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The Forrester Wave™: Enterprise Service Buses, Q1 2009

by Larry Fulton
for Enterprise Architecture Professionals

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Progress Software, Oracle, Software AG, IBM, And TIBCO Software Lead Among Commercial And Open Source Solutions

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EXECUTIVE SUMMARY

In Forrester's 171-criteria evaluation of enterprise service bus (ESB) vendors, we found that Progress Software, Oracle, Software AG, IBM, and TIBCO Software support the broadest range of protocols and other features, have the most-focused ESB and service-oriented-architecture- (SOA-) related strategies, the most-mature tooling, and the greatest flexibility in deployment and configuration. IONA Technologies (recently acquired by Progress Software) and Sun Microsystems are Strong Performers: They have very solid products that lack only some of the breadth of the Leaders', each in different areas. Another Strong Performer, JBoss, a Division of Red Hat, and Contender MuleSource both provide solutions with strong core functionality; these vendors' scores suffer primarily because their solutions have fewer features than those of their older competitors. Microsoft, also a Contender, offers a solution that will appeal strongly to BizTalk users looking for ESB-like mediation but suffered in the evaluation because of its Windows centricity and the assemble-it-from-a-kit nature of its ESB solution.

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NOTES & RESOURCES

Forrester interviewed 21 vendor and user companies: IBM; IONA Technologies; JBoss, a Division of Red Hat; Microsoft; MuleSource; Oracle; Progress Software; Software AG; Sun Microsystems; TIBCO Software; and 21 reference companies.

Related Research Documents

"The Forrester Wave™: Integration-Centric Business Process Management Suites, Q4 2008"
October 6, 2008

"Shaping Your Middleware Strategy To Benefit From ESBs"
May 21, 2007

"The Forrester Wave™: SOA And Web Services Management, Q1 2006"
"February 10, 2006

AN ENTERPRISE SERVICE BUS IS USUALLY THE CORE INFRASTRUCTURE FOR SOA

Most SOA efforts rely heavily on one or more ESBs as their core software infrastructure. This is because an ESB bundles solutions to many different challenges in a single product. ESBs, for example, route multiple protocols and map multiple data formats; create composite services to externalize standard behavior; do data-based routing and service-level agreement (SLA) monitoring and management; and integrate with security infrastructure.

Before the financial meltdown of September 2008, the ESB market was growing at over 10% annually, driven largely by customer adoption of SOA. ESBs are often among the first major product acquisitions associated with SOA programs.

A Set Of Core Functions Defines ESBs

ESBs have become the "kitchen sink" of middleware, packed with so many features that it has become difficult even to define the category in concrete terms. Forrester has previously defined an ESB as:

> *An intermediary that makes a set of reusable business services widely available.*[1]

The full range of current ESB capabilities suggests that this is only part of the story (see Figure 1). A more detailed definition would be:

> *An intermediary that provides core functions to makes a set of reusable services widely available, plus extended functions that simplify the use of the ESB in a real-world IT environment.*

The core functions, which provide the basic operational capabilities of the ESB, are:

- **Support of multiple protocols.** An ESB must support a wide range of Web services, REST, and other protocols, both to provide a range of capabilities for newly developed business needs and to support integration with a wide range of third-party and legacy systems and services.
- **Protocol conversion.** Just as important as an ESB's support of multiple protocols is its ability to accept a request in one protocol and forward it as a request using a different protocol, a capability that simplifies using the ESB with multiple new and legacy systems.
- **Data transformation and data-based routing.** ESBs must have the ability to translate data from one format to another, possibly using that data to enrich data streams and make routing decisions along the way.
- **Support of multiple connectivity options.** ESBs must provide the means to connect to the databases, messaging systems, management tools, and other infrastructure components that are part of an organization's existing infrastructure.

- **Support of composite services through lightweight orchestration.** Lightweight orchestration, commonly called "flows" or "itineraries" by ESB vendors, is generally stateless and short-lived, though neither is a requirement. It means connecting multiple services together into a larger composite service, with the ESB managing the flow of control and information among the component services. The term "lightweight" stands in contrast to Business-Process-Execution-Language- (BPEL-) based process orchestration.

- **Support of multiple standard business file formats.** Many vertical industries have defined file formats, the most recent being XML-based. ESBs must provide the ability to work directly with these formats.

- **Integrated security features.** ESBs provide integration with security directories and operating-system security features to support authentication and authorization, simplifying the challenge of making services available to multiple user communities (for example, employees, customers, and agents).

- **A comprehensive error handling mechanism.** ESBs must provide uniform mechanisms for identifying, managing, and monitoring both technical and business errors, with the ability to customize specific error behavior as needed.

- **Support of both synchronous and asynchronous operations.** ESBs must support requests and operations of both the synchronous and asynchronous variety, making it easy to use each where appropriate, since all modern organizations will have business activities that fall into both categories.

- **Highly available and scalable infrastructure.** ESBs can use software and/or hardware clustering and other mechanisms to provide high availability. Every ESB has the ability to support horizontal scalability and to span a large infrastructure; some also provide facilities to support vertical scalability of individual services.

- **Support of many options in each of the above categories.** As an integration platform, an ESB has to support a large number of options. One of the key differentiators separating the Leaders from the rest of the vendors is the breadth of options they provide — a breadth that translates to maximum flexibility for customers. In each category, the list of options that "most" products support grows, while "some" products support the most obscure options.

- **Extensibility.** While it is important for ESBs to support a broad range of individual capabilities in each area, it is perhaps even more important for an ESB to make it possible for customers to add capabilities themselves. Your ESB doesn't support a particular WS protocol? Add it. You need to talk to an aging legacy system using a home-grown messaging system? Add support for that, too. The good news is that all of the ESBs provide some means to make these kinds of extensions, and extensions are full citizens, indistinguishable from the out-of-the-box options.

ESBs Also Provide A Variety Of Extended Functions

Extended functions are those ESB capabilities that lie beyond the operational machinery that makes services widely available to consumers. ESB vendors continue to add these features, competitors respond, and the list of "standard" features grows. As a result, ESBs offer a mix of features, some quite mature, some merely integrations with other products, and others falling somewhere within the range of maturity in between. The extended functions available in today's ESBs are:

- **Graphical editing tools.** Graphical editors for ESB flows ("itineraries" or "lightweight orchestrations") make it much easier for architects and developers to work with ESB activities over time, especially in the case of maintenance activities that occur long after flows' original development. Without graphical editing tools, developers must work directly with the ESB's proprietary XML-based programming language, a task that requires both tedious hand-coding of XML and in-depth knowledge of the ESB's operation.

- **SLA monitoring and management.** Most ESBs have some provision for controlling throttling and load balancing to meet defined SLAs on a per-endpoint basis. ESBs cannot yet replace SOA service management products that provide endpoint security and management, though the trend is moving toward ESBs providing more and more of these capabilities.[2] Most ESBs have some provision for controlling throttling and load balancing to meet defined SLAs on a per-endpoint basis.

- **BPEL and other business process support.** Design, simulation, and execution of business processes using BPEL and its cousins remain primarily the domain of business process management suites (BPMS), but ESBs are supporting a growing range of these capabilities.[3] Most products have the ability to create, execute, and manage BPEL orchestrations; some also offer process-simulation capabilities.

- **Business activity monitoring (BAM).** BAM allows customers to define business-centric metrics called key performance indicators (KPIs) and to present those KPIs in near-real time using dashboards. BAM also generates alerts to notify businesspeople of potential operational problems when these KPIs cross specified thresholds. Some ESBs provide comprehensive BAM capabilities; others rely on third-party BAM products.

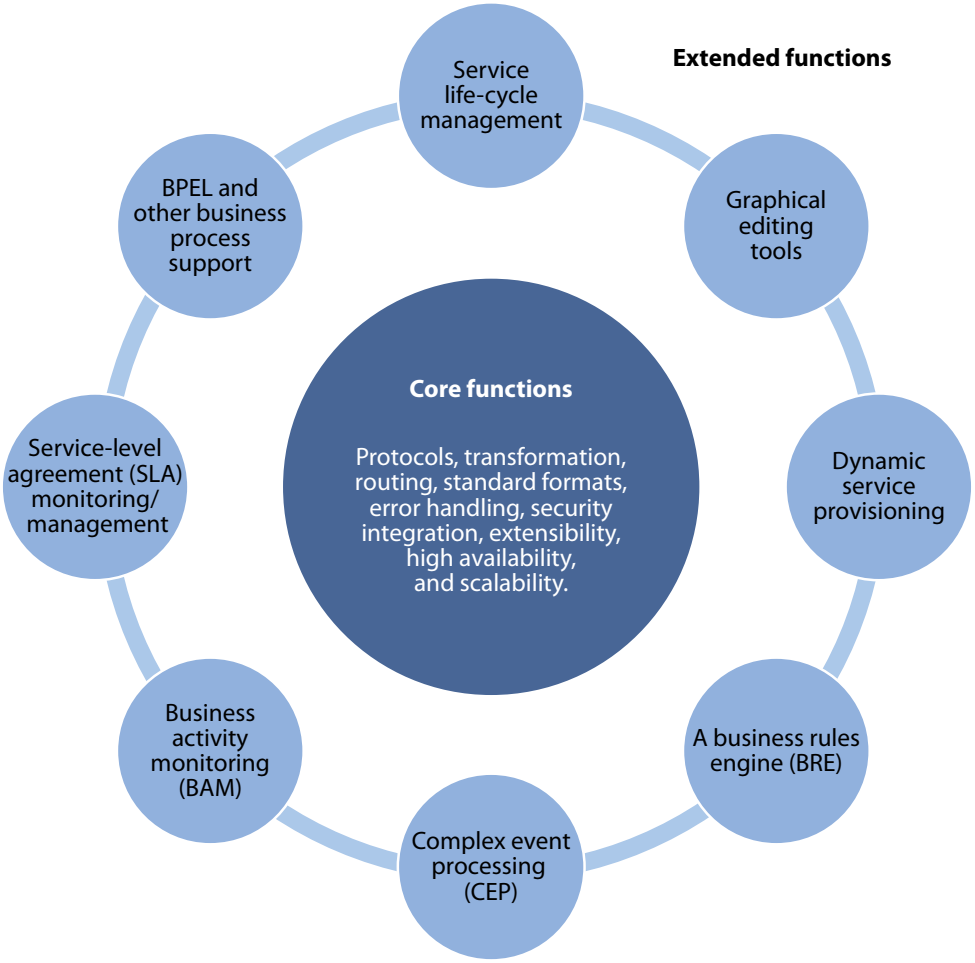
- **Service life-cycle management.** Most ESBs include at least some life-cycle management features. ESB vendors that have independent application life-cycle management solutions (IBM, Oracle, and Software AG) naturally promote use of these products with their ESBs.

- **Dynamic service provisioning.** Most ESBs can have the ability to dynamically provision new ESB operations, which means that users can add or modify flows without having to restart ESB components. ESBs that can host services themselves can also have the ability to dynamically provision those services. Innovations in this space include the ability to dynamically control the number of service instances running to meet SLA targets.

- **Complex event processing (CEP).** Complex event processing is growing, and as ESBs are both conduits for and sources of events, they are natural components of CEP applications. Vendors are adding prebuilt integrations for their own and third-party CEP engines.

- **A business rules engine (BRE).** None of the ESBs include an embedded BRE, but several offer prepackaged integration with a third-party product. Some provide a plug-in BRE themselves; others require separate licensing of a third-party product.

Figure 1 Core And Extended ESB Functions



43267 Source: Forrester Research, Inc.

Open Source ESBs Are Coming Of Age But Aren't There Yet

Forrester's evaluation includes four open source ESBs: IONA FUSE (now Progress Software), JBoss Enterprise SOA Platform, MuleSource Mule ESB, and Sun ESB Suite.[4] Customers can download, modify, and use these products in production for free. All four of the products are, according to customers who use them, stable, reliable, and scalable, making them options for many shops. If you can support an open source product yourself, the open source options' zero-cost licensing is difficult to overlook.[5]

However, Forrester's research uncovered three issues for customers considering the open source ESBs:

- **Open source ESBs lack the features and enterprise-class tooling of commercial options.** If you need an ESB that provides the most widely used Web services protocols, the open source products are fine choices. But, if you need graphical flow editing (as you probably do if yours is a typical large IT shop where in 18 months a more junior developer will have to understand what is happening in your production ESB flows) or if you want to talk to a dozen rusty legacy systems using a combination of proprietary and legacy protocols, you won't find everything you need in an open source ESB today; though you could, of course, add the additional protocols yourself.[6]

- **Open source support eliminates the "free software" benefit.** If you want a vendor support contract for your open source ESB, you'll have to pay for it.[7] If you run the software on 10,000 nodes, a per-node support subscription will dramatically raise your ESB costs. The vendors understand this potential cost problem, so expect to see some experimentation as these products mature.

- **One open source product tends to attract others.** In general, open source ESBs tend to drive the inclusion of other open source components (though this is less true of the Sun and IONA products). Want a BPEL engine to work with Mule? There is an open source BPEL engine you can use. Need transaction support to span two ESBs? Just assemble the pieces using an open source transaction manager. And so it goes. If your organization doesn't have the stomach for broad use of open source components, you'll have to put some controls in place to limit the introduction of additional components without appropriate review.

ESB EVALUATION OVERVIEW

To assess the state of the ESB market and see how the vendors stack up against each other, Forrester evaluated the strengths and weaknesses of top ESB vendors, including vendors of both traditionally licensed and open source ESBs.

Distinctions Among ESBs Are In The Details And The Breadth Of Options

After examining past research and user needs and conducting vendor and expert interviews, Forrester developed a comprehensive set of evaluation criteria for ESBs. We evaluated vendors and their ESBs using 171 criteria, which we grouped into three buckets:

- **Current offering.** These criteria consider design-time, runtime, and architectural aspects of the solutions. The ESB must provide direct support for runtime activities — administration, communications, provisioning of ESB and service resources, and execution — as well as design-time activities such as design, development, and testing. Every ESB provides fault tolerance and scalability, though the finer points of these and other architectural considerations vary among the available solutions. Forrester considers graphical editing of ESB flows (or "itineraries") critical in a large IT environment; as a result, products requiring architects and developers to directly manipulate XML received lower scores for tooling.

  A competitive ESB must support many different protocols, security directories, databases, messaging systems, interaction models, business data formats, etc. (This evaluation includes 22 such lists, splitting them among 37 of the evaluation criteria). Forrester compiled lists, with vendor input, that represent all the features available across the industry and rated each solution on its breadth of support. For the largest lists, we split them into groups, with "group 1" representing the most commonly supported options and "group 2" representing the rest.[8] Architects need to consider the importance of these items in their own evaluations. For example, ODBC/JDBC support will pretty much cover you on databases, but you need to assess which protocols you can or cannot live without.

- **Strategy.** This section includes information about solution cost, product strategy, corporate SOA strategy, and how the vendor takes advantage of strategic alliances in this space. We evaluated cost by creating specific pricing scenarios (numbers of CPUs, servers, users) and requiring each vendor to respond with list pricing for both up-front licensing and ongoing support. However, though these results are comparable, expect discounting to have a significant impact on your specific situation, especially if you are looking at an enterprise license, which is not included. Pricing has a significant impact on scores in this evaluation, which can be misleading. Vendors will clearly provide varying levels of performance, so the apparently more expensive solution may in fact require less hardware and be much more attractive. Forrester strongly recommends some level of benchmarking as part of any product selection activity.

- **Market presence.** Criteria in this section provide the current market footprint of each vendor based on the vendor's installed customer base, its annual ESB-related and overall revenue, its revenue growth, and the size of its field operation (which may include partnerships).

Aside From Certain Open Source Youngsters, Established Vendors Are The ESB Providers

Forrester included 10 vendors in the assessment: IBM; IONA Technologies; JBoss, a Division of Red Hat; Microsoft; MuleSource; Oracle; Progress Software; Software AG; Sun Microsystems; and TIBCO Software. Each of these vendors has (see Figure 2):

- **Multiple active deployments.** To ensure that each vendor had reference customers with sufficient experience to judge the product, we required that each participating vendor have at

least 100 different customers using the solution in production as of March 31, 2008. We also required that each product release included in the Wave be generally available as of August 2008.

- **A separate ESB offering.** ESBs are finding their way into many different software products.[9] To keep the focus on ESBs that customers can purchase as standalone solutions, we required that each participating vendor have at least 10 customers using the solution as a separate ESB offering as of March 31, 2008.

Figure 2 Evaluated Vendors: Vendor Information And Selection Criteria

Vendor	Solution evaluated	Product version evaluated	Version release date
IBM	• WebSphere Message Broker	6.1	Nov 22, 2007
	• WebSphere Enterprise Service Bus (and WebSphere Process Server)	6.1.2	June 27, 2008
	• WebSphere DataPower Integration Appliance XI50	3.6.1	April 29, 2008
	(Also includes SOA governance capabilities with WebSphere Service Registry and Repository)	6.2	July 25, 2008
IONA Technologies	IONA Artix	5.1	December 2007
JBoss, a Division of Red Hat	JBoss Enterprise SOA Platform, which includes JBoss ESB	4.2	February 2008
Microsoft	Licensed products:		
	• BizTalk Server	2006 R2	2006
	• Visual Studio Professional	2005	Nov. 7, 2005
	• System Center Operations Manager	2007	March 23, 2007
	Available free to MSDN subscribers:		
	· ESB Guidance (including Managed Services Engine)	N/A	N/A
MuleSource	Mule Enterprise	1.6	May 30, 2008
Oracle	Oracle Service Bus (OSB)	3.0	February 2008
Progress Software	Sonic ESB	7.6	April 29, 2008
Software AG	webMethods ESB Platform	7.1	August 2007
Sun Microsystems	Sun Enterprise Service Bus Suite	6	June 5, 2008
TIBCO Software	ActiveMatrix	2.1	November 2007 and August 2008

Vendor qualification criteria

The vendor has at least 100 different customers using the solution in production as of March 31, 2008.
The product release(s) included in the Wave is generally available as of August 31, 2008.
The ESB solution is available as a standalone offering and is in use by at least 10 customers as such as of March 31, 2008.

43267 Source: Forrester Research, Inc.

THE BAR IS HIGH FOR ENTERING THE ESB MARKET

The evaluation uncovered a market in which (see Figure 3):

- **Progress Software, Oracle, Software AG, IBM, and TIBCO lead the pack.** These vendors do it all, and they do it all well. All four of these vendors' solutions include very broad feature sets that include support for many protocols, interaction models, file formats, error handling features, and more. They all have the strong tool sets that let Eclipse-based developers work with design artifacts graphically.

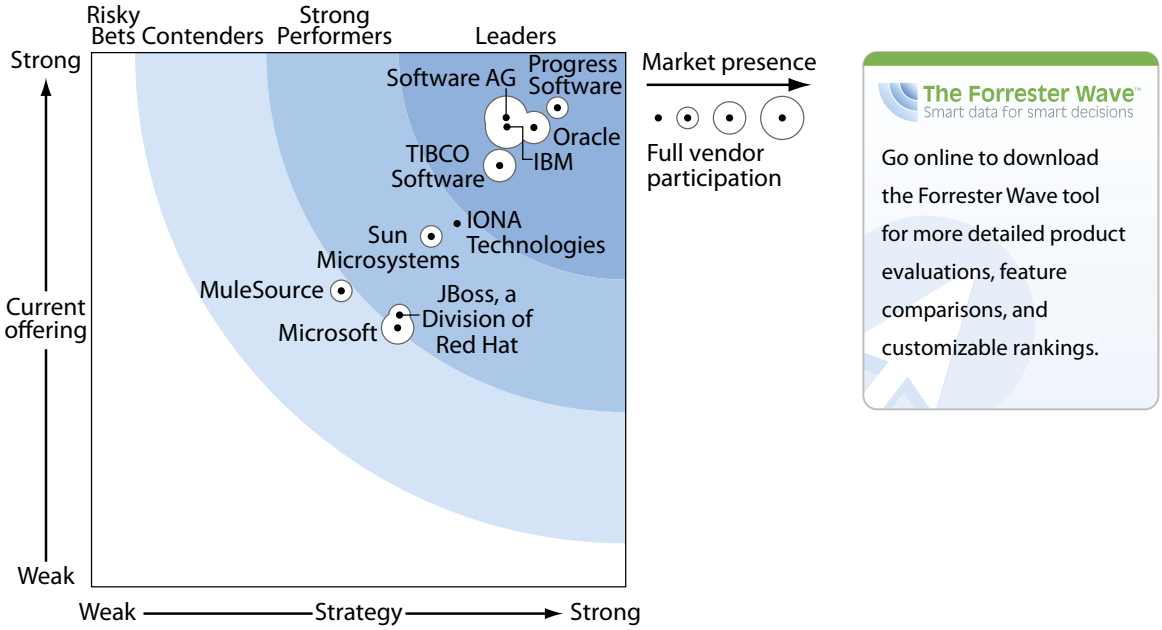
- **IONA, Sun Microsystems, and JBoss, a Division of Red Hat offer competitive options.** Both IONA — now owned by Progress — and Sun fall in the middle of the pack, but for very different reasons. IONA's Artix and FUSE products are established and successful, especially with customers that want the lightweight-endpoint approach IONA offers. Sun Microsystems' strongly standards-compliant Sun ESB Suite offering is simply too young to have a feature set like those of the Leaders' solutions, though its trajectory suggests future growth in both capability and adoption. Though Sun ESB Suite is a community-developed open source product, it is clearly heavily dependent on Sun's involvement, at least for the foreseeable future. JBoss has a strong core ESB engine, popular with developers in shops that favor open source. It has limited but growing enterprise features and lacks graphical tooling and the breadth of options the older products offer.

- **Microsoft offers strong core ESB functions for BizTalk customers.** Windows-centric customers with existing BizTalk implementations and the appetite for a little "assembly" will find that Microsoft's ESB offering is a product with strong ESB capabilities and — a pleasant and welcome surprise — a strong ability to integrate with services on other platforms. Microsoft's main challenge is that it provides its ESB solution essentially in kit form — freely available "ESB Guidance" information and software that the customer must graft onto the combination of Microsoft BizTalk Server and Windows Communications Foundation (WCF). ESB Guidance does include a full reference implementation of a working ESB with all the components integrated. Also, both the developer and application code must directly manipulate XML artifacts because the solution does not provide a graphical editor. The solution runs only on Windows, which limits its applicability in shops that need to deploy their ESB to other platforms.

- **MuleSource has a strong core but a narrower feature set.** Like the JBoss product, MuleSource's offering has a strong core ESB engine and is very popular today with developers in shops that favor open source. Though Mule ESB is evolving, it currently has limited enterprise features and fell short on graphical tool sets, broad protocol and application adapter libraries, and critical partnerships.

This evaluation of the ESB market is a starting point only. We encourage readers to view detailed product evaluations and adapt the criteria weightings to fit their individual needs through the Forrester Wave™ Excel-based vendor comparison tool.

Figure 3 Forrester Wave™: Enterprise Service Buses, Q1 '09



Source: Forrester Research, Inc.

Figure 3 Forrester Wave™: Enterprise Service Buses, Q'1 '09 (Cont.)

	Forrester's Weighting	IBM	IONA Technologies	JBoss, a Division of Red Hat	Microsoft	MuleSource	Oracle	Progress Software	Software AG	Sun Microsystems	TIBCO Software
CURRENT OFFERING	50%	4.29	3.38	2.46	2.42	2.75	4.28	4.46	4.39	3.26	3.92
Basic information	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Design time	35%	3.72	3.46	3.20	2.60	2.72	4.36	4.30	4.52	3.64	3.30
Runtime	30%	4.86	2.78	2.23	2.77	2.98	4.23	4.48	4.29	3.27	4.40
Architecture	35%	4.36	3.83	1.91	1.93	2.59	4.25	4.60	4.34	2.86	4.13
STRATEGY	50%	3.89	3.42	2.86	2.87	2.34	4.14	4.36	3.89	3.18	3.82
Product strategy	25%	4.40	5.00	4.20	4.00	2.60	4.40	5.00	3.80	4.00	4.40
Strategic alliances	20%	5.00	2.40	2.20	5.00	1.00	5.00	5.00	5.00	3.80	5.00
Corporate strategy	25%	5.00	2.00	1.50	1.50	2.00	5.00	3.50	5.00	2.00	4.50
Solution cost	30%	1.80	3.96	3.30	1.64	3.30	2.64	4.12	2.30	3.08	1.98
MARKET PRESENCE	0%	4.38	1.53	2.91	3.95	3.00	3.55	2.51	4.18	3.00	3.51
Installed base	25%	5.00	2.00	2.00	5.00	5.00	3.00	3.00	5.00	5.00	4.00
Revenue	25%	5.00	1.40	2.60	4.20	1.00	4.10	2.60	3.00	2.60	3.40
Growth	25%	2.50	1.00	5.00	3.00	5.00	3.00	2.50	5.00	2.00	3.00
Services	25%	5.00	1.70	2.05	3.60	1.00	4.10	1.95	3.70	2.40	3.65

All scores are based on a scale of 0 (weak) to 5 (strong).

Source: Forrester Research, Inc.

VENDOR PROFILES

Leaders

- **Progress Software.** Of all the products we evaluated, Progress Software's offering has the most comprehensive out-of-the-box support for developing and supporting both lightweight and BPEL orchestrations. It also has broad support for runtime protocols, connectivity options, mediation capabilities, security, and service monitoring and management. Its tooling is very clean, but to use it, developers and architects do need a detailed understanding of Sonic ESB operations. Sonic ESB sports the broadest set of out-of-the-box availability options; its internal software clustering provides no-rollback continuation of processing in the face of messaging node failures while at the same time meeting state-of-the-art performance levels for persistent messaging. It also has among the strongest set of capabilities to support geographic scalability of the ESB across a large number of nodes and physical locations.

- **Oracle.** Oracle Service Bus (OSB) is the first post-acquisition version of what used to be BEA Systems' AquaLogic Service Bus, and unsurprisingly, BEA's traditional strengths in delivering mission-critical middleware are apparent, as is BEA's developer-friendly tooling.[10] OSB has two development interfaces for different roles: an Eclipse-based integrated development environment (IDE) targeted at traditional integration developers creating, hosting, and integrating shared services, and a browser-based tool set for users creating composite applications through process orchestration (Oracle calls these users "shared service specialists").[11] OSB earned top scores for design-time support because of tight integration between OSB and its Oracle Enterprise Repository, which makes it easier for OSB customers to get full SOA service life-cycle management support by using both products together.[12] The OSB runtime includes broad support for runtime protocols, connectivity options, mediation capabilities, security, and service monitoring and management. OSB receives lower scores for its runtime process management, as Oracle included those capabilities in its separate BPEL Process Manager. OSB's availability and scalability features rely on the underlying application server (currently requiring Oracle WebLogic Server).

- **Software AG.** The standout feature of webMethods ESB is its elegant tooling. The product has the cleanest developer abstraction among all the products, which means that it only requires developers to have minimal knowledge of the ESB's underlying operating principles. Software AG earned top scores for design-time support by including its CentraSite repository.[13] Compared with other Leaders, Software AG includes a slightly more limited set of supported protocols, a limitation largely offset by its comprehensive stable of connectivity, mediation, security, and process-management features. WebMethods ESB's architecture scores suffered most from not having fully dynamic provisioning of ESB resources or an embeddable runtime. Software AG's strategy scores suffered primarily from its high list prices.

- **IBM.** IBM fields three ESB solutions: WebSphere Enterprise Service Bus (WSESB), WebSphere Message Broker, and WebSphere DataPower Integration Appliance XI50. The solution set has traditional IBM strengths including broad feature sets and strong "enterprise" features. IBM ESBs have the broadest set of supported runtime protocols, connectivity options, mediation capabilities, security, commercial data standards, and service monitoring and management — hands down. IBM's enterprise features include multiple paths to high availability and both horizontal and vertical scalability. IBM's only weakness in this area is that customers need to integrate a number of products to meet their most extreme needs. The tool sets for Message Broker and ESB are very similar, are a real improvement over previous generations, and stand out from the crowd in making the best overall use of screen real estate.

  IBM targets the DataPower appliance for performance-critical, security gateway, and heavy transformation requirements and frequently recommends that customers adopt a solution that uses DataPower alongside one or more of IBM's other ESB offerings. WebSphere Message Broker is the most mature and broadly deployed IBM ESB product, providing the broadest

set of across-the-board ESB features in the IBM product line. WebSphere ESB is designed to run within and work with WebSphere Application Server (WAS); therefore, it's a natural fit for organizations heavily invested in WAS.

IBM's largest disadvantage in the Wave scoring lies in its list prices — partly because it fields three ESBs plus WebSphere Service Registry and Repository and partly because its list prices are high.

- **TIBCO Software.** The company's ActiveMatrix ESB is descended from TIBCO's EAI offering, and its tooling has some strong features: horizontal default layout to conserve screen space, a property-sheet-based interface for modifying node behavior, transformation stages logically associated with each node (which eliminates extra transformation nodes), and simulation capabilities. Using the tools does require in-depth knowledge of the product, especially when working with Web services protocols. ActiveMatrix ESB includes a top-tier supply of protocols, connectivity, mediation, security, and process management features. The ActiveMatrix foundation gives ActiveMatrix ESB the ability to provision and host services in a grid environment, offering a high level of dynamic scalability best suited to a data center environment. ActiveMatrix ESB's scores suffered from its high list prices and the extensibility and design-time life-cycle management limitations of the release considered for this report. TIBCO has since released an updated version that includes new integration with HP Software's SOA Systinet service life-cycle management solution and a redesigned developer interface.

Strong Performers

- **IONA Technologies.** IONA has two ESBs: its commercially licensed Artix ESB and its open source FUSE, based on Apache ServiceMix. IONA's strategy has been to drive the development and evolution of FUSE as its base offering, with Artix providing more-advanced functionality. As an example, many IONA customers use the products in a complementary fashion — broad deployment of FUSE alongside a more limited deployment of Artix to fill specific needs such as extensive service enablement of existing mainframe assets. The included Artix Registry/Repository provides light life-cycle management support but particularly strong support for managing deployments. IONA designed its Artix and FUSE tooling specifically around making existing services available to requesters through Artix mediation; the tools are largely wizard-driven to simplify creation of protocol conversion, data transformation, routing, and other mediation artifacts, but using them does require a fairly clear understanding of Artix operation. IONA's biggest weakness is that it doesn't field as much connectivity and mediation or as many protocols and other options as the larger players.

- **Sun Microsystems.** Forrester evaluated the first release of Sun ESB Suite. Considering its relative newness, Sun ESB Suite has solid protocol support, with narrower choices for connectivity, mediation, security, service monitoring and management, import/export of artifacts, and extensibility of its repository. The solution's scalability and availability scores suffer from its reliance on the GlassFish application server for clustering (the scores tend to penalize

products for required dependencies) and the lack of tooling maturity that would simplify managing large, geographically dispersed deployments. Sun's strategy scores suffered from a product and SOA strategy that is still getting off the ground, higher-than-average list prices, and midrange subscription prices.

- **JBoss, a Division of Red Hat.** JBoss Enterprise SOA Platform has fewer options and extended features when compared with more mature products. JBoss Enterprise SOA Platform includes Eclipse-based tooling but nevertheless requires both direct manipulation of XML files and in-depth knowledge of the product. Graphical tooling is on JBoss' list of planned enhancements for 2009. JBoss Enterprise SOA Platform's administrative tooling is much better than its development tools; it uses a Web console to manage and monitor all ESB nodes.

  The product's runtime scores suffer from its limited range of options for protocol, connectivity, mediation, security, monitoring, and management. Scalability and availability features are complete but rely to some extent on underlying infrastructure. JBoss Enterprise SOA Platform's pricing is attractive when compared with the price of licensing a commercial product but mid-range when you add its support fees to the cost picture. Of course, customers are not required to pay support fees. JBoss' biggest challenge is expanding the options and adding enterprise-class functionality while drawing revenue from a free product.

Contenders

- **Microsoft.** Microsoft's ESB solution is really a combination of products — BizTalk Server, Visual Studio, and System Center Operations Manager — plus a collection of documentation and samples along with a freely downloadable and modifiable "Managed Service Engine" (MSE) collectively called ESB Guidance. The net effect is to marry BizTalk Server's orchestration engine and .NET's Windows Communications Foundation's binding and protocol conversion capabilities to MSE's mediation and routing capabilities. Customers need to assemble these pieces themselves. While BizTalk has mature tooling, developers must work directly with XML files to create the ESB orchestrations ("flows" or "itineraries") that MSE consumes. Microsoft is committed to ensuring that files created for MSE will be compatible with its ESB road map, which includes an updated MSE and future capabilities that are part of the "Dublin initiatives." Customers with existing BizTalk implementations, a general desire to keep their integration logic within the Windows platform, and the ability to work at the required level will be pleasantly surprised by the solution's breadth of capability as well as its breadth of support for integrating with services on other platforms.

- **MuleSource.** Mule ESB is the darling of open source developers interested in ESBs, and it does in fact provide a very solid engine for mediation, routing, and lightweight orchestration. If your shop is comfortable creating complete solutions by assembling components from multiple open source projects, Mule ESB might be a great fit. A major limitation of Mule ESB: Architects and developers must work directly with the XML files that define the flow of activities within the

ESB. Mule ESB's runtime and architecture scores reflect its relative immaturity — the product doesn't offer the breadth of options you see in more-mature ESBs, and its strategy is focused on the short term. Mule's pricing is favorable compared with the licensing costs of other products but somewhat midrange when you add its support fees to the cost picture. MuleSource is working aggressively to fill in the gaps in design-time graphical tooling and features as well as to broaden protocol support to make Mule ESB a mainstream, enterprise-class product.

SUPPLEMENTAL MATERIAL

Online Resource

The online version of Figure 3 is an Excel-based vendor comparison tool that provides detailed product evaluations and customizable rankings.

Data Sources Used In This Forrester Wave

Forrester used a combination of three data sources to assess the strengths and weaknesses of each solution:

- **Vendor surveys.** Forrester surveyed vendors on their capabilities as they relate to the evaluation criteria. Once we analyzed the completed vendor surveys, we conducted vendor calls where necessary to gather details of vendor qualifications.
- **Product demos.** We asked vendors to conduct demonstrations of their product's functionality. We used findings from these product demos to validate details of each vendor's product capabilities.
- **Customer reference calls.** To validate product and vendor qualifications, Forrester also conducted reference calls with two of each vendor's current customers. For vendors with multiple ESBs in the evaluation, we worked with the vendor to make sure we spoke with multiple customers for each product.

The Forrester Wave Methodology

We conduct primary research to develop a list of vendors that meet our criteria to be evaluated in this market. From that initial pool of vendors, we then narrow our final list. We choose these vendors based on: 1) product fit; 2) customer success; and 3) Forrester client demand. We eliminate vendors that have limited customer references and products that don't fit the scope of our evaluation.

After examining past research, user need assessments, and vendor and expert interviews, we develop the initial evaluation criteria. To evaluate the vendors and their products against our set of criteria, we gather details of product qualifications through a combination of questionnaires, demos, and discussions with client references. We send evaluations to the vendors for their review, and we adjust the evaluations to provide the most accurate view of vendor offerings and strategies.

We set default weightings to reflect our analysis of the needs of large user companies — and/or other scenarios as outlined in the Forrester Wave document — and then score the vendors based on a clearly defined scale. These default weightings are only a starting point, and we encourage readers to adapt the weightings to fit their individual needs through the Excel-based tool. The final scores generate the graphical depiction of the market based on current offering, strategy, and market presence. Forrester intends to update vendor evaluations regularly as product capabilities and vendor strategies evolve.

ENDNOTES

[1] Although the concept of an ESB is well established, its definition has continued to evolve as use case and product capabilities have expanded. This shifting landscape, combined with the different strengths of different vendors, has kept the definitional debate for ESBs alive. See the May 21, 2007, "Shaping Your Middleware Strategy To Benefit From ESBs" report.

[2] To assess the state of the SOA management market and see how the solutions stack up against one another, Forrester evaluated the strengths and weaknesses of top SOA management vendors across 106 criteria. See the February 10, 2006, "The Forrester Wave™: SOA And Web Services Management, Q1 2006" report.

[3] Forrester evaluated leading integration-centric business process management suite (IC-BPMS) vendors across 109 criteria and found that Software AG, IBM, TIBCO Software, Vitria Technology, Oracle , SAP, and Cordys Software achieved leadership status based on their combined strength across the four major areas of evaluation: enterprise application integration (EAI), business-to-business interactions (B2B), business process management (BPM), and service-oriented architecture (SOA). Microsoft, Sterling Commerce, and Sun Microsystems scored as Strong Performers in this category, but each has some limitations related to BPM functionality. See the October 6, 2008, "The Forrester Wave™: Integration-Centric Business Process Management Suites, Q4 2008" report

[4] Progress Software acquired IONA during the course of this evaluation. See the August 1, 2008, "Progress Software Snags IONA And Mindreef For SOA" report. .

[5] The conventional software vendors know they need to maintain substantially higher value than the open source products provide. As the open source ESBs mature, look for commercial products to come down in price and to continue adding new, useful capabilities to increase their value.

[6] Many open source ESBs do include graphical editing of BPEL process flows, but as of this evaluation none of them provided graphical editing of flows or itineraries.

[7] Open source ESB vendors typically sell annual contracts that include installs, packaging, patches, and other support services.

[8] The list for the criterion "Web services protocols group 2" is the longest and includes this list of additional Web services protocols that was too long to be included in its entirety in the criteria explanation in the Wave model: Message Transmission Optimization Mechanism (MTOM), binary Web services, Streaming API for XML (StAX), Java API to read/write XML docs, UDDI v2, UDDI v3, WS-I Attachments Profile,

WS-Security SAML Token Profile, WS-SecurityPolicy, SOAP over TCP/IP, SOAP w/ Attachments API for Java (SAAJ), XML attachments from Java, WS-Security Kerberos Token Profile, WS-Trust, SOAP Message Normalization, Schema Centric XML canonicalization, XML encryption (native, not via WS-Security), XML-binary Optimized Packaging (XOP), XML Signature (native, not via WS-Security), WS-SecureConversation, WS-SecureExchange (WS-SX), WS-Transaction, WS-MetadataExchange (WS-MEX), SOAP over compressed sockets (ZIP sockets), Fast Infoset (FI - binary encoding for XML), Liberty Alliance Web Security Framework (Liberty Alliance ID-WSF), eXtensible Access Control Markup Language (XACML), Web Services Distributed Management (WSDM), WS-BusinessActivity, Web Services Composite Application Framework (WS-CAF), WS-Coordination, WS-Federation, WS-Coordination Framework (WS-CF), WS_Notification (both WS-BaseNotification and WS-BrokeredNotification).

[9] Forrester has found ESBs and/or ESB features in products with service-oriented interfaces or that provide other service-oriented integration capabilities, such as business process management suites (BPMSes).

[10] Forrester published a 2007 report discussing the potential ramifications of an Oracle acquisition of BEA Systems. See the October 16, 2007, "An Oracle-BEA Combo: How It Will Affect You" report. .

[11] Even though Oracle Service Bus' tools support different roles, they provide equivalent features and capabilities.

[12] Oracle Enterprise Repository, in its prior incarnation as BEA's AquaLogic Registry Repository, led the field in Forrester's early 2008 evaluation of SOA service life-cycle management solutions. See the January 28, 2008, "The Forrester Wave™: SOA Service Life-Cycle Management, Q1 2008" report.

[13] Software AG's CentraSite Governance Edition was among the Leaders cited in Forrester's early 2008 evaluation of SOA service life-cycle management solutions. See the January 28, 2008, "The Forrester Wave™: SOA Service Life-Cycle Management, Q1 2008" report.

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