Integrating the OSGi Service Oriented Architecture into the Enterprise

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Distinguished Engineer
Chief Architect – Client Software

IBM Software Group
What is happening in the Enterprise domain?
SOA is Hot! But what does it mean in the Enterprise?

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

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

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

... a composite application?
A set of related & integrated services that support a business process built on an SOA
Why SOA for business flexibility and reuse?

- **Economics**: globalization demands flexibility
- **Business processes**: changing quickly and sometimes outsourced
- **Growth**: at the top of the CEO agenda
- **Reusable assets**: can cut costs
- **Information**: greater availability
- **Crucial for flexibility and becoming an On Demand Business**

*Sources: CBDi*
What are the core Enterprise SOA elements?

Coming together under Service Oriented Architecture

- Skills - assistance, and best practices
- Applications
- Industry know-how and best practices linked to business
- Flexible, robust infrastructure that reuses existing IT assets
How are Enterprises thinking (technically) about SOA?

The SOA Lifecycle

- Discover
  - Construct & Test
  - Compose

- Integrate people
- Integrate processes
- Manage and integrate information

- Gather requirements
- Model & Simulate
- Design

- Financial transparency
- Business/IT alignment
- Process control

- Manage applications & services
- Manage identity & compliance
- Monitor business metrics
IBM SOA Foundation Products

New! From IBM WebSphere software

**WebSphere Integration Developer**
Easy-to-use integration to simplify and speed the assembly of composite applications

**WebSphere Process Server**
Flexible deployment of business processes, making plug-and-play of components a reality

**WebSphere Business Modeler**
Simple to use process modeling for the business analyst to help maximize process and business resource re-use

**WebSphere ESB**
Connectivity infrastructure for integrating applications and services to power your SOA

**WebSphere Business Monitor**
Real-time visibility into process performance enabling process intervention and continuous improvement

SOA on your terms and our expertise
New SOA Product for Extending to the Edge
WebSphere Everyplace Deployment

What does WebSphere ED do?
- Extends SOA onto Desktops, Laptops, Mobile and Embedded
- Enhances traditional browser-based user interfaces
- Provides advanced user interfaces “beyond the browser”

Business Value:
- Efficient reuse of common skills and assets all the way to the edge
- Better human and machine integration to business processes
- Move business processes closer to the business problem
- Increased process availability via disconnected operations

Support for SOA:
- Symmetric services out to the Edge (e.g.: Web Services)
- Dynamically composable managed platform
- Based on open standards
- Same programming model as the rest of the SOA family
What does this have to do with OSGi?
Extend SOA beyond the Data Center (the “Edge”)

- Better (faster and consistent) response time on the Web based UI
- "Richer" UI than available in a Browser
- Ability to integrate existing "Client based" applications into their web applications
- Local business process execution (enabling mobility if needed)

**Gartner**

“...Growing trend back from browser-based thin clients to something in the middle – richer, smart clients...”
Programming Model

SOA is the composition model for the MVC patterns across topologies

Dynamically manageable
Platform
Applications
Configuration
“Disconnectable” operations
Desktops and appliances

SOA is the composition model for the MVC patterns across topologies

Intermediate Tiers

End Point

Preserve Roles
Development
Deployment
Richer experiences
Local Interactions
Alternate View/Control choices

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Managed Client Middleware

Extending to People, Places and Things

Enabled via one architectural model, one programming model, one consistent tool set

PEOPLE, PLACES, THINGS

- Industrial Controller
- Telematics Controller
- Smart Phone/PDA
- Smartcard
- Banking ATM
- Laptop

BUSINESS PROCESSES

- Monitoring
- Workflows
- Application Adapters

INFORMATION

- Search, Analysis
- Integration
- Data & Content

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Managed “Client” Middleware

Extending to People, Places and Things via OSGi technologies

Enabled via one architectural model, one programming model, one consistent tool set
How is IBM delivering Enterprise platforms based on OSGi?
IBM Client Technologies
An architecture to enable the eco-system
Client Technologies addresses “People, Places, and Things”
(extensions beyond the data center)

EMBEDDED
Extend/Enhance platform programmability to enable human and machine integration to/from enterprise and business processes to improve efficiency and effectiveness

SOLUTION APPLICATIONS
Extend/Enhance human and machine integration to/from enterprise and business processes to improve efficiency and effectiveness

RICH COLLABORATION
Extend/Enhance collaboration between humans involved in enterprise and business processes to improve efficiency & effectiveness

Developer Skill:
“Technical Construction”
Integrate

Developer Skill:
“Self Service”
Collaborate

Developer Skill:
“Platform Integrator”
Enable

OSGi
Single Consistent Framework

- **“Embedded”**
- **“Solution Apps”**
- **“Rich Collaboration”**

**Client Technologies**
- Interaction Services (Browser, GUI, eVV, Multimodal, ...)
- Access Services (Web Services, MQe, DB2e, Web Container, ...)
- Managed Client Services and Platform Mgmt (J9, Service Framework, Device Agent, ...)

**Collaboration Services**

**Operating System (multiple)**

**Desktop PCs – Rich Desktop User Experience**
- Larger Mobile Devices (Laptops, Tablet PC’s, PDA’s, Smart phones) – Rich Mobile User Experience
- MIDP Phones – Basic Mobile User Experience
- Embedded - No Local User Experience
Packaging

- **Runtime**
  - *Pre-configured device middleware service platforms*
  - *Components* for *(composition/extension)* of *(new/existing)* platforms

- **Tooling**
  - *Packaging* for *platform composition*
  - *Development* for *application creation*
  - *Analysis* for *optimization*
  - *Porting kits* for *movement*
Portfolio

“Solution Apps”
WED (client) 6.0
{WED (server) 6.0}

“Embedded”
WCTME 5.7.2
{WEDM, MQe, DB2e, WAS}

“Rich Collaboration”
WMC 2.5*
WCS 2.5 + {Domino 7.0}

{optional}
Portfolio for “the Edge”

“Solution Apps”
WebSphere Everyplace Deployment (client) 6.0 (WED)
{WED (server) 6.0}

“Embedded”
Workplace Client Technology Micro Edition 5.7.2 (WCTME)
{WEDM, MQe, DB2e, WAS}

“Rich Collaboration”
Workplace Managed Client 2.5* (WMC)
WCS 2.5 + {Domino 7.0}

{optional}

* GA 4Q05
WCTME 5.7.2 tools

MIDP mobile handhelds  Advanced mobile handhelds, tablets, laptops, desktops

WCTME 5.x IDE

<table>
<thead>
<tr>
<th>Enterprise MIDP Tools</th>
<th>Web Services for MIDP</th>
<th>eSWT</th>
<th>Extension Services (includes Web Services)</th>
<th>Application Tools for Extension Services</th>
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<tr>
<td>WEME CLDC/MIDP</td>
<td>WEME CDC/F/PBP/PP, OSGi MEE, J2SE</td>
<td>SMF Bundle Development Kit</td>
<td>J2EE Tooling</td>
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<td>J2EE</td>
<td>WSSD/AD</td>
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Eclipse

“Embedded” WCTME 5.7.2

*Advanced mobile handhelds, tablets, laptops, desktops*
WCTME 5.7.2 SDK

WCTME 5.7 CD

Licenses (LPP and OEM)

WCTME 5.7.1 GA August 30, 2004 (International)
WCTME 5.7.2 GA January, 2004 (International)
WebSphere ED (Client) 6.0

Enterprise and ISV Applications

Middleware Shell

Interaction Services

Access Services

Managed Client Services

Framework

Class Library

Virtual Machine

- Web Application View with SWT Browser Component
- Application Launcher/Switcher
- Preference Pages
- JFace
- SWT
- Generic UI frame
- Update Manager
- Help UI (with Lucene)
- Core Extension Point Framework
- Micro Broker
- MQTT
- JMS
- JNDI
- Transaction Container
- JDBC
- DB2e/Cloudscape
- Web Container
- Servlet/JSP
- XML Parsing
- KeyStore
- OSGi Device Agent
- SyncML Framework
- OSGi Services
- JMS
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- “Solution Apps”

WebSphere ED 6.0

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WebSphere ED 6.0

Managed Client Services

Framework

Class Library

Virtual Machine
WebSphere ED v6.0 - End-to-End Components

Send and receive secure transactions
Consume and publish Web Services
Synchronize relational data
Install and maintain software

1. "Embedded"
2. "Solution Apps"

WED 6.0
- MQe 2.0.1.8
- Web Services
- DB2e 8.2 Cloudscape
- Device Agent 1.8
- Service Framework
- J2SE 1.4.2

WED 6.0
- MQe
- Web Services
- DB2e Sync Server
- DMS
- User Services
- WAS 6.0

Integrated Administration

Application 1
Application 2
Application 3
Application N

“Solution Apps”
WebSphere ED 6.0

“Solution Apps”
WebSphere ED 6.0
WED 6.0 - Target Application Types

- User Interaction Applications
  - Eclipse RCP
  - Web Applications (JSP 1.2/Servlet 2.3, JSP 2.0/Servlet 2.4, Struts, JSF)

- Database Applications

- EJB Applications (subset of EJB 2.0 appropriate for clients)

- Messaging Applications

- Web Services Applications
  - Applications Consume Web Services (JSR 172)
  - Applications Provide Web Services
  - IBM Extensions (e.g. security, etc.)

- OSGi (R3)

- End to end
  - Connected and Disconnected Operations for all Application Types

“Solution Apps”
WebSphere ED 6.0
WebSphere Everyplace Deployment - IDE

End to End Applications

“Solution Apps”
WebSphere ED 6.0
WebSphere ED 6.0 Client Toolkit

**Bundle Developer Kit**
- Replacement for SMF Bundle Development Tools
- Extends Eclipse PDE Tooling
- Updated manifest editor
- Platform profiles

**Application Tools**
- Extend the RWD Web Tools
- Bundle Web Project
- Allows JSPs to be packaged for the embedded Web Container
- Server 2.3 and 2.4 support
- JSP 1.2 and 2.0 support
- JSF Tag library 1.2 support
- Struts support

**Transaction Container Tools**
- Extends the RAD EJB Tools
- Bundle Transaction Container Project
- Embedded deployment descriptor editor
- Allows packaging and deployment of RAD EJBs to the embedded transaction container
- Subset of full EJB 2.0 support

**Web Services Tools**
- Client stub generator tool
- Expose OSGi services as Web Services
- WS-Security

**Platform Builder**
- Allow OEMs to package applications and custom platform for easy deployment
- Wizard and editor to manage configuration
- Produces a platform containing
  - User selectable platform libraries
  - Use applications and bundles
  - Optional inclusion of JVM
  - User selectable workbench
- PreReq verification
- Configuration of startup parameters

**Samples**
- Placed in Samples Gallery
- Showcase, Application, and Technology Samples
End-to-End Application Samples (Source)

- **Order Entry**
  - Simple application for ordering bottles/cans from three stores
  - Two forms (rich UI, Web UI) with shared business logic

- **Mobile Adjuster**
  - Insurance Adjuster capabilities
  - Coding best-practices
  - Implements the browser user interface pattern

- **Open Financial Network**
  - Bank branch teller capabilities
  - Coding best-practices
  - Implements the rich client user interface pattern
Sample Applications

“Solution Apps”
WebSphere ED 6.0
Mobile Adjuster

WebSphere ED 6.0

“Solution Apps”
Mobile Adjuster End-to-End

“Solution Apps”
WebSphere ED 6.0
Banking Opportunity
Architecturally, it looks like the retail store topology
Open Financial Network

“Solution Apps”
WebSphere ED 6.0
Example Application

WebSphere Everyplace Deployment

Bank Teller System

Client Strategy

“Solution Apps”
WebSphere ED 6.0
"Rich Collaboration"
WMC 2.5
“Rich Collaboration”
WMC 2.5
IBM again delivered strong results, reflecting the breadth and strength of our business model. For the fourth quarter, we delivered $27.7 billion in revenue, which was up 7 percent as reported, and 3 percent at constant currency. Our pre-tax income was $4.4 billion, up 13 percent over fourth quarter of last year.

We delivered $1.81 of earnings per share, which was a 16 percent improvement over last year’s fourth quarter. Our cash flow performance and balance sheet remain strong. Net Cash from Operations was $6.4 billion in the fourth quarter, excluding Global Financing Receivables.

2004 was a very good year for IBM, with continued share gains and strong financial performance. For the full year, we delivered record revenues of $96.5 billion, up 8 percent year-to-year. Pretax earnings were $12 billion, up 11 percent year-to-year, but up 14 percent without the one-time pension settlement charge recorded in the third quarter.

Earnings per share were $4.94. Before the same one-time charge, earnings were $5.05, up 16 percent. These results exceeded analysts’ expectations from the beginning of the year by 12 cents.
“Rich Collaboration”
WMC 2.5
### Client Strategy

**Rich Collaboration**

WMC 2.5

---

## New Project Plan - IBM Workplace

### Documents

- **Document Libraries**
  - Briefings
  - Release Planning

---

### Briefings

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Start Date</th>
<th>End Date</th>
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<tr>
<td>1</td>
<td>Create Component Lists</td>
<td>Jan 23, 2005</td>
<td>Jan 25, 2005</td>
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<tr>
<td>2</td>
<td>Define Build System</td>
<td>Jan 23, 2005</td>
<td>Feb 6, 2005</td>
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<td>3</td>
<td>Run the first build</td>
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<td>4</td>
<td>Resolve deployment issues</td>
<td>Jan 29, 2005</td>
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Rich Collaboration
WMC 2.5
Some other cool stuff
pSeries Virtual Partition Manager

- List Partition Status
- Create Partitions
- Partition Management
- Etc.

“Embedded” WebSphere ED Inside

Create and Manage Virtual Partitions
Eclipse / OSGi Synergy continues

- **Equinox reborn**
  - Standalone OSGi project in Eclipse
  - Open to implementing all OSGi services
  - Extracted and available w/o RCP (UI/App Model)

- **Embedded RCP**
  - Eclipse technology project to investigate use of RCP in “embedded” (ie, Small)
    - eSWT and SWT Mobile Extensions
    - Runtime based on OSGi and Eclipse Extension Point Framework
    - eJFace
    - eWorkbench
    - eUpdate Manager
    - Thorough test suites to validate independent implementations
  - Target dates
    - eSWT and SWT Mobile Extensions 1.0 - Nov, 2005
    - eRCP 1.0 Dec, 2005
  - Key Committers
    - Nokia, Motorola, IBM
Mobile Adjuster exploiting eRCP/MEG (same application)
Summary
SOA Extended “beyond the Data Center”
Enabling People, Places, Things

Solution Apps

Embedded
ME 5.7.2

EO 5.8.1
WED 6.0

Rich Collaboration
WMC 2.6
WMC X.Y

Enabled by OSGi
What should the OSGi Alliance do next?
Client side middleware industry standards

- Technical completeness requires specification of the following:
  - Data Formats
  - Communication Protocols that deliver and consume those Data Formats
  - Programming Interfaces
  - declarative "Service" interfaces
  - imperative bindings

- Interoperability completeness requires the following:
  - Control (fair and transparent multi-lateral governance)
  - Completeness (see above)
  - Compliance (uniform adherence to the specs that maximizes interoperation)
  - Cost (equitable licensing of essential IPR; brand value flows equally to all "members")

SOA requires “Client” side middleware industry standards
Some suggestions…

- **Technical**
  - Establish, endorse an application model or models
    - MIDP – OAT is a good start for Mobile Consumer ("a better MIDP")
    - Eclipse (e)RCP should be embraced for Enterprise
  - Define a seamless model for robustness on an appropriate timetable
    - Improve intra-process (VM) support
    - Recognize that multi-processes are required (and inevitable)
      - establish an upward compatible model (eventing, pub/sub, ESB integration)
  - Add declarative (language neutral) interfaces
    - Begin establishing other language bindings
    - Embrace Web Services

- **Organizational**
  - Establish clear relationships to other bodies (some of this is done, but not well known)
    - OASIS, OMA, Eclipse, etc.
  - Overhaul the OSGi messaging and focus – it is not a simple fix
    - Think (hard) about where OSGi is getting traction
    - Name / Mission Statement / Web Presence / Etc.
    - Nothing should be out of bounds!

*You have created a foundational GEM…
*It is time to “cut, polish and mount” for maximum luster!*
END