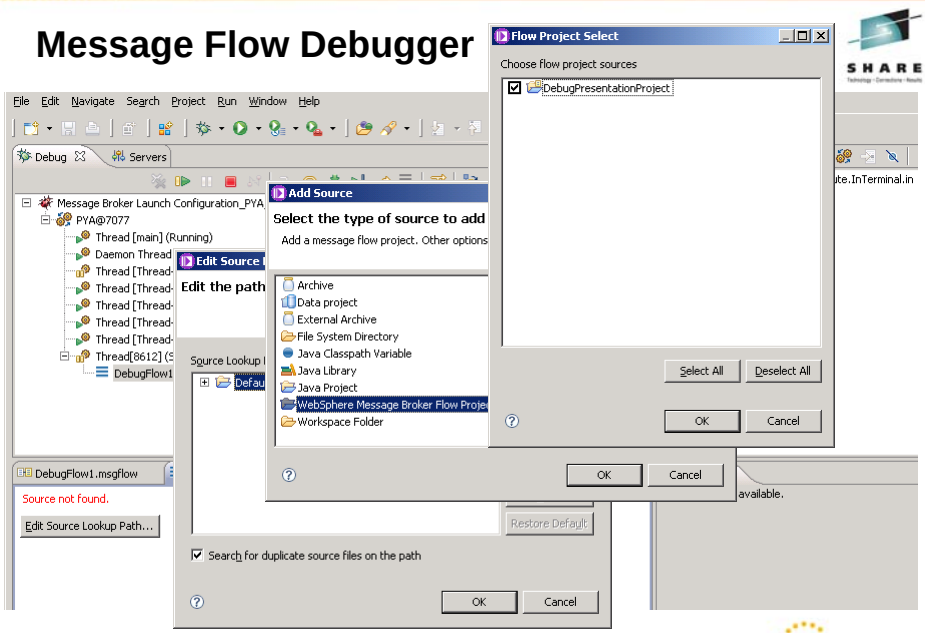
Message Flow Debugger



HOWTO Enable the debugger to allow you to debug message flows from the Message Broker toolkit

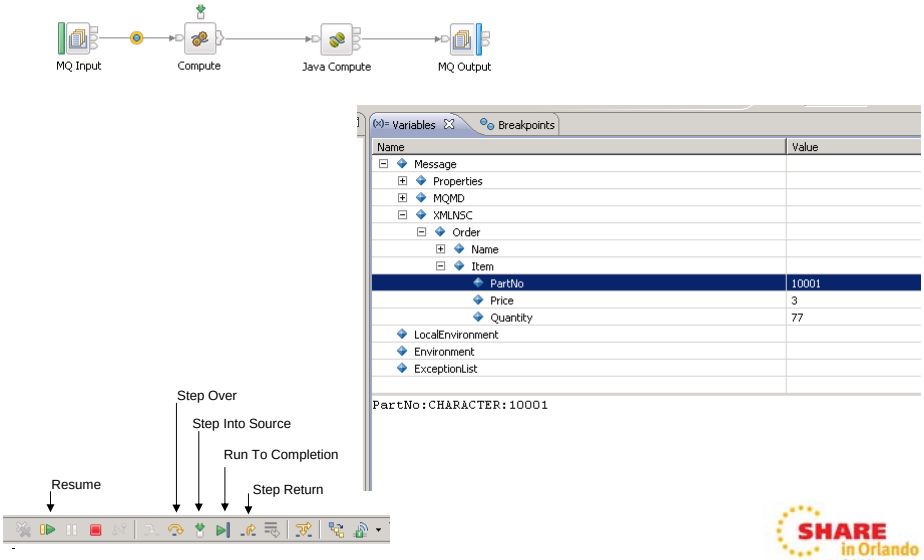


Message Flow Debugger



HOWTO Configure the Source lookup path to enable you to step through you message flow application

Message Flow Debugger

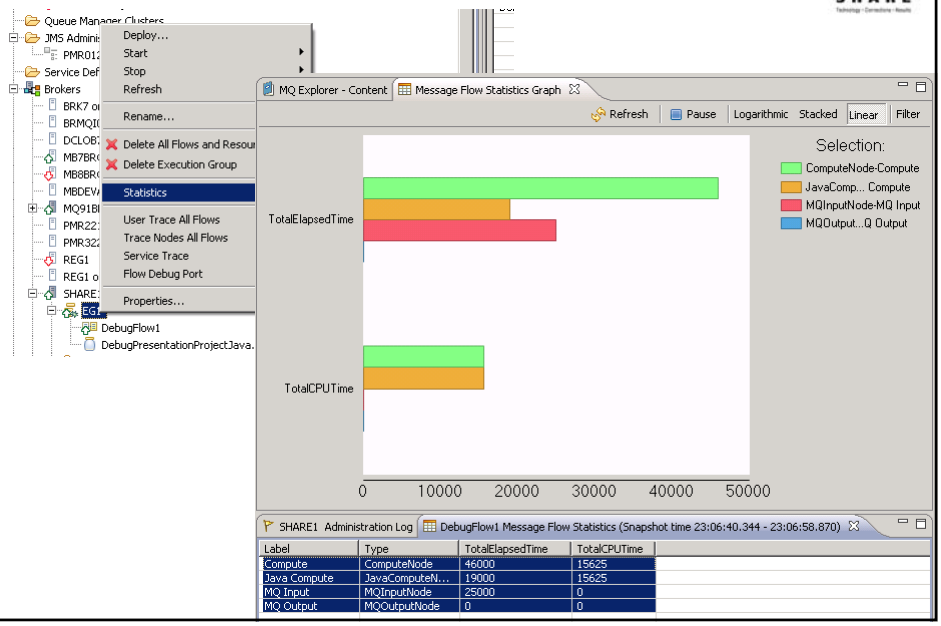


Message Flow Debugger

N O T E S

- Use the Message Flow debugger to debug your message flows
- Set breakpoints on the connections between nodes
- At each stage you can view (and edit) the Message Trees
- Step into ESQL or Java compute nodes
- Requires the enablement of the JVMDebug port on the execution group you wish to debug
  - Don't do this on production machines as it hits performance

Message Flow Statistics



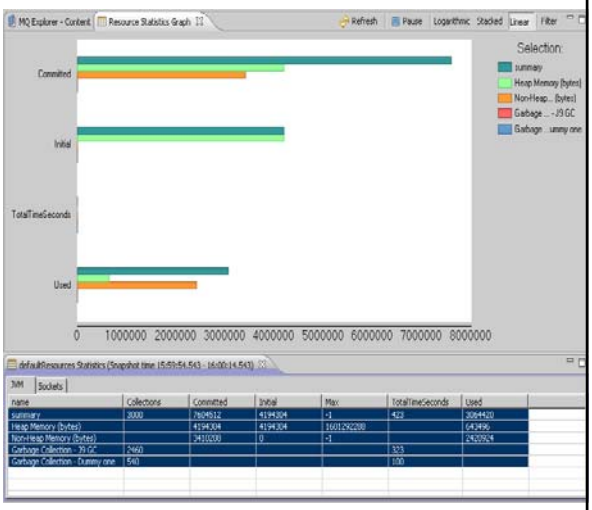
Message Flow Statistics - Notes

N O T E S

- You can enable and display message flow statistics using MBX.
- You can the use the results and graphs to diagnose performance and operational problems.
- During normal operation it can be useful to enable message flow statistics so you can get a feel for what 'normal' looks like as well as to help tuning flows and machines for performance.
- During operational issues you may notice that certain nodes are using more/less cpu than normal, or maybe a certain node is showing no usage data, so perhaps is no longer being driven when it should. All quantifiable differences could be indicative of an issue worth investigating, or provide clues to help solve other problems.
- With the statistics view open in MBX click on the execution group or message flow to change the scope of the data displayed. Clicking on the execution group will restrict the information to the flow level, whereas clicking on a given flow will show the statistics at a node level.

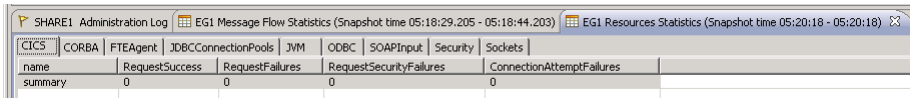
Resource Statistics

- Find out the current resource usage of a broker or execution group
  - **CICS –** successful requests, failures, security failures…
  - **CORBA** – Invocations, Success, Failures
  - **FTE** – Inbound/Outbound transfers, bytes sent/received…
  - **JDBC** – Requests, Cached requests, Providers…
  - **JVM –** Memory used, thread count, heap statistics…
  - **ODBC** – Connections, Closures, Errors, Successes
  - **SOAPInput** – Inbound messages, Replies, Failures, Policy Sets
  - **Security** – Operations, Success, Failures, Cache usage…
  - **Sockets** – Total sockets, message sizes, Kb sent/received
  - **Parsers** – Memory usage; message elements created/deleted; parser count
- More resource types being added in the future

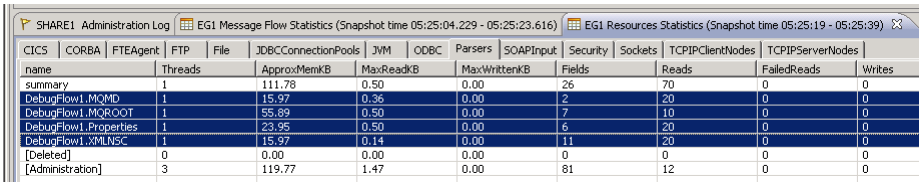


Resource Statistics - Examples

- Each resource reports values specific to the given resource type
- Failure counts are often key values to monitor



- Parser stats provide a great insight to a given flow



Resource Statistics - Notes

NOTES

- Every resource is different, so each resource reports different values.
- In the same way as with message flow statistics, it's a good idea to enable resource statistics when things are going well so that you can get a feeling, or some concrete numbers for what to expect.
- The key values to monitor are the failure counts.
- When you're having trouble and you know that your flows make use of certain resources take a look at the failure counts or connection errors to see if they are highlighting any issues.
- Other key values are the bytes sent/received. If these are not increasing when they should be then they might point at a problem.
- Message Broker does not attempt to provide analytics or averages on the values. The raw numbers are presented and published to allow customers and external tools to provide the analytics.
- As with message flow statistics the resource statistics data format is documented and the data is published as xml messages to a given topic allowing customers and other applications to subscribe to and process the data.
- As well as looking for errors through the failed reads and failed writes counts, parser resource statistics can be used to size your message flows as they given an approximation of the memory used by the message flow for parsing and the logical tree structure. You can also see the maximum size input and output buffers used, so you can tell the max message sizes being processed, and you can see the number of fields being created, which can all point at problems with flow design, or if these numbers change over baseline figures, of a change in message size/type being processed.

NOTES

How to diagnose some common scenarios

Scenarios

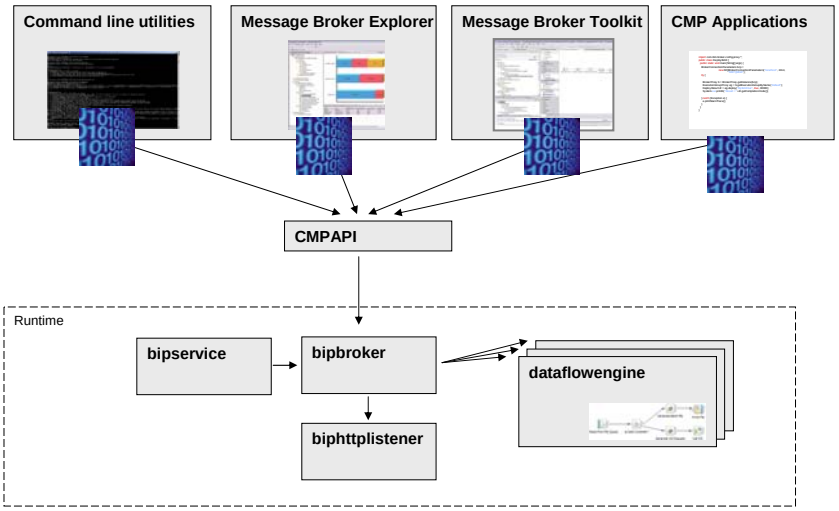
- Message Broker won't start
  - First check the JOBLOG.

+BIP8873I MQ91BRK 0 Starting the component verification for component 'MQ91BRK'. : ImbComponentVerification(78)
+BIP8875W MQ91BRK 0 The component verification for 'MQ91BRK' has finished, but one or more checks failed. : ImbComponentVerification(187)

  - Then check the STDOUT/STDERR for MQSICVP

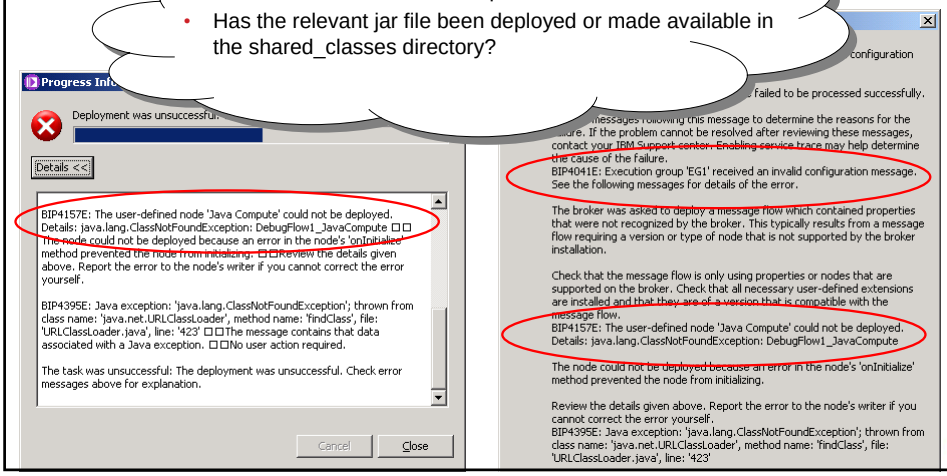
BIP8873I: Starting the component verification for component 'MQ91BRK'.
BIP8876I: Starting the environment verification for component 'MQ91BRK'.
BIP8894I: Verification passed for 'Registry'.
BIP8894I: Verification passed for 'MQSI_REGISTRY'.
BIP8907E: Verification failed. Unable to verify Java level.
Unable to verify the installed Java level. This error is typically caused by Java not being installed, or a file permissions error.
Ensure Java has been correctly installed, by running the command java -version.
If Java has been correctly installed, see the preceding messages for further information about the cause of this failure, and the actions that you can take to resolve it.
BIP8894I: Verification passed for 'MQSI_COMPONENT_NAME'.
BIP8894I: Verification passed for 'MQSI_FILEPATH'.
BIP8900I: Verification passed for APF Authorization of file '/u/wmqi91/broker/instpath/bin/bipimain'.
BIP8894I: Verification passed for 'Current Working Directory'.
BIP8877W: The environment verification for component 'MQ91BRK' has finished, but one or more checks failed.
One or more of the environment verification checks failed.
Check the error log for preceding error messages.
BIP8882I: Starting the WebSphere MQ verification for component 'MQ91BRK'.
BIP8886I: Verification passed for queue 'SYSTEM.BROKER.ADMIN.QUEUE' on queue manager 'MQ91'.
BIP8886I: Verification passed for queue 'SYSTEM.BROKER.EXECUTIONGROUP.QUEUE' on queue manager 'MQ91'.
BIP8886I: Verification passed for queue 'SYSTEM.BROKER.EXECUTIONGROUP.REPLY' on queue manager 'MQ91'.
BIP8884I: The WebSphere MQ verification for component 'MQ91BRK' has finished successfully.
BIP8875W: The component verification for 'MQ91BRK' has finished, but one or more checks failed.
One or more of the component verification checks failed.
Check the error log for preceding error messages.

Deploy of a Message flow fails



Deploy of a Message flow fails

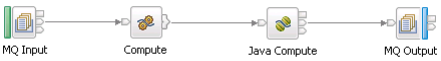
- Whether you deploy using the Message Broker Toolkit, MBX or via the command line you will see any deploy errors being reported
- Always make sure to read all
  - The fi
    - In this scenario the Java compute node cannot find it's class
    - Has the relevant jar file been deployed or made available in the shared_classes directory?



Where's my output message?

- A user reports that they're not receiving any messages
- So where are the messages going and what can you look at?
  - Resource statistics
  - Message Flow statistics
  - User trace
  - Message Flow Debugger
- We'll see how all of the above can be used to piece together the pieces of the puzzle

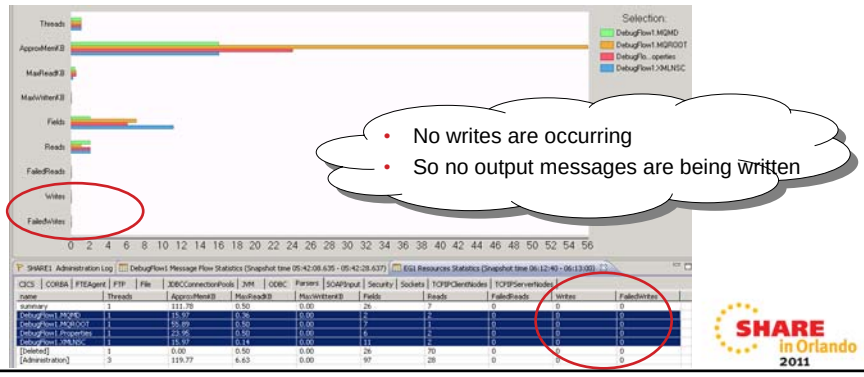
- The message flow



  - A simple MQ In/Out flow with some transformation logic

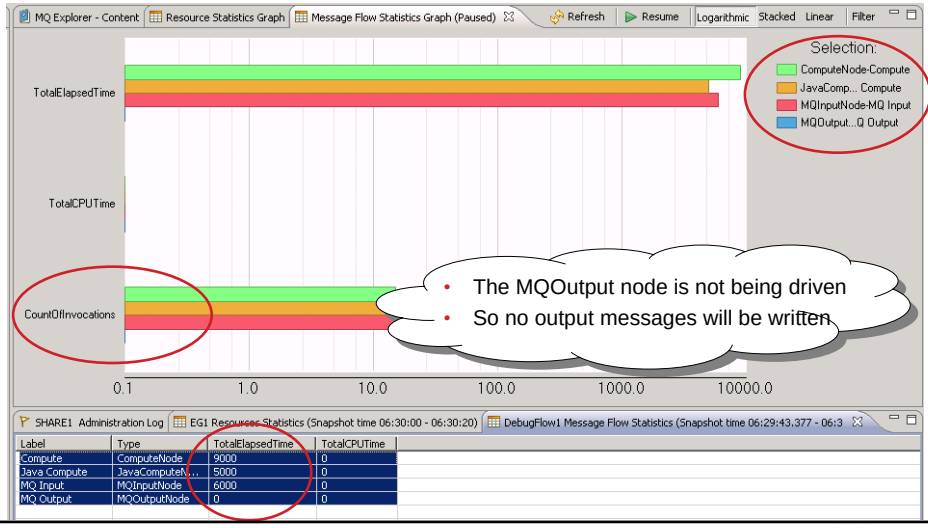
Where's my output message?

- Resource statistics
  - Is there a resource stat available for your output transport that would show if messages are being written?
    - MQ is not yet available, so not helpful here
    - But CICS, CORBA, FTP, File, HTTP Sockets & TCPIP Nodes are available
    - The parsers output could be useful
    - Are any messages being written?



Where's my output message?

- Message Flow statistics
  - Are all nodes in the flow being driven as expected?



Where's my output message?

- User Trace
  - Can we see why the MQOutput node is not being driven?
  - We saw earlier what to look for in a User Trace, can we see that here?

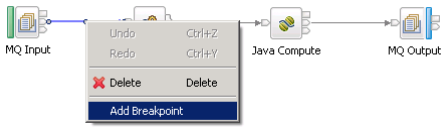
```
UserTrace   BIP2632I: Message received and propagated to 'out' terminal of MQ input node 'DebugFlow1.MQ Input'.
UserTrace   BIP6060I: Parser type "Properties" created on behalf of node 'DebugFlow1.MQ Input' to handle portion of incoming message of length 0 bytes beginning at
            offset '0'.
UserTrace   BIP6061I: Parser type "MQMD" created on behalf of node 'DebugFlow1.MQ Input' to handle portion of incoming message of length '364' bytes beginning at
            offset '0'. Parser type selected based on value "MQHMD" from previous parser.
UserTrace   BIP6061I: Parser type "XMLNSC" created on behalf of node 'DebugFlow1.MQ Input' to handle portion of incoming message of length '144' bytes beginning at
            offset '364'. Parser type selected based on value "XMLNSC" from previous parser.
UserTrace   BIP2537I: Node 'DebugFlow1_Compute': Executing statement   "BEGIN ... END;" at ('.DebugFlow1_Compute.Main', '2.2').
UserTrace   BIP2537I: Node 'DebugFlow1_Compute': Executing statement   "CopyEntireMessage();" at ('.DebugFlow1_Compute.Main', '3.3').
UserTrace   BIP2538I: Node 'DebugFlow1_Compute': Evaluating expression "CopyEntireMessage()" at ('.DebugFlow1_Compute.Main', '3.8').
UserTrace   BIP2537I: Node 'DebugFlow1_Compute': Executing statement   "BEGIN ... END;" at ('.DebugFlow1_Compute.CopyEntireMessage', '1.39').
UserTrace   BIP2537I: Node 'DebugFlow1_Compute': Executing statement   "SET OutputRoot = InputRoot;" at ('.DebugFlow1_Compute.CopyEntireMessage', '2.3').
UserTrace   BIP2539I: Node 'DebugFlow1_Compute': Evaluating expression "InputRoot" at ('.DebugFlo                                                    to
            "InputRoot". The result was "ROW... Root Element Type=16777216 NameS
UserTrace   BIP2568I: Node 'DebugFlow1_Compute': Copying sub-tree from "
UserTrace   BIP2537I: Node 'DebugFlow1_Compute': Executing statement
            DECIMAL) * CAST(OutputRoot.XMLNSC.Order.Item.Quantity AS "
UserTrace   BIP2539I: Node 'DebugFlow1_Compute': Evaluating ex
            resolved to "OutputRoot.XMLNSC.Order.Item.Price". The res
UserTrace   BIP2539I: Node 'DebugFlow1_Compute': Evaluating expr
            ('.DebugFlow1_Compute.Main', '4.39'). This resolved to "CAST('7
UserTrace   BIP2539I: Node 'DebugFlow1_Compute': Evaluating exp                                                    This
            resolved to "OutputRoot.XMLNSC.Order.Item.Quantity". The resu
UserTrace   BIP2539I: Node 'DebugFlow1_Compute': Evaluating expression "C
            ('.DebugFlow1_Compute.Main', '4.93'). This resolved to "CAST('77' AS INTEGER)
UserTrace   BIP2539I: Node 'DebugFlow1_Compute': Evaluating expression "CAST(OutputRoot.XMLNSC.Order                    MAL) *
            CAST(OutputRoot.XMLNSC.Order.Item.Quantity AS INTEGER)" at ('.DebugFlow1_Compute.Main', '4.91'). This resolved to "3 * 77". The result was "231".
UserTrace   BIP2566I: Node 'DebugFlow1_Compute': Assigning value      "231" to field / variable "OutputRoot.XMLNSC.Order.Total".
UserTrace   BIP2537I: Node 'DebugFlow1_Compute': Executing statement   "RETURN TRUE;" at ('.DebugFlow1_Compute.Main', '5.3').
UserTrace   BIP4015I: Message propagated to 'out' terminal of node 'DebugFlow1.Compute' with the following message trees: ".
UserTrace   BIP3804I: Invoking the evaluate() method of node (class='ComIbmJavaComputeNode', name='DebugFlow1#FCMComposite_1_4').
 About to pass a message to the evaluate() method of the specified node.
 No user action required.
```

- The last thing the trace shows is the JavaCompute node being invoked
- This never propagates to its output terminal
- Why?

… then the trace ends ….

Where's my output message?

- Message Flow Debugger
  - Enable and connect to the debug port
  - Add a breakpoint to the message flow



  - Fire in a message and the breakpoint triggers

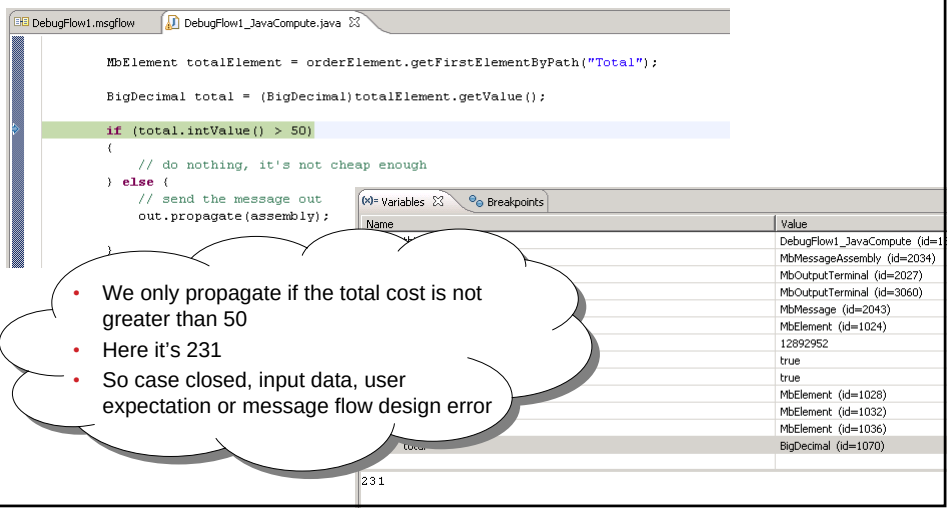
  - We can then step through the message flow and into the ESQL and Java code

Where's my output message?

- Message Flow Debugger
  - As the message is never propagated from the JavaCompute node we need to see why
  - When the flow is paused on the connection between the compute and JavaCompute nodes we can step into the source

Where's my output message?

- Message Flow Debugger
  - Once in the Java source we can step through the code to understand why propagate is never called



- We only propagate if the total cost is not greater than 50
- Here it's 231
- So case closed, input data, user expectation or message flow design error

Summary

- What are the "moving" parts
- Where is the diagnostic information
- What Trace to use
- What do I do with a Dump / FFDC ?
- What are the common "Status" commands
- "Out the box" Tools available for debugging
- How to Diagnose Common Scenarios

This was session 09431 - The rest of the week ……

	Monday	Tuesday	Wednesday	Thursday	Friday
08:00			More than a buzzword: Extending the reach of your MQ messaging with Web 2.0	Batch, local, remote, and traditional MVS - file processing in Message Broker	Lyn's Story Time - Avoiding the MQ Problems Others have Hit
09:30		WebSphere MQ 101: Introduction to the world's leading messaging provider	The Do's and Don'ts of Queue Manager Performance	So, what else can I do? - MQ API beyond the basics	MQ Project Planning Session
11:00		MQ Publish/Subscribe	The Do's and Don'ts of Message Broker Performance	Diagnosing problems for Message Broker	What's new for the MQ Family and Message Broker
12:15	MQ Freebies! Top 5 SupportPacs	The doctor is in. Hands-on lab and lots of help with the MQ family		Using the WMQ V7 Verbs in CICS Programs	
01:30	Diagnosing problems for MQ	WebSphere Message Broker 101: The Swiss army knife for application integration	The Dark Side of Monitoring MQ - SMF 115 and 116 record reading and interpretation	Getting your MQ JMS applications running, with or without WAS	
03:00	Keeping your eye on it all - Queue Manager Monitoring & Auditing	The MQ API for dummies - the basics	Under the hood of Message Broker on z/OS - WLM, SMF and more	Message Broker Patterns - Generate applications in an instant	
04:30	Message Broker administration for dummies	All About WebSphere MQ File Transfer Edition	For your eyes only - WebSphere MQ Advanced Message Security	Keeping your MQ service up and running - Queue Manager clustering	
06:00			Free MQ! - MQ Clients and what you can do with them	MQ Q-Box - Open Microphone to ask the experts questions	

Session 09439

You think you have problems...well maybe you do.
Diagnosing problems for Message Broker