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JMS Performance Comparison

Performance Comparison for
Publish Subscribe Messaging

AMERICA'S

Fiorano Software, Inc.
718 University Avenue Suite
212, Los Gatos,
CA 95032 USA
Tel: +1 408 354 3210
Fax: +1 408 354 0846
Toll-Free: +1 800 663 3621
Email: info@fiorano.com

EMEA

Fiorano Software Ltd.
3000 Hillswood Drive Hillswood
Business Park Chertsey Surrey
KT16 0RS UK
Tel: +44 (0) 1932 895005
Fax: +44 (0) 1932 325413
Email: info_uk@fiorano.com

APAC

Fiorano Software Pte. Ltd.
Level 42, Suntec Tower Three 8
Temasek Boulevard 038988
Singapore
Tel: +65 68292234
Fax: +65 68292235
Email: info_asiapac@fiorano.com

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Executive Summary

This paper presents a performance analysis of publish/subscribe messaging throughput of FioranoMQ® 9.1.1, Sonic MQ 7.6, Tibco EMS v4.4.0, ActiveMQ 5.3.0, Jboss Messaging 1.4.4, Sun MQ 4.0, and IBM WebSphere MQ 7.0. This analysis provides a head-to-head comparison of these products designed to illustrate the products' relative performance characteristics for several messaging scenarios.

The test scenarios represent stress level conditions for real world applications. The tests examine performance under load, where a single message broker is required to support many publishers and subscribers. The testing methodology and driving program were the ones developed by Sonic Software, Inc. and are available at:

<http://communities.progress.com/pcom/docs/DOC-29828>

The testing tool used for these performance tests is highly configurable and can be used to test any JMS broker. Also, this tool allows running and measurement of a wide range of test definitions.

Do note that the different configurations or performance tuning of any JMS broker may potentially yield throughput gains (or losses) for any of these tests. Changes to the test definitions will produce different throughput rates and this should be considered when attempting to map these results to expected performance of any particular JMS application.

All the JMS brokers were configured with out-of-the-box default values and no performance specific product tuning was carried out for any of them. It's observed from the detailed results that the relative performance of the message brokers varies under various conditions. While performance analysis should always be conducted for a particular messaging environment, the results of these tests suggest that FioranoMQ will deliver messages more efficiently in demanding messaging environments in today's real-time enterprises.

1. Test Methodology

All the tests described in this section were carried out using a highly configurable testing tool. This tool allows running and measurement of a wide range of test definitions.

This section begins with a brief description of test conditions which are created to test the JMS server. This is followed by a section that describes the tests and their results. The final section provides a brief description of the hardware and software configurations.

1.1 Test Conditions

All the tests were conducted under the following conditions:

- Each client runs on a separate JMS connection.
- All test results are recorded after the client connections have been established and publishers/subscribers and other objects had been created.
- All tests were run multiple times to assure repeatability.

- Performance was measured under maximum load by publishing as many messages as possible using default settings of the server.
- During the test, no other applications were running and using resources on the system under test.
- Dups_ok was used by all consumers.
- All servers were tested in the default mode - which meant running SonicMQ, Tibco EMS in "Evaluation" (non-HA) mode, ActiveMQ 5.2 (default configuration mode), FioranoMQ and others in normal production ready (non-HA) mode.

1.2 Test Scenario's

The tests were conducted for the most popular messaging models employed using Topics in JMS.

Non-Persistent Publishers & Non-Durable Subscribers

This model is typically used by applications which are exchanging high volume of messages and have a requirement of minimum latency.

Persistent Publishers & Durable Subscribers

This model is typically employed by applications which need maximum level of redundancy and need once and only once guarantee of message delivery irrespective of the client or server failure.

The following tests were conducted based on typical customer use-cases:

- Topic Scalability Tests:** These tests observe the performance characteristics of JMS server with varying # of Pub/Sub clients on a fixed number of topics. The results illustrate the scalability of JMS server as more clients (all working on same JMS Topic) are employed.
- Server Scalability Tests:** These tests observe the performance characteristics of JMS server with varying # of Topics with fixed # of Pub/Sub clients per topic. The results illustrate the scalability of JMS server as more clients (each working on independent JMS Topics) are employed.
- Persistent Producer, Multiple Durable Consumers:** These tests observe the performance characteristics of JMS server when a single persistent publisher is used to publish messages to multiple durable subscribers.
- Non-Persistent Producer, Multiple Non-Durable Consumers:** These tests observe the performance characteristics of JMS server when a single non-persistent publisher is used to publish messages to multiple non-durable subscribers.

In order to generate the highest amount of message load, no processing time is introduced at either side of the client message exchanges. Allowing publishers to send messages as fast as possible in this manner enables these tests to expose the maximum message throughput rates. The test message size was chosen to reflect use cases observed in typical customer proof of concept scenarios.

1.3 Test Duration

All test scenarios were executed for a total of eight minutes. Each test execution comprised of eight, sixty-second intervals. The first two and last intervals were considered **ramp-up** and **ramp-down** intervals, respectively.

Ramp-up intervals are times during which the systems are increasing their message handling capacities, typically via resource allocation in response to the newly introduced client load.

Ramp-down intervals are times in which the systems are decreasing their capacity in response to decreased client loads that result from test completion. The remaining five intervals were considered **measurement** intervals during which steady-state performance was achieved.

Steady-state is the condition in which message rates exhibit negligible change.

1.4 Environment Setup

All client connections, publishers and subscribers were established before any testing ramp-up periods were started.

Each product's message store, log files, queues, and topics were deleted and recreated therefore the broker stopped and restarted between each test.

1.5 Measurement

Performance data was collected during the five-minute measurement intervals only. No data was collected during ramp-up and ramp-down intervals. Tests were run twice, and measurements were averaged to obtain final results.

1.6 Topology

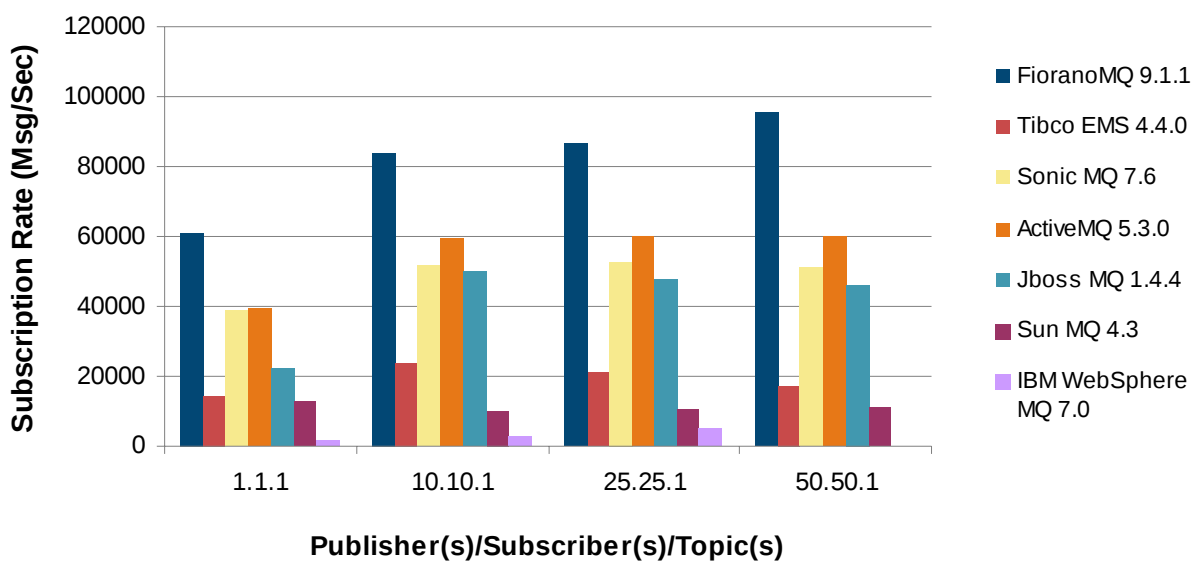
The topology contains two machines: One for running the clients and the other for running the server. The system configurations are detailed later in this document. These systems having 1GB NIC cards were interconnected using a 1 GBPS peer to peer connection.

2. Performance Results

2.1 Topic Scalability

P/S/T	Message Type	Subscriber Type	Message Size (bytes)	Subscription Rate (messages / sec)						
				FioranoMQ 9.1.1	Tibco EMS 4.4.0	Sonic MQ 7.6	Active MQ 5.3.0	Jboss 1.4.4	Sun MQ 4.3	IBM WebSphere MQ 7.0
1/1/1	Non-Persistent	Non-Durable	1024	61302	14341	38682	39343	22348	12579	1465
10/10/1	Non-Persistent	Non-Durable	1024	83640	23809	51663	57614	50106	10243	2753
25/25/1	Non-Persistent	Non-Durable	1024	86708	21230	52768	58114	47866	11089	5230
50/50/1	Non-Persistent	Non-Durable	1024	95499	17281	51050	58564	46143	10569	-

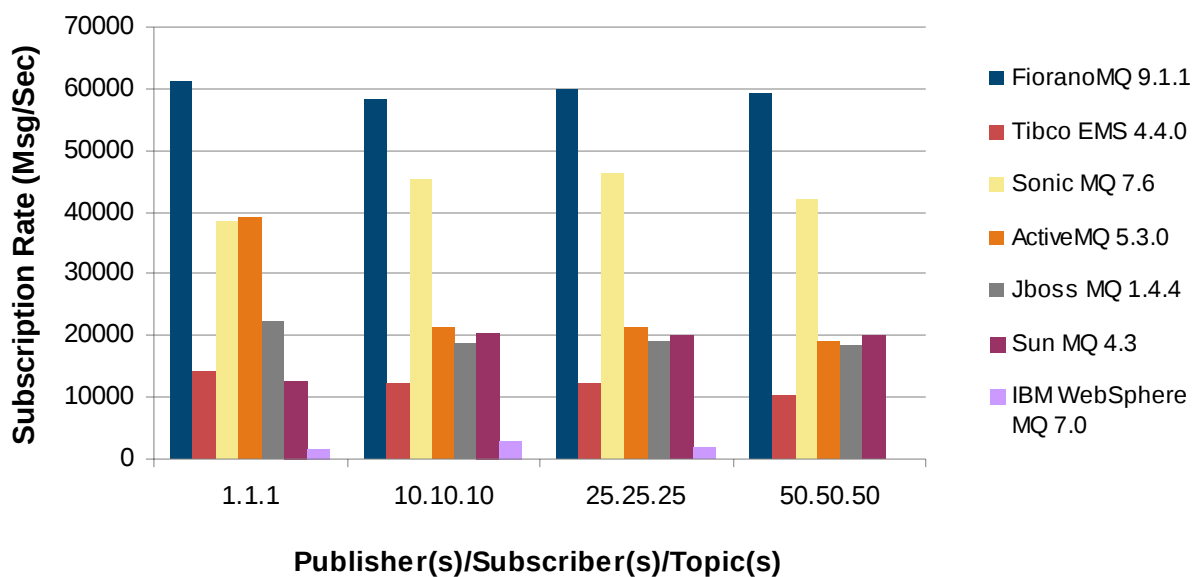
Topic Scalability



2.2 Server Scalability

P/S/T	Message Type	Subscriber Type	Message Size (bytes)	Subscription Rate (messages / sec)						
				FioranoMQ 9.1.1	Tibco EMS 4.4.0	Sonic MQ 7.6	Active MQ 5.3.0	Jboss 1.4.4	Sun MQ 4.3	IBM WebSphere MQ 7.0
1/1/1	Non-Persistent	Non-Durable	1024	61302	14341	38682	39343	22348	12579	1465
10/10/10	Non-Persistent	Non-Durable	1024	58203	12472	45424	21468	18909	20298	2843
25/25/25	Non-Persistent	Non-Durable	1024	60001	12444	46192	21296	19045	19965	1853
50/50/50	Non-Persistent	Non-Durable	1024	59156	10278	42106	18997	18313	20064	-

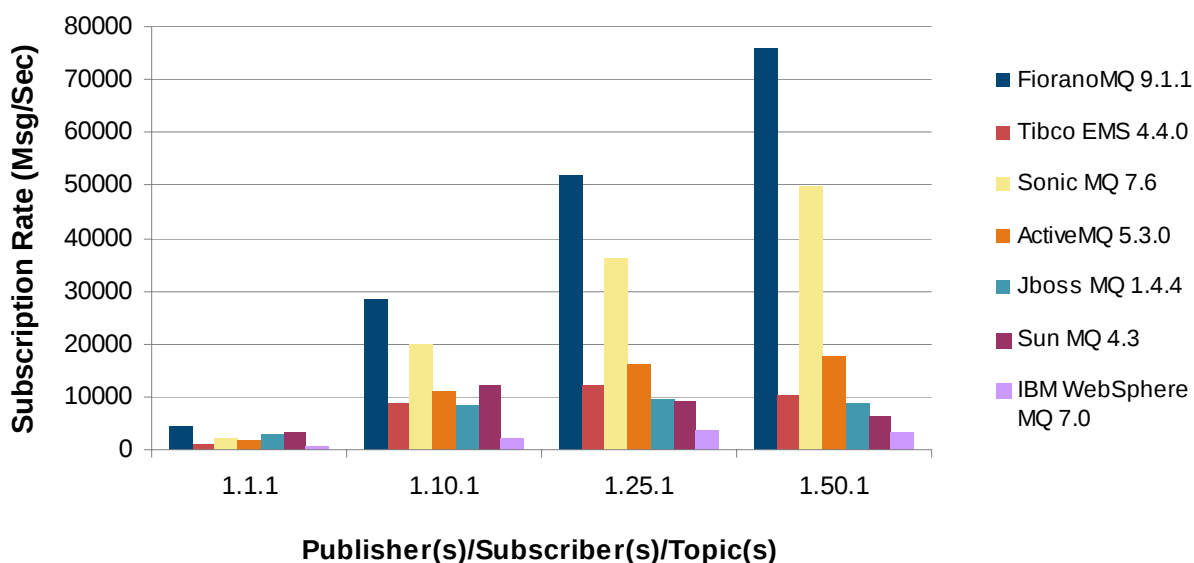
Server Scalability



2.3 Persistent Publisher, Durable Subscribers

P/S/T	Message Type	Subscriber Type	Message Size (bytes)	Subscription Rate (messages / sec)						
				FioranoMQ 9.1.1	Tibco EMS 4.4.0	Sonic MQ 7.6	Active MQ 5.3.0	Jboss 1.4.4	Sun MQ 4.3	IBM WebSphere MQ 7.0
1/1/1	Persistent	Durable	1024	4297	985	2055	2015	3007	3501	818
1/10/1	Persistent	Durable	1024	28554	8708	19994	11099	8367	12098	2120
1/25/1	Persistent	Durable	1024	51963	12215	36262	16206	9503	9148	3579
1/50/1	Persistent	Durable	1024	75825	10424	49823	17786	8833	6188	3309

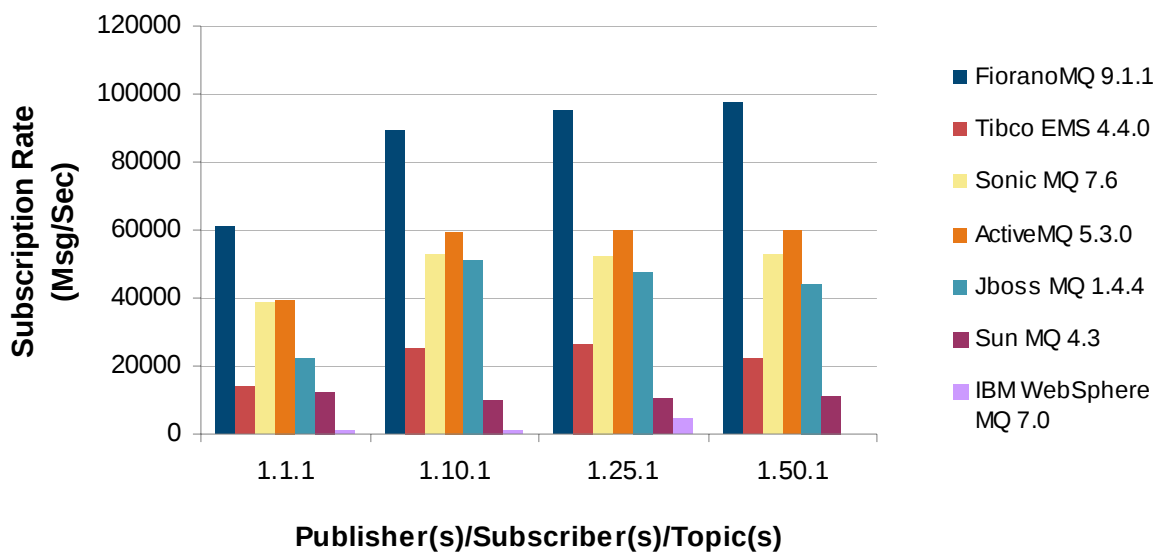
Persistent Publisher, Durable Subscriber



2.4 Non-Persistent Publisher, Non-Durable Subscribers

P/S/T	Message Type	Subscriber Type	Message Size (bytes)	Subscription Rate (messages / sec)						
				FioranoMQ 9.1.1	Tibco EMS 4.4.0	Sonic MQ 7.6	Active MQ 5.3.0	Jboss 1.4.4	Sun MQ 4.3	IBM WebSphere MQ 7.0
1/1/1	Non-Persistent	Non-Durable	1024	61302	14341	38682	39343	22348	12579	1465
1/10/1	Non-Persistent	Non-Durable	1024	89158	25329	52901	59644	51152	10108	1203
1/25/1	Non-Persistent	Non-Durable	1024	95027	26219	52344	59782	47874	10582	4682
1/50/1	Non-Persistent	Non-Durable	1024	97408	22128	52825	60146	44324	11067	

Non Persistent Publisher, Non Durable Subscriber



3. System Configuration

3.1 Hardware Configuration

Server System

- GNU/Linux 2.6.18-92.el5xen
- 4 CPU Intel(R) Xeon(R) CPU 5160 @ 3.00GHz
- 64 bit 8 GB RAM

Client System

- Microsoft Windows Server 2003 R2
- 4 CPU Intel(R) Xeon(R) CPU 5160 @ 3.00GHz
- 64 bit 8 GB RAM

Network Settings

- Client and Server were on the same network
- Network Speed: 1GBPS

3.2 Software Configuration

- Java 2 Runtime Environment, Standard Edition (build 1.5.0_18-b02)
- FioranoMQ v 9.1.1
- Sonic MQ v 7.6
- Tibco EMS v 4.4.0 (In persistent tests, the TIBCO topics were set to failsafe to ensure persistence to disk)
- ActiveMQ v 5.3.0
- Jboss 1.4.4
- Sun MQ 4.3
- IBM WebSphere 7.0

About Fiorano Software

Founded in 1995, Silicon Valley based Fiorano is a California Corporation with proven leadership in enterprise middleware and peer-to-peer distributed systems. Fiorano's innovative [event-driven](#), dataflow SOA platform integrates applications and complex technologies into an enterprise nervous system, increases business process performance, yields higher message throughput and enhances availability through agent-based visual composition that bridges the capability gap between business models and their implementation – the [model is the application](#), ready to run.

Global leaders including ABN AMRO, Boeing, British Telecom, Capgemini Telecom, Chicago Mercantile Exchange Group, McKesson, NASA, POSCO Steel, Qwest Communications, Rabobank, Schlumberger, Lockheed Martin, United States Coast Guard and Vodafone have deployed Fiorano to drive innovation through open, [standards-based](#), dataflow [SOA](#) applications built in just days, yielding unprecedented productivity.

The [Fiorano SOA Platform](#) built on the [Fiorano Enterprise Service Bus](#) (ESB) and [Fiorano Message Queue](#) (MQ), together deliver the industry fastest, lowest latency, highest throughput [real-time messaging](#) (asynchronous and synchronous) to power [high performance](#), highly available, and collaborative workflow applications whose application services are distributed throughout the IT landscape. Fiorano's distributed, peer-to-peer agents abstract complexity of developing and deploying services to unlock value in a customer's enterprise architecture framework.