

Building a successful SOA strategy through middleware

Service-oriented architectures deliver the flexible foundation that organizations need today to respond rapidly to business change. Middleware provides the critical path to a successful SOA deployment.

EXECUTIVE SUMMARY

Interest in service-oriented architectures (SOA) is growing at many organizations today. In a recent survey of IT executives conducted by *CIO Insight* magazine, one-quarter of respondents indicated that they've already deployed a services-oriented architecture. Another 19 percent were testing or piloting SOA, while one-third were evaluating or tracking SOA developments.

The excitement surrounding SOA is not surprising considering what SOA can do for business. Because it relies upon loosely coupled services that can change as quickly as business needs dictate, SOA is ideally suited to today's fast-paced competitive environment. Services may be integrated across heterogeneous platforms, enabling companies to drive more value out of existing investments. SOA adopters have been able to increase business process accuracy, streamline integration efforts, and bolster security and compliance efforts.

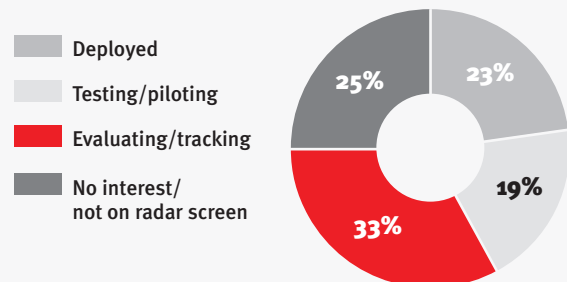
SOA is fueling a revolution in the enterprise.

But it's also driving change in a place you might not expect—the mid-tier.

With service-oriented architecture, enterprises are relying more and more on middleware to provide core services. These services include the critical—like integration, security and management functionality—as well as insightful, such as business intelligence and collaboration-centric capabilities that help businesses work smarter.

SERVICE-ORIENTED ARCHITECTURE

Please indicate where your company stands with regard to the following new technologies.



Source: CIO Insight, June 2005

The technology needs of SOA have vaulted the mid-tier to the position of strategic focal point for today's enterprises. Middleware today enables companies to address three of their greatest challenges head-on:

- Accelerating growth
- Gaining greater insight into the business
- Reducing exposure to risk

Even those corporations that view SOA as a goal to reach in the future are paying attention to the expanded capabilities of middleware because of its ability to help them run their businesses better *today*.

This white paper will show readers how to create a successful SOA strategy by leading with middleware.

RETHINKING ARCHITECTURE

Multiple forces are compelling organizations to reexamine the IT architectures that support their operations. First, there's the accelerating speed of business. To be competitive today, businesses must be able to react instantly to changes in the market—even anticipate changes before they happen.

Another factor affecting architecture is that many companies

must comply with regulations such as the Sarbanes-Oxley Act, ensuring that they have the proper systems, processes and controls in place. Then, there's geography: Many corporations operate in multiple, geographically disperse locations, and have suppliers and other business partners around the globe.

Additionally, many companies have undergone mergers and acquisitions, resulting in a conglomeration of multi-vendor, multi-platform IT systems. Add to this landscape the challenges presented by existing and emerging information security threats, as well as the need to hold down costs, and it's easy to understand why CIOs need to look beyond traditional computing paradigms to meet the needs of their businesses.

Undoubtedly, things have changed since client/server computing first emerged in the 1980s and 1990s. Then, it delivered significant benefits—businesses could distribute computing power throughout the enterprise via networks of servers, workstations, desktop PCs and mobile devices, and provide unprecedented access to information.

Then the Internet upped the ante even more, enabling companies to provide anytime, anywhere information access by Web-enabling their applications and data. By leveraging the Internet, corporations could share information, collaborate electronically and conduct business in ways and at speeds never thought possible.

But as effective as Internet-enabled architectures have been at providing broadly distributed access to information, they now come up short in a number of areas. For one thing, they don't support the level of flexibility and change management that businesses need today to remain competitive. They also do not enable re-use and portability of applications and code, adding to total cost of ownership. They don't support standards for platform independence, limiting flexibility.

These limitations and the realities of modern business are driving companies towards standards-based service-oriented architectures (SOA).

MAKING THE MOVE TO SOA

SOA embodies the new flexibility-driven approach to information technology that companies are increasingly embracing, compelled primarily by the need to stay competitive.

BY THE NUMBERS

Current statistics on middleware and related topics:

\$6.7 billion: Worldwide application integration, middleware and portal license revenue in 2004, according to Gartner.

5.8%: Increase in worldwide application integration, middleware and portal license revenue in 2004 compared with 2003, according to Gartner.

\$2.3 billion: Amount spent worldwide on Web services software in 2004, more than double the total from the previous year, according to IDC.

\$14.9 billion: Amount to be spent on Web services software worldwide by 2009, according to IDC.

21%: Portion of companies that have deployed SOA, according to a survey of 134 companies by AMR Research.

33%: Portion of companies planning to implement SOA in the next 12 months, according to the AMR Research survey.

80%: Portion of software development projects that will be based on service-oriented architecture by 2008, according to Gartner.

Within a service-oriented architecture, application functions are modularized and presented as loosely coupled services that support specific business needs. Because systems interfaces are not dependent on any one platform, any client device running any operating system or application can use a service. Thus, the same service may be used and reused in different ways by various departments and applications across an enterprise. Companies can lower costs by meeting new needs with existing applications. IT staff can quickly roll out new capabilities and functionality to meet changing business requirements.

This type of environment is critical for today's enterprises. "The challenge posed in today's complex and volatile business atmosphere is to create an IT environment designed for the unknown, with detailed business policies and rules abstracted from fixed functional and operational capabilities," said Framingham, Mass.-based research firm IDC earlier this year. "It is the ability to deliver these abstracted capabilities that underlies the strength of SOA."

The payoff can be significant. Besides becoming more agile, early SOA adopters have also been able to:

- Leverage and extend existing IT assets
- Increase levels of consistency and accuracy across key business processes
- Streamline efforts to integrate disparate enterprise software, database and legacy systems
- Bolster security and compliance efforts

This diversity of benefits begs the question—*how*? How can SOA address issues on an architectural level that were previously handled at the application level? The answer is middleware—the new strategic focal point for business and IT leaders alike.

THE MIDDLEWARE-SOA CONNECTION

Connecting "middleware" with "strategic" might appear odd considering its history. Companies have used middleware for years to bridge the gaps between old and new. Early proprietary tools brought mainframes and their data into fast-growing distributed computing environments, providing communication across heterogeneous platforms. Middleware was instrumental in connecting legacy and custom-built in-house applications to new enterprise resource planning (ERP) and

customer relationship management (CRM) systems that dominated IT spending in the mid-to-late 1990s.

These connections, while successful, created another problem altogether—inflexibility. To deliver the information needed to fulfill business requirements, disparate systems—enterprise software applications, databases, legacy systems—were glued together by middleware. As businesses have added new systems and connections to keep up with competitive demands (like e-business suites, business intelligence tools, Web services and Internet-based connections to suppliers and partners) their infrastructures have grown into tangled webs of hardwired connections.

The result? Employees and partners can now access critical information contained in databases from virtually anywhere, via a Web browser—certainly a good thing. But if new requirements necessitate change in business processes, access to different data sources, or managing new and existing users for the service, the process of changing it can be expensive and time-consuming—if the change can be made at all. That's why SOA is so appealing, because it provides a quick, effective, cost-conscious way to respond to change.

TOP 5 SOA BENEFITS

- 1. Simplified integration.** Companies can link disparate applications, processes and data sources quickly by creating standardized SOA services that work together. Development cycles are shortened and integration costs are lowered.
- 2. Increased reuse.** Application components that are exposed as SOA services can be used repeatedly, which saves development time and increases application reliability. Skill sets, particularly within IT, may be better leveraged, and training costs lowered.
- 3. Greater agility.** Enterprises can quickly deploy new business processes or modify existing ones in response to change.
- 4. Higher level of consistency and accuracy** across business processes. Changes to services take effect across an entire company immediately—no more time-consuming, department-by-department updates. Helps corporations work toward "one version of the truth" with their data.
- 5. Reduced risk.** SOA supports adaptable processes and a single security model for accessing services. This helps companies to comply with regulatory demands quickly and cost-effectively.

So where does middleware fit in? Critical services—such as business processes, integration, security and user interfaces—that used to be contained *within applications* now reside *at the middleware layer* within service-oriented architectures.

Says Gartner, “Business requirements for more flexible, powerful and maintainable application software are rapidly changing the underlying middleware infrastructure, including application servers, integration backbones and related middleware tools.”

STRATEGIZING AROUND MIDDLEWARE

To support unprecedented levels of flexibility and visibility in running their businesses, IT managers are relying on middleware for more comprehensive and broader capabilities. In fact, the perception of middleware as a standalone toolset for developers is shifting to middleware as a strategic asset that helps organizations compete more effectively in fast-changing markets.

To achieve competitive advantage, it’s not uncommon to find these types of tools and services driven into the mid-tier:

- **Security and identity management.** One of SOA’s strengths is enabling companies to connect with external partners and customers. Exposing critical corporate data in this fashion demands tight security. By providing security and identity management capabilities at the middleware layer, companies can maintain tight, centralized control over their IT assets. Leading middleware suites also support automatic provisioning, access control, authentication, single sign-on and federated identity, so strict policies designed to secure information and protect privacy may be upheld with minimal impact on IT resources.
- **Collaboration.** Globalization, outsourcing and even the growth of software as a service are all working to further fragment an already geographically dispersed workforce. That’s why tools that can bring employees and business partners together and help them increase their levels of productivity are so important. Through tools like portals, unified messaging and team-centric workspaces, companies can leverage existing business processes, applications and data while providing secure collaborative environments.

- **Information aggregation and analysis.** Corporations today certainly aren’t lacking for data. For most, it’s the opposite—a near-universal information explosion over the past few years has left many companies drowning in siloed data that they can’t leverage enterprisewide. By synchronizing information centrally with a master list,

THE ROAD TO SOA

Enterprises looking to move to a services-oriented architecture need to follow certain steps to ensure success. One thing to keep in mind is that adopting SOA in a “big-bang” approach isn’t the only option. Organizations can gradually move to SOA by creating a service framework around selected existing applications first, then moving newer applications as needed.

Companies first need to identify key priorities for the business, such as generating new sources of revenue or improving customer service. IT executives should meet with the CEO, other senior executives and heads of business divisions to discuss these priorities and how IT can help meet business goals.

Next, IT leadership must determine where services-based applications can be used throughout the organization to help improve processes. Once that’s decided, management should determine whether it makes more sense to build a service from scratch or extend an existing application to an SOA environment. Many organizations will use a combination of both approaches when implementing an SOA.

The development process for new and revamped applications needs to be managed correctly through the various phases, including conceptualization, pilot testing and production. This process must move along at a rapid pace, or organizations risk getting to production too late to take advantage of market opportunities. Adhering to Web services standards such as SOAP and WSDL will ease the development process and ensure that the service will run effectively regardless of the environment.

Application planners and developers must think about future organizational needs and consider interoperability early on when building services, because many services can be used for multiple projects.

Taking an SOA approach to delivering new functionality can provide some significant benefits. One is simplified integration; organizations can connect disparate applications quickly by creating standardized SOA services that work together. Another benefit is increased reuse of IT resources. Application components that are exposed as SOA services can be reused easily, saving development time and costs for IT.

SOA also provides enterprises with greater business agility. They can rapidly deploy new business processes or modify existing ones in response to change using services as SOA process building blocks. Finally, there is reduced risk. Having adaptable processes and a single security model for accessing services enables timely, cost-effective regulatory compliance.

companies may achieve “one version of the truth” for their business. Once data is consolidated and cleansed, it can be analyzed more effectively by business intelligence tools. Having these data quality and analysis capabilities at the mid-tier enables consistency, faster time to delivery, and a higher level of accuracy.

- **Business process orchestration.** Given the rate at which business must change today, it’s imperative for organizations to uncover ways to make these changes quickly, accurately and securely. Enabling these capabilities at the middleware level within an SOA framework allows companies to standardize and streamline business process change.

Harnessing middleware’s broader capabilities within a service-oriented environment makes good business sense for a number of reasons. The now-strategic mid-tier enables corporations to:

- Support and accelerate business expansion
- Deliver greater insight into business issues and drivers
- Reduce exposure to risk and support governance initiatives

But don’t think that in order to take advantage of middleware’s expanded capabilities, you must have an SOA framework in place. On the contrary—middleware tools may be deployed today within existing architectures to help manage

and leverage information stores more effectively. Recognizing the strategic importance of middleware now—and taking advantage of it—will only help companies work better today, and make a smoother transition to SOA in the future.

That’s why choosing the right middleware solution is a top priority for CIOs and the businesses they serve.

CHOOSING A MIDDLEWARE SOLUTION

There’s certainly no shortage of middleware products available today. Analysts count a handful of major players, plus a sizable “other” category (40 percent by Gartner’s latest measure) comprised of smaller niche players. With the growing interest in SOA—which brings with it the need to connect systems and applications together—the number of vendors vying for budget dollars will only increase. Choice is good—but too much choice can lead to confusion, and may delay SOA rollouts.

One of the first big decisions that companies will face when investigating middleware is whether to invest in point solutions or suites of tools and applications from single vendors. Arguments can, and have, been made successfully for both approaches. Point-product vendors typically claim specialization as their key differentiator—in other words, by only doing one thing, they do it completely, and extremely well. Suite vendors, on the other hand, offer the ease of deployment, use and interoperability that’s tough to achieve when cobbling together products from multiple sources.

FIVE KEY REQUIREMENTS TO DEMAND FROM TODAY’S MIDDLEWARE

1. Delivers a comprehensive solution. Middleware must be comprehensive, supporting a wide range of functions such as application development and integration, security and business intelligence.

2. Optimizes business and IT operations. Middleware should enable enterprises to optimize business processes and IT operations by ensuring visibility and helping to make critical information available to the right users at the right time.

3. Enables accuracy and timely business decisions. A middleware platform has to enable companies to improve the accuracy and timeliness of business decisions, presenting information within the context of current business and market conditions so managers can more skillfully direct operations within their lines

of business and cope with ongoing change.

4. Provides secure corporate information. Protecting information assets is more vital than ever. Middleware must support information security and enable organizations to be compliant with regulations, with minimal business disruption. Middleware must be robust and scalable, with high availability and built-in security.

5. Leverages existing IT investments. Enterprise should be able to deploy middleware without having to rip out existing applications and systems at great cost. Middleware should be based on open standards so it can interoperate with middleware products and databases from other vendors, as well as across heterogeneous business applications.

What do industry analysts think? IDC offers the following insight: “The complexity of implementing multiple point-to-point middleware products drives IT developers and their management toward ‘suites’ that can do it all more easily” (Worldwide and North America Application Deployment Software Forecast Update, August 2005).

This strategy makes sense for a number of reasons. First, although vendors may claim adherence to standards that will allow interoperability with other vendors’ products, there’s only one way to validate the claims—install the software. If it doesn’t work, downtime may ensue, and unnecessary costs incurred. A complete middleware solution from one vendor is typically built from the ground up with interoperability in mind—deployment is quicker, and integration is streamlined.

Second, point products may cost more to manage, which contributes to higher cost of ownership. With a suite, IT staff typically only needs to learn a single interface. This is key, because the more interfaces and management tools are added to IT’s plate, the more time, effort and resources it takes to master and manage them all. And when it comes time to deploy the inevitable software patch or fix, or test and validate a new release, IT staff will have an easier time dealing with a single source.

For these reasons, CIOs are finding that it makes sense to seek out a single provider for the middleware solution that will add the most value to their business whether they have already implemented an SOA, or are just starting to lay the groundwork.

SOA IN PRACTICE

Organizations in a variety of industries are deploying a service oriented architecture with the help of Oracle Fusion Middleware suite. Here are some examples:

- A leading communications company wanted to embrace SOA, but found that its proprietary systems wouldn’t support the move. The company needed to improve insight into core business processes that cross multiple systems and address other costly issues related to management and administration of these processes—inability to support high transaction volumes and enable multi-step processes, as well as difficulties integrating heterogeneous systems. This inability to track key events and take action when processes failed cost the company millions.

The company chose the standards-compliant, application server-agnostic Oracle BPEL Process Manager, a part of the Oracle Fusion Middleware suite, to address these challenges. By developing a common approach for automating and reusing its complex business processes, the company now has the ability to automate its order-to-cash processes that span multiple systems, track processes in real time leading to improved customer service, and reduce time to activate/deactivate service for improved operating margins. In addition, the company can also easily create and reuse business processes to automate service offerings, so new services can be rolled out faster, positioning them more competitively in a fast-moving telecommunications industry.

- A logistics business plans to use Oracle Fusion Middleware as the foundation for its new service-oriented platform. Like many global organizations that grew through mergers and acquisitions, the company now has the challenge of standardizing on key technologies and applications among its many subsidiaries. Because of the scope of the project, the company will create an

advanced Enterprise Service Bus (ESB) using Oracle Application Server 10g for its strategic IT integration platform. This platform will allow the company’s departments and business units around the world to develop integration projects with local controls and autonomy that can also connect with the company’s larger, global integration grid. For example, a division in Germany can define and implement pricing while a separate division in the U.S. can control the procurement process.

Oracle will play a major role in the move to SOA as a business partner that will help this company support its international growth strategy. The company’s service-oriented platform based on Oracle Fusion Middleware will enable them to easily plug both newly developed and existing IT systems and provide the company with flexibility and speed required to become a leading company in logistics worldwide.

- A transportation enterprise is relying increasingly on SOA because it provides a means of updating and optimizing business processes as quickly as market conditions change. SOA-based services—which enable the company to provide up-to-date information to its business users, external partners and customers—are the foundation for new customer-centric applications. For example, the company upgraded old mainframe clients to Web-accessible PCs and a centralized database built on Oracle Database 10g to create the foundation for its new passenger booking application. This service-oriented, customer-facing application creates efficiencies that save the airline \$1 million per year.

ORACLE FUSION MIDDLEWARE

Oracle is among the top providers of complete middleware solutions, or suites, today. Its Oracle Fusion Middleware family is designed to address integration issues while laying a foundation for developing, deploying, maintaining and optimizing a service-oriented architecture.

Oracle Fusion Middleware delivers the tools that companies need to transform their architectures into flexible, service-driven frameworks that respond to challenge quickly, and transform their data into actionable information. It includes solutions for:

- **Application server and development tools.** Oracle's standards-based application server and development tools provide organizations with a comprehensive and integrated environment to easily develop, deploy, maintain and secure service-oriented architecture applications.
- **Business integration.** Oracle business integration tools help companies integrate and monitor business processes, applications and data, and securely extend these connections to business partners outside the organization.
- **Data hubs.** Very few companies can consolidate and cleanse disparate data sources to produce a "single version of the truth" when it comes to customer, product or financial information. Oracle Data Hubs not only provide reliable and accurate master data information, but also help companies turn data into actionable information.
- **Business intelligence.** Tools in this suite help enterprises address diverse analytical needs from query, reporting and analysis to data integration and management. Organizations have better information when they need it to support key business decisions.
- **Content and collaboration.** In addition to providing collaboration capabilities that foster employee and partner productivity, Oracle content services help mitigate risk and strengthen corporate compliance by managing email, electronic documents, instant messages, voicemail, fax and Web conferences in a database repository. Organizations can establish process controls across all content with a centralized repository to cost-effectively audit, retain, archive and manage content for compliance—and to react with agility when new regulatory pressures appear.

- **Identity management.** As companies expose more of their information and systems to customers and partners, securing the data that lies within and ensuring proper access takes on an added level of importance. Oracle identity management solutions provide the infrastructure to help corporations centrally manage identities and access throughout their life cycles, so critical systems are protected without causing resource drain on IT.

For complete details on these and other solutions, and to access customer success stories, seminars and demonstrations, visit www.oracle.com/middleware.

DIFFERENTIATING FACTORS

When searching for a solution provider, enterprises look for features and functionality that differentiate one vendor from the next. This is understandable and to be encouraged—first, because these solutions tend to represent large budget expenditures; and second, because while commoditization is good for prices, it may also inhibit competitiveness. As part of the due diligence process, companies should investigate what vendors deliver that sets them apart.

There are three key capabilities of Oracle Fusion Middleware that set it apart from competing solutions. First, Oracle Fusion Middleware delivers a *complete* solution that addresses all of a company's top challenges when deploying a services-oriented infrastructure, ranging from J2EE application server and development tools, integration and business intelligence to collaboration and content management. All products within the family have been engineered to work together which provides out-of-the-box integration benefits. Implementation times are faster, which in turn means quicker time to benefit and ROI. Over time, companies may also reduce staffing, management and support expenses with Oracle Fusion Middleware as technology expertise and training can be leveraged on multiple projects—which in turn saves money.

Second, Oracle Fusion Middleware, because it is based upon industry standards, is highly interoperable. Products in the family can work with third-party middleware products and databases, as well as across heterogeneous business applications. For example, Oracle's Business Process Execution Language (BPEL) Manager runs on any J2EE application server including its own application server as well as those from IBM and BEA. Oracle's identity

SOA BEST PRACTICES

- Determine the need for a service-oriented architecture or services-based applications within the organization, based on the existing technology architecture and taking into account current and future requirements of the organization.
- Get buy-in for broad SOA adoption from senior business and technology executives and line-of-business managers to help ensure success.
- Establish an SOA center of excellence to be staffed with IT and business people who will help select standards and products, as well as plan, design, develop and promote the new SOA environment within the organization.
- Consider hiring outside consultants who are expert in SOA, Web services, BPEL, WSIF and other related areas if these skills are not readily available internally.
- Communicate regularly on SOA developments and successes to keep people in the organization—as well as key business partners—aware of progress.
- Determine the expected benefits of an SOA adoption to the organization—such as application reuse, improved integration, cost savings, improved customer service—and decide how best to measure these benefits.
- Plan to adopt SOA in a phased approach, starting with a single, low-risk application or a pilot program before broadening to other applications, across business divisions and eventually to an enterprise SOA infrastructure.
- Share “lessons learned” among SOA development and implementation teams during the rollout process to avoid duplicating earlier mistakes, and to repeat successes.
- Regularly measure the results of the SOA adoption in terms of added business value for the organization.
- Keep abreast of the latest developments in SOA, such as standards developments, new middleware and other integration products and features, and vendor partnerships.

management solution works with leading LDAP servers such as Sun Java System Directory Server or Microsoft Active Directory. Oracle Fusion Middleware can also run on several popular computing platforms and interoperate with middleware products and applications from IBM, Microsoft and SAP. Because it works with what organizations already own—applications, technology and infrastructure from any vendor—there’s no need to rip and replace. Organizations can avoid getting locked into one vendor and save money by leveraging existing IT investments more extensively.

Oracle Fusion Middleware—along with the Oracle grid computing initiative—also helps companies reduce risk by ensuring that applications and data are available, scalable and secure, and that efficiencies can be leveraged across the mid-tier. Oracle Identity Management adds crucial security functionality such as single sign-on and federation capabilities for Oracle and non-Oracle applications. These are must-have capabilities for enterprises that rely on systems, applications and information to support their business processes—24x7x365.

ENABLE THE FUTURE TODAY

Both business and technology are vastly different than they were when client/server computing first emerged

as a new and promising architecture. In the past, many applications and systems were designed to address specific requirements and functions. Today, organizations need an IT architecture that can easily adapt to change, providing a secure, flexible, cost-efficient environment that supports complex, heterogeneous infrastructures. A service-oriented architecture can meet that need.

Says IDC, “A well-constructed, standards-based SOA can empower a business environment with a flexible infrastructure and processing environment by provisioning independent, reusable automated business and systems functions as services and providing a robust and secure foundation for leveraging these services. Efficiencies in the design, implementation, and operation of SOA-based systems can allow organizations to adapt far more readily to a changing environment.”

Middleware provides a critical path to SOA. Oracle Fusion Middleware gives enterprises a means of achieving a true service-oriented architecture that can support the business now and in the future.

For more information on Oracle Fusion Middleware, visit www.oracle.com/middleware. ■

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