NetWeaver Interoperability: Integrating with Open Source and Microsoft. .NET

Wilson Ramos and Wallace Su
Technical Alliance Managers, SAP Global Ecosystem & Partner Group
The Solution Map for NetWeaver indicates that enabling interoperability is a crucial function.
Enabling Platform Interoperability includes developing applications that are compatible with NetWeaver.

Developing Applications that are compatible with SAP NetWeaver

"Developers can utilize development tools for alternative development platforms, namely Microsoft .NET so build content and solutions for SAP NetWeaver"
Agenda for this session:

- Interoperability and SAP NetWeaver

Case Studies

- Open Source Support in SAP NetWeaver – Wilson Ramos
- Consuming Enterprise Services with Microsoft .Net – Wallace Su
Open Source Support in SAP NetWeaver
Objectives for this session:

- Introduction to SAP’s position and support of Open Source.
- Discussion of SAP’s contribution to the Open Source community.
- Demonstration of the following Open Source frameworks operating within a SAP NetWeaver environment.
  - Struts
  - Hibernate
  - Axis
  - Joram
  - ANT
SAP and Open Source

Open Source Bases Application on NetWeaver with
- Struts
- Hibernate
- Axis
- JORAM
- Ant

Other Open Source frameworks and SAP

Summary
What is Open Source?

- A Software development method
  - Source code is made freely available so that outside programmers can submit improvements or use it themselves. This includes fixing bugs, improving performance, and adding features.

- A definition of software that includes freely available
  - Access to source code,
  - Redistribution,
  - Modification, and
  - Derived works

- Associated with license models ensuring the above
  - Copyleft (General Public License – GPL, LGPL)
  - Copyright (MIT, Apache)
“To combine the advantages of our strategic, standards-based commercial platform with mature, Open Source software that provides cost savings for our customers and a tactical advantage for specific use-cases.” - FW
<table>
<thead>
<tr>
<th>Component</th>
<th>Products</th>
<th>Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise Applications</td>
<td>SugarCRM, Compiere, Ohioedge</td>
<td>★</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Zope, phpBB, Nukes, PostNuke</td>
<td>★★★</td>
</tr>
<tr>
<td>Content Management</td>
<td>Midgard, OpenCMS, Lenya, Typo3, Red Hat</td>
<td>★★★★</td>
</tr>
<tr>
<td>Presentation</td>
<td>Jetspeed, Gluecode, Zope, uPortal, Liferay</td>
<td>★★★</td>
</tr>
<tr>
<td>Search</td>
<td>Lucene, ht://Dig</td>
<td>★★★</td>
</tr>
<tr>
<td>Process Management</td>
<td>Openflow</td>
<td>★</td>
</tr>
<tr>
<td>Development Tools</td>
<td>Eclipse, NetBeans, PHP, Perl, Struts, Hibernate, Spring</td>
<td>★★★★★</td>
</tr>
<tr>
<td>Integration Services</td>
<td>Openadaptor</td>
<td>★</td>
</tr>
<tr>
<td>Enterprise Service Bus</td>
<td>Celtix, ServiceMix</td>
<td>★</td>
</tr>
<tr>
<td>Application Servers</td>
<td>JBoss, JonAS,</td>
<td>★★★</td>
</tr>
<tr>
<td>Directory Services</td>
<td>OpenLDAP</td>
<td>★★★</td>
</tr>
<tr>
<td>RDBMS</td>
<td>MySQL, PostgreSQL, Firebird, Ingres</td>
<td>★★</td>
</tr>
<tr>
<td>Security</td>
<td>Snort, Nessus</td>
<td>★★★★★</td>
</tr>
<tr>
<td>Operating System</td>
<td>Linux, FreeBSD</td>
<td>★★★★★</td>
</tr>
<tr>
<td>Virtualization</td>
<td>Xen</td>
<td>★★</td>
</tr>
</tbody>
</table>
SAP NetWeaver Developer Studio extends Eclipse.

- SAP NetWeaver Developer Studio embeds the eclipse development framework and extends this framework with hundreds of plug-ins providing developers with productivity tools that accelerate development and increase agility.

- SAP is a board member and major sponsor of the Eclipse foundation.
SAP NetWeaver supports major scripting environments.

- SAP is extending the APIs of popular scripting languages to enable developers to exploit and integrate with SAP’s Enterprise Services Architecture
  - PHP
  - Perl
- SAP provides a Scripting Toolkit to allow easy integration with SAP ESOA and traditional environments.

Customer benefits

- Familiarity to developers
- Ability to easily integrate applications that are complementary to SAP’s business applications
SAP NetWeaver interoperates with Open Source frameworks.

- SAP NetWeaver *interoperates* smoothly with *mature* open source development frameworks to provide developers with choice and flexibility when developing applications
  - Struts
  - Hibernate

**Customer benefits**

- Familiarity to developers
SAP Netweaver supports Firefox.

- SAP is committed to providing its customers maximum flexibility with regard to end-user devices.
- Alongside Microsoft Internet Explorer, SAP also supports the Mozilla Firefox browser.

**Customer benefits**

- Customers can choose the browser that best suits their particular business needs.
SAP uses Open Source software internally.

- SAP’s internal development and services both leverage Open Source software where appropriate.
- SAP hosted solutions run Linux.
- SAP development internally uses Open Source software such as:
  - JUnit
  - Python
  - gcc
SAP is committed to providing its customers **maximum flexibility** with regard to databases.

SAP entered into a Cooperation Agreement (Cross-Licensing) with MySQL AB in 2003 to distribute and support MaxDB.

MaxDB is the most popular open source database certified for SAP/R3.

**Customer benefits**

- Customers can choose the database that best suits their particular business needs.
- Open source infrastructure frees budget to be invested in differentiating innovation.
SAP has created a group to work directly with the Open Source Community.

**SAP Global Open Source Office**

- Established in 2004
- Cross-Organizational team to coordinate all Open Source related activities

**Strategic competence hub for our partners**

- Generate joint concepts and GTM strategies
- Long-term partnership projects

**The operational focal point for the field and our customers**

- Roll-In/Roll-Out from/to customer through SAP’s field organization

**Contact:** opensource@exchange.sap-ag.de
Summary: SAP’s mission with Open Source

- SAP’s mission is to make its customers successful.
- SAP will support open source software if it shows:
  - Maturity
  - Tangible benefit to our customers (e.g. lower TCO or added functionality).
SAP and Open Source

Open Source Bases Application on NetWeaver with
• Struts
• Hibernate
• Axis
• JORAM
• Ant

Other Open Source frameworks and SAP

Summary
SAP-Open Source Compatibility Illustrated – The Employee Management Application

**Deployment**

1. Deploy
   - SAP Deployment API

2. SAP Deployment & ANT API
   - Deploy

**Runtime**

**Struts**
- **View**
  - Struts JSPs
- **Controller**
  - Struts Actions

**Model**
- Hibernate POJOs

**Custom Libs**
- Hibernate API
- Joram API
- AXIS API
- Log4J
- Helper libs
- etc

**App Server**
- Persistent data
  - Employee
  - Department

**Hosted Web Service**
- AXIS API
  - consume

**JMS Destinations**
- send message

**JMS receiver stand alone client**
- consume message

**AXIS API**
- consume

**Hosted Web Service**
- send message

**JMS receiver stand alone client**
- consume message
Apache Struts is an open-source web application framework for developing Java EE web applications
Runtime

- Deploy Hibernate package (Hibernate API and helper libraries as shared libraries)
- Deploy your own JDBC driver for the database you are running at
- Deploy your own Data Source with
  - `vendor_sql` SQL Support Layer or
  - `native_sql` SQL Support Layer

Hibernate is a JAVA solution used to provide object-relational mapping (ORM) between object-oriented domain models and traditional relational databases.
Demo Application: Web Services support through AXIS

Apache Axis is an open source, XML based Web service framework.

- Import AXIS libraries into the application context.
- Deploy the Web Service on Tomcat
- Program Axis API calls in the Struts controller.

Runtime

Struts

View

Struts JSPs

Controller

Struts Actions

Model

Hibernate POJOs

Custom Libs

- Hibernate API
- Joram API
- AXIS API
- Log4J
- Helper libs
- etc

App Server

AXIS API consume

Hosted Web Service

Apache Axis is an open source, XML based Web service framework.
**Demo Application: JMS support through JORAM**

**JORAM** is an Open Source message-oriented-middleware product that supports JMS (Java Message Service) and SOAP (Simple Object Access Protocol).

- Import JORAM libraries into the application context.
- Program JORAM API calls in the Struts controller.
- Implement a simple Message Receiver client.
Demo Application: ANT for deployment

- Use the **SAP Deployment Client**
- Download from SDN
  - Sample Deployment Client Package
  - Utility Libraries
  - Sample ANT project
- Invoke the client in an ANT task (build.xml)

*Apache Ant is a JAVA software tool for automating software build processes.*
DEMO
SAP and Open Source

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Other Open Source frameworks and SAP

Summary
Other Open Source Frameworks

Other frameworks that were explored:

- Log4J – Logging framework
- The Spring framework

Good News:

- How-To’s for all frameworks are available on the SDN:
  https://www.sdn.sap.com/irj/sdn/docs?rid=/webcontent/uuid/e081a4b6-0801-0010-7fa4-c3c7a0454815
SAP and Open Source

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Other Open Source frameworks and SAP

Summary
Where do I start?

Join SDN

Download the software, tools and information

Migrate / Deploy your solution on SAP NetWeaver

Contact the SAP Representative

SAP DEVELOPER NETWORK
Further Information

Public Web:

SAP Developer Network: [www.sdn.sap.com](http://www.sdn.sap.com)
  ➔ Forums ➔ Web Application Server ➔ Web AS Migration
  ➔ Developer Area Web Application Server ➔ Quick Link  [J2EE Migration Kit](http://www.sdn.sap.com)

Consuming Enterprise Services in Microsoft .Net
From Web Service To Enterprise Service

Using the ES Workplace
Implementation Practice
Demo in Visual Studio .Net
Q&A
Resources
What are the steps you need to take to call an Web Service

- Provider builds and defines the service in WSDL
- Provider registers the service in UDDI
- User finds the service by searching UDDI registry
- Generate the proxy class from the WSDL
- User application binds to the Web Service and invokes its operations via SOAP
- All SAP applications can expose services

- You can develop a service in any release

Release 4.6 and older require additional components to expose Web services. This can be e.g. a SAP Web Application Server or the SAP Exchange Infrastructure

The service you have developed does not change during an upgrade to a higher release, but automatically becomes available as a Web service.
From Web Services to Enterprise Service

Web services
- Open standard for system interaction independent of technical architecture
- Self-contained, self-describing, modular functionality
- Once deployed, applications and other Web services can discover and invoke a Web service

Enterprise services
- Web services which provide business functionality
- Have enterprise quality in scalability, robustness, security, manageability, supportability, ...
- Replace UDDI for a richer Enterprise Service Repository including Models of ES Packages
From Web Service To Enterprise Service

Using the ES Workplace

Implementation Practice
Demo in Visual Studio .Net
Q&A
Resources
SAP Enterprise Services Workplace
Access to Enterprise services for Enterprise Architects

Browse
- Enterprise Services
- Collaborate via SDN
- ES packages

Test-drive
- Consume enterprise services
- my SAP Business Suite 2005
- Enterprise Service Repository

Use
- Easy access to implement required pieces

www.sdn.sap.com ➔ Enterprise SOA ➔ ES Workplace
SAP ES Workplace and ES Packages
Explore, test-drive and run Enterprise Services Packages

- ES Packages
- Enterprise services
- Education (Wiki)

ES Workplace
1. Find the Enterprise Service in the ES Workplace.

2. Make some adjustments in the WSDL to work with .Net 2.0

3. Generate a proxy class for the WSDL and import the class into a Visual Studio .Net 2005 project

4. Write an application which uses the proxy class

5. Test Enterprise Service on the ES Workplace.
What are the steps you need to take to call an Enterprise Service

- Find the Enterprise Service you are looking for in the Enterprise Service Repository (ESR) of the ES Workplace
Find the Enterprise Service you want to implement and retrieve it

Go to [http://sdn.sap.com](http://sdn.sap.com) -> ES Workplace -> Start Browsing

Find the Enterprise Service in the ES Repository
**Example: Find Material by Search Text**

*Find Material by Search Text - Microsoft Internet Explorer*

**Definition**
Find Material by Search Text is an operation that searches for material ID by search text.

**Technical Data**
- **Entity Type**: Service Operation
- **Technical Name in Enterprise Service Repository (ESR)**: MaterialSimpleSearchTextQueryResponse_In
- **Namespace in ESR**: http://sap.com/m/EA-APPL/SE/Global
- **Software Component Version in ESR**: ECC-SE 6.00 SP00/01
- **Category**: Inbound
- **Mode**: Synchronous
- **Related Web Service Definition**: ECC_MATERIALBYSEARCHTEXT003QR

**Message Type Request**
- Material Simple by Search Text Query

**Message Type Response**
- Material Simple by Search Text Response

**Use**
The Find Material by Search Text inbound operation provides the following functionality:

**Features**
This inbound operation processes the following message types:

- [Click here to get detailed field description]

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**Explore Input/Output parameters.**

**Download the WSDL definition.**

**Read about definition and use.**
What are the steps you need to take to call an Enterprise Service

- Find the Enterprise Service you are looking for in the Enterprise Service Repository (ESR) of the ES Workplace
- Retrieve the WSDL from the Enterprise Service Repository
Retrieve the WSDL from the Enterprise Service Repository

Save the WSDL definition to your file system or record the WSDL URL for later use.
What are the steps you need to take to call an Enterprise Service

- Find the Enterprise Service you are looking for in the Enterprise Service Repository (ESR) of the ES Workplace
- Retrieve the WSDL from the Enterprise Service Repository
- Make minor change to the WSDL to fit the needs of Microsoft
Make minor changes to the WSDL to fit the needs of Microsoft

Find the word “parameters” in the WSDL definition and replace it by “parameter”.

<xsd:simpleType name="integer">
  <xsd:restriction base="xsd:integer">
    <xsd:minInclusive value="0"/>
    <xsd:maxLength value="10"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="negative">
  <xsd:restriction base="xsd:integer">
    <xsd:minInclusive value="-5"/>
    <xsd:maxLength value="10"/>
  </xsd:restriction>
</xsd:simpleType>
What are the steps you need to take to call an Enterprise Service

- Find the Enterprise Service you are looking for in the Enterprise Service Repository (ESR) of the ES Workplace
- Retrieve the WSDL from the Enterprise Service Repository
- Make minor change to the WSDL to fit the needs of Microsoft
- Generate the proxy class from the WSDL
Generate the proxy class from the WSDL

Open up Visual Studio 2005 Command Prompt and generate the class file via the command line wsdl.exe tool
What are the steps you need to take to call an Enterprise Service

- Find the Enterprise Service you are looking for in the Enterprise Service Repository (ESR) of the ES Workplace
- Retrieve the WSDL from the Enterprise Service Repository
- Make minor change to the WSDL to fit the needs of Microsoft
- Generate the proxy class from the WSDL
- Import the generated proxy classes into Visual Studio .Net project
Import the generated proxy classes into Visual Studio .Net project

Create a new project in Visual Studio .Net and Import the generated class into a folder inside the project

```csharp
void Main(string[] args)
```
What are the steps you need to take to call an Enterprise Service

- Find the Enterprise Service you are looking for in the Enterprise Service Repository (ESR) of the ES Workplace
- Retrieve the WSDL from the Enterprise Service Repository
- Make minor change to the WSDL to fit the needs of Microsoft
- Generate the proxy class from the WSDL
- Import the generated proxy classes into Visual Studio .Net project
- Write a small program which uses the proxy to call the Enterprise Service
From Web Service To Enterprise Service
Using the ES Workplace
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It’s Demo Time:

Demo of Simple program using Enterprise Services.

```csharp
Employee.Credentials = new System.Net.NetworkCredential(SAP_USERNAME, SAP_PASSWORD);
if (USE_PROXY) {
  pEmployee.Proxy = new WebProxy(PROXY_HOST, PROXY_PORT);
}

BAPI_EMP_ID[] employees = BAPI_EMP_ID(0);
pEmployee.BAPI_EMP_ID = employees;
char[] splitter = "\n";
string[] name = new string[] {
  "Meesa Missing",
  "Sarah Moore",
  "Barra Bower",
  "Franziska Stahl"
};
foreach (string emp) {
  // split name
  string[] name = emp.Split(spliter);
  // move the first name
  emp1.firstname = name[0];
  //... other code...
}
```
Implementation for .Net 2.0

1. Find the Enterprise Service in the ES Workplace.

2. Make some adjustments in the WSDL to work with .Net 2.0

3. Generate a proxy class for the WSDL and import the class into a Visual Studio .Net 2005 project

4. Write an application which uses the proxy class

5. Test Enterprise Service on the ES Workplace.
Questions?

Q&A
Resources

ES Workplace Homepage

Roadmap for NetWeaver & Microsoft .Net
https://www.sdn.sap.com/irj/sdn/go/portal/prtroot/docs/library/uuid/c650c090-0201-0010-26a2-a14f7dbc1d4f

Documentation on Enterprise Services Packages

Microsoft Parameters vs. Parameter problem
http://msdn.microsoft.com/msdnmag/issues/02/12/XMLFiles