SOA Technical Overview
Achieve Business Agility

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History has not been Kind to Brittle Businesses

- In 1917, BC Forbes compiled his first list of the 100 largest American companies.
- In 1987, Forbes published its Forbes 100 list and compared it to its 1917 list.
- Of the original group, 61 had ceased to exist!

Of the remaining 39, only 18 had managed to stay in the top 100.

How will your company transform its business to beat competition and deliver increasing customer value over time?

Be prepared for change.
It’s the only thing you can count on.
Business flexibility depends on IT flexibility

“Today’s IT architectures are the biggest roadblocks most companies face when making strategic moves.”

—McKinsey
“Flexible IT, Better Strategy”

Why are today’s architectures roadblocks?

- Complexity
- Monolithic and silo’d applications
- Hidden interfaces
- Custom coded connections
- Not designed for change

Actual application architecture for a consumer electronics company
The Big Divide

- Poor communication between LOB and IT
- Business managers view IT as costly and slow
- IT maintenance cost absorb 70+% of the funding
- IT too often viewed as a cost center not a strategic business tool
What is a Service?

- Consider interacting with a waiter in a restaurant:
  - Order food
  - Brings food
  - Refills glasses
  - Brings bill

- **How** the waiter achieves the task is not important, only that he **does**

- Waiter acts as an Interface to the restaurant

- Waiter is your **view** of the restaurant service
Services from Existing Software

- Existing software can be described as Services
  - Through adapters
  - Through “Web Services”
  - Through technology
    - J2EE
    - .NET
    - … others
Services from New Applications

- Services can be constructed for new applications
  - Web Services
  - J2EE EJBs
  - .NET assemblies

- Services can be constructed for new applications that interact with existing software
  - Bridges
  - Gateways
Services in your Business

- A wide variety of systems to be integrated
- Each one has a distinct set of APIs and associated semantics
- A very difficult task to write “glue” code to join them all together
Services Oriented Architecture Steps

• **Step 1: Break down your business into components**
  o Decide what is strategically important, what is just operations in the value chain, prioritize and scope your transformation projects

• **Step 2: Define a Service Model**
  o Identify your business services based on your business components, Identify your business processes, specify the services, processes and components accordingly

• **Step 3: Implement a Service Model**
  o Develop a service-oriented architecture to support the Componentized Business, Implement service based scoping policy for projects, Implement appropriate governance mechanism
For Successful SOA, Keep It Simple

Instead of:

- Enterprise-wide initiatives
- Architecture for architecture’s sake
- Complete re-engineering

Start with:

- End-to-end departmental projects
- Focus on IT professional’s needs
- Integrating existing organizational structures
Dispelling Myths about SOA

• Web Services = SOA

• ESB = SOA

• Component Architectures (and previous architectures) failed

• The primary value of SOA is code reuse and programmer productivity
SOA Reference Architecture
SOA with an ESB – Simplifying Interfaces and Applications

Turning this...

- Consolidate multi vendor platforms into a unified messaging backbone, enable re-use of both the business applications and their interfaces,
- Decouples interfaces from the business applications and reduces technical complexity.
- QoS to match business need, sending the right data to the right service, logs and correlates events.

...into this.

Enterprise Service Bus (inc Backbone)

= interface

SOA + ESB:

- Introduces rich business abstractions to describe the application interface.
- Decouples interfaces from the business applications and reduces technical complexity.
- Consolidate multi vendor platforms into a unified messaging backbone, enable re-use of both the business applications and their interfaces,
- QoS to match business need, sending the right data to the right service, logs and correlates events.

The ESB → Virtualizes access to services.
Two Core Principles Enable Flexibility

The ESB facilitates the *decoupling of interactions* between requestor(s) and provider(s)

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**Service Virtualization**
- Routing
- Protocol and transports
- Transformation of interfaces

**Aspect Oriented Connectivity**
- Security
- Management etc...
- Log and Audit
- Event tracking
An ESB enables flexible connectivity for integrating business applications, services and processes.
WebSphere Message Broker

- **Universal Connectivity**
  - Simplify application connectivity to provide a flexible and dynamic infrastructure

- **Routes and transforms messages FROM anywhere, TO anywhere**
  - Supports a wide range of protocols
    - MQ, JMS 1.1, HTTP(S), Web Services (SOAP, REST), File, ERP (SAP, SEBL…), TCP/IP, SCA
  - Supports a broad range of data formats
    - Binary (C/COBOL), XML, SOAP, CSV, Industry (SWIFT, EDI, HL7…), IDoc, User Defined
  - Interactions and Operations
    - Route, Filter, Transform, Enrich, Monitor, Distribute, Decompose, Sequence, Correlate, Detect

- **Simple programming**
  - Patterns based for top-down, parameterized connectivity of common use cases
    - e.g. Web Service façades, Message oriented processing, Queue to File…
  - Construction based for bottom-up assembly of bespoke connectivity logic
    - Message Flows to describe application connectivity comprising…
    - Message Nodes which encapsulate required integration logic which operate on…
    - Message Tree which describes the data in a format independent manner
    - Transformation options include Graphical mapping, PHP, Java, ESQL, XSL and WTX

- **Operational Management and Performance**
  - Extensive Administration and Systems Management facilities for developed solutions
  - Wide range of operating system and hardware platforms supported
  - Offers performance of traditional transaction processing environments
  - Available in Trial, Remote Deployment, Get Started and Enterprise deployment options
Message Broker Toolkit is Visual and Graphical
Event Driven Architecture (EDA)

- **Publish and Subscribe**
  - *Publication* node to publish using WebSphere MQ

- **Multiple Inputs**
  - *Collector* node groups incoming messages from multiple sources
  - Correlated set of messages or events propagated downstream

- **Sequence / Resequence nodes**
  - Messages arrive in *any* order, propagated according to monotonic sequence number
  - Sequence groups have defined start and end, propagated in order within group
  - Strong synergy with aggregation and collector nodes
  - Fully multi-threaded and handles parallel sequence groups

- **Fan out / Fan In (Aggregation)**
  - Generate multiple requests from single request
    - Coordinate the responses to provide single consolidated response
  - Improve response time because requests performed in parallel
  - Fits nicely with several typical ESB patterns
Extensive Security Capabilities

- **PEP node for Authentication, Authorization and Identity Mapping**
  - Can be placed anywhere in message flow to perform security functions
    - Additional flexibility adds to existing input node security

- **Enhanced Security Token Support for PEP and Input nodes**
  - SAML, Kerberos, LTPA & RACF PassTickets complement existing user, password & X509 tokens
  - PEP node: all new tokens available
    - Users can easily extend to support custom and non-standard tokens
      - e.g. LTPA v1.1, Liberty tokens, TAM credentials...
  - SOAP nodes: adds support for SAML, Kerberos & LTPA tokens
    - SAML WS-Security supports Passthrough/’Bearer’ scenarios
    - Implementation allows for future addition of Sender Voucher & Holder of Key authentications
  - MQ/HTTP nodes: adds SAML support to existing tokens

- **Security Policy Decision Point (PDP)**
  - WS-Trust 1.3 for token authentication & authorization
  - TFIM and LDAP PDPs also supported out-of-the-box
  - Kerberos WS-Security will exploit Key Distribution Cache
    - e.g. Active Directory on Windows...

- **Operational Control**
  - Security Profiles allow operational reconfiguration of PDP without redeploy
  - Resource manager security statistics; totals, passes, exceptions, cached
Derive Value from an Application Inventory

*Understand your application assets and control their access dynamically*

**Catalog application and service assets using a registry, e.g. WSRR**
- Web Service and MQ Service definitions
- Classifications: by function, owning department
- Relationships: applications dependencies for lifecycle management, versioning
- User defined properties (metadata): Application=GOLD or Service=SILVER

**Use registry information in ESB routing**
- Built-in facilities allow ESB to access registry
- Enables policy based processing

**Primary use cases:**
- **Visibility:** application catalog & relationships
- **Governance:** who accesses which applications/services
- **Dynamicity:** update registry to change ESB behavior without redeploy
- **Policy based Processing:** policy enforcement and policy based service selection

**Use metadata to implement ‘smart’ mediations**
- **Advertise availability of the ‘virtual services’**
- **Capture metadata about services for use by Service Bus**
- **Service Provider**
- **Virtual Service**
- **Service Requestor**
- **Service Registry**
Why Governance is Important

1. A currency service is created for a specific line of business (LOB)
2. Other LOBs start using the service
3. LOBs increase use of service / quality suffers
4. Service is fixed at provider’s expense
5. Fix works temporarily but problem reappears
6. Maintenance costs soar / provider ends service
Without Proper Management and Governance of SOA…

This could become…

… like this

The promise of SOA

A pile of services

… and so would go the promised benefits of SOA
Basics of an End-to-End SOA Governance Infrastructure
What is a registry ... a repository?

**Registry?**
Contains Service Metadata

**Repository?**
Stores Service Artifacts

*An integrated Registry / Repository Solution is needed govern and manage SOA for maximum value*

- Business process vitality
- New value through reuse of assets
- Improved connectivity
- Closer alignment of IT to business
- Business Flexibility
The WebSphere Service Registry and Repository provides value throughout the SOA Lifecycle.

**WebSphere Service Registry and Repository**

- **Publish**
- **Find**
- **Enrich**
- **Manage**
- **Govern**

**Encourage Reuse**
Find and reuse services for building blocks for new composite applications.

**Enable Governance**
Govern services throughout the service lifecycle.

**Enhance Connectivity**
Enable dynamic and efficient interactions between services at runtime.

**Help optimize service performance**
Enable enforcement of policies. Impact analysis.
WSRR is your Enterprise SOA Registry/Repository

Highly Prescriptive Service Lifecycle Governance

- Register your services for **visibility** and **reuse**

- Optimize resource costs by **governing service consumption** with service contract management

- Accelerate reuse with **Automated Service Discovery** across heterogeneous environments

- Reduce business risk with **prescriptive service lifecycle** governance including MQ Applications

- Tailor Service Governance implementation to **fit your business needs**

- **Apply operational policies consistently** to help achieve reliability and compliance
WSRR 3 Layer Security Architecture

User Interface
- Web
- Eclipse Plug-in

External Systems
- ESBs
- Process Servers
- Appliances

3rd Party
- Registries & Repositories

Programming Interfaces
- Java
- SOAP

Extensions & Integrations
- Web
- Eclipse Plug-in

Events generated

Registry & Repository
- Create
- Retrieve
- Update
- Delete

Admin
- Import/Export
- configure
- JMX

Access Control
- Validation
- Notification

Governance
- Transition
- Validate
- Notify
- Impact analysis
- Audit
- Lifecycle
- Validators

WSRR Authorization

WSR Authentication

WAS Server
- J2EE Security
- JMX Security
- JAAS
- URI
- Security Server
- WS-SEC

WAS Authentication

Content models

Events
Granting Access to Service

1. Service found in WSRR
2. Request for Access Made
3. Governance Board Approves Request
4. WSRR Access Updated
5. Security Info Given to Requestor
6. Requestor Makes Updates
WSRR Access Control editor provides guidance for authoring roles and permissions.
- Allows for advanced permissions with the specification of an XPath expression.
- Click-to-AssignKey permissions to roles.
- Easy view for understanding what permissions are assigned to the various roles.
ESB Integration

Dynamic Endpoint Selection
1) ESB mediation is invoked
2) Mediation queries WebSphere Service Registry and Repository for information about the requestor and candidate provider
3) Mediation matches requestor with best candidate provider
4) Message is routed

Availability Management
1) Selected provider fails to respond due to failure
2) Mediation queries WebSphere Service Registry and Repository to find other candidate providers
3) Mediation matches requestor with best candidate provider
4) Message is routed

Policy Enforcement
1) Mediation queries WebSphere Service Registry and Repository for information about the requestor and candidate provider
2) Mediation retrieves policy information from registry
3) Requestor and provider are matched based on these policies
4) Message is routed
Questions
Thank You