

Open Source Software for SOA

L&T Infotech Center of Excellence



L&T Infotech

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Introduction

Today's competitive world requires businesses to be agile and innovative. However, IT systems may become a stumbling block if they are not well-architected. Service-oriented Architecture (SOA) is an architectural pattern, which promises to bring much-needed flexibility in Enterprise IT systems. However, this flexibility does not come free. A good amount of investment in tools and services is needed to adopt SOA. Many IT departments are finding it difficult to make a business case for such investment. There could be many reasons for this. Firstly, one can't simply quantify the flexibility that is needed or achieved after SOA adoption. Secondly, the real benefits of SOA in monetary terms can be seen only in the long term. Finally, end users of IT systems are unlikely to see any obvious benefit of SOA adoption in their day-to-day activities. Due to these reasons, SOA is being adopted slowly, even though there is a general agreement in the IT community on the benefits of SOA.

Given this scenario, it is not surprising to see increasing interest in open source SOA tools. Open source software (OSS) has been around for quite some time and we are seeing an increasing trend in their adoption in enterprises of almost all sizes. Whether adoption of open source software really reduces Total Cost of Ownership (TCO) is still a debatable issue as there are claims and counter-claims regarding it. But it surely reduces the upfront investment. Interestingly, that makes it suitable for SOA adoption as organizations can absorb ongoing cost of OSS while its benefits are being realized over a period of time.

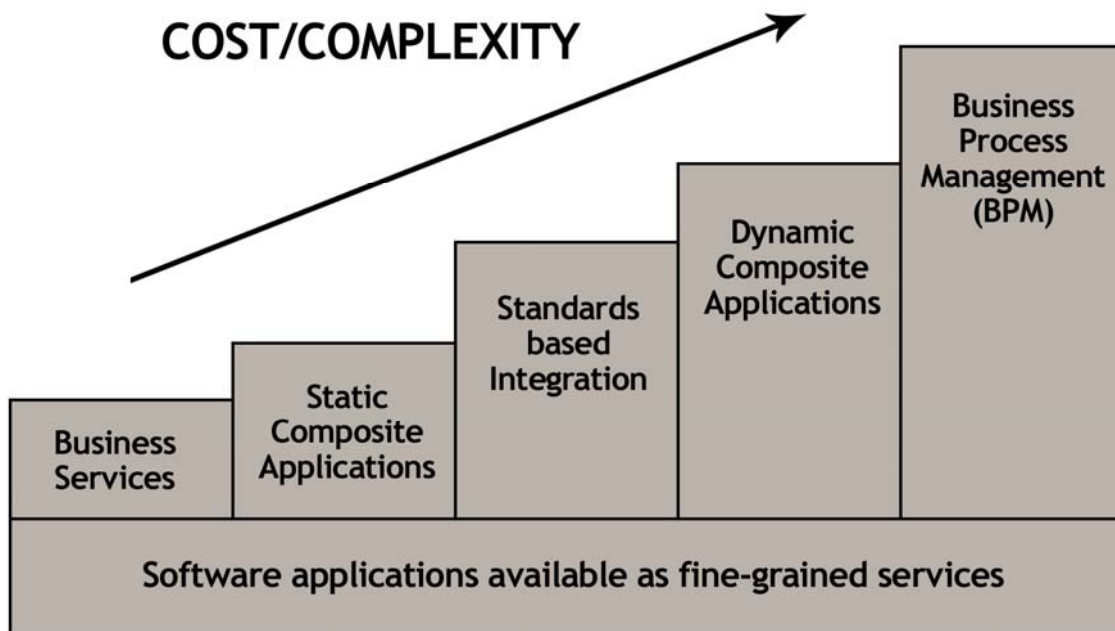
Now the question arises whether there are any open source tools available for adoption of SOA. The answer is both yes and no. The open source tools are available for those organizations who have just started to adopt SOA or have intentions to adopt SOA to some extent but not completely. But, there are no open source tools available today for organizations planning to adopt SOA quite aggressively.

We have identified following five purposes for which organizations will adopt SOA:

1. Business Services
2. Static Composite Applications
3. Standards-based Integration
4. Dynamic Composite Applications
5. Business Process Management (BPM)

While SOA would mean making software applications available as services (mainly web services), the use of these services will be made for either one or many of these above-mentioned purposes. The extent to which the software applications will be made into services will also depend on the reason for adoption of SOA by the organization. For developing Business Services, only some of the applications need to be exposed as services, while for BPM, all applications should be made available as services. Hence the cost/complexity involved for Business Services will be lesser than that for others while for BPM it will be the highest among all. This point will need to be kept in mind as we look into availability of OSS for each of these purposes in following sections.

Figure 1: SOA Adoption (Source: L&T Infotech Research)



Business Services

Many organizations are looking at SOA to develop business services. These business services are nothing but coarse-grained web services with a large number of operations with complex message structures. An example of such a business service is an employee information service that can have operations such as `getContactDetails`, `getPersonalDetails`, `searchEmployeeByLastName` and so on. These business services can either be offered to their business partners over the internet or can be used as shared services across their divisions/groups. Since these services are based on standards such as SOAP, WSDL and WS-Security, they can be accessed over multiple channels such as web applications, web portals, mobile devices and thick clients.

To develop such business services, we would need tools that can either expose services out of existing systems or ones that can help develop new web services. How to expose services out of existing systems largely depends on those systems. Fortunately, new versions of almost all packaged applications from vendors such as SAP and Oracle provide web services, almost out of the box. However, this may not be the situation with all packaged software vendors, particularly those who offer vertical-specific or niche products such as engineering-related products. In such cases, if these tools offer Application Programming Interfaces (APIs) then these APIs can be used to expose services. This is the same as developing new services.

There are many choices available for the development of new web services in Java. But it can be best done with Apache Axis2, which acts as core engine for web services. Besides providing runtime for deploying web services, it also provides Eclipse plug-ins so that you can use Eclipse as the Integrated Development Environment (IDE) for web services development. Apache Axis2 not only supports SOAP 1.1 and SOAP 1.2, but also has integrated support for widely popular REST style of Web services. That means the same business logic implementation can offer both a WS-* style interface as well as a REST style interface simultaneously. It also supports addition of plug-in "modules" that extend its functionality for features such as security and reliability.

Static Composite Applications

Once such business services are in place, the organization can go for development of static composite applications. What we mean by 'static' here is such composite applications will be developed programmatically as against 'dynamic' composite applications, which will be developed by using GUI-based service orchestration engine. Development of such static composite applications would require availability of desired services and the tools for developing applications that can *consume* these services.

Again Eclipse and Axis2 are what can be used for development of static composite applications.

Standards-based Integration

Perhaps the most significant purpose for which SOA is being adopted is for integrating applications based on open standards. While simple web services can be used to do point-to-point and non-mission-critical integration, some intermediary is needed for reliable integration. We have developed one such intermediary, called *ws-xspace*, in collaboration with IIT, Bombay. This product is being released as open source software. It can be used when two or more applications, which can consume web services, need to be connected.

But when you need enterprise-level integration, you should look for deploying an Enterprise Service Bus (ESB) product. As there are many differing claims on what an ESB is, there is no commonly agreed-upon definition for ESB. For this discussion, let's define ESB as a software infrastructure tool that provides messaging, content-based routing, and XML-based data transformation. There are many open source ESB products around. However, we have identified four, which are backed by well-known organizations.

1. OpenESB from Sun Microsystems
2. Mule ESB from Codehaus
3. Celtrix from ObjectWeb and with backing from IONA Technologies
4. ServiceMix from Apache Foundation

Both OpenESB and ServiceMix are open-source implementations of the Java Business Integration (JBI) specification (JSR 208). While Celtrix and Mule are not built on JBI, they do support its integration. While there is very little information available on deployment of these ESBs, there is a claim by the Mule team about Mule being used at organizations such as HP, Sony, Deutsche Bank and CitiBank.

One can also use Service Orchestration Engine along with ESB for integration. This way, enterprise applications can be integrated along the business process that cuts through these applications. Business Process Execution Language (BPEL) is a de facto standard for service orchestration. All these ESB products either embed BPEL engine or allow easy integration of third-party open source BPEL engines such as the one offered by Intalio. So, one can use a combination of ESB and a BPEL engine to achieve what we call business process-based integration.

Dynamic Composite Application

A service orchestration engine based on BPEL standard can be used to develop a new software solution for a particular business process. We see this as a paradigm shift in software development. In the development of dynamic composite applications, the requirements are gathered in the form of business processes, and existing services are orchestrated to develop the software solution for it. The IntalioServer for Intalio seems to be a good choice for a service orchestration engine for development of such dynamic composite applications. It is the same BPEL engine that can be plugged with ESB for integration purpose. It has native support for the BPEL 2.0 specification. Another open source product jBPM is from JBoss. jBPM is used to support jPDL as process language, which is proprietary to JBoss. But now it supports BPEL 1.1, albeit in beta status. Hence we will need to wait till its BPEL support gets mature. Apache has a project under incubation called Apache Ode, which supports both 1.1 and 2.0 version of BPEL specification.

Business Process Management (BPM)

Many IT-savvy organizations adopt SOA because they wish to use it as a foundation for launching their IT-enabled BPM initiative. The toolset used for this purpose is typically called Business Process Management System (or Suite) or simply BPMS. We define BPMS as a suite of products that should at least include the following tools:

1. Business Process Modeler (preferably supporting BPMN notation)
2. IDE for Service Assembly (preferably supporting BPEL standard)
3. Runtime for service orchestration (again preferably supporting BPEL)
4. Tool for Business Activity Monitoring (BAM)

The business process modeler and BAM tool are meant to be used by business process analysts while the others come under the domain of IT. Business Process Modeling Notation (BPMN) is emerging as a de facto standard for modeling business processes and BPEL for service assembly by means of orchestration. Both JBoss and Italo claim to have BPMS offerings, to which we disagree. While JBoss provides facility for process definition, it is not meant to be used by business process analysts. Also, it does not provide a tool for BAM. Intalio provides more a comprehensive but an incomplete toolset; it provides all the required tools except BAM tool.

Conclusion

Open Source Software provides a viable alternative to commercial products for SOA adoption. However, we should remember that open source software does not mean zero investment. Organizations will need to invest money for professional services and for support but the upfront investment for licenses is virtually zero.

We advise our customers to adopt SOA in an evolutionary manner - they should first go for development of business services, followed by static composite applications and so on. In other words, we do not encourage customers to go for BPM directly unless there is a strong business case for it or the whole enterprise IT systems are to be deployed from scratch. With such an evolutionary approach, use of open source software makes a lot of sense. This is not limited only to the cost perspective. OSS typically supports open standards whole-heartedly. That helps organizations leverage their earlier investments while avoiding any vendor or product lock-in. So, one can actually migrate to a commercial product or another OSS product, if required, provided strict adherence to open standards is maintained.

In all, we expect to see an increase in SOA adoption based on open source software.

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