

SOA Management with Oracle Enterprise Manager

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SOA Management with Oracle Enterprise Manager

EXECUTIVE OVERVIEW

Changing markets, increasing competitive pressures and evolving customer needs are placing greater pressure on IT to deliver greater flexibility and speed. In response to these challenges, several companies are adopting Service-Oriented Architecture (SOA) as a means of delivering on these requirements by overcoming the complexity of their application and IT environments. SOA represents a fundamental shift in the way new applications are designed, developed, and integrated with legacy business applications, and facilitates the development of enterprise applications as modular business services that can be easily integrated and reused.

Within a SOA environment it is critical to align business and IT perspectives, deliver on customer expectations of service levels, automate management of SOA runtime environments, (such as managing the lifecycle of web services, and quickly diagnosing root cause of problems in the service layer) and help manage the SOA infrastructure components themselves. Oracle Enterprise Manager (EM) addresses these challenges by helping model, monitor, and manage the SOA environment and services delivered to the customer.

Oracle SOA Suite is a standards-based best of breed suite that enables you to build Service-Oriented Applications and deploy them to your choice of middleware platform. Oracle Enterprise Manager Grid Control, when used in conjunction with Oracle SOA Suite, can help you achieve greater organizational flexibility better than any other solution in the market. Together, they can reduce your costs and middleware complexity. They can also help you to achieve the best total value of opportunity.

INTRODUCTION

Today, every organization is faced with the need to adapt to changes in the global business environment, to rapidly respond to competitors, and how to best exploit organizational assets to prepare for growth. Your enterprise application infrastructure can either help you meet these business imperatives or it can impede your ability to change. To help you, your infrastructure must:

- Improve your ability to predict and respond to change
- Enhance organizational productivity

- Simplify your information technology environment
- Leverage existing investments

In order to deliver on these requirements and overcome the complexity of their IT environments, leading companies are adopting Service-Oriented Architecture (SOA). SOA represents a fundamental shift in the way new applications are designed, developed, and integrated with legacy business applications, and facilitates the development of enterprise applications as modular business services that can be easily integrated and reused.

Oracle SOA Suite and Oracle Enterprise Manager enable you to build Service-Oriented Applications, deploy them, and manage them to your choice of middleware platform. The Oracle SOA suite consists of:

1. An Integrated Service Environment (ISE) to develop services
2. A multi-protocol Enterprise Service Bus (ESB) to integrate applications
3. A Services Registry for discovering and managing the lifecycle of services
4. A BPEL-based orchestration engine to tie services into business processes
5. A Business Rules Engine to enable business policies to be captured and automated
6. Web Services management and security solution to enforce authentication and authorization policies on services and to monitor services and processes for compliance to SLAs
7. A Business Activity Monitoring (BAM) solution to gain real-time visibility into business entities and their interactions, and a means to enable automated actions to be performed
8. An Enterprise Portal for employees, customers and partners to access content, access relevance performance metrics, collaborate and take actions via interaction with business processes.

This paper will show how Enterprise Manager Grid Control in conjunction with Oracle SOA Suite can manage SOA environments efficiently and in a cost effective manner. EM Grid Control enables SOA management by bridging business and IT perspectives, helping manage service levels to customer expectations, resolving service problems quickly, lowering the cost of managing the lifecycle of services, and reducing the business impact of any changes.

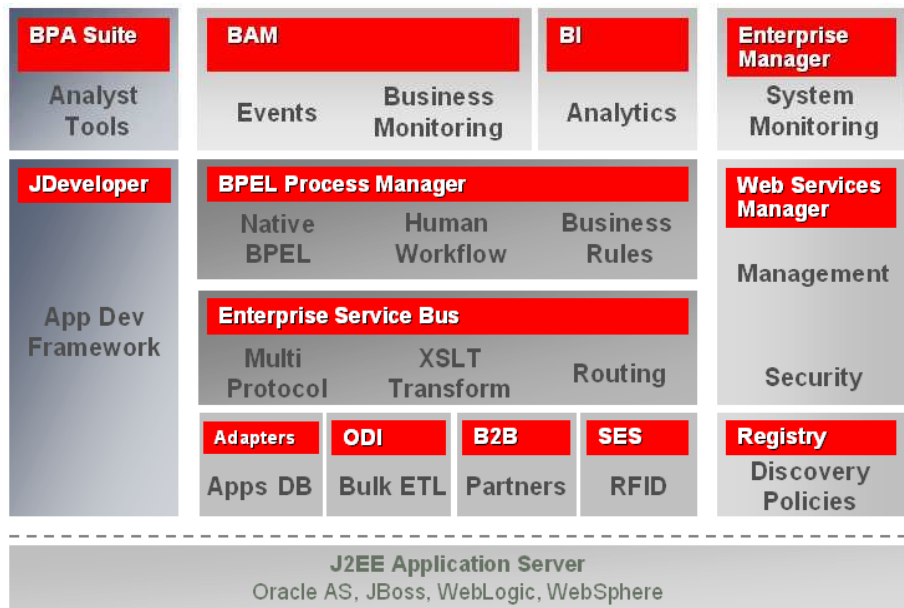


Figure 1: Oracle SOA Suite

SOA MANAGEMENT CHALLENGES

SOA Management Challenges

1. SOA Runtime Governance
2. SOA Infrastructure Management
3. Business-IT Alignment

As SOA projects mature within IT organizations, a new set of challenges will arise that will center on generating return on the SOA investment. SOA projects can easily get out of hand if they are managed incorrectly. Managing a SOA environment presents several challenges for the IT organization, at the infrastructure, service and the business levels.

IT organizations that implement SOA not only face challenges managing the three layers, but also deriving extra value from a combination of the layers. The three main management challenges are:

Challenge 1: SOA Runtime Governance

Service-Oriented Architectures, unlike traditional application architectures, are designed for change. SOA-based applications and systems become flexible “plug-and-play” IT assets that can be adapted quickly and easily to new business demands. In addition, Web Services development tools make it extremely easy to create Web Services from any procedures. Without established SOA governance policies, there is a danger that services can proliferate out of control. What is required is the ability to manage the lifecycle - from design, to deployment, to provisioning, & configuration, and to monitoring- of these services. Key questions for SOA runtime governance are:

- Can I accelerate root cause diagnosis and impact analysis by understanding the provider-consumer relationships and dependencies, defined at design/development time?

- How do I implement web services to work in accordance with operating policies and consumer/provider agreements? How do I monitor and ensure quality, predictability and performance of web services?

Example 1:

A large bank has a SOA infrastructure in place with several Web Services being orchestrated via business processes on their production environment. A corporate policy to enhance security across all applications is issued by the corporate security group. A shared security Web Service provides encryption and decryption functionality to several disparate applications. The IT manager needs to understand the impact of changing a particular Web Service, by understanding the dependencies of business processes with services in the SOA environment. A seemingly simple change to a security policy, like changing encryption key sizes, can reduce service levels for all applications dependant on this service. The use of shared services means that the IT manager has to easily understand the nature of interdependencies that plays a key role in prioritizing changes and understanding the effects of any changes.

Challenge 2: SOA Infrastructure Management

As SOA projects grow in size, the underlying IT infrastructure has to support high availability and performance across the entire stack. Operation managers find that monitoring and manageability capabilities of the SOA infrastructure decrease as the underlying business processes, services, applications, databases, servers, firewalls etc increase.

You can not have special management and security policies for your SOA and different ones for the rest of your enterprise applications and supporting IT infrastructure. The two layers, SOA and IT infrastructure, affect each other. Disruptions in one can be caused by problems in the other. An effective approach to SOA management must be unified with the rest of the enterprise systems and policies that it encapsulates. In other words, effective management solutions must be aware of two entirely different layers of technology and yet work as one unified whole.

Example 2: Consider a hosted software provider with a SOA infrastructure in place that guarantees an application uptime of 98% to its customers. Customers of the hosted software provider have automated several critical business processes with their suppliers. During the peak holiday season, an unknown problem causes a delay in business process automated transactions and notifications. Upon further investigation the IT staff realize that the Process Manager server was down for a period of time that caused the processing delays. The IT manager is responsible for monitoring and managing system infrastructure components such as servers, firewall, network components, and SOA components such as Process Managers, ESB hubs, shared Web Services and business processes. The IT manager realized

that without visibility into the SOA infrastructure, the organization could not be agile or cost-effective while managing a SOA environment.

Challenge 3: Business-IT alignment

A common dilemma in organizations is balancing business needs with IT spending. CIOs constantly try to satisfy business owners while keeping a lid on spending and increasing IT efficiency. Key questions the CIO would like answered are:

- What is the impact of IT on business? Some key performance indicators may be IT indicators. When changes happen in my IT environment, what is the impact on the business? How do I prioritize IT activities? When business problems arise, can I identify if they are caused by IT issues? What are the IT dependencies of a business process?

Example 3: A manufacturing company's operation manager needs to better manage his company's "Order-to-Cash" operations cycle. Orders placed through various channels such as the web, phone, mail etc are then processed via various different application services for fulfillment, shipping and billing via manual and/or automated business processes. The manager would like to continuously monitor overall order flow and escalate any scenarios where orders are 'stuck' for a period of time exceeding a predefined duration. He would like to automatically determine if the 'stuck' processes are due to specific business process issues (measured by business KPIs), or system problems (measured by system metrics).

ORACLE ENTERPRISE MANAGER – SOA MANAGEMENT

Management of services is extremely important in SOA environments, where services are integrated, reused, and constantly changed. Oracle Enterprise Manager simplifies monitoring and managing SOA environments. It addresses each of the challenges outlined above by helping model, monitor, and manage the SOA environment and services delivered to the customer.

SOA Runtime Governance

Oracle Enterprise Manager Grid Control provides several features to govern SOA environments effectively. It enables IT staff to manage runtime environments by providing monitoring information about processes and Web Services, and their interdependencies. In conjunction with Oracle Web Services Manager (OWSM), Grid Control provides policy authoring and attachment, including runtime enforcement of policies, and recording diagnostic information for policies. Finally, Grid Control also enables lifecycle management of Web Services deployed as J2EE applications.

SOA Runtime Governance

- 1. Business Processes**
- 2. Web Services**
- 3. Policies**

Business Processes

Business processes are the key drivers in a SOA environment, and enable customers to integrate not only disparate enterprise applications, but also with suppliers and partners. But, because services are shared in a SOA environment, changes may lead to unintended consequences. A key aspect of SOA management is to understand the service provider-consumer relationships and dependencies in business processes. These dependencies are typically defined at design time. Understanding these relationships accelerates change impact analysis and root cause diagnosis.

Oracle BPEL Process Manager (PM) is the first native business process execution language (BPEL) engine for Web Services orchestration enabling you to design, define and execute business processes. In a typical SOA environment, BPEL orchestrates flows between several Web Services within an enterprise, and it becomes difficult for the administrator to monitor and keep track of the processes. Enterprise Manager Grid Control discovers BPEL processes, partner links, and associated information such as Process ID, LifeCycle, State, Version, partner link WSDLs, roles and Open/Closed process instance statistics. These discovered BPEL processes and partner links can be modeled as services and sub-services in Grid Control. Once these have been established, SOAP tests can be defined to monitor these Web Services. All the benefits of Grid Control's Service Level Management can be utilized for BPEL processes and associated partner links. BPEL instance error management helps to notify administrators of faulted instances, as well as enables integrations with ticketing systems such as Remedy or Siebel Helpdesk.

Web Services

Oracle's end user monitoring solution gives you the ability to identify and resolve problems even before customers, partners or suppliers experience them. Core to this capability is the ability to test status and performance of Web Services from the end user perspective, monitor the systems that the application is running, and diagnose problems through all tiers of the infrastructure. This enables effective Service Level Management that incorporates Web Services performance into agreements.

The primary mechanism to measure end user experience is System Tests. These are simulated user transactions, that can be executed from anywhere around the world. Since these Tests can be made to repeat at frequent intervals, they provide a reliable way to monitor Web Service performance and availability. These are SOAP based tests, giving you the ability to monitor performance and availability of Web Services end points, typically WSDLs. In addition to System Tests, EM can also measure real user experience for web applications. Aggregate views of real user experience by domain, region, URL, visitor, etc. are possible, giving you the ability to quickly identify the source of problems to particular geographies or aspects of your application.

Grid Control provides Web Services Management functionality for configuration of auditing, logging, security and reliability parameters of Web Services. Auditing allows you to store message contents; logging allows you to extract the content of these messages and store them; security allows you to configure security features to be applied to a web service request or response; and reliability allows you to configure port level reliability characteristics for web service messages.

When it comes to managing the lifecycle of Web Services, EM provides JSR 88 support for J2EE application deployment. A JSR 88 based deployment wizard simplifies deployment and redeployment of J2EE applications. Task oriented deployment plan editors; assist application administrators in assigning or mapping the most common deployment descriptors at deploy time. Finally, a generic deployment plan editor provides access to all deployment descriptors for advanced configuration.

The discovery capabilities of EM can automatically discover J2EE Application Web Modules and Web Services as EM Services, as well as the relationships of these services to their underlying systems components. This enables you to build an end-to-end service dependency model that can be leveraged to identify the impact of any proposed changes. It can also be leveraged as a diagnostic tool to isolate the root cause of service problems.

Policies

Oracle Web Services Manager (OWSM) is a Web Services security and management solution that provides the visibility and control required to deploy Web Services into production. OWSM allows companies to define policies that govern Web Service operations such as access, authorization, logging, and load balancing, and then wrap these policies around Web services. It also works without requiring a change to the service definition. OWSM management console has a graphical dashboard that shows overall statistics, including security metrics such as unauthorized access attempts, and service figures including the average service failure rate and average registered service latency. IT and business managers can drill down into the dashboard by service to see statistics on individual operations.

In future releases, Enterprise Manager Grid Control will inherit all the functionalities provided by OWSM, and will further provide a rich, browser-based UI to author and attach policies. Grid Control will also integrate seamlessly with Oracle Metadata Services (MDS) that will be the single store for enterprise policies and metadata information that includes versioning. Grid Control will provide the framework for the Policy Manager to record log information, policy violations and exceptions. In conjunction with OWSM, Grid Control will unify Web Services policy enforcement that facilitate easier compliance reporting and lower maintenance costs. Grid Control and OWSM are the only enterprise management tools that integrate Web Services policy management, monitoring and auditing, making it easy for IT to implement and manage policies in a SOA environment.

SOA Infrastructure Management

SOA Infrastructure Management

1. **BPEL PM monitoring**
2. **Dehydration Store monitoring**
3. **Application Server monitoring**

According to Gartner, a typical company spends over two thirds of its IT resources in monitoring, patching, and provisioning activities. Automating these activities can dramatically lower the cost of running your Grid. This ability to manage “many as one” is unique to EM. It includes virtualized resource views of the Grid, system dashboards, topology views, and monitoring templates. These capabilities significantly lower the total cost of owning and managing your Grid infrastructure. IT organizations need to adapt quickly to manage SOA environments in a cost-effective and agile manner. Enterprise Manager Grid Control enables IT staff to manage the entire spectrum of infrastructure components, including SOA infrastructure components such as Process Manager server, ESB components, and Policy Manager components.

BPEL PM Monitoring

Oracle Enterprise Manager Grid Control discovers BPEL Process Manager targets and domains, and exposes metrics associated with them. The Process Manager home page displays the status, PM server usage in terms of open and completed requests, along with server level metric values. For each PM server, domain credentials can be stored. In addition the domain home page lists all the processes deployed to that domain, and domain level metric values. These discovered BPEL PM servers can be modeled as services in Grid Control, and all the benefits of Service Level Management apply to these targets. Enterprise Manager also manages the dehydration store (database) associated with the BPEL Process Manager. Further Enterprise Manager monitors and manages middleware products such as Oracle Application Server, BEA Weblogic and IBM Websphere.

Only Grid Control provides an effective infrastructure monitoring solution for Oracle SOA suite components.

Business-IT alignment

Business-IT Alignment

1. **Data Exchange Connector**
2. **Service Level Management**

As SOA projects mature within enterprises and business processes proliferate, they find it challenging to integrate business indicators with system metrics. Enterprises can consolidate their IT and business management tools into a unified system using Enterprise Manager Grid Control. Grid Control enables Service Level Management (SLM) on a combination of system metrics and business indicators to facilitate an end-to-end service mapping.

Data Exchange Connector

Oracle Enterprise Manager Grid Control's Data Exchange Connector enables integration with other enterprise monitoring systems, including business activity monitoring systems. The Data Exchange Connector uses a JMS compliant data exchange hub to connect monitoring systems with EM Grid Control. An Enterprise Service Bus (ESB) and OC4J JMS are examples of data hubs. Within

Grid Control, administrators can setup inbound and outbound XML based data exchange sessions with any JMS based hub for bi-directional exchange of data. It can absorb business KPIs and events from other systems. Conversely, it can push outbound target status, alerts and metrics in a normalized or denormalized format, for consumption by other monitoring systems.

BAM-EM Integration: Oracle Business Activity Monitoring (BAM) is used to gain real-time visibility into business entities and their interactions, and a means to enable automated actions to be performed. BAM's main features are:

- Monitor key business metrics in real-time, e.g. Key Performance Indicators (KPIs) or Service-Level Agreements (SLAs)
- Analyze real-time data to identify bottlenecks, exceptions, and solutions to business problems
- Act on current conditions either automatically or manually from a dashboard in order to meet business needs

BAM works in conjunction with Oracle BPEL Process Manager, which designs and executes the enterprise business processes. BPEL Process Manager business processes consists of a construct called “sensors” that can extract data from business process flows and send it to Oracle BAM's Active Data Cache. An example would be measuring supplier response times in a supply chain business flow, which integrates a retailer with its suppliers. BAM provides a rich user interface with realtime charts, reports, KPIs, and more, to display KPIs and alerts.

Oracle Enterprise Manager Grid Control integrates seamlessly with Oracle BAM via the EM Data Connector out of the box. Customers have the flexibility to integrate monitoring in the tool of their choice. BAM-EM integration enables business owners and IT managers to work off of a common monitoring system, and a single console. It simplifies root cause analysis, and enables Service Level Agreements (SLAs) based on a combination of business KPIs and system metrics. Enterprise Manager Grid Control's standards based integrated solution is the best in class for monitoring and managing the performance of the business with the performance of IT.

Service Level Management

EM's service level management solution is unique in the fact that it allows both end user experience metrics (including Web service metrics), system metrics and business KPIs to be used in determining service levels. You can define service levels based on business requirements, model the end-to-end service down to the system components it depends on, monitor performance against these goals, and report on SLA compliance to key stakeholders.

Service Level Objectives can be specified not only in terms of the system-level metrics for the components supporting the service, but also in terms of end user experience metrics and business KPIs imported from other systems. EM is unique in allowing all these classes of metrics to be used in measuring service levels. The

basis for the service level management capability is a modeling facility that allows you to define a business service to be composed of component services and supporting infrastructure.

A services dashboard provides real-time views into service level agreements (SLAs) and, along with other custom reports, is invaluable in communicating SLA compliance to business customers.

CONCLUSION

IT and Business managers face several challenges as SOA projects mature in their organizations. They need to align business indicators with system metrics, manage the SOA runtime environment and manage the SOA infrastructure. Enterprise Manager Grid Control is the only product in the market that provides end-to-end monitoring and management capabilities for the Oracle SOA Suite. EM Grid Control enables alignment of business and IT indicators, management of the SOA runtime environment, and management of existing IT assets seamlessly with SOA components such as business processes, Web Services, policies, and infrastructure components. Together Oracle EM Grid Control and SOA Suite enable customers reduce the total cost of ownership and achieve the best total value of opportunity.



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