Approach to Service Management
In SOA Space

Gopala Krishna Behara & Srikanth Inaganti

Abstract

SOA Management covers the Management and Monitoring of applications, services, processes, middleware, infrastructure, and software tools in accordance with the business goals. Managing SOA is a multi-faced task, as it covers IT Management and Business Service Management. Service management can be classified into two areas (i) Runtime (ii) Design time. Some of the activities involved in runtime may trigger activities in design time. Design time activities are part of the service development and maintenance lifecycle. The majority of the service management aspects concentrate on Registry, Repository, Metamodel, Configurability, Policy Management and Enforcement, and Operational aspects of service infrastructure.

This paper consolidates the management of SOA at different layers and the various challenges that are faced for SOA management.

Introduction

SOA Management includes IT processes, services, and software/tools for managing and monitoring SOA composite applications and supporting infrastructure based on enterprise governance practices, such as COBIT and ITIL, that are in accordance with business goals. Service Orientation has the power of increased competitiveness in the today’s ever changing business environment. SOA is a set of practices for Organizing and Managing IT resources and people to build and support services. Before the SOA era, system and application administrators were using different monitoring tools for different software platforms. For example, web servers, application servers, and database servers have their own tools to diagnose and help in resolving issues. In a composite application world, ensuring the good health of each of these components would not necessarily result in the health of overall composite application. In order to identify the issues related to agility and real-time world, different class of products should be working together in accordance with SOA best practices and management goals.

Service Management broadly involves the following tactical aspects:

- Business Management: This covers the areas such as BPM, transaction management, and BAM
- System Management: Includes web service monitoring, alerting, exception management, and root cause analysis
- Life Cycle Management: Includes provisioning, version control, Web Service dependencies and depreciation
- Enterprise Security and Policy Management: Includes identity and access management, key management, run-time governance, design-time governance, Content-Aware Networking (Hardware and software intermediaries)

The following are the more long term and strategic efforts required to make enterprise level SOA initiative a success.

- Program Management (System Integration Leadership skills)
- Integration COE activities
- SOA Governance: IT Governance processes adjustments/refinement as per SOA needs
Without the above three, enterprise SOA initiatives would be either a failure or a partial success in terms of meeting the business objectives.

**Challenges for SOA management**

The following are some of the challenges for SOA management:

- Understand how services relate to each other and to the IT infrastructure
- Understand how the services are related to the business process layer
- Control the message flow in the service environment through management mediations like log, filter, and route
- Centralize services management policy
- Align the SDLC processes, as appropriate, which allows Application - Service Integration
- Define business-related IT goals
- Achieve the quality of service (QoS) defined by the business; each service endpoint should be managed as a resource
- Invocation of services (service consumer) as well as the application functionality exposed as a service (service provider)
- Managed services should have real-time availability and performance metrics
- Ensure that management non-functional requirements of the IT architecture are aligned with the business objectives
- Service Lifecycle Management

**SOA Management Layers**

The following diagram (Figure 1) represents the broad range of line items involved in various management layers of SOA. The SOA management layer mainly consists of the following layers:

- Composite application management layer
- Refined SDLC processes for application-service integration
- Process management layer
- Service management layer
- Middleware management layer
- Infrastructure management layer
- SOA Governance
The following diagram (Figure 2) depicts the activities to be performed for service implementation from analysis to close phase.

The application activities start from analysis to testing with normal SDLC lifecycle.

For Service specific activities, the analysis phase involves the analysis or reuse analysis of the services and identification of list of services to be reused/built. The followed activities involve service planning, service definition, service specification, service design, and service implementation.
Business Process Management (BPM) refers to the set of activities that organizations perform either to manage or optimize their business processes and adapt them to enterprise needs. Business processes are typically a combination of automated and manual tasks.

The main goals and benefits of BPM include the following:

- Reduce the mismatch between business requirements and IT systems
- Increase employee productivity
- Reduce operational costs by automating and streamlining business processes
- Increase corporate agility and flexibility
- Reduce development costs and effort by using a high-level, graphical programming language
Business Performance Optimization

Business performance optimization is a combination of methodology, best practices, and technology infrastructure. Business performance management solutions monitor relevant business events, which may cross multiple processes, and relate them to key performance indicators (KPIs).

Business optimization should be performed at all levels of the enterprise, from the operational IT level, through line-of-business managers, up to senior executives. All require visibility into the KPIs for which they are responsible. Alignment across all organizational levels is required for overall business optimization.

Business Activity Monitoring

Business activity monitoring (BAM) is an emerging technology for enabling business performance optimization. BAM is defined as “the concept of providing real-time access to critical business performance indicators, along with the supporting information to improve the speed and effectiveness of business operations.” BAM solutions allow organizations to correlate events from multiple processes and relate them to measures that are meaningful to the enterprise. In doing so, BAM provides a “big picture” of business performance and helps align business strategy with operational execution.

BAM solutions provide business dashboards that correlate real-time business events with KPIs. Some BAM solutions include predictive capabilities and can identify emerging patterns that may influence a KPI, giving managers the information necessary to proactively handle emerging problems rather than simply react to erupting crises.
Service Management

Service is a piece of software that can be reused across the enterprise, in the context of many business processes or subprocesses, consisting of an interface, implementation, contract, and data.

In the process perspective, activities surrounding the service management can be classified into two areas (i) Runtime (ii) Design time. The activities involved in runtime feed into design time activities to form a closed loop control systems. Design time activities are part of the service development and maintenance lifecycle. The majority of the service management aspects revolve around registry, repository, metamodel, policy management and enforcement, and operational aspects of service infrastructure. Service infrastructure management involves performance management, middleware platform management, and service operational aspects such as monitoring, installation and deployment, etc.

The following diagram represents the overall activities involved in the service management:

![Service Management Diagram]

**Figure 4. Service Management Activities**

Manage Transactional Performance

Managing and monitoring the end-to-end transactional performance is a key measurement for SLAs.

Managing transactional performance includes the following:

- Understand the performance of a service and the decomposition of transactions with specific metrics for individual requests. Provide the relationship between service requests and the implementation artifacts such as J2EE beans and JDBC requests.
- Monitoring and Management tool covers the end-to-end view of the composite application
- Detailed information on performance and availability metrics for the individual resources.
Service Middleware Management

The following middleware is Managed and Monitored as a part of the service management:

- Web Server
- Application server
- Message Oriented Middleware
- EAI platforms, Integration Brokers, Data Integration platform suites
- Security
- Service Registry
- Service Repository
- Enterprise Service Bus
- Data bases (Relational, hierarchical, XML, Object Oriented, etc)
- Collaboration Suites
- Knowledge Management Solutions

Service Infrastructure Management

Managing the infrastructure involves the following activities:

- Well thought out IT processes
- Hardware Installation
- Upgrades
- DR planning and implementation
- Health Check in terms of committed SLAs
- Network Management
- Sharing the instances across multiple applications
- Ensuring the required QOS

Manage the operational systems

Managing the operational systems includes the following:

- Understand the health of the infrastructure that support the services
- Correlate problems in the services to infrastructure issues such as a queue filling up or an exhausted thread pool

In the case of services, SLAs have to be defined at the enterprise level; that is, future reuse potential of the service across applications and business processes has to be taken into account, and cumulative sum of the load across all business processes and applications would specify the enterprise level SLAs.

SOA Governance

Governance is not management. Governance is a framework within which management operates to achieve stated objectives. IT Governance is a continuous process that helps in setting the overall direction to IT management, Organization chart, RACI charts, Governance Decision Framework(s), defining or streamlining the processes and enforces control over the entire IT ecosystem in accordance with business goals. IT Governance would be typically driven by architectural boards that report directly in to CTO/CIO. The following are the broad responsibilities of architecture board at the enterprise level:

1. Architecture Definition, Maintenance, Communication
2. IT Standards Definition
3. Architecture Compliance Review and Approvals
4. Architecture Deviations Processing, Updates to IT Standards
5. Seeking the feedback from IT Management and Upgrading the existing IT processes

SOA governance is an instance of IT governance with some refinement in IT processes and controls as required by particular enterprise needs across all phases of the enterprise SOA initiatives such as SOA Strategy, SOA Plan and Define, Service Oriented analysis and design, SOA implementation, SOA testing, SOA deployment, etc.

SOA Governance would be a success only if it can result in flexibility for competitive advantage in the marketplace, and visibility for management to take immediate actions and effective policy enforcement. Policy management would normally cover aspects such as defining security (SSO, application, services, data), payload characteristics, Service-Level-Agreements, Commercials/Utility related, QOS levels, Transactional semantics, etc.; identify the policies; enforce the identified policies; changing policies at runtime; etc. Since SOA is centered on reuse, the enterprise architecture board needs to add reuse analysis as one more element to architecture review processes, for all applications being built, in respective toll gates. The number of architecture reviews/toll gates depends on the size, complexity, SDLC process in place, etc. Promoting reuse culture requires installing the enterprise-wide service repository and registry, establishing the IT processes that are tightly integrated into application development and maintenance processes. IT processes are required around the areas such as finding the services, understanding the service offering as against the application requirements, understanding the policies, properties of service, composing the service, dependencies, etc., publishing the composed services, etc.

Broadly SOA Governance can be divided in to three areas:

(i) Governance of SOA initiative: This involves organizational chart, roles, skills, rules/laws (standards, guidelines, principles, policies, reference architecture), compliance and vitality processes, program management/SI leadership, fine tuning the IT processes and controls, defining governance decision framework, establishing vision, objectives for various Centers Of Excellence, etc.

(ii) Design time Governance: Defining design guidelines and standards for services. Defining the policies and properties to be applied to services. Enforcing them through review processes within SDLC

(iii) Runtime Governance: Establishing the mechanisms to change the policies and properties at runtime – that augment the changes as desired by business users

Conclusions

This article addresses the importance of service management and its distribution across various SOA management layers. The article also explains activities surrounding the service management in runtime as well as design time areas. The key elements of the layer for managing the service are highlighted in this document.

References

3. The Forrester Wave™: SOA And Web Services Management, Q1 2006, Feb 2006
Glossary of Terms

<table>
<thead>
<tr>
<th>Acronym/Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPM</td>
<td>Business Process Management</td>
</tr>
<tr>
<td>BAM</td>
<td>Business Activity Monitoring</td>
</tr>
<tr>
<td>COBIT</td>
<td>Control Objectives for Information and related Technology</td>
</tr>
<tr>
<td>COE</td>
<td>Center of Excellence</td>
</tr>
<tr>
<td>ITIL</td>
<td>IT Infrastructure Library</td>
</tr>
<tr>
<td>QOS</td>
<td>Quality of Service</td>
</tr>
<tr>
<td>SDLC</td>
<td>Software Development Life Cycle</td>
</tr>
<tr>
<td>SOA</td>
<td>Service Oriented Architecture</td>
</tr>
</tbody>
</table>

Acknowledgements

We would like to thank our boss Dr. Udaya Bhaskar Vemulapati for giving me this opportunity to work in this area. I also want to thank Prasad Palli for providing me the valuable inputs in the form of review observations.

Authors

Dr. Gopala Krishna Behara and Srikanth Inaganti are Enterprise Architects in the Enterprise Consulting and Architecture Practice division of Wipro. They have a total of around 12 years of experience with Software Engineering, including Project Management, Enterprise Architecture, Business Process Management, SOA, Solution Architecture, Design and Development for Internet/Intranet, Client/Server applications, and Business Application Systems for clients, with commendable exposure in designing the Applications under UML methodology and Rational Unified Process.

Contact information: Gopala Krishna Behara, E-Architect, ECAP Group, Wipro Technologies, gopalkrishna.behra@wipro.com, Office # 91 40 3079 5110; Mobile # 91 9949997724.

Srikanth Inaganti, E-Architect, ECAP Group, Wipro Technologies, srikanth.inaganti@wipro.com, Office # 91 40 3079 5110; Mobile # 91 9849058064