



WHITE PAPER

Application Performance Management

**Effective Performance Management
for Service-Oriented Applications**

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Executive summary

Service-oriented architecture (SOA) is a new approach to keep an old promise: Align IT services with business goals, at justifiable costs and with competitive speed. SOA applications provide the flexibility, agility, extensibility, and contribution to IT productivity that are driving the rapid expansion of supply and demand.

Loosely coupled software services are the source of SOA strength, but they inevitably add complexity. SOA applications stretch across infrastructure tiers, software, middleware, hardware, and operating systems—even corporate or national borders. They are relatively new, unfamiliar to IT administrators, and changing fast. Tools to manage them must:

- Work across multiple vendors' hardware and software platforms
- Monitor and correlate end-user transactions across multiple tiers
- Help IT specialists from different fields drill down to the root causes of performance issues
- Provide actionable application performance troubleshooting advice and guidance

Precise application performance management (APM) solutions have been proven in the most demanding multi-tier applications of global financial services firms, telecommunications companies, and online retailers. Each solution component offers compelling advantages for managing SOA applications:

- Precise helps monitor, collect, and analyze information across the application tiers and platforms of the most complex SOA applications. It provides the end-to-end visibility and business focus needed to keep applications running at peak performance, managed according to service level agreements (SLAs), and scaled up or out with confidence and to keep staff productive.
- Precise also provides active monitoring and real-time diagnostics for business-critical Web applications. It helps organizations anticipate and prevent problems instead of relying on customer complaints and troubleshooting to fix them.
- Precise Application Service Dashboard organizes the information needed by an applications team—or a single specialist—to monitor and analyze critical application performance, toward the goal of peak effectiveness.

The Precise APM solution helps organizations realize their business goals for SOA applications, delivering business-level visibility and control for significant gains in agility, flexibility, and productivity.

The service-oriented architecture promise

SOA provides an applications approach that serves business requirements, after decades in which business processes had been forced into arbitrary IT frameworks. The vision offers compelling benefits to both business users of IT and IT itself.

For business users, the chief appeal of SOA lies in its flexibility—the ability to integrate, reintegrate, adapt, and redeploy IT assets as business requirements change and grow. The SOA platform helps organizations design and adapt IT services to meet business requirements and market demand—improving time-to-market for products and services. Businesses today are changing fast to stay competitive, for example, by outsourcing and offshoring or adding partners to their supply chains. To keep pace with today's markets, companies need to use IT as a competitive tool. The most competitive businesses are adopting SOA-based applications to improve their capacity to stay ahead.

For IT, the open, standards-based SOA framework offers:

- **Agility**—SOA applications are easier to modify, upgrade, and reconfigure, so high-priority initiatives generate business value in less time.
- **Flexibility**—Existing infrastructure, software, and processes may be reconfigured and redeployed, for better returns on IT investments and higher utilization of staff.
- **Productivity**—Reuse of code and components improves developer productivity, reduces application development time and effort, and cuts IT backlogs.
- **Extensibility**—SOA helps organizations extend returns from legacy IT investments, creating loosely coupled solutions that consolidate fragmented IT capabilities.

As a practical matter, SOA promises to help IT integrate existing applications with new applications, easily map business processes such as order-to-cash into software IT structures and processes, share data and access, and establish interoperability among diverse systems. But in a larger sense, SOA promises to help businesses reduce costs even as they adapt to change more quickly and use IT as an extension of their business strategies.

This rare alignment of business and IT benefits has catapulted SOA into the top rank of enterprise IT priorities. In fact, Gartner reports SOA as number six among CIOs' Top Ten Technology Priorities for 2006.¹ *InfoWorld* magazine reports that the "SOA market is exploding" with almost 80 percent of survey participants agreeing that "SOA is a critical or high priority over the next three to five years."²

¹ Press release, *Gartner Survey of 1,400 CIOs Shows Transformation of IT Organisation is Accelerating* (Egham, UK: Gartner Executive Programmes, 2006).

http://www.gartner.com/press_releases/asset_143678_11.html

² Wade Grubbs, *From Pilot to Payoff: Service-Oriented Architecture Hits Its Stride* (San Francisco: InfoWorld Media Group for BEA Systems, 2006).

Inside SOA

The core concept of SOA is *loose coupling* of software services—a way of organizing services that may have different origins and ownership to minimize their interdependencies. This approach is much more adaptable than expensive, more tightly coupled technologies, including the Common Object Request Broker Architecture (CORBA) and Distributed Component Object Model (DCOM) interoperability frameworks that SOA supersedes.

SOA Web services

SOA concepts have their practical roots in Web services distributed-computing technology. Although it is possible in principle to implement SOA using other technologies, Web services underpin most SOA-based applications and form the foundation of standards-based SOA.

Web services technology contributes to the momentum of SOA. Open standards Web services support loosely coupled interactions among vendor proprietary, open source, and home-grown systems. The speed, cost-effectiveness, and flexibility of this approach have helped to dissolve proprietary barriers among systems and accelerate adoption. SOA helps IT to diverge from stovepiped systems toward more open, flexible technology.

SOA uses and users

SOA is a natural technology for applications in e-commerce, Internet banking, and securities trading and in real-time business-to-business collaboration. Companies well suited for SOA projects include those involved in mergers and acquisitions, multichannel product or service rollouts, business-to-business networks, geographic expansion, and enterprise-wide systems integration projects. For example:

- Travel firms can use SOA to speed up the development of critical Internet-based applications as the market moves from agent-based to online reservations.
- Telecommunications companies can coordinate information across financial, provisioning, and customer relationship management systems to align billing, service provisioning, and customer support business processes.
- Government agencies can align information systems with strategic objectives, including easier citizen access to services, to comply with federal mandates.
- Financial and banking firms can offer self-service online banking, personal portfolio management, securities trading, and more by linking transaction-heavy processing on the back-end systems with Web-based user interfaces.

Responding to customer demands and emerging market trends, leading infrastructure vendors have invested heavily in SOA infrastructures that are cost-efficient and productive to implement. Organizations use the IBM® WebSphere family of products to build mission-critical applications that apply SOA principles. They use the BEA AquaLogic product family to develop SOA-based applications. On the Windows® platform, Microsoft has introduced the .NET and compatible SOA technologies. SAP's NetWeaver application platform provides the infrastructure needed for exposing

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application code as services. And Oracle has built the Fusion SOA platform to effectively use the application logic obtained in their PeopleSoft, Siebel, Retek, J.D. Edwards, and other acquisitions. Many businesses are already applying these technologies to build their own next-generation applications.

With all its promise, however, SOA also brings the challenge of maintaining optimal IT system performance. No system, however flexible, is useful if it underperforms. SOA principles help IT bridge persistent technology gaps, but they often make the IT environment more complex. And because SOA applications are often customer-facing, multichannel applications and portals, application performance problems are genuine business emergencies. Performance issues buried deep inside distributed SOA environments can choke the flow of banking transactions, securities trades, ticketing, customer support, and every form of online commerce.

Performance challenges in a SOA-based architecture

The challenges for IT administrators managing SOA applications stem from the following factors:

- **Multi-tier application architecture**—SOA-based applications typically employ multiple tiers, such as orchestration servers, enterprise service bus infrastructures, application servers, data adapters, databases, storage layers, and others. Monitoring SOA-based applications requires monitoring all these components and their interactions.
- **Heterogeneous platforms**—SOA-based applications are seldom homogeneous. For example, a service built in .NET may call one built in J2EE or use data from both Microsoft® SQL Server and Oracle® databases. Heterogeneity of the environment means IT administrators must monitor across platforms as well as tiers.
- **Loose coupling**—Loose coupling adds flexibility but may interfere with visibility and control. For example, an SOA-based banking application might redirect a service request to a different provider according to predefined business rules, introducing unknown performance characteristics.
- **Boundary crossing**—SOA-based applications often cross physical server boundaries and may even cross private and public network boundaries. These extra “hops” make failures and performance bottlenecks more likely.
- **Limited staff experience**—SOA-based applications are relatively new and introduce unfamiliar elements to IT administrators. For example, orchestration layers and the service bus are still unfamiliar concepts to IT administrators.
- **Abstraction**—SOA-based applications abstract their underlying implementations, so traditional performance testing during development may be insufficient to ensure performance in production. For example, developers may be calling a component developed by another company or in another country.
- **Rapid rate of change**—SOA-based applications help IT change quickly to meet business needs. Thus operating manuals, training, and the support infrastructure must be kept up to date to assist IT administrators.

Most of these factors have their roots in the advantages of SOA; any new framework that supports quick, loose connection across a broad span of hardware and software infrastructure would present many of the same challenges. They are not barriers, but new approaches are needed to overcome them. In particular, IT managers need to extend their performance management practices to meet the complexity of demanding SOA environments.

Managing the performance of SOA-based applications

First and foremost, IT managers must adopt an advanced performance management solution to help ensure the performance of their SOA-based applications. Performance problems in SOA environments are experienced more quickly and broadly than with traditional applications. Manual processes or vendor-supplied tools simply do not provide the visibility needed for effective management.

SOA-based applications demand an industry-proven APM solution that spans every platform and tier of the SOA infrastructure. An ideal APM solution for SOA would offer the following capabilities:

- **Broad coverage**—No database tuning tool can tell the complete story about an SOA environment, nor will a J2EE profiler. The narrow perspective of infrastructure vendor log analyzers makes them miss the majority of SOA performance problems, and small-vendor tools for visibility into a single tier will build false confidence that could lead to serious performance problems with SOA-based applications.
- **Multilevel coverage with correlation**—An APM solution should cover Web servers, application logic, application servers, middleware, network flow, database activity, and all storage layers and be able to correlate activity across multiple tiers.
- **Active monitoring**—APM solutions should be able to simulate real SOA transactions to identify problems before they affect end users or partner systems. For example, simulating a message sent using Simple Object Access Protocol (SOAP) can determine whether service requests are being fulfilled successfully. Active monitoring is essential to help ensure that services are continuously available for end-user and partner systems.
- **Performance intelligence**—Fast-changing SOA-based applications need an APM solution that can analyze performance data and deliver intelligence about components and their interactions. Some examples of intelligence include forecasts of application scalability, information about past and current compliance with SLAs, and actionable advice to help fix performance bottlenecks in SOA-based applications.
- **Consistent, customizable views of performance data**—An ideal APM solution for SOA-based applications would provide a single view of all relevant performance data. It should also be easy to build customized views into SOA-based application performance without switching between multiple tools and user interfaces.

APM in SOA environments

Precise has provided APM solutions for over 15 years, with heavy investments into building one of the industry's best APM solutions. Precise's APM solution rests on three pillars:

- Precise monitors end-user transactions with in-depth collection and analysis of performance data.
- Precise provides continuous active monitoring to maintain the performance and availability of critical Web business systems, including SOA-based applications.
- Application Service Dashboard provides a unified, consistent, and customizable view of data on the performance of SOA-based applications.

Precise—monitoring, collection, and analysis

Precise has been solving complex application problems for years, and the solution is well-suited to the challenges of SOA-based architectures. A mature APM solution with exceptionally broad coverage of operating systems, databases, applications, storage subsystems, and middleware platforms, Precise is used by enterprises worldwide to monitor and tune the performance of their most critical customer-facing applications.

The solution looks across tiers of Web services infrastructure—from XML requests through the middle tier, across the database, to the storage tier and back—correlating transactions across application layers to pinpoint sources of problems, analyze root causes, and eliminate bottlenecks.

Precise takes an end-user perspective toward performance, tracking real transactions across tiers and correlating results. Unlike point solutions that measure performance in just one layer, Precise provides an overview of application-focused information correlated across layers. It monitors end-to-end performance in live production environments, using low-overhead technologies that require no application code changes.

Precise not only isolates the causes of performance degradation, but it also uses customizable SmarTune expert advice technology to guide staff toward quick, effective problem resolution. The fully integrated solution helps keep the application infrastructure running at peak efficiency, delivering the service levels businesses demand.

Designed and optimized to manage performance in multi-tiered Web-based applications, Precise is an excellent fit for the advanced performance-monitoring challenges of SOA environments. Organizations can expect rapid, significant operational improvements from their Precise investment in these areas:

- **Staff utilization**—With end-to-end visibility across every supporting tier, IT staff can identify and resolve the causes of latencies or slowdowns quickly, and then move on to other tasks.

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- **SLA monitoring and reporting**—Precise helps IT staff assess performance data to determine performance baselines and set SLAs. Threshold ranges can be adjusted to anticipate performance issues, identifying and resolving them even before users experience an impact.
- **Efficient, collaborative problem solving**—Precise works across tiers, platforms, and functional areas, so application teams can quickly identify performance bottlenecks and route issues to appropriate IT groups.
- **Abstraction layer troubleshooting**—Precise helps IT staff uncover performance complexities lying beneath the SOA services abstraction layer. The solution shows the transaction's progress throughout application tiers beneath the services abstraction. Once a troubled tier is identified, Precise supports drill-down analysis to identify the root causes of the problem.
- **Scalability**—Precise is designed to support the increased complexity of SOA-based applications as they scale up and out. It is a proven performer at the global enterprise scale that has been implemented by some of the world's largest firms across hundreds of servers and thousands of users.

Active monitoring for performance and availability

Precise's synthetic transaction solution monitors the execution of Web business system transactions and performs real-time diagnostics when problems occur or SLA thresholds are violated. It gives customers fast time-to-value and strong ROI with its ease of installation and simple administration.

Precise's synthetic transaction solution monitors a broad collection of system transactions and events. Its design supports modern multi-tier architectures, including SOAs and Web services that use SOAP wrappers to encapsulate application requests. Within the solution, users can create SOAP jobs to check the availability and responsiveness of Web services by calling them using a SOAP request.

Precise's synthetic transaction solution supports the use of SOAP jobs by creating a monitor or a diagnostic. Users can deploy a SOAP monitor to test responsiveness easily, according to a schedule. Alternatively, as a diagnostic, Precise's synthetic transaction solution runs SOAP jobs to diagnose problems encountered while monitoring an application.

Along with SOAP, Precise's synthetic transaction solution supports a broad range of other infrastructure protocols and applications including DNS, FTP, ICMP Ping, LDAP, POP3, IMAP4, MAPI, RADIUS, Command Shell, TCP/IP, and Citrix. This breadth of coverage allows Precise's synthetic transaction solution to comprehensively monitor complex, enterprise-class applications.

Application Service Dashboard—a unified view of performance

Application Service Dashboard provides a customizable, portal-based dashboard for viewing SOA-based application performance data as through a single pane of glass. It can show data from multiple tiers and aggregate it across the SOA infrastructure. For example, it can show the top activities in a database side by side with the top SAP transactions. Application Service Dashboard utilizes portlets based on widely accepted standards including JSR 168. Using Application Service Dashboard, IT managers can get a comprehensive view of their applications with no need to switch

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between multiple tools offering different metrics and user interfaces. In addition, by role-based data filtering, IT administrators can arrange data about SOA-based applications according to their job function. For example, an applications administrator can examine the activity of top applications, while the Tuxedo administrator can concentrate on transactions crossing that middleware platform.



Like the other components of the APM solution, Application Service Dashboard works across multiple platforms and tiers, delivering actionable performance information for effective, coordinated response. Most important is its ability to combine consistent, up-to-date performance information with views that can be customized to the needs of multiple specialists. This helps interdisciplinary teams work together effectively.

Precise and special features and advanced requirements

Precise addresses SOA environments with special features or advanced requirements. Some advanced features of Precise include:

- **Platform coexistence**—Precise supports J2EE, .NET, and other frameworks for effective management of mixed SOA environments. For example, a J2EE presentation layer might communicate with a .NET business layer that uses an SQL Server repository and a back-end J2EE business layer that uses an Oracle database. Precise can instrument all the technologies (J2EE, .NET, SQL Server, and Oracle) and correlate transactions as they move among the tiers
- **Portal awareness**—Although portal technology predates SOA, loosely coupled systems are an excellent fit with the cross-application visibility that portals provide. As a result, most organizations implement portals within their SOA-based applications. Precise fully supports

Figure 1 Precise Application Service Dashboard

popular portal servers, including visibility into their inner workings, so root causes of portal performance issues can be understood and resolved as simply as those of other application components. Precise delivers performance information using meaningful portlet names, eliminating look-up and translation delays and errors.

- **WebSphere and WebLogic support**—Precise collects performance metrics provided by application servers including IBM WebSphere, IBM WebSphere MQ, and BEA WebLogic. These metrics are an important source of performance data about database connection pools, Enterprise JavaBeans components, pools and caches, sessions, and threads. IT personnel can use them to assess application performance against that of their application servers.
- **Instrumentation support**—Precise includes instrumentation for Web services including SOAP, JAX-RPC, and JAXR calls; XML processing; and statistics collection for JMS.

Conclusion

SOA delivers on its promise of a cost-effective applications framework to support rapid, flexible configuration and reconfiguration of IT services to meet business requirements and goals. But the strengths of SOA—speed, loose coupling, use of multiple tiers of heterogeneous hardware and software infrastructure—greatly complicate the task of application performance management.

Success with SOA implementation requires an APM solution that monitors business-critical enterprise applications actively to uncover and correlate performance factors across multiple platforms and tiers at the speed and scale required for effective response. The Precise APM solution helps IT administrators master the complexity of SOA with active performance monitoring and expert tuning capabilities to anticipate, identify, and resolve performance problems—often before end users become aware of them.

The Precise APM solution reaches through the SOA abstraction layer to provide visibility into the interrelationships and dependencies of components and tiers that affect the response times of complex transactions. It works together with SOA applications to help them run optimally, promoting the principal goal of SOA—improved business agility. Its timely alerts for pending performance issues help IT meet SLA requirements and resolve issues before they become problems. The solution helps achieve desired returns on enterprise SOA investments by making staff, infrastructure, and applications more effective.

The Precise APM solution is essential for IT organizations to realize their vision of SOA business value, with tools that keep SOA-based applications up and running at peak performance, improving interactions with partners, suppliers, customers, and employees and achieving overall gains in business agility, flexibility, and productivity.

About Precise Software Solutions

Commitment, Focus, Experience

For over 15 years Precise Software Solutions has helped our Global 2000 customers manage business performance in complex, heterogeneous environments, assuring availability and business continuity. Precise offers a complete solution – from discovery through ongoing management – that allows our customers to focus on their core business. We offer the broadest platform support, in terms of enterprise application, operating system, database, and development environment coverage. Precise is the solution of choice for IT as an organization-wide standard for application management.

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