# IBM MQ
# Vs
# Open Source (Active MQ)

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# Agenda

- Why Message Oriented Middleware?

- IBM Integration Portfolio

- Performance

- High Availability

- Transactional Integrity

- Administration

- Security

- Other considerations

- TCA & TCO

# Why Message Oriented Middleware (MOM)?

- **MOM architecture principles**
  - ▶ Can be reliable and transactional (best effort is also supported)
  - ▶ Asynchronous and Synchronous
  - ▶ Publish / subscribe (in addition to point to point)
  - ▶ Can use optimized wire representations (including MQTT)
  - ▶ Decoupling message producers and consumers logically and physically
  - ▶ Flexible routing of messages to their destination
  - ▶ Ability to transform messages as they pass through the server
  - ▶ Flexible programming API (selectors, expiration, sequence, and more)
  - ▶ Support for many programming languages, platforms and network protocols

- **As the result, good MOM implementation should be able to provide**
  - ▶ Easy programming experience
  - ▶ Reliability, availability, scalability and high performance
  - ▶ Highly distributed, heterogeneous and flexible topologies
  - ▶ High security

| | | IBM | Open Source |
|---|---|---|---|
| **Software** | Messaging | IBM MQ and MQ Light | Apache ActiveMQ, Pivotal RabbitMQ, Eclipse paho, OpenAMQ, etc. |
| | Enterprise Service Bus | IBM Integration Bus | Mule ESB, Apache ServiceMix, Apache Synapse, UltraESB, Talend, Spring Integration, Petals ESB, etc. |
| | Governance & API Management | IBM WS Service Registry & Repository IBM API Management | WSO2 Governance Registry, Red Hat apiman, Tyk, ApiAxle, WSO2 API Mgr, etc. |
| | Adapters and protocols | Included with IIB | Many OSS projects |
| | B2B integration | IBM Sterling B2B Integration | Many OSS projects (Jentrata, Avetti, etc.) |
| | Managed file transfer | 1. Sterling Connect:Direct 2. IBM MQ MFT | JADE, karonte, fileXhub, DivConq, etc. |
| **Appliance** | Messaging | IBM MQ Appliance (new!) | None |
| | Cloud integration | IBM Cast Iron | None |
| | m2m Internet of Things | IBM MessageSight | None |
| | Security gateway | IBM DataPower XI52 | None |
| | B2B integration | IBM DataPower XB Series | None |
| **SaaS, PaaS** | Managed file transfer | IBM Sterling File Transfer (SaaS) | None |
| | API management | IBM API Management Service (SaaS) | WSO2 Api Cloud, 3scale, etc. |
| | Integration | BlueMix MQLight, BlueMix Node Red, IIB patterns for PureApplication System and SoftLayer (all PaaS) | RedHat OpenShift Enterprise iPaaS, Mule CloudHub, snapLogic, WSO2 Managed Cloud, etc. |

Some Open Source projects listed above are not yet complete or mature (or both)

# According to Gartner, IBM holds #1 position in the middleware software for the past 13 years

| | 2013 Rev. ($B) | YTY growth | rank | share | growth |
|---|---|---|---|---|---|
| **BPM** | 2.49 | 5.6 % | # 1 | 28.6 % | 4 % |
| **ESB** | 2.56 | 4.4 % | # 1 | 29.2 % | 5.2 % |
| **MOM** | 1.43 | 6.1 % | # 1 | 66.7 % | 0.6 % |
| **MFT Suites** | 0.6 | 9.2% | # 1 | 34.4 % | 9.1 % |
| **TP Monitors** | 1.85 | -7.5 % | # 1 | 81.7 % | -9.2 % |
| **Appliances AIM** | 0.12 | -6.5 % | # 1 | 59.5 % | 6.4 % |
| **B2B** | 0.85 | 8.9 % | # 1 | 18.8 % | 12 % |
| **App Servers** | 4.84 | 9.7 % | # 2 | 29.1 % | 6.4 % |
| **Portals** | 1.8 | 2.6 % | # 2 | 26.9 % | 3.6 % |
| **App Svc Governance** | 0.51 | 14.4% | # 2 | 12.7 % | 6.9 % |
| **Other AIM** | 4.47 | 7.1 % | # 6 | 2.4 % | 62.3 % |

# What is Apache ActiveMQ?

- Open-source messaging project with Apache 2.0 license

- No license fees

- Commercial support is available from Ameliant, OpenLogic, Red Hat, Savoir, TTM, Tomitribe and possibly others

- There are known production deployments in different industries

- Pure Java implementation on the server with JMS 1.1 API support

- Clients in several programming languages (Java, C++, etc.)

- Wire formats, including OpenWire, STOMP, MQTT, AMQP

- Protocols supported are TCP, NIO, UDP, SSL+NIO, VM, HTTP, WebSockets

- High availability and replication options

- Persistent and non-Persistent messaging

- Basic administration console

- Soon to be replaced by Apache Apollo

- ActiveMQ is the default JMS provider in Apache Geronimo and can be used as the un-supported JMS provider in other JEE servers and Java runtimes, but it is recommended to run it standalone as it is very resource intensive

# Performance test architecture

24 cores IBM xSeries server, VMware ESXi (dedicated server)

VM "**mqhost**" on Linux x64 (8 cores)

WMQ 8.0 queue managers
- Multiple Request Queues
- Multiple Reply Queues

IBM Performance Harness for JSM 1.2 in "Responders" mode

VM "**clienthost**" on Linux x64 (8 cores)

Multiple instances of the multi-threaded IBM Performance Harness for JMS 1.2 in "Requestor" mode

Automated iterative test control script
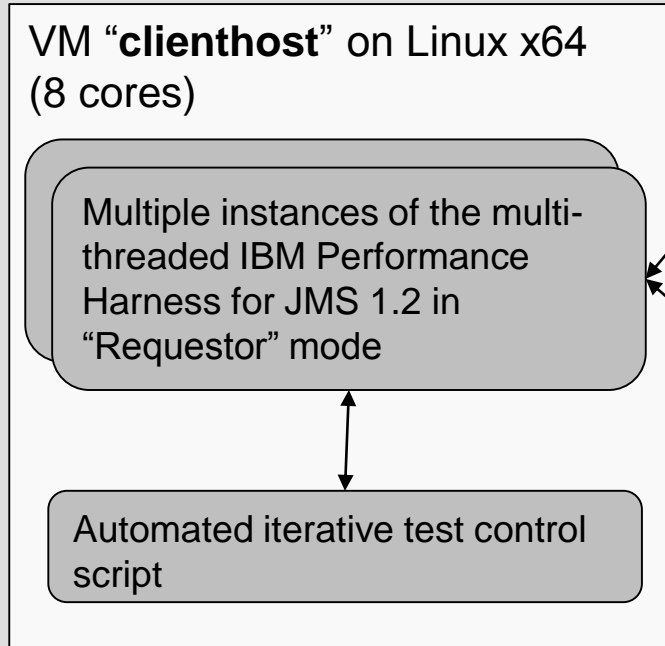
TCP/IP

Private VMware VMXNET3 connection

SSD

VM "**amqhost**" on Linux x64 (8 cores)
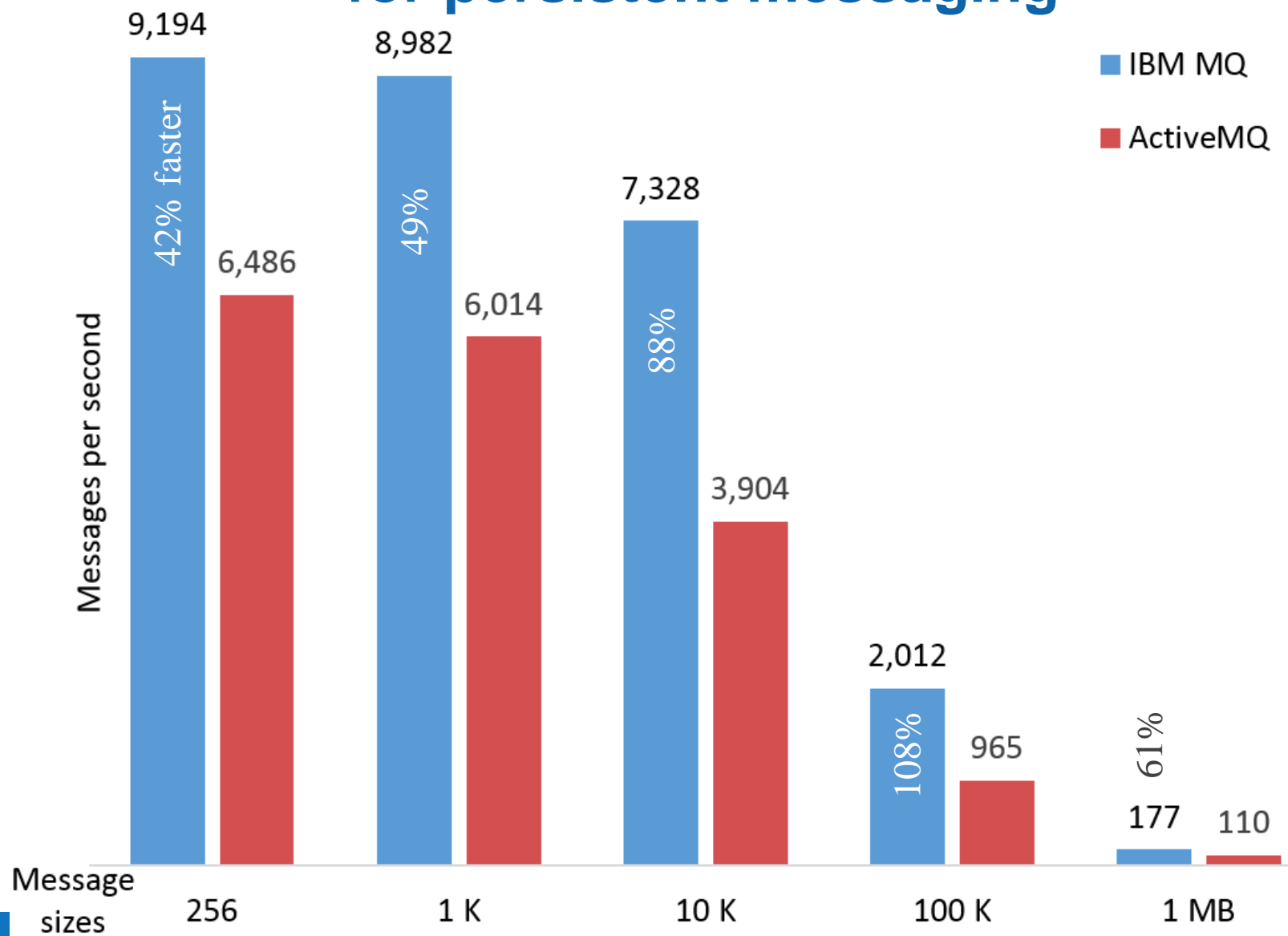
AMQ 5.11 queue managers
- Multiple Request Queues
- Multiple Reply Queues

IBM Performance Harness for JSM 1.2 in "Responders" mode

# Performance test

- **No significant difference between JDK 1.7 and 1.8 for ActiveMQ performance**

- **Ran hundreds of tests with many different options (changing one at a time):**
  - Number of input and output queues (from 1 to 100)
  - Number of requestors and responders (from 20 to 150)
  - JVM heap sizes (from 1GB to 16GB)
  - Linux kernel tuning settings
  - Message pre-fetch sizes (from 10 to 2000)
  - Message sizes (from 20 byte to 10MB)
  - Transports (tcp, nio, vm) with OpenWire protocol with different settings (nagle on/off, caching on/off, tightEncoding on/off, etc.)
  - socketBufferSize (from to 65,536 to 131,072), ioBufferSize (from 8,192 to 16,384)
  - Many other tuning settings on AMQ were tested in different permutations
  - Test run times varied from 3 minutes to 24 hours

- **Used KahaDB for persistent tests as LevelDB failed heavy stress test**
  - When running 100 clients against 5 queues with 1MB messages, ActiveMQ LevelDB persistence repeatedly crashed the JVM
  - LevelDB does not support XA and is not a default persistence engine in AMQ 5.11
  - If one had multiple disks in the system, then it is not possible to have multiple LevelDB stores configured (unlike KahaDB)
  - Many open issues on JIRA for LevelDB (crashes, performance issues, etc.)

- **Monitored memory, CPU, disk, network utilization to achieve maximum utilization**

- **There are many knobs to turn and I do not pretend to have achieved the optimum**

# IBM MQ is up to 2.1 times faster than ActiveMQ for persistent messaging



Messages per second

**IBM MQ**
**ActiveMQ**

| Message size | IBM MQ | ActiveMQ | % faster |
|---|---|---|---|
| 256 | 9,194 | 6,486 | 42% faster |
| 1 K | 8,982 | 6,014 | 49% |
| 10 K | 7,328 | 3,904 | 88% |
| 100 K | 2,012 | 965 | 108% |
| 1 MB | 177 | 110 | 61% |

Message sizes

*Capitalware's MQ Technical Conference v2.0.1.5*
Published: February 2015

# High availability and failover tests

| | Excellent |
|---|---|
| | Limited |
| | No support |

IBM

*The Apache ActiveMQ* *

| | IBM | ActiveMQ |
|---|---|---|
| **Scenario 1:** Power or NIC failure on the Master with subsequent failover to the Slave (no active clients) | Passed | Passed |
| **Scenario 2:** Power or NIC failure on the Master with subsequent failover to the Slave (WITH active clients) | Passed | **FAILED**<br>1 duplicate message on the client (server is OK) |
| **Scenario 3a:** NIC failure on the Master with failover to the Slave (no active clients) | Passed | Passed |
| **Scenario 3b:** Restore NIC on former Master (while it is running) | Passed | **FAILED**<br>Cluster ends up with two Masters, 100% of messages are duplicated (every message is seen twice), original Slave (now also Master) remains to be Master, but no longer receives messages and subsequent failover is no longer possible |
| **Scenario 3c:** Restart former Master JVM after NIC failed and was restored | Passed | **FAILED**<br>100% of messages sent to the "false Master" before it was restarted are lost, but it does come up as Slave after restart |

*Tested with default KahaDB. New persistence based on LevelDB has not yet been tested (note that LevelDB does not support XA transactions and fails under high long running load)

# Transaction Integrity

- IBM MQ provides XA Transaction Manager out of the box and supports 2 Phase Commit (2PC) between Queue Manager and the database when MQI client runs on the same server as the QM (database can be remote)

- To replicate messages between multiple Queue Managers MQ can use Remote/Local Queue definitions and does not require XA transactions (store and forward scenario)

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- Apache ActiveMQ does NOT provide transaction manager

- AMQ can be managed by external Transaction Manager and appears to be compatible with XA protocol. Requirement for 3rd party Transaction Manager (WAS or WLS) brings additional complexity (installation, configuration and management) and additional cost (license and support)

- LevelDB does not support XA transactions

- WARNING: Without 3rd party Transaction Manager applications sending/receiving messages between multiple AMQ Broker instances and other XA resources (DBMS) have high chance of message loss and/or duplication in case of power, network or software errors (this is not related to failover and high availability test cases described earlier)

# Administration

| | IBM | The Apache ActiveMQ |
|---|---|---|
| Admin GUI | MQ Explorer | JMX Console, or howtio, or JBoss Operations Network |
| Interactive command line and scripting | MQ Scripting Commands (MQSC) | Limited to stop/start and a couple of other commands |
| Programmatic admin API | MQ Administrative Interface (MQAI) | JMX |
| Administration by sending messages | Programmable Command Formats (PCF) | Not available |
| 3rd party admin tools | Many 3rd party tools | Very few with limited function |
| Configuration files | mq.ini + few other files | activemq.xml + few other files |

# Examples of IBM MQ command line

**Rich set of MQSC commands to manage every aspect of MQ**

- Manage queue manager and its objects, queues, process definitions, channels, client connection channels, listeners, services, namelists, clusters, and security)
- interactively or via scripting
- local or remote servers

```
DEFINE QLOCAL( q_name )
 [ BOQNAME( string ) ]                          [ BOTHRESH( integer ) ]
 [ CLUSNL( namelist_name ) ]                    [ CLUSTER( cluster_name ) ]
 [ DEFBIND( NOTFIXED | OPEN > ]                 [ DEFPRESP( SYNC | ASYNC ) ]
 [ DEFPRTY( integer ) ]                         [ DEFPSIST( YES | NO ) ]
 [ DEFREADA( NO | YES | DISABLED > ]            [ DESCR( string ) ]
 [ DEFSOPT( EXCL | SHARED > ]                   [ DISTL( YES | NO ) ]
 [ GET( ENABLED | DISABLED > ]                  [ INITQ( string ) ]
 [ LIKE( qlocal_name ) ]                        [ MAXDEPTH( integer ) ]
 [ MAXMSGL( integer ) ]                         [ MSGDLVSQ( PRIORITY | FIFO > ]
 [ HARDENBO | NOHARDENBO ]                      [ REPLACE | NOREPLACE ]
 [ SHARE | NOSHARE ]                            [ TRIGGER | NOTRIGGER ]
 [ PROCESS( string ) ]                          [ PUT( ENABLED | DISABLED > ]
 [ PROPCTL( COMPAT | NONE | ALL | FORCE > ]
 [ QDEPTHHI( integer ) ]                        [ QDEPTHLO( integer ) ]
 [ QDPHIEV( ENABLED | DISABLED > ]              [ QDPLOEV( ENABLED | DISABLED ]
 [ QDPMAXEV( ENABLED | DISABLED > ]             [ QSVCIEV( NONE | HIGH | OK > ]
 [ QSVCINT( integer ) ]                         [ RETINTVL( integer ) ]
 [ SCOPE( QMGR | CELL > ]                       [ TRIGDATA( string ) ]
 [ TRIGDPTH( integer ) ]                        [ TRIGMPRI( integer ) ]
 [ TRIGTYPE( FIRST | EVERY | DEPTH | NONE > ]
 [ USAGE( NORMAL | XMITQ > ]                    [ NPMCLASS( NORMAL | HIGH > ]
 [ STATQ( QMGR | ON | OFF > ]                   [ ACCTQ( QMGR | ON | OFF > ]
 [ MONQ( OFF | QMGR | LOW | MEDIUM | HIGH > ]
 [ CLWLRANK( integer ) ]                        [ CLWLPRTY( integer ) ]
 [ CLWLUSEQ( LOCAL | ANY | QMGR > ]
```

```
ALTER QLOCAL( q_name )
 [ BOQNAME( string ) ]                          [ BOTHRESH( integer ) ]
 [ CLUSNL( namelist_name ) ]                    [ CLUSTER( cluster_name ) ]
 [ DEFBIND( NOTFIXED | OPEN > ]                 [ DEFPRESP( SYNC | ASYNC ) ]
 [ DEFPRTY( integer ) ]                         [ DEFPSIST( YES | NO ) ]
 [ DEFREADA( NO | YES | DISABLED > ]            [ DESCR( string ) ]
 [ DEFSOPT( EXCL | SHARED > ]                   [ DISTL( YES | NO ) ]
 [ GET( ENABLED | DISABLED > ]                  [ HARDENBO | NOHARDENBO ]
 [ INITQ( string ) ]                            [ MAXDEPTH( integer ) ]
 [ MAXMSGL( integer ) ]                         [ MSGDLVSQ( PRIORITY | FIFO > ]
 [ NPMCLASS( NORMAL | HIGH > ]                  [ PROCESS( string ) ]
 [ PROPCTL( COMPAT | NONE | ALL | FORCE > ]
 [ PUT( ENABLED | DISABLED > ]                  [ QDEPTHHI( integer ) ]
 [ QDEPTHLO( integer ) ]                        [ QDPHIEV( ENABLED | DISABLED > ]
 [ QDPLOEV( ENABLED | DISABLED > ]              [ QDPMAXEV( ENABLED | DISABLED > ]
 [ QSVCIEV( NONE | HIGH | OK > ]                [ QSVCINT( integer ) ]
 [ RETINTVL( integer ) ]                        [ SCOPE( QMGR | CELL > ]
 [ TRIGDATA( string ) ]                         [ TRIGDPTH( integer ) ]
 [ TRIGGER | NOTRIGGER ]                        [ TRIGMPRI( integer ) ]
 [ TRIGTYPE( FIRST | EVERY | DEPTH | NONE > ]
 [ USAGE( NORMAL | XMITQ > ]                    [ ACCTQ( QMGR | ON | OFF > ]
 [ MONQ( QMGR | OFF | LOW | MEDIUM | HIGH > ]
 [ SHARE | NOSHARE ]                            [ STATQ( QMGR | ON | OFF > ]
 [ CLWLRANK( integer ) ]                        [ CLWLPRTY( integer ) ]
 [ CLWLUSEQ( LOCAL | ANY | QMGR > ]             [ FORCE ]
```

# Examples of IBM MQ admin screens

# Examples of ActiveMQ JMX admin GUI



**Browse REPLY2**

Message ID ↑

ID:amqhost-
1056-1423785107483-1:47:1:1:102

ID:amqhost-
1056-1423785107483-1:52:1:1:102

View Consumers

Copyright 2005-2014 The Apache Softw

**Active Consumers for REPLY2**

| Client ID Connection ID ↑ | SessionId | Selector | Enqueues | Dequeues | Dispatched | Dispatched Queue | Prefetch Max pending | Exclusive Retroactive |
|---|---|---|---|---|---|---|---|---|
| 1_2 ID:clienthost-59784-1423785129022-1:2 | 1 | | 15466 | 15466 | 15466 | 0 | 10 0 | false false |
| 1_22 ID:clienthost-59784-1423785129022-1:22 | 1 | | 15175 | 15174 | 15175 | 1 | 10 0 | false false |
| 1_37 ID:clienthost-59784-1423785129022-1:37 | 1 | | 14952 | 14952 | 14952 | 0 | 10 0 | false false |
| 1_47 ID:clienthost-59784-1423785129022-1:47 | 1 | | 14821 | 14820 | 14821 | 1 | 10 0 | false false |
| 1_32 ID:clienthost-59784-1423785129022-1:32 | 1 | | 15029 | 15029 | 15029 | 0 | 10 0 | false false |
| 1_42 ID:clienthost-59784-1423785129022-1:42 | 1 | | 14881 | 14881 | 14881 | 0 | 10 0 | false false |
| 1_27 ID:clienthost-59784-1423785129022-1:27 | 1 | | 15100 | 15100 | 15100 | 0 | 10 0 | false false |

Home | Queues | Topics | Subscribers | Connections | Network | Scheduled | Send

# Administration: the good 👍, the bad 👎 and the ugly ✋

👍 GUI and cmd line admin tools can manage many servers from a "single pane of glass", including clustered and standalone configurations

👍 Feature rich MQ Explorer, command line tools and management APIs provide management of all aspects of the configuration

👍 All administrative tools have detailed help options and examples

👍 Performance tuning and troubleshooting are very well documented. Detailed performance reports are available

👍 Many more configuration options are provided for ultimate flexibility, however default options work very well for many installations

# Administration: the **good** 👍, the **bad** 👎 and the **ugly** ✋

👎 Command line tools are very limited to start, stop, add instance and get status commands – all for individual servers, not centralized mgmt

✋ No "single pane of glass" management provided

👎 Very limited embedded JMX based Admin GUI (also several 3rd party tools, such as Howtio), but it requires manual file editing to make changes for every individual server

✋ Small subset of administrative commands is available via JMX beans, but in most cases requires administrators manual file editing

👎 Performance tuning and troubleshooting is fairly complicated and involves intimate knowledge of JVM, ActiveMQ, KahaDB, OpenSSL, etc.

# Security comparison

IBM | Apache ActiveMQ

| Category | Feature | IBM | Apache ActiveMQ |
|---|---|---|---|
| **Standards Compliance** | FIPS 140-2 C | Excellent | No support |
| | Common Criteria certification at EAL2 | Excellent | No support |
| | NIST 800-131A | Excellent | Limited |
| **Role-based** | Strong authentication policies | Excellent | Excellent |
| | Strong authorization policies | Excellent | Limited |
| **Auditing** | Auditing | Limited | Limited |
| | Audit file encryption | Excellent | Excellent |
| | Audit Monitoring | Excellent | Excellent |
| **Data Security** | Message content encryption | Excellent | No support |
| | IP Blocking to prevent DoS | Excellent | No support |
| | Encrypted Data store | Excellent | Excellent |
| **Misc.** | Proxy support within the DMZ | Excellent | No support |
| | Tunneling support within the DMZ | Excellent | No support |
| | Documentation | Excellent | Limited |

Legend:
- Excellent (green)
- Limited (yellow)
- No support (red)

# Documentation: the good 👍, the bad 👎 and the ugly 🤚

👍 IBM MQ provides very detailed and accurate information on all aspects of the product, including development, installation, configuration, operations, etc. (can be accessed remotely or installed locally)

👍 IBM provides detailed performance reports with tuning recommendations

👍 Redbooks (security, high availability, development, etc.)

👎 Some parts of the documentation are not easy to follow

👎 Apache ActiveMQ documentation is very limited and does not cover many areas of the product, it is also often not up to date for the recent versions, thus requires access to the source code to understand how to configure the product (users are complaining). High level concepts are covered, but many details must be "googled around" with varying luck…

🤚 No performance reports for recent versions, no sizing guidelines. Some performance information is misleading (example - KahaDB vs LevelDB)

👎 Limited information on tuning and best practices

# User forums: the good 👍, the bad 👎 and the ugly ✋

👍 User forums are very active (over 60,000 topics, ~380,000 posts on mqseries.net, developerWorks and stackoverflow.com forums)

👍 On the main user forum ~90% of questions are answered (mqseries.net)

👍 Average replies per question 6.6

👍 On stackoverflow.com 76% of questions are marked as answered

👍 When I was doing performance testing, all of my questions were answered

# User forums: the good 👍, the bad 👎 and the ugly ✋

👍 User forums are relatively active (total of ~15,000 topics on main forum and stackoverflow.com)

👎 On stackoverflow.com 66% of questions are marked as answered

✋ On the main user forum less than 50% of questions are answered

✋ Average replies per question 2.2 (keep in mind that not all are answers)

✋ When I was doing my research and performance testing, not a single one of my own questions was answered…

# Features comparison

| Excellent |
|-----------|
| Good |
| Limited |
| No support |

IBM — The Apache ActiveMQ

| | | IBM | Apache ActiveMQ |
|---|---|---|---|
| **Messaging** | JMS 1.1, 2.0 | Supported | JMS 1.1 |
| | AMQP | Requires a bridge | Supported |
| | MQTT | Supported | Supported |
| | Java, C++/C#, PHP clients | Supported | Supported |
| | Managed file transfer | Provided via MQ MFT in MQ Advanced | Not provided |
| **Quality of Services** | Failover | Proven | Messages can be lost or duplicated |
| | High availability | Clustered QMs and Multi-Instance QMs | Network failures result in 2 conflicting masters |
| | Scalability | Can have many clustered QMs | Supports networks of brokers |
| | Transaction Manager (TMgr) | Provided (2PC between QM and DBMS) | Requires 3rd party |
| | Can serve as XA resource | Can be managed by external TMgr | Can be managed by external TMgr |
| | Performance | Best in class | Significantly slower than MQ for persistent msgs |
| **Admin** | Management GUI | MQ Explorer is very feature rich | Very limited (file editing required) |
| | Management CLI | Rich set of command lines for mgmt | Very limited (file editing required) |
| | Management API | Rich API for management | Limited set of JMX beans available |
| | One pane mgmt | Can manage all servers from one place | Each server must be managed individually |
| | Deployment patterns | Provided in IBM SCO, IPAS, SoftLayer | Possibly provided via 3rd party |
| **Misc.** | Documentation | Detailed and accurate | Incomplete and not always accurate |
| | Disk and memory footprint | 650 MB disk, under 1GB of RAM | 70 MB disk, 2+ GB RAM |
| | Integration with DataPower | Fully integrated | Not supported |
| | Platform support | Over 20 platforms | 3rd party support for limited set of platforms |
| | Installation time | Basic scripted install takes 60 sec | Basic scripted install takes 15 sec |
| **Security** | Message encryption | Advanced Message Security | Custom programming required |
| | Auditing and logging | All, but few administrative actions | File editing actions are not audited |
| | Heartbleed bug | Not impacted | Impacted as it relies on Open SSL |
| | Authentication/Authorization | Supported | Supported |

- **Software license & subscription costs[1]**

<10%

TCO vs. TCA

- Hardware and networking costs
- Downtime costs (planned and unplanned)
- Upgrades cost
- SLA penalties
- Deployment cost
- Operational support cost (day to day operations)
- Performance costs
- Cost of selection of the vendor software
- Requirements analysis cost
- Developer, admin and end-user training cost
- Application design and development costs
- Cost of integration with other systems
- Quality, user acceptance and other testing costs
- Application enhancements and bug fixes cost
- Replacement costs
- Cost of other risks (including security breaches)

>90%

# Clients struggle to overcome barriers of time, cost and risk

*Source: Forrester Consulting*

## Typical IT Project Time and Budget

| Phase | Time (days) | Budget |
|---|---|---|
| Specify/design | 73 - 96 | 14% - 16% |
| Procure | 57 - 112 | 19% - 21% |
| Implement | 74 – 93 | 12% |
| Configure/test | 74 – 80 | 10% - 11% |
| Cluster & HA | 66 – 104 | 11% - 12% |
| Backup | 44 – 108 | 10% |
| Tune | 89 – 98 | 9% - 10% |
| Management | 67 – 110 | 9 – 10% |

**34%** *of new IT projects (US)* **deploy late**

## Top Causes of Project Delays

**Hardware**

Troubleshooting and tuning production environment — **45%**

Integration, configuration and testing of the infrastructure — **45%**

Installation, cabling and network access for the environment — **29%**

**Software**

Integration, configuration and testing of applications — **41%**

Integration, configuration and testing of middleware — **35%**

Configuration, build and deployment of applications — **34%**
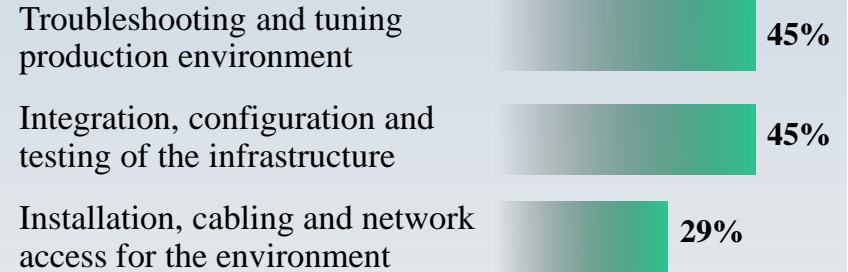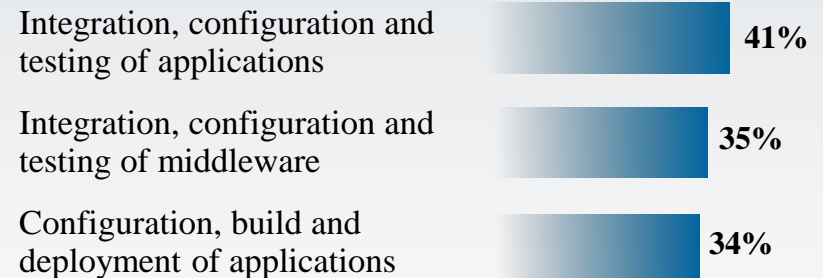
# Average cost of downtime per industry

| Industry segment | Cost per Hour (Millions) |
|---|---|
| Energy | $ 2.8 |
| Telecommunications | $ 2.1 |
| Manufacturing | $ 1.6 |
| Financial | $ 1.5 |
| Information Technology | $ 1.4 |
| Insurance | $ 1.2 |
| Retail | $ 1.1 |
| Pharmaceuticals | $ 1.1 |
| Banking | $ 1.0 |
| Consumer Products | $ 0.8 |
| Chemicals | $ 0.7 |
| Transportation | $ 0.7 |

Sources: ITG Value Proposition for Siebel Enterprise Applications, Business case for IBM System z & Robert Frances Group

# Support policy for IBM vs. Red Hat

- **Production**
  - ▶ all cores in production must be licensed

- **Development**
  - ▶ MQ, WAS for Developers (including Liberty), JBoss A-MQ, JBoss EAP are free for development environment

- **Non-production**
  - ▶ WAS, MQ, JBoss A-MQ, JBoss EAP must be licensed for non-production

- **Number of support contacts**
  - ▶ IBM: unlimited
  - ▶ Red Hat: depends on the number of cores licensed: 2 contacts up to 32 cores, 4 contacts up to 64 cores, etc. up to 12 contacts for 192 cores

# Cost comparison: IBM MQ vs. Red Hat JBoss AMQ

Assuming 30% discount from list for both vendors.

| # servers | # sockets | # cores | IBM PVU | CPU | # of support conta cts | *Without* required prerequisites | | | | *With* required prerequisites | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 5 years | | 10 years | | 5 years | | 10 years | |
| | | | | | | WMQ | JBoss A-MQ | WMQ | JBoss A-MQ | WMQ | JBoss A-MQ | WMQ | JBoss A-MQ |
| 4 | 1 | 4 | 50 | x86 | 3 | $85,680 | $182,700 | $133,280 | $365,400 | $85,680 | $286,510 | $133,280 | $573,020 |
| 4 | 1 | 6 | 50 | x86 | 5 | $128,520 | $258,300 | $199,920 | $516,600 | $128,520 | $410,308 | $199,920 | $820,615 |
| 4 | 1 | 8 | 50 | x86 | 5 | $171,360 | $333,900 | $266,560 | $667,800 | $171,360 | $537,813 | $266,560 | $1,075,625 |
| 4 | 1 | 12 | 50 | x86 | 7 | $257,040 | $485,100 | $399,840 | $970,200 | $257,040 | $789,115 | $399,840 | $1,578,230 |
| 4 | 1 | 16 | 50 | x86 | 9 | $342,720 | $560,700 | $533,120 | $1,121,400 | $342,720 | $964,818 | $533,120 | $1,929,635 |
| 4 | 2 | 4 | 70 | x86 | 5 | $239,904 | $333,900 | $373,184 | $667,800 | $239,904 | $537,813 | $373,184 | $1,075,625 |
| 4 | 2 | 6 | 70 | x86 | 7 | $359,856 | $485,100 | $559,776 | $970,200 | $359,856 | $789,115 | $559,776 | $1,578,230 |
| 4 | 2 | 8 | 70 | x86 | 9 | $479,808 | $560,700 | $746,368 | $1,121,400 | $479,808 | $964,818 | $746,368 | $1,929,635 |
| 4 | 2 | 10 | 70 | x86 | 11 | $599,760 | $711,900 | $932,960 | $1,423,800 | $599,760 | $1,216,120 | $932,960 | $2,432,240 |
| 4 | 2 | 12 | 70 | x86 | 13 | $719,712 | $863,100 | $1,119,552 | $1,726,200 | $719,712 | $1,471,130 | $1,119,552 | $2,942,260 |
| 4 | 2 | 14 | 70 | x86 | 13 | $839,664 | $938,700 | $1,306,144 | $1,877,400 | $839,664 | $1,646,833 | $1,306,144 | $3,293,665 |
| 4 | 2 | 16 | 70 | x86 | 13 | $959,616 | $1,089,900 | $1,492,736 | $2,179,800 | $959,616 | $1,898,135 | $1,492,736 | $3,796,270 |
| 4 | 2 | 18 | 70 | x86 | 13 | $1,079,568 | $1,241,100 | $1,679,328 | $2,482,200 | $1,079,568 | $2,149,438 | $1,679,328 | $4,298,875 |
| 4 | 4 | 8 | 100 | x86 | 13 | $1,370,880 | $1,089,900 | $2,132,480 | $2,179,800 | $1,370,880 | $1,898,135 | $2,132,480 | $3,796,270 |
| 4 | 4 | 10 | 100 | x86 | 13 | $1,713,600 | $1,316,700 | $2,665,600 | $2,633,400 | $1,713,600 | $2,325,140 | $2,665,600 | $4,650,280 |
| 4 | 4 | 12 | 100 | x86 | 13 | $2,056,320 | $1,619,100 | $3,198,720 | $3,238,200 | $2,056,320 | $2,831,453 | $3,198,720 | $5,662,905 |
| 4 | 4 | 14 | 100 | x86 | 13 | $2,399,040 | $1,845,900 | $3,731,840 | $3,691,800 | $2,399,040 | $3,258,458 | $3,731,840 | $6,516,915 |
| 4 | 4 | 16 | 100 | x86 | 13 | $2,741,760 | $2,148,300 | $4,264,960 | $4,296,600 | $2,741,760 | $3,764,770 | $4,264,960 | $7,529,540 |
| 4 | 4 | 18 | 100 | x86 | 13 | $3,084,480 | $2,375,100 | $4,798,080 | $4,750,200 | $3,084,480 | $4,191,775 | $4,798,080 | $8,383,550 |
| 4 | 6 | 12 | 120 | x86 | 13 | $3,701,376 | $2,375,100 | $5,757,696 | $4,750,200 | $3,701,376 | $4,191,775 | $5,757,696 | $8,383,550 |
| 4 | 6 | 14 | 120 | x86 | 13 | $4,318,272 | $2,753,100 | $6,717,312 | $5,506,200 | $4,318,272 | $4,873,790 | $6,717,312 | $9,747,580 |
| 4 | 6 | 18 | 120 | x86 | 13 | $5,552,064 | $3,509,100 | $8,636,544 | $7,018,200 | $5,552,064 | $6,234,113 | $8,636,544 | $12,468,225 |

This cost comparison considers License & Support costs - only the tip of the iceberg

See more details here: http://whywebsphere.com/2014/07/30/websphere-mq-vs-red-hat-jboss-a-mq-cost-calculator/

# Eh?

- Three queue managers walked into a bar…
  - ... so we moved the buffers above it!

- Knock Knock, Who's There?
  - .... 2035

- What do Hursley MQ Developers have for lunch?
  - … a pub sub!

- Why does Santa like MQ at railway stations?
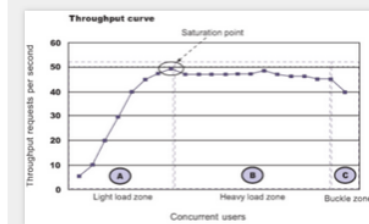  - … because of its presents on all major platforms!

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## White Paper

**IBM WebSphere MQ 7.5 versus Apache ActiveMQ 5.9: Failover, Transactional Integrity and Administration**

# Questions & Answers