

Ferdinand Project Middleware List

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FERDINAND PROJECT MIDDLEWARE LIST

PURPOSE

The purpose of this report is to provide an overview of the middleware environments used in the Ferdinand project. The environment selection has been based on four major criteria:

- Implementation available in source form (necessary for investigating potential performance anomalies).
- Multiple comparable implementations available (necessary for generalizing performance evaluation results).
- Environment widely in use in contemporary applications.
- Realistic workloads available.

This report is intended to serve as a (continuously updated) reference for project partners, care is therefore taken to include links to web sites of the individual technologies as much as possible.

MIDDLEWARE CLASSES

The three middleware classes considered by the Ferdinand project are:

- communication middleware,
- container (component) middleware,
- object (data) persistence middleware.

1 JMS & JMS-LIKE MIDDLEWARE

This chapter includes the communication middleware implementing the JMS specification or implementing the same communication mechanism (asynchronous message passing with queues) using a different API.

1.1 OVERHEAD SOURCES

- the number of messages
- the size of messages
- other sources of overhead like models of communication are still being explored

1.2 REFERENCE IMPLEMENTATIONS

Name	ActiveMQ
URL	http://activemq.apache.org/
Download, Source code	Both binaries and source code http://svn.apache.org/repos/asf/activemq/
License	Apache v 2.0 Licence
Example, case-study, benchmark	<ul style="list-style-type: none">- Project list [http://activemq.apache.org/projects-using-activemq.html]<ul style="list-style-type: none">• Apache Directory Project - LDAP [http://directory.apache.org/]• OpenIM: Java Jabberserver [http://www.openim.techlab.smk.fr/en/]• And many others...- Maven performance tests [http://activemq.apache.org/activemq-performance-module-users-manual.html]- Benchmark tests [http://activemq.apache.org/benchmark-tests.html]- JMeter performance tests [http://activemq.apache.org/jmeter-performance-tests.html]
Evaluation Progress	JMS broker installed. First benchmarks using JMSTester executed.

Name	HornetQ
URL	http://jboss.org/hornetq/
Download, Source code	Both binaries and source code http://jboss.org/hornetq/downloads.html svn.jboss.org/repos/hornetq/trunk
License	Apache v 2.0 Licence
Example, case-study, benchmark	<ul style="list-style-type: none">- Case studies<ul style="list-style-type: none">• Last.fm [http://java.dzone.com/articles/case-study-how-lastfm-uses]- hornetq-vm: VM for testing of clustered scenarios [http://sourceforge.net/projects/hornetq-vm/]
Evaluation Progress	JMS broker installed, waiting for SpecJMS benchmarking suit.

Name	JORAM
URL	http://joram.ow2.org/
Download, Source code	Both binaries and source code http://joram.ow2.org/download/index.html http://forge.ow2.org/plugins/scmsvn/index.php?group_id=4

License	LGPL
Example, case-study, benchmark	- main transport for new generation of Space Monitoring and Control (SM&C) middleware (CNES)
Evaluation Progress	JMS broker installed, waiting for SpecJMS benchmarking suit.

Name	RabbitMQ
URL	http://www.rabbitmq.com/
Download, Source code	http://www.rabbitmq.com/download.html
License	Mozilla Public License
Example, case-study, benchmark	- similar to ActiveMQ - used in various cloud implementation - part of SpringSource
Evaluation Progress	JMS broker installed, waiting for SpecJMS benchmarking suit.

Name	ZeroMQ - broker free messaging
URL	http://www.zeromq.org/
Download, Source code	
License	LGPL
Example, case-study, benchmark	- low-level messaging platform - http://java.dzone.com/articles/%C3%B8mq-fast-broker-free-messaging - http://nichol.as/zeromq-an-introduction - http://www.zeromq.org/results:ib-tests-v206
Evaluation Progress	Messaging broker does not support JMS API. For now, broker is excluded from evaluation.

1.3 BENCHMARKS

- The Sonic TestHarness [<http://communities.progress.com/pcom/docs/DOC-29828>], free
- Fuse JMSTester [<http://jmstester.fusesource.org/index.html>], Apache 2.0 license
- SPECjms2007 [<http://www.spec.org/jms2007/>], \$450, industry-standard benchmark
 - still used (HornetQ publishes its results in this benchmark)
- Jmeter tool [<http://jakarta.apache.org/jmeter/>], Apache 2.0 License
 - Building a JMS Topic Test Plan [<http://jakarta.apache.org/jmeter/usermanual/build-jms-topic-test-plan.html>]

1.4 BENCHMARK METHODOLOGIES, RESULTS

- Benchmark Comparison of Messaging Throughput in Enterprise Messaging Systems using the Java Message Service API [<https://community.jboss.org/wiki/HornetQ-thePerformanceLeaderinEnterpriseMessaging>]

- JMS Performance Benchmarks [<http://www.codeproject.com/KB/showcase/PerformanceBenchmarks.aspx>], FioranoMQ 2008, Sonic MQ 7.0, Tibco EMS v4.4.0, ActiveMQ 4.1.0, Jboss Messaging 1.4 SP1 and Sun JAVA MQ 4.1
- Performance testing open source JMS [<http://www.c2b2.co.uk/iPoint/ipoint?SelectedPage=69&110ArticleID=17>]

1.5 EVALUATION RESULTS

- As presented in the tables above, initial exploration of JMS broker implementations was done. We have also selected benchmarking tools to determine performance of all JMS and later on validate performance predictions.
- We have installed all brokers (except ZeroMQ) and the JMSTester tool. JMSTester was used first for several benchmarks on the ActiveMQ broker. ZeroMQ was excluded from evaluation because we did not find any suitable benchmarking suite that would allow us to compare the performance with other JMS brokers. Nevertheless, we are still planning to look at ZeroMQ built-in performance benchmarks.
- Initial JMSTester tests pointed out a need for better JMS benchmarking suite. Because of positive experience with other SPEC benchmarks, we are now launching experiments with the SPECjms benchmarking suite.
- OpenJMS broker was excluded because it is no longer maintained. The new Open MQ broker will be probably included in the future.

2 EJB FAMILY MIDDLEWARE

This chapter covers the (component) container middleware, which typically provides both communication and persistence as well. It also includes configuration middleware (such as OSGi) used to handle internal architecture.

An interesting source of performance-related information is available at [<http://www.j2eeperformance.com/>].

2.1 OVERHEAD SOURCES

- Overhead sources will be identified upon further closer examination of EJB framework.

2.2 REFERENCE IMPLEMENTATIONS

Name	Spring
URL	http://www.springsource.org/about
Download, Source code	http://www.springsource.org/download source: http://sourceforge.net/scm/?type=cvs&group_id=73357
License	Apache License, Version 2.0
Example, case-study, benchmark	
Frequently used communication and persistence mw. <ul style="list-style-type: none">- Apache ActiveMQ for messaging- Hibernate for persistence- Spring Web Services for web services- Supports composition of applications from OSGi bundles.	

Name	JBoss Application Server
URL	http://www.jboss.org/jbossas
Download, Source code	http://www.jboss.org/jbossas/downloads http://anonsvn.jboss.org/repos/jbossas/
License	LGPL
Example, case-study, benchmark	- Offers application profiler
Frequently used communication and persistence mw. <ul style="list-style-type: none">- HornetQ for messaging- Hibernate for persistence- JBoss WS for web services	

Name	JOOnAS
URL	http://wiki.jonas.ow2.org/
Download, Source code	http://wiki.jonas.ow2.org/xwiki/bin/view/Main/Downloads http://forge.ow2.org/projects/jonas

License	LGPL
Example, case-study, benchmark	- Documented examples and demos
Frequently used communication and persistence mw. - OSGi based services architecture. Platform is Apache Felix and iPOJO - JORAM for JMS - EasyBeans EJB container [http://www.easybeans.net/xwiki/bin/view/Main/WebHome] - The default persistence provider used in EasyBeans is Hibernate Entity Manager , Apache OpenJPA , ...	

Name	Glassfish
URL	http://glassfish.dev.java.net/ , http://glassfish.java.net/
Download, Source code	http://glassfish.java.net/public/downloadsindex.html#top
License	LGPL
Example, case-study, benchmark	
Alternative for JBoss	

- Geronimo (<http://geronimo.apache.org/>)
- OpenEJB (<http://openejb.apache.org/>)
- Glassfish (<https://glassfish.dev.java.net/>)

2.3 BENCHMARKS

- **JMOB: Java Middleware Open Benchmarking** [<http://jmob.ow2.org/>], hosts several benchmark projects, appears to be a good source of information and data, open source
 - **RUBiS** (Rice University Bidding System): an auction site prototype modeled after [eBay.com](http://www.ebay.com). [<http://www.objectweb.org/rubis/>]
The project appears to be inactive.
 - **CLIF** (CLIF is a Load Injection Framework) is a starting development activity aiming at providing a generic load injection platform for benchmarking middleware. [<http://forge.ow2.org/projects/clif/>]
The project appears to be **active**.
 - **Stock-Online** is the [CSIRO](#) application used to stress middleware performance and scalability. [<http://forge.ow2.org/projects/stock-online/>]
The project appears to be abandoned.
 - **RUBBoS** is a bulletin board benchmark modeled after an online news forum. [<http://jmob.ow2.org/rubbos.html>]
The project appears to be abandoned.
- **SPECjEnterprise2010** [<http://www.spec.org/jEnterprise2010/>], \$500, industry-standard benchmark
- **TPC-W** (Web Commerce) Benchmark [<http://cs.nyu.edu/~totok/professional/software/tpcw/tpcw.html>], currently deprecated, but may be interesting for comparison.
 - [Benchmarking Application Servers for Enterprise JavaBeans with the TPC-W Benchmark](#) (older paper)
 - [Official site](#)
- **Bench4Q** benchmark [<http://forge.ow2.org/projects/jaspte/>], LGPL, extends the of TPC-W benchmark

2.4 BENCHMARK METHODOLOGIES, RESULTS

- Top Java 5 EE Servers Compared [http://weblogs.java.net/blog/jdcampbell/archive/2008/02/top_java_5_ee_s_1.html]
- Next Generation Performance Benchmark [<http://weblogs.java.net/blog/mkarg/archive/2010/01/03/next-generation-performance-benchmark>]

2.5 EVALUATION RESULTS

- We have categorized and select several EJB implementations. We are now in preparation of tests of EJB implementations using SPECjEnterprise2010 benchmarking suit.

3 OTHER MIDDLEWARE

Presentation middleware like Servlets, JSP and middleware like HADOOP or Blitz JavaSpaces are still considered for evaluation and performance prediction.

This chapter includes service oriented middleware frameworks still under consideration.

4.1 JAX-RS- JAVA API FOR RESTFUL SERVICES

JAX-RS is a Java API for creating web services according to the Representational State Transfer (REST) software architecture style.

Implementations:

- [Apache CXF](#), an open source [Web service](#) framework.
- [Jersey](#), the reference implementation from [Sun](#) (now [Oracle](#)).
- [RESTEasy](#), [JBoss](#)'s implementation.
- [Restlet](#), developed by Jerome Louvel and Dave Pawson, a pioneer in REST frameworks.
- [Apache Wink](#), [Apache Software Foundation](#) Incubator project, the server module implements JAX-RS.

5 CASE STUDIES

5.1 CMS & CRM BASED ON EJB AND SIMILAR

See also the list of Java CMS systems at <http://java-source.net/open-source/content-managment-systems> and <http://www.wareprise.com/2007/12/01/open-source-j2ee-based-cms/>.

Name	Shopizer e-commerce content management
URL	http://www.shopizer.com/
Download, Source code	http://sourceforge.net/projects/shopizer/
License	LGPL
Notes	Demonstration examples provided [http://www.shopizer.com/?page_id=59]. JEE servlet container-based

Name	InfoGlue CMS and portal platform
URL	http://www.infoglue.org/
Download, Source code	http://www.infoglue.org/old/projects/infoglue_cms/Developer_resources , cvs -d :pserver:anonymous@www.infoglue.org:/home/cvsroot
License	GPL license (Gnu General Public License)
Notes	Video guide. Demonstration examples provided [http://www.infoglue.org/References/]. Eclipse IDE Hibernate, JNDI, JMS, ... Running on Tomcat, Websphere, ...

Name	nuxeo Enterprise Content Management (ECM) Document Management
URL	http://www.nuxeo.com/en
Download, Source code	http://www.nuxeo.com/en/downloads/ http://doc.nuxeo.com/display/KB/Working+with+Nuxeo+EP+source+code
License	LGPL
Notes	Designed to run on bare java, in a servlet container or in a JEE container (EAR including EJB3 bindings).

Name	OpenCMS website content management system
URL	http://www.opencms.org/
Download, Source code	http://www.opencms.org/en/download/ , http://www.opencms.org/en/development/cvs.html
License	LGPL, version 2.1
Notes	Reference projects provided [http://www.opencms.org/en/support/references/]

	Demo website [http://demo.opencms.org/en/] J2EE servlet-based
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