Service Oriented Architecture: an Overview

26 Febbraio 2008, Università di Bologna: Seminario IBM
Agenda

- What is an SOA?
- Benefits of an SOA
- SOA reference architecture
- SOA with IBM products
- ESB and SOA lifecycle
- SOA Governance
IT’s Architectural Evolution: Making IT More Responsive

- Monolithic Applications
- Client/Server
- Distributed Technologies
- Web Services
- SOA

Progress

Time
### Service Oriented Architecture

**Different Things to Different People**

<table>
<thead>
<tr>
<th>Capabilities that a business wants to expose as a <strong>set of services</strong> to clients and partner organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>An <strong>architectural style</strong> that requires a service provider, requestor and a service description. It addresses characteristics such as loose coupling, reuse and simple and composite implementations</td>
</tr>
<tr>
<td>A <strong>programming model</strong> complete with standards, tools, methods and technologies such as Web services</td>
</tr>
<tr>
<td>A <strong>set of agreements</strong> among service requestors and service providers that specify the quality of service and identify key business and IT metrics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Roles</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business</strong></td>
</tr>
<tr>
<td><strong>Architecture</strong></td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
</tr>
<tr>
<td><strong>Operations</strong></td>
</tr>
</tbody>
</table>

**Different Things to Different People**
To keep pace with global competition:

“We are taking apart each task and sending it... to whomever can do it best, ... and then we are reassembling all the pieces”

from Thomas Friedman’s ‘The World is Flat’

- The standards and technology are finally in place, with broad industry support
- Availability of best practices for effective governance
- The necessary software to get started is available today

Why SOA Now?

“SOA is the next-wave architecture to drive the evolution of IT”

Alex Cullen
Principal Analyst for IT Management, Forrester Research
What are the benefits of service-oriented architecture?

- **Business benefits**
  - Business flexibility provided by increased granularity of processes enabled through services
  - Ability to quickly create business processes and composite applications to respond to changes in the marketplace
  - Improved customer service using services, without having to worry about the underlying IT infrastructure

- **IT benefits**
  - Becoming a more responsive IT organization with a secure and managed integration environment
  - Decreasing development and deployment cycle times through the use of pre-built, reusable services building blocks.
  - Reducing complexity and maintenance costs with common services
  - Enhancing existing IT systems rather than replacing them
What differentiates SOA from claims like this in the past?

**Standards**
- Broadly adopted Web services ensure well-defined interfaces.
- Before, proprietary standards limited interoperability

**Organizational Commitment**
- Business and IT are united behind SOA (63% of projects today are driven by LOB)*
- Before, communication channels & ‘vocabulary’ not in place

**Degree of Focus**
- SOA services focus on business-level activities & interactions
- Before, focus was on narrow, technical sub-tasks

**Connections**
- SOA services are linked dynamically and flexibly
- Before, service interactions were hard-coded and dependent on the application

**Level of Reuse**
- SOA services can be extensively re-used to leverage existing IT assets
- Before, any reuse was within silo’ed applications

*Source: Cutter Benchmark Survey*
IBM is the #1 commercial supporter of the Open Operating System choice, which includes Linux.

IBM contributed technology to J2EE & helped form the Apache Software Foundation.

Open Application Server includes J2EE and Apache, where IBM led or co-led the creation of SOAP, WSDL, UDDI, WS-Security, BPEL4WS, and more.

Web Services and Eclipse are part of the Open Application Integration platform, with IBM donating $40M of initial technology.

SOA is based on an open platform and open standards.
Key Standards for SOA

SOA and Web Service Standards

Business Services: Service Offerings and Components
e.g. Book Flight, Low Fare Search, Update PNR Data

Evolving Industry Semantics
(ACORD, SWIFT, FIXML, OTAXML, UCCNet)

Semantic Standards

Service Interaction Components (WSRP, JSR 168)
Service Orchestration (WS-BPEL)
Service Discovery (WSIL, UDDI, RAS)
Service Invocation & Messaging (WS-I, SOAP)
XML (Infoset, Namespace, Schema)
Network Protocol (HTTP, SMTP, Other)

Infrastructure Standards

Security (WS-SEC)
Transactions (WS-Tx)
Management
SOA Represents a Marked Change in IT Prioritization
And Requires a New Way of Thinking

Old Thinking
IT manages IT assets that support the business

Silos, static, physical

New Thinking
IT manages services and components that support business results

Flexible, dynamic, virtualized
What is .....?

... a service?
A repeatable business task – e.g., check customer credit; open new account

... service oriented architecture (SOA)?
An IT architectural style that supports service orientation

... service orientation?
A way of integrating your business as linked services and the outcomes that they bring

... a composite application?
A set of related & integrated services that support a business process built on an SOA
SOA Infrastructure

Required for Enterprise-wide Service Orientation
IBM SOA References Architecture

Business Innovation & Optimization Services
Facilitates better decision-making with real-time business information

Interaction Services
Enables collaboration between people, processes & information

Process Services
Orchestrates and automates business processes

Information Services
Manages diverse data and content in a unified manner

ESB
Integrated environment for design and creation of solution assets

Partner Services
Connect with trading partners

Business App Services
Build on a robust, scaleable, and secure services environment

Access Services
Facilitates interactions with information and application assets

Infrastructure Services
Optimizes throughput, availability and performance

IT Service Management
Manage and secure services, applications & resources
IBM SOA References Architecture

- **Business Innovation & Optimization Services**: Facilitates better decision-making with real-time business information.
- **Process Services**: Orchestrate and automate business processes.
- **Information Services**: Manages diverse data and content in a unified manner.
- **Interaction Services**: Enables collaboration between people, processes & information.
- **Partner Services**: Connect with trading partners.
- **Business App Services**: Build on a robust, scaleable, and secure services environment.
- **Access Services**: Facilitates interactions with information and application assets.
- **Infrastructural Services**: Optimizes throughput, availability and performance.

Integrated environment for design and creation of solution assets.
Business Driven Development
An Iterative, Business-focused Development Process

Model
• Business Analysts
• Software and Data Architects
• Business Process Execution Language

Assemble
• Development Team
• Integration Developers
• Testers

Deploy
• Deployment Team
• Platform-specific Runtime Specialists

Manage
• Business Operations Analysts
• IT Operations Managers

Run-time Statistics
Continual Process Improvement
Observation Model (KPIs)

Model Business Requirements
Unified Modeling Language
Model Software Architecture

Choreograph Services
Develop New Services
Configure Human Task Manager
Develop User Interface
Test

WSDL
EAR, DDL

Team Unifying Platform

Business Driven Development: An Iterative, Business-focused Development Process
How are customers thinking technically about flexible IT through SOA?

The SOA Lifecycle

- Discover
- Construct & Test
- Compose

- Gather requirements
- Model & Simulate
- Design

- Assemble

- Manage
- Governance & Processes

- Deploy

- Integrate people
- Integrate processes
- Manage and integrate information

- Financial transparency
- Business/IT alignment
- Process control

- Manage applications & services
- Manage identity & compliance
- Monitor business metrics

- Business/IT alignment
- Process control
IBM WebSphere BPM Suite

WebSphere Business Modeler
Capture, simulate, analyze, and optimize business models to reduce risk and increase flexibility

WebSphere Integration Developer
Assemble existing and new assets to execute and manage business processes

WebSphere Process Server, WebSphere ESB
Deploy process EARs. Run process instances. Monitor the running process instances

WebSphere Business Monitor
Real-time visibility and analysis of business information for timely and coordinated action

WebSphere Services Registry & Repository
Real-time visibility and analysis of business information for timely and coordinated action
When selecting SOA projects, focus on solving specific business problems as part of an evolving enterprise architecture.

IBM has a variety of assets and best practices around the SOA entry points, based on our extensive experience with customers.

**People Entry Point:**
Interaction and Collaboration

**Information Entry Point:**
Information as a Service

**Process Entry Point:**
Process Automation

**Reuse Entry Point:**
Creating and reusing proven, high-value assets

**Connectivity Entry Point:**
Securely and flexibly interconnecting
Customer success via SOA Entry Points

Distinct but interrelated projects with proven value

What is it?

<table>
<thead>
<tr>
<th>People</th>
<th>Greater productivity and flexibility through targeted user interactions for improved operations and collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process</td>
<td>Achieve business process innovation through treating tasks as modular services</td>
</tr>
<tr>
<td>Information</td>
<td>Service-enable existing assets and fill portfolio gaps with new reusable services</td>
</tr>
<tr>
<td>Reuse</td>
<td>Connectivity</td>
</tr>
</tbody>
</table>
ESB: The Next Step on the Connectivity Evolution

Turn this ...

...into this (web services).

- Rich business abstractions describe the application interface
- Decouples the interfaces from the business applications
- The number and complexity of the interfaces is reduced
- Business applications and their interfaces become reusable

But separate connection points still leaving bloated interfaces ....
The Enterprise Service Bus shrinks those interfaces further

Turn this (web services)... into this (SOA)

 ✓ Decouples the point-to-point connections from the interfaces
 ✓ Allows for dynamic selection, substitution, and matching
 ✓ Enables more flexible coupling and decoupling of the applications
 ✓ Enables you to find both the applications and the interfaces for re-use

RESULT → Greater Business Responsiveness
What is an Enterprise Service Bus (ESB)?

Flexible connectivity infrastructure for integrating applications and services to power your SOA

- **ROUTING** messages between services
- **CONVERTING** transport protocols between requestor and service
- **HANDLING** business events from disparate sources
Integrating the applications in your SOA

*Enterprise Service Bus software from IBM WebSphere*

Flexible connectivity infrastructure for integrating applications and services to power your SOA

- **WebSphere ESB**: a new product delivering an Enterprise Service Bus
  - Standards based connectivity including SOAP, XML, JMS, etc.

- **WebSphere Message Broker**: a new version delivering an *advanced* Enterprise Service Bus
  - Universal connectivity including SOAP, XML, JMS, COBOL copybook, SCADA, etc.
  - Advanced message transformation, enrichment and routing
What is Governance?

**SOA Governance is a catalyst for improving overall IT Governance**

**IT Governance**
- Establishing decision making rights associated with IT
- Establishing mechanisms and policies used to measure and control the way IT decisions are made and carried out

**SOA Governance**
- Extension of IT governance focused on the **lifecycle of services** to ensure the business value of SOA
Why SOA Governance Matters

**SOA Governance empowers teams to innovate**

- Realize business benefits of SOA
  - Business process flexibility
  - Improved time to market

- Mitigate business risk and regain control
  - Maintaining quality of service
  - Ensuring consistency of service

- Improved team effectiveness
  - Measuring the right things
  - Communicating clearly between business and IT
SOA Governance Lifecycle

Plan the Governance Need
- Document and validate business strategy for SOA and IT
- Assess current IT and SOA capabilities
- Define/Refine SOA vision and strategy
- Review current Governance capabilities and arrangements
- Layout governance plan

Monitor and Manage the Governance Processes
- Monitor compliance with policies
- Monitor compliance with governance arrangements
- Monitor IT effectiveness metrics

Define the Governance Approach
- Define/modify governance processes
- Design policies and enforcement mechanisms
- Identify success factors, metrics
- Identify owners and funding model
- Charter/refine SOA Center of Excellence
- Design governance IT infrastructure

Enable the Governance Model Incrementally
- Deploy governance mechanisms
- Deploy governance IT infrastructure
- Educate and deploy on expected behaviors and practices
- Deploy policies
SOA References Architecture

- Business Innovation & Optimization Services:
  - Business Modeling
  - Business Monitoring
  - Business Dashboards

- Interaction Services:
  - WebSphere Portal Server

- Process Services:
  - WebSphere Process Server

- Information Services:
  - WebSphere Information Integration

- Partner Services:
  - WebSphere Partner Gateway

- Business App Services:
  - WebSphere Application Server

- Access Services:
  - WebSphere Business Integration Adapter/HATS

- Infrastructure Services:
  - Virtualization
  - High Availability

- ESB:
  - WebSphere ESB
  - WebSphere Message Broker
  - WebSphere Service Registry

- Development Services:
  - Rational Application Developer
  - WebSphere Integration Developer

- IT Service Management:
  - IBM Tivoli Composite Application Manager

- WebSphere XD

- WebSphere Application Server

- Workload Management
Thank You

Thank You in various languages:
- **Thank You**: English
- **Merci**: French
- **Grazie**: Italian
- **Danke**: German
- **Gracias**: Spanish
- **Obrigado**: Portuguese
- **شكراً**: Arabic
- **धन्यवाद**: Hindi
- **谢谢**: Chinese
- **감사합니다**: Korean
- **ありがとう**: Japanese
- **Obrigado**: Brazilian Portuguese
- ** благодаря вам**: Russian
- **가지**: Traditional Chinese
- **감사합니다**: Korean
- **사랑해요**: Korean
- **多谢**: Simplified Chinese
- **多謝**: Japanese
- **Благодарю**: Romanian
- **adding multumesc**: Romanian
- **الشكر**: Arabic
- **Thank You**: English

Languages featured:
- Arabic
- Brazilian Portuguese
- Bulgarian
- Chinese
- Czech
- Danish
- Dutch
- English
- French
- German
- Greek
- Hindi
- Hungarian
- Indonesian
- Italian
- Japanese
- Korean
- Lithuanian
- Norwegian
- Persian
- Polish
- Portuguese
- Russian
- Simplified Chinese
- Spanish
- Swedish
- Tamil
- Thai
- Traditional Chinese
- Turkish
- Ukrainian
- Urdu
- Vietnamese
- Japanese