



OPEN SOURCE EAI/SOA TOOLS

/// WHITE PAPER



Gourav Suri
Mphasis Integration Architecture Team

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Executive Summary

A lot is being said and written about 'EAI'. 'SOA' is the new silver bullet that has become the talk of the town.

This paper explores the various open source 'EAI' offerings available today, their maturity level and their fitness for use as a solution of choice for a large organization.

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1. Introduction

Enterprise Application Integration (EAI) is a vast topic that includes a diverse range of tools and technologies. There are several commercial tools that address the EAI needs of enterprises around the world. However, in light of the renewed stress that companies around the world place on open source software, we decided to study the open source EAI tools in the market.



2. What are the benefits and risks associated with the use of Open Source?

Large corporations have traditionally relied on commercially licensed (“closed source”) software for mission-critical infrastructure, but open source solutions are increasingly common in enterprise architecture. As open source technologies have earned a reputation for reliability and performance, enterprise IT organizations now deploy a mix of open and closed source software with great success.

Open source software is developed collaboratively and is owned by a community rather than a single vendor. The source code is freely available, and users are permitted and encouraged to change, improve, and redistribute the software - subject to the terms of the open source license.

The benefits of open source software include:

- **Code Transparency** - Enterprises enjoy full access to the source code of an open source solution, so their IT infrastructure isn't running on a black box of proprietary code.
- **Standards Support** - Open source projects tend to be designed to support industry standards, and to interoperate with other open source and commercial technologies.
- **Cost savings** - Users do not pay a license fee to adopt open source software nor do they pay for updates, significantly reducing total cost of the project.
- **Vendor-neutrality** - True open source software is developed and owned by a developer community, so open source adopters are not locked in to a vendor's platform by proprietary modules and technical prerequisites.
- **Innovation** - With a large community that includes end

users contributing to the project, open source software provides a practical vehicle for the latest technology advancements.

Some of the risks associated with the use of open source software are:

- **Support** : Open source solutions do not always have the support and services typically provided by commercial software vendors.

- **Rapid release cycles**: In addition, open source projects tend to have rapid release cycles for new features, patches and other improvements appearing in a seemingly continuous process, rather than in the discrete release process characteristic of enterprise software vendors.

3. Comparative analysis of some Open Source product offerings in the integration space

General information:

| Software | Creator | Edition | Release Date | Cost (USD) | Software license |
|-----------------------------------|----------------------------|---------|----------------|-------------------------------------|----------------------------------|
| Apache Camel | | 1.4 | Aug 2008 | Free | Apache Software Foundation |
| Apache Synapse | Apache Software Foundation | 1.2 | May 2008 | Free / Commercial support available | Apache Software License |
| Blackbird ESB | ITema | 1.0 | July 2007 | Free | GPLv3 |
| ChainBuilder ESB | Bostech Corporation | 1.3.1 | July, 2008 | Free | Dual (GPL or proprietary) |
| FUSE ESB - Enterprise ServiceMix | IONA Technologies | 3.x | 2007 | | based on Apache Software License |
| Jitterbit | Jitterbit | 2.0 | May 2008 | | JPL |
| Mule ESB | MuleSource | 2.0 | April 2008 | | CPAL |
| Openadaptor | The Software Conservancy | 3.4.2 | July 2008 | Free | variant of MIT |
| OpenESB | Sun Microsystems | 2.0 | May 2008 | Licensed as part of Sun Java CAPS | CDDL |
| OpenLink Virtuoso | OpenLink Software | 4.5 | 2001 | 850 per value unit | Dual (GPL or proprietary) |
| PETALS ESB | OW2 Consortium | 2.2.1 | September 2008 | Free | LGPL |
| ServiceMix | Apache Software | 3.2.1 | December 2007 | | Apache Software License |
| WSO2 Enterprise Service Bus (ESB) | WSO2 | 1.7.1 | Aug 2008 | Free / Commercial support available | Apache Software License |

Operating system support:

| Software | Microsoft Windows | | | | Mac OSX | Linux | | IBM | | | | HP-UX | Solaisis |
|-----------------------------------|-------------------|----------|-------|-------------|---------|---------|------|-----|--------|-------|------|-------|----------|
| | 2000 | XP | Vista | 2003 Server | | Red Hat | SUSE | AIX | OS/390 | i5/OS | z/OS | | |
| Apache Synapse | Yes | Yes | Yes | Yes | | Yes | Yes | Yes | | | | | Yes |
| Chain-Builder ESB | Yes | Yes | | Yes | | Yes | No | No | No | No | No | No | No |
| Openadaptor | Yes | Yes | | Yes | Yes | Yes | Yes | Yes | | | | Yes | Yes |
| OpenESB | Yes | Yes | | Yes | Yes | Yes | Yes | Yes | No | No | No | Yes | Yes |
| OpenLink Virtuoso | Yes | Yes | | Yes | | Yes | Yes | Yes | No | No | No | Yes | Yes |
| PEtALS ESB | Yes | Yes | | Yes | Yes | Yes | Yes | Yes | No | No | No | Yes | Yes |
| ServiceMix | Yes | With SP2 | | Yes | Yes | Yes | Yes | Yes | No | No | No | Yes | Yes |
| WSO2 Enterprise Service Bus (ESB) | Yes | Yes | Yes | Yes | | Yes | Yes | Yes | | | | | Yes |

For more information on both commercial and non-commercial products, refer :

http://en.wikipedia.org/wiki/Comparison_of_business_integration_software

Many of the vendors have written pre-packaged applications for particular vertical industries (i.e., Telecom), so customers will have to investigate multiple vendors to ensure there is support for their particular industry.

4. Where can I find a brief review of Open Source EAI solutions written in Java, primarily Message Oriented Middleware (i.e. MOM) Brokers that perform Routing, Brokering and Transformations?

The description for a few solutions is stated below. Descriptions for the rest can be found at:

<http://www.manageability.org/blog/stuff/open-source-messaging-integration-transformation-routing-java/view>

OpenEAI - The purpose of OpenEAI Project is to discover and document the controlling dynamics, principles, and practices of enterprise application integration and to present, implement, and promote those findings. The OpenEAI Project presents findings in the form of the OpenEAI methodology and OpenEAI software for implementing integrations. (LGPL)

OpenAdaptor - Openadaptor™ is a Java/XML-based software platform which allows for rapid business system integration with little or no custom programming. It is highly extensible and provides many ready-built interface components for JMS, LDAP, Mail, MQ Series, Oracle, Sybase and MSSQL Server as well as data exchange formats such as XML. New components are regularly added. (BSD based)

Mule - Mule is a simple yet robust and highly scalable component broker and services framework. Mule is a light-weight, event-driven component technology; it is highly scalable, using ideas from SEDA; designed around the ESB (Enterprise Service Bus). Components managed by mule can be Beans, EJBs, IoC3 compatible components, Servlets, POJOs, etc; Mule builds on existing best-of-breed lightweight containers and gives you the option to pick and choose which framework components you wish to use and connectors for JMS, HTTP, TCP, SMTP, POP3, FILE, XML-RPC and VM.

ServiceMix - Apache ServiceMix is an open source distributed Enterprise Service Bus (ESB) and SOA toolkit built from the ground up on the semantics and APIs of the Java Business Integration (JBI) specification JSR 208 and released under the Apache license. ServiceMix is lightweight and easily embeddable, has integrated Spring support and can be run at the edge of the network (inside a client or server), as a standalone ESB provider or as a service within another ESB. You can use ServiceMix in Java SE or a Java EE application server. ServiceMix uses ActiveMQ to provide remoting, clustering, reliability and distributed failover.

5. Which ESB solution (both Commercial and Open Source) is rated as the best by the Director of Platform Technology at walmart.com global who has many large scale integration projects under his belt ?

This is what Eugene Ciurana, the director of platform technology at walmart.com has to say about Mule after taking into account the most mature ESB offerings like

| Product | Vendor | Connects with... |
|-----------------------------|-------------------------------|---|
| Active Matrix BusinessWorks | TIBCO | SOAP, EMS, JMS, Rendezvous, MQ, BPEL |
| Mule ESB | Open-source, MuleSource, Inc | SOAP, REST, JMS, MQ, JBI, AQ, Caching, JavaSpaces, GigaSpaces, Email, IM, JCA, AS400 Data Queues, System I/O |
| OpenESB | Open-source, Sun Microsystems | JBI, JCA, JAX-RPC, JAX-WS |
| Sonic ESB | Progress Software | JMS, SOAP, JMX |
| Websphere ESB | IBM | JMS, MQ, SOAP; requires additional adapters to interface with other products and legacy protocols; requires Websphere to work |

Mule is the best of breed open-source enterprise service bus. It does the same things as any commercial offering with similar or better results. It's free. An open-source community thrives around it. Mule is in production in many large companies worldwide, from financial institutions to large e-commerce applications. The product is easy to install, deploy, maintain, and extend. Anyone with some understanding of enterprise integration and a text editor may configure it. While it lacks (at this time) some of the flashy features from its commercial cousins like drag and drop configuration and pretty manuals, it outshines other systems by the sheer number of adapters and extensions already available that your company can use for solving tough integration problems with no more investment than a click and a download.

Consider Mule seriously if you are in the design, evaluation, or development phases of a massive enterprise integration effort for your company. Mule can do everything the commercial ESBs can, at a lower TCO; it's more complete than other open-source offerings like OpenESB; it complies with more standards (de facto or formal) than commercial products; and it's ideal for preventing vendor lock-in. Check it out!

To know more about the evaluation, please read the complete article located at :

<http://www.theserverside.com/tt/articles/article.tss?l=CaseStudyMule>

This article is a testimony that open source integration tools backed by 24x7 customer support are indeed being used in commercial organizations for large scale integration projects.

Mule provides every common transport and protocol in an open-source package from a single download, at no cost, and with a rich community around it is one of the most compelling reasons for using Mule. The Mule community has demonstrated the software connecting a wide variety of mission-critical systems in financial institutions, airlines, commerce, and technology companies. Mule and all its bundled subcomponents are licensed under a variation of the well-known Mozilla Public License 1.1. Mule performs as well or better as commercial ESBs, and there is at least one company offering 24x7 support and indemnification, the last two requirements that many corporations demand before considering any open-source software for deployment. It seems like all the items in the corporate checklist can be marked off with minimal risk resulting from bringing this open-source product in-house. This ought to make IT management and legal departments sleep well at night when Mule becomes part of the enterprise architecture.

To learn more about mule visit :

<http://www.muleumo.org/display/MULE/Home>

<http://www.mulesource.com/>

6. How is IONA approaching Open Source?

| Product | Fuse | Atrix ESB |
|---------------------------------------|---|---|
| Target user | Organizations deploying mission-critical applications in a Java environment | Organizations deploying mission-critical applications in a complex, heterogeneous environment |
| Certified releases | Yes | Yes |
| Environment support | Java, JMS, JCA, JBI, SOAP, Web services, HTTP, REST | Any transport, protocol, payload format, language, or development platform |
| Legacy system support | Can be extended with plug-ins | Out-of-the-box support for many third party packages including mainframes; can also be extended with plug-ins |
| Enterprise systems | Built-in security and management functionality | Built-in security and management functionality integrated with leading third party solutions |
| Enterprise Qualities of Service (QoS) | High performance, robustness extensibility | High performance, robustness, extensibility, transaction support, high availability |

Source : http://open.iona.com/docs/collateral/When_to_Use_Open_Source.pdf

IONA Technologies has been serving Global 2000 for over 15 years and is committed to making its customers successful with both open and closed source software. IONA targets organizations with mission-critical

applications and as a result all IONA solutions - both open and closed source - are fully supported and have certified release schedules to minimize risk.

IONA's model is to give away their software and sell their professional services in order to "help organizations take advantage of open source and to ensure the successful adoption of SOA."

IONA offers both open source and commercially licensed SOA infrastructure products. Both product families are designed for mission-critical deployments, and both adhere strictly to IONA's philosophy of distributed SOA and standards-based development. IONA SOA products include:

FUSE - FUSE is IONA's open source family of SOA components. FUSE includes the FUSE ESB, the FUSE Services Framework, the FUSE Message Broker and the FUSE Mediation Router. The FUSE components are tested together, certified, and supported to combine the speed and innovation of open source software with the reliability and expertise of commercially provided enterprise services.

IONA Artix - Artix is IONA's commercially licensed SOA infrastructure suite. It is used in complex environments that host "ten of everything" including legacy systems and diverse middleware components, and have stringent qualities of service (QoS) requirements. Currently in its fifth major release, Artix is built on patented technology that has been deployed in demanding environments for over 10 years.

7. What is a Software Stack and what are the Open Source SOA Stacks available in the market today?

A software stack is created when applications and services that would typically run on their own are integrated into what looks like a stand-alone solution.

And the more commoditized and generic the solution is, the easier it is to create a stack because the individual components in the stack can adhere to industry standards. However, to motivate engineers to build a stack, the solution also requires some level of complexity. If the solution space is relatively straightforward, it would be easier to rebuild functionality rather than try to integrate an existing solution into a stack.

This is why SOA middleware solutions are such a fertile ground for stacks. The problem domain is complex, but the solutions are standardized. And delivering solutions as a stack is very compelling because the components within the stack maintain their autonomy. So stacks not only have the benefit of reuse from system integration, but they also have the benefit of the components within the stack and have the ability to continue to evolve and improve on their own organically.

Stacks vary in terms of maturity, but a reasonably mature stack should include a common install and update procedure so the end users are not aware of the components within the stack. It should also have unified administration and configuration, such as creating a set of administration pages that uses an underlying JMX API that each individual component in the stack exposes.

To remain a stack, however, the components should not be tightly integrated together. Rather, each component within the stack maintains its own product roadmap and can evolve on its own. As an unfortunate side effect, software providers can get stack-happy, and once the product managers realize the relatively low effort of integrating components into their software solution when compared to engineering, they can request that all sorts of modules be integrated.

Open source software helps to facilitate the building of software stacks. It is not a coincidence that the popularity of stacks coincides with the mainstream arrival of open source software. There are five primary reasons for this:

- Open source typically builds to standards.
- Integrators have access to the source.
- Integrators can become committers themselves.
- Open source licensing is very friendly to integrating and distributing into other solutions, especially other open source solutions.
- Open source roadmaps are typically transparent on some JIRA-type roadmaps.

When a commercial software company builds a stack, it usually requires a legal partnership to proclaim that one product works with another. This formality is stricter than their open source counterparts require and are thus harder to achieve.

So it should come as no surprise that open source is leading the way when it comes to the availability of software stacks. And there are many open source solutions for SOA middleware. Like stacks, open source also thrives when the problem domain is standardized and complex, and infrastructure in particular is a domain where many open source components exist.

It makes sense that the collaborative relationship between software stacks, open source and SOA has resulted in the creation of several viable SOA solutions built using open source that have been combined into software stacks. Some examples of SOA stacks that have been built from open source include: LogicBlaze FUSE, JBoss JEMS and WSO2 Tungsten as pictured below. Examples of major components of SOA open source software stacks.

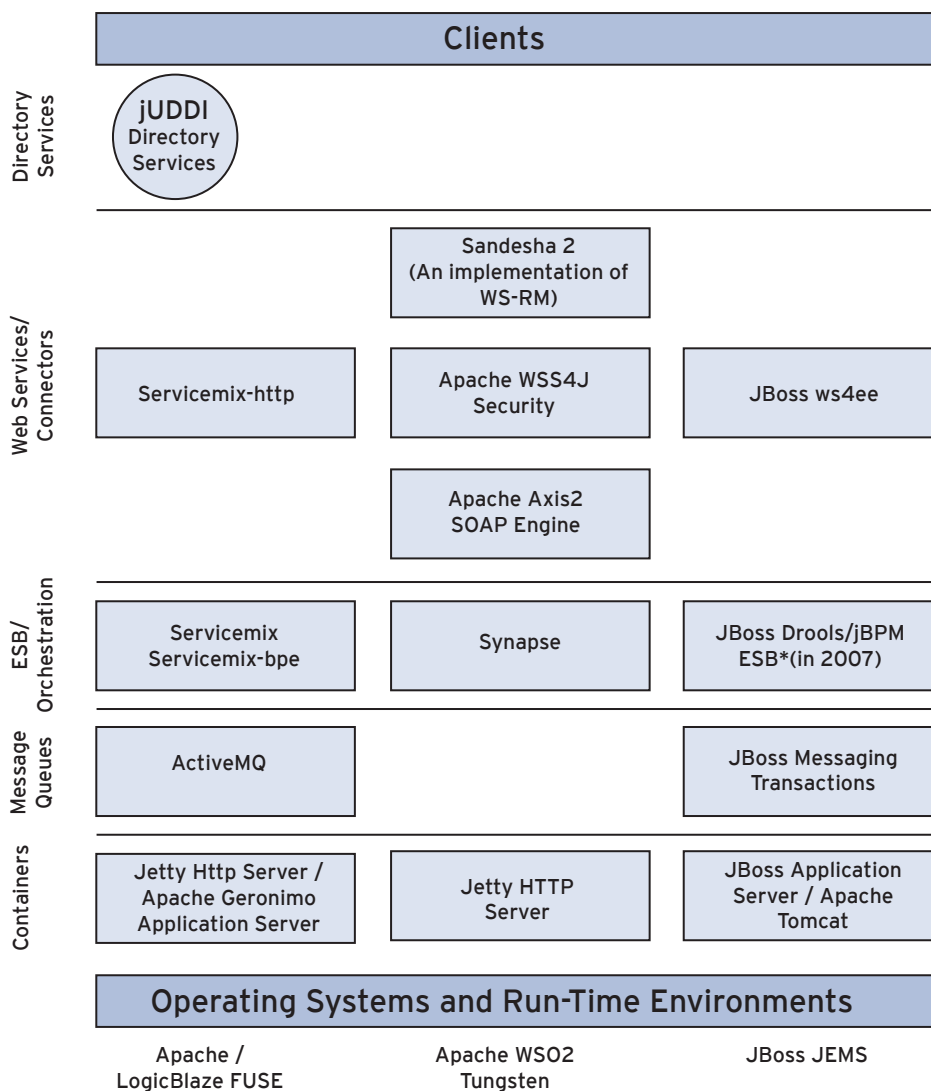
These stacks are relatively new as SOA open source stacks are a new and evolving concept, but they are mature enough to warrant consideration when looking to implement an SOA solution and certainly should be evaluated as they continue to evolve. The functionality these stacks provide differ in specific implementation, but in general they all include components that provide SOA middleware capabilities such as:

- Guaranteed message transport
- Data transformation
- Transactional support
- Message orchestration and service discovery

And these SOA open source software stacks are evolving constantly. LogicBlaze recently announced that they are now including the LifeRay portal to the FUSE stack. A question can arise if portal functionality belongs in a SOA technology suite, but it is undeniable that open source SOA stacks have arrived and are evolving.

The stack architecture is a good trend to recognize and monitor in general. Stack-based architectures are showing up everywhere, especially with open source components. Having the knowledge of how stacks differ from basic systems integration, including their benefits and drawbacks, is a useful perspective when evaluating any stack-based solution.

Source : <http://open.iona.com/docs/collateral/WhenToUseOpenSource.pdf>
http://searchsoa.techtarget.com/tip/0,289483,sid26_qci1208644,00.html



Source : http://searchsoa.techtarget.com/tip/0,289483,sid26_qci1208644,00.html

If your organization is considering SOA infrastructure, look at the new open source stacks. And when reviewing the stack, it is helpful to not only view the solution as an autonomous solution set, but also as a stack of interrelating components, each with its own motivation, engineering team, capability and roadmap.

This perspective will not only help you when evaluating stack-based solutions, but will also give your organization increased awareness of how the solution is constructed and how it will fit into your overall SOA strategy.

8. Conclusion (so far)

As organizations try and leverage the existing systems that they have in-house, EAI markets were expected to reach 4.7 billion by 2007 (source : researchandmarkets.com).

Going forward, as more open source software stacks backed by 24x7 support emerge, their offerings expand and mature, open-source is all set to be an offering of choice for quite a lot of organizations.

A new generation of enterprise application integration (EAI) tools is moving us nearer to a true 'plug-and-play' systems approach - offering the speed and flexibility especially necessary for success in the e-world.

Of course, as ever with IT, the promise is, as yet, stronger than the reality. They are only moving towards being 'plug and play'; as yet, you'll find yourself writing significant amounts of code to link the linkages. It is possible to adopt a single tool to link a range of disparate systems but there will be some interface work needed for most of the links. The very flexibility of the tools - and their ability to handle a vast range of data and message types - means that there is a lot to learn and discovering all the abilities and nuances of any one of the tools requires a lot of training and practice. So, although they are not complex conceptually, in practical terms there is a lot of complex detail to unravel.

EAI allows the organisation to leave legacy systems in place but to overlay them with an EAI approach that can take data out of the systems, process it and send it to the right destination system.

Derry Newman, IT manager of Sony Broadcast and Professional Europe, believes a single EAI tool can meet all a company's needs. He says Sony is using just the Crossworlds tool because EAI tools demand implementation staff with skill in both the tool and the target systems and are therefore expensive and scarce. Multiple integration approaches make hiring these skills more of a headache (and an expense) and increase a company's dependence on the one or two people who know how to use each tool.

Newman admits there are drawbacks to using a single tool. "You don't necessarily have the optimum solution," he points out. "We've already had to buy an upgrade to get more connectors as we encountered an unexpected system in a trading partner. Having said that, we've yet to run into an integration need where we haven't felt in a position to start discussing and planning. I can go to meetings with corporate customers and channel partners and not worry about what flavour of IT they've got." Of course, with EAI you need to understand the problem before you select the tool to use. There is no one magic solution - but selecting one primary EAI tool will help provide consistency across multiple integration projects.

For choosing an EAI tool, just ask these simple questions :

- What applications, interfaces, message formats and technologies are currently supported and what further enhancements are planned?
- How easy will it be to adapt integration projects to changes in business or technology?
- What developer skills and resources will be required? How do these relate to what you already have?
- Does the tool have a visual or rules-based interface which will allow it to be used by end-users?
- What support and service does the supplier itself offer and what partnering arrangements and training programmes does it have in place with systems integrators?

9. References

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Contact us

USA

Mphasis
460 Park Avenue South
Suite # 1101, New York
NY 10016, U.S.A.
Tel: +1 212 686 6655
Fax: +1 212 686 2422

UK

Mphasis
100 Borough High Street
London SE1 1LB
Tel: +44 20 30 057 660
Fax: + 44 20 30 311 348

Mphasis
Edinburgh House
43-51 Windsor Road
Slough SL1 2EE, UK
Tel: +44 0 1753 217 700
Fax: +44 0 1753 217 701

INDIA

Mphasis
Bagmane Ttechnology Park
Byrasandra, C.V. Raman Nagar
Bangalore 560 093, India
Ph.: +91 80 4004 0404
Fax: +91 80 4004 9999

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