Understanding SOA - Service Oriented Architectures

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Agenda

• Distributed Computing
• Service Delivery Platform
• Service Oriented Architecture (SOA)
• Benefits
• Oracle Fusion Middleware
History of Distributed Computing

Phase I
- Client/Server
- DCE
- Downsize

Phase II
- CORBA
- DCOM
- EJB
- Components

Phase III
- MOM
- Messaging

History of Distributed Computing
Distributed Computing and Software Architecture Evolution

Grid and Services Convergence ➔ Grid Computing Service Computing ➔ Grid and Services Convergence

- Multi-Tier
- Client-Server
- Remote Access
- Host-Based

Time

Web Services
- Object-Oriented
- Component-Based
- Structured

Structured

Component-Based

Object-Oriented

Time

Grid and Services Convergence
Issues with Existing Models

- Proprietary protocols
- Interoperability
- Platform lock-in
- Inflexible
What is Service Computing?

- Providing **technical solutions** to the business that are derived directly from the business processes they support.
- Decomposing business processes into **discrete business services** used to produce IT-enabled business processes for internal and external consumption.
- Systematically creating **new services** by rewiring and integrating **existing services** and business processes.
Why Service Computing?

- Align Functional and IT Focus Around Functional Priorities
- Accelerate Response to Changing Conditions
- Increase Visibility Into Operations
- Maximize Investments - Reuse Existing IT Assets
Non-Service Computing Application Environment

Silo Everything

• No shared user–interface
• No shared business rules
• No shared data models
• No shared storage
• No shared hardware server
• No shared database

Manual, Batch, or Point-to-Point Messaging Integration

User Interface
Application-1
Server
Storage

User Interface
Application-2
Server
Storage

User Interface
Application-3
Server
Storage

Manual
Messaging
Batch
Service Computing Application Environment

**Virtualized Everything**

- Shared Software Services Support Business Services
- Applications Defined by Collaboration of Services and Composite Services
- Shared Business Rules within Services
- Shared data models
- Enterprise Portal Provides Access to Services
- Shared Server and Storage for Increased Scalability and Availability

- Shared, Clustered database
What is SOA?

- Evolution of distributed computing
- Application functions are modularized and presented as services
- IT architecture for synchronous and asynchronous applications
- Services are loosely coupled
  - Service interface is independent of the implementation
Why SOA? – The Cruel Reality

Source: Gartner
Why SOA? - The Reality of Modern Business

- Geographic, Departmental Evolution
- Mergers & Acquisitions (M & A)
- Compliance issues
- Difficult to Answer Simple Questions
- Costly to Operate
- Inflexible

Difficult to achieve benefits of an Information-Driven Enterprise
Why SOA: Monolithic Applications

Inflexible, Inefficient, Hard to Maintain

- Hard to adapt to changing business requirements
- Duplication of functionality means wasted resources
- Small fixes require large investments of time and labor
**SOA: Service Oriented Architecture**

*Application Components Known as Services*

- Buzz
  - J2EE, Web Services, Service Enablement

*Ability to Orchestrate Services Into Composite Applications*

- Buzz
  - Composite Applications, Orchestration, ESB, BPEL

**Why You Care?**

*Re-Developing Applications is Expensive, Orchestration is Not*
Benefits of SOA

- Respond to business changes
- Address new needs with existing applications
- Unlock existing application investments
- Support new channels & complex interactions
- Support organic business
Anatomy of a Service

Service Consumer

Interface Proxy

Service Interface

Service Implementation

New Service

Wrapped Legacy

Composite Service
Service Oriented Architecture

Monolithic Applications

Services

- ERP
- Database
- Legacy
- J2EE App

- Check Inventory
- Customer Update
- Employee Record
- Check Availability
Interoperability of Web Services

- Web Services Interoperability
  - Develops profiles
  - Suggests best practices
  - Provides testing tools
- Runtime and tools uptake
  - Oracle JDeveloper analysis
  - OracleAS compliance
# J2EE 1.4 - Web Services

<table>
<thead>
<tr>
<th>Java APIs for XML</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAXP</td>
<td>Java API for XML Parsing</td>
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<tr>
<td>JAXB</td>
<td>Java API for XML Data Binding</td>
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<td>JAX-RPC</td>
<td>Java API for XML Remote Procedure Call</td>
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<td>SAAJ</td>
<td>SOAP API for Attachments in Java</td>
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<td>JAXR</td>
<td>Java API for XML Registries</td>
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<td>EJB 2.1</td>
<td>Stateless Session EJB Endpoint Model</td>
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<tr>
<td>JSR 109</td>
<td>Web Services Deployment Model</td>
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</table>
Web Services Reliability

- At least once semantics
- At most once semantics
- Guaranteed message ordering
- Exactly once semantics
Web Services Security

- Authentication
  - User name/password token
  - X.509 token

- XML Digital Signatures
- XML Encryption
Web Services Orchestration

Loan Entry
Credit Rating
United Loan
Fulfillment
Star Loan

BPEL
Service Bus
Application Server

Adapter
Adapter
Adapter
Adapter
Web Services Management

• Managing and deploying operational policies across applications and Web services
  • Layer best-practice security and management across *all* services

• No modifications to applications or services
  • Support WS-* standards

• Can secure/manage Web services implemented in heterogeneous languages and environments
Web Services Management

BUILD Policies

ENFORCE Policies

MONITOR Policies

Policy Manager

Policy Gateway

Policy Agents

Web Services

Web Service Monitor
Policy Enforcement and Visibility: Monitoring

- Provide real-time visibility into Web Service interactions
  - Automatic issue resolution by dynamic policy updates
  - Alerts about anomalies
  - Enforce policies
  - Validate compliance with IT best practices
Service Communication

- Communicate with messages
- No knowledge about partner
- Likely heterogeneous
Service Platform (Virtual)

Service Consumers

Enterprise Service Bus (ESB)

Service Interfaces and Service Implementations

Service Rules & Config

Control

Change

Service Reporting & Mgmt
An ESB Moves Data

Monitoring and Configuration

Connect
- Adapters
- Apps Events
- Metadata
- Security
- WS Manager

Enrich
- Transformation
- Value Mappings
- System Xref
- Business Rules

Distribute
- Routing
- Protocol Bus
- Messaging
- Gateways
- Interoperability

Monitoring and Configuration

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Evolution of the Bus

Standards Based Messaging

CRM

ERP

B2B

Legacy

Portal

.NET
Multi Protocol Bus

Design

- CRM
  - WSDL
- ERP
  - WSDL
- B2B
  - WSDL

Manage

- SOAP/HTTP/ Reliable SOAP
- OEMS, JMS, MQ, TIBCO
- Local, In Memory
- Legacy
  - WSDL
- Portal
  - WSDL
- .NET
  - WSDL

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ESB enables SOA and EDA

- **SOA – Service Oriented Architecture**
  - Distributed, Web Services
  - WSDL, SOAP, XML, XSD
  - Registry Lookup, UDDI
  - Request / Reply

- **EDA – Event Driven Enterprise**
  - Message Oriented
  - Qualities of Service
  - Asynchronous Publish / Subscribe
## Greater Agility
Technology Provides Solutions

<table>
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<tr>
<th>Business Visibility</th>
<th>Business Activity Monitoring</th>
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<td>Business Process Optimization</td>
<td>SOA, EDA, ESB, BPM, Rules</td>
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<td>Better Quality Information</td>
<td>Data Hubs Business Intelligence</td>
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<td>Ubiquitous Information Access</td>
<td>Multi-Channel Computing</td>
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<tr>
<td>Improve Workplace Productivity</td>
<td>Enterprise Portals</td>
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</table>

Technology provides solutions through various components, leading to greater agility and improved business processes.
Customer Needs

- Optimize Processes & Applications to Change
- Build Flexible, Adaptable Applications
- Secure Access & Reduce Risks
- Share Information & Collaborate Productively
- Take Decisions with Better Quality Information
- Lower Technology Costs
Lower Costs
Technology Provides Solutions

- Developer Productivity
- Mainframe QOS on Cheap HW
- Technology Optimization
- Security Compliance
- Customization & Maintenance
- Integrated Service Environment
- Grid Computing
- Systems Management
- Identity Management
- Metadata & Lifecycle Management
Oracle’s Response

Service Oriented Architecture

React to changing processes

Grid Computing

Application Server Clusters

Database Clusters

Networked Storage

React to changing demand

Flexibility and Speed are Advantages
Oracle Fusion Middleware Overview

**UNIFIED WORKPLACE**
- Portal, Collaboration Services, BI Tools, BAM, Search

**DEV. TOOLS**
- Java & SOA Tools, Dev Framework

**INTEGRATION & PROCESS MGMT.**
- BPM, ESB, B2B

**INFORMATION MGMT.**
- ETL, Data Hubs, Content Mgmt.

**SECURITY & MGMT.**
- Identity Mgmt., Services Mgmt., System Mgmt.

**ENTERPRISE APPLICATION SERVER**
- J2EE, Web Svcs., Events, Rules, MetaData Rpty. & Svcs. Registry

**ENTERPRISE GRID**
- Scalability, Resource Management, High Availability
Cross Platform

**Application Server**
- Oracle Application Server
- WebLogic Server
- WebSphere
- JBoss

**Database**
- Oracle Database
- SQL Server
- Oracle Lite
- Sybase
- DB2

**IDE**
- JDeveloper
- Eclipse

**Operating Systems**
- Linux
- Window XP/2003
- Solaris
- HP UX
- AIX
Example: DSL Provisioning at Belgacom

Application for the provisioning and activation of DSL lines. Belgacom is processing up to 15,000 DSL provisions / day through SOA and BPEL processes which link their customer interfaces and OSS layer, managing activation and repair.

- Telco Activation Services
  - DSL Activation Manager
  - 6000+ network equipment endpoints (SLEE gateway)
  - SDSL Activation Manager
- Sales/Customer Service Interfaces and Order Review
- Exception Management
- Billing Services
- Reporting Services
- Account Management Services

Register for New Service
Self-service web app
Call Center
Troubleshooting Request

Application Server

Struts

Oracle
Oracle Applications - Exposing Services

- All Oracle Applications can expose Web Services
- No add on products required to get “Services”

Services provide the foundation for deep and adaptive industry processes.
Order To Invoice Process Flow

Inventory Check
Order Publish
Status Update “Shipped”
Status Update “Complete”
Further Reading

- **Authors:** Dirk Krafzig, Karl Banke, Dirk Slama
- **Publisher:** Prentice Hall PTR (November 9, 2004)
- **Language:** English
- **ISBN:** 0131465759

- **Author:** David Chappell
- **Publisher:** O'Reilly Media, Inc.; 1 edition (June, 2004)
- **Language:** English
- **ISBN:** 0596006756

- **Author:** Eric Newcomer, Greg Lomow
- **Publisher:** Addison-Wesley Professional (December 14, 2004)
- **Language:** English
- **ISBN:** 0321180860
Further Reading

• Melissa Cook
  • Publisher: Prentice Hall PTR; 1 edition (January 22, 1996)
  • ISBN: 0134402561

• Howard Smith & Peter Fingar
  • Publisher: Meghan-Kiffer Press; (August 2003)
  • ISBN: 0929652355