



SOA In Focus

Service Component Architecture, Apache Tuscany & WebSphere SOA Feature Pack Beta

Simon Laws
Open Source SOA



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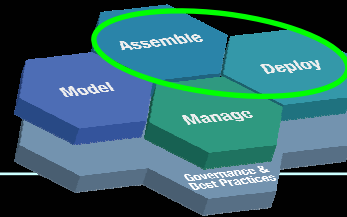
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Objectives

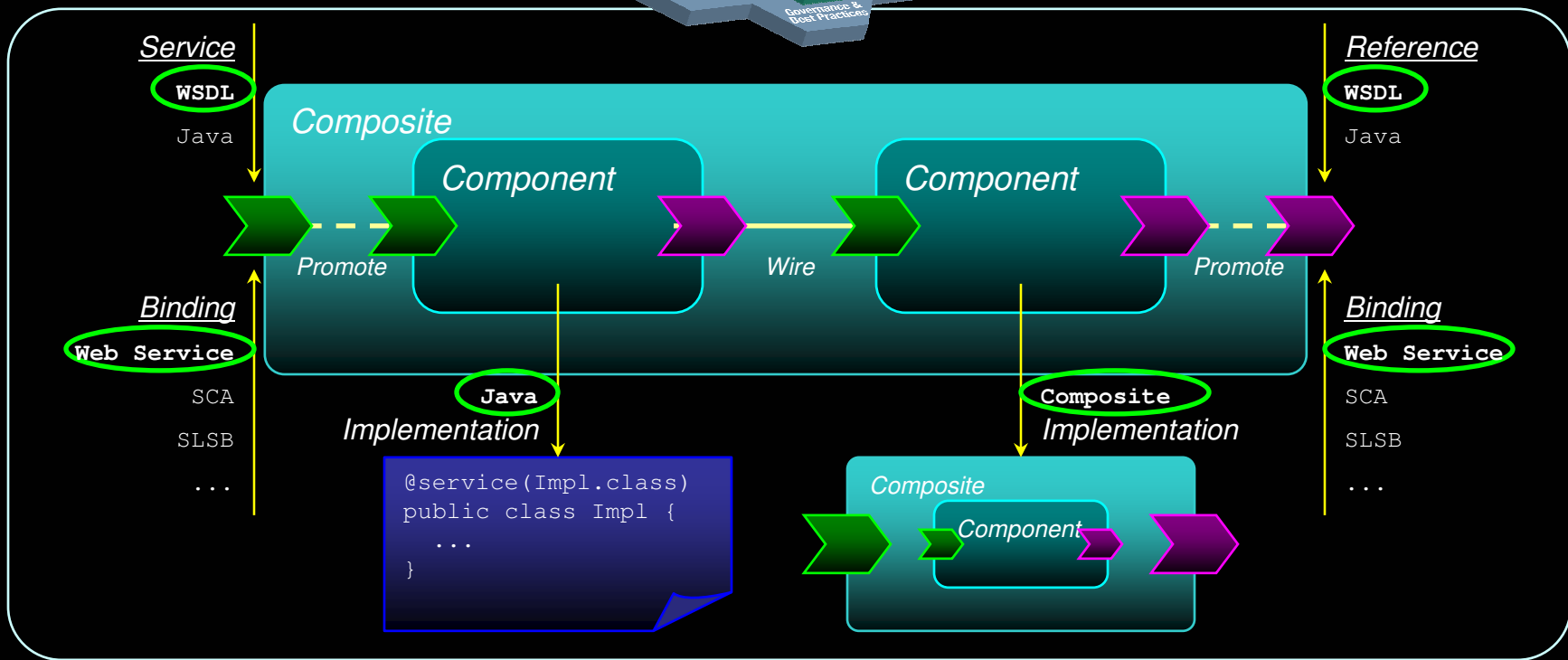
- **Overview of SCA**
- **Apache Tuscany**
- **WebSphere SOA Feature Pack Beta**

SCA Overview

Design → Implement → Compose → Run → Test



WebSphere software
WebSphere Application Server v6.1 + SCA



SCA V1.0

- **SCA specification development started life in OSOA – a Consortium of industry vendors. The specs reached v1.0 here**

– <http://www.osoa.org>



- **Apache has an incubator project called Tuscany which hosts the multi-lingual open source implementations for SCA v1.0**

– <http://incubator.apache.org/projects/tuscany.html>

- **SCA specification development has now moved to the OASIS Open Composite Service Architecture section**

– <http://www.oasis-open.org>



SOA In Focus

Apache Tuscany


Apache Tuscany – <http://incubator.apache.org/tuscany/>



Apache Tuscany > Home > General Info > Index

[User List](#) | [Dev List](#) | [Issue Trac](#)

General

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[User Feedback](#)
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[Blog](#) 

Tuscany SCA

[SCA Overview](#)
[SCA Java](#)
[SCA Native](#)
[SCA PHP](#)

Tuscany SDO

[SDO Overview](#)
[SDO Java](#)
[SDO C++](#)
[SDO PHP](#)

Tuscany DAS

[DAS Overview](#)
[DAS Java](#)
[DAS C++](#)

Overview

Welcome to the Apache Tuscany project! The Tuscany community is working to create a robust and easy to use infrastructure that simplifies the development of service-based application networks and addresses real business problems posed in SOA.

Tuscany is based on specifications defined by the Open SOA Collaboration:

- **Service Component Architecture (SCA)** - An essential characteristic of SOA is the ability to assemble new and existing services to create brand new applications that may consist of different technologies. Service Component Architecture defines a simple, service-based model for construction, assembly and deployment of network of services (existing and new ones) that is language-neutral. Tuscany is working on SCA specification 1.0. [Learn more about SCA](#)
- **Service Data Object (SDO)** provides a uniform interface for handling different forms of data, including XML documents, that can exist in a network of services and provides the mechanism for tracking changes. Tuscany supports SDO specification 2.1. [Learn more about SDO](#)
- **Data Access Service (DAS)** provides a simple SDO interface to relational databases. [Learn more about DAS](#)






The above mentioned technologies provide a full infrastructure for developing and running SOA based applications. They are not dependent on one another and can be used independently.

Please join us to create a simple, practical, extensible SOA infrastructure to address the problems that large-scale applications and service networks are faced with. We look forward to your participation.

Latest Tuscany Releases

- [DAS Java 1.0-incubating-beta2](#) (Oct, 2007)
- [SCA Java 1.1-incubating](#) (Feb, 2008)
- [SDO Java 1.0-incubating](#) (Aug 2007)
- [SCA Native Incubator-M3](#) (May, 2007)

News

- **Feb 05, 2007 - Tuscany Java SCA 1.1 released!**
- **Nov 12-13, 2007 - SOAWorld Conference & Expo 2007 West** 
Raymond Feng presents [Practical SOA with Apache Tuscany](#) 
- **Oct 06, 2007 - Tuscany DAS Beta2 released!**
- **Sept 24, 2007 - Tuscany Java SCA 1.0 released!**
- **Sept 12-13, 2007 - Java Zone, Europe** 
Simon Laws [presents](#)  SCA and Tuscany
- **Nov 12-16 2007 - ApacheCon US** , Atlanta, Georgia in US
Jean Sebastien Delfino and Mario Antollini will hold a 3 hours tutorial session for SCA and Tuscany
- To view a **list of previous releases** please go to the download page of each subproject.
- [past Tuscany events](#)

What is Apache Tuscany

Some words from the project charter:

“... open-source software for distribution at no charge to the public, that simplifies the development, deployment and management of distributed applications built as compositions of service components.

These components may be implemented with a range of technologies and connected using a variety of communication protocols.

This software will implement relevant open standards including, but not limited to, the SCA and SDO standards defined by the OASIS OpenCSA member section.”

Apache Tuscany - History

Project created in Dec 2005 in Apache incubator

Initial code contribution from BEA and IBM

8 SCA implementation releases

09/07 1.0 release (first implementation of SCA spec v1.0)

12/07 1.0.1 bug fix release

01/08 1.1 release, JMS binding and improved policy support

Growing user and developer community

Tuscany Modules

There is a wide selection of modules in various stages of development .

- **Component Implementation Types**

- BPEL
- DAS
- Java
- Notification
- OSGi
- Resource
- Script (Groovy, Ruby, Python, Javascript)
- Spring
- XQuery

- **Hosting**

- Jetty
- Tomcat
- WebSphere
- Geronimo
- OSGi

- **Binding Types**

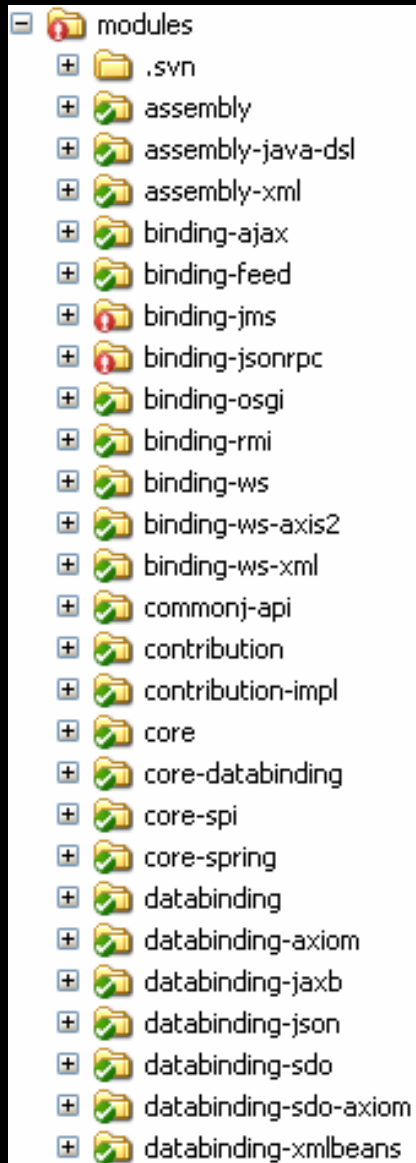
- Ajax
- Feed (RSS, Atom)
- JMS
- JsonRpc
- Notification
- OSGi
- Rmi
- SCA
- Ws/Axis2
- XQuery

- **Databindings**

- Axiom
- Jaxb
- Json
- Saxon
- Sdo
- XmlBeans

There is lots more to be done. If you are interested in Open Source consider yourself invited to join the Tuscany project

Extensibility



- Tuscany Java SCA is based on an extensible, modularized architecture that can easily be extended.
- There is a stable SPI defined for adding new technologies, e.g. bindings, databindings, implementations and hosting support.
- If you find that SCA doesn't support your technology of choice check with the Tuscany mailing list (see "How to find out more") as it may already be in development and you could help develop or test it.
- Alternatively it's not too hard to add new ones yourself and you could come and help Tuscany build it
- All contributions are most welcome!

Getting Tuscany Java SCA

- **Install the Eclipse plugin**

- <http://people.apache.org/~jsdelfino/tuscany/tools/updatesite>
- <http://jsdelfino.blogspot.com/2007/10/developing-sca-application-with-apache.html>

- **Get a release**

- <http://incubator.apache.org/tuscany/sca-java-releases.html>

- **Get the code from our Subversion repository**

- <http://svn.apache.org/repos/asf/incubator/tuscany/>

Using Apache Tuscany

Java - calculator/src/Calculator.composite - Eclipse Platform

File Edit Source Navigate Search Project Run XML Window Help

Package Explorer Hierarchy

- assets
- calculator
 - src
 - calculator
 - AddService.java
 - AddServiceImpl.java
 - CalculatorClient.java
 - CalculatorService.java
 - CalculatorServiceImpl.java
 - DivideService.java
 - DivideServiceImpl.java
 - MultiplyService.java
 - MultiplyServiceImpl.java
 - SubtractService.java
 - SubtractServiceImpl.java
 - calculator.conversational
 - launch
 - LaunchCalculator.java
 - Calculator.composite
 - CalculatorService.wsdl
 - JRE System Library [Java50]
 - Tuscany Library
 - target
 - build.xml
 - calculator.png
 - calculator.svg
 - pom.xml
 - README
 - cloud
 - store
 - store-merger

```

<composite xmlns="http://www.osoa.org/xmlns/sca/1.0"
  targetNamespace="http://sample"
  xmlns:sample="http://sample"
  name="Calculator">

  <component name="CalculatorServiceComponent">
    <implementation.java class="calculator.CalculatorServiceComponent" />
    <service name="CalculatorService">
      <interface.java interface="calculator.CalculatorService" />
      <binding.ws/>
      <binding.sca/>
    </service>
    <reference name="addService" target="AddServiceComponent" />
    <reference name="subtractService" target="SubtractServiceComponent" />
    <reference name="multiplyService" target="MultiplyServiceComponent" />
    <reference name="divideService" target="DivideServiceComponent" />
  </component>
</composite>
  
```

Task List

Find: All

Uncategorized

Outline

ent name=ConversationalCalculatorServiceComponent.java class=calculator.CalculatorServiceComponent

reference name=calculatorService

#comment

binding.ws uri=http://localhost:9080

Problems @ Javadoc Declaration Console

<terminated> LaunchCalculator [Java Application] C:\Program Files\IBM\Java50\jre\bin\javaw.exe (3 Mar 2008 13:04:22)

Warning: Running an XSLT 1.0 stylesheet with an XSLT 2.0 processor

Warning: Running an XSLT 1.0 stylesheet with an XSLT 2.0 processor

03-Mar-2008 13:04:29 org.apache.tuscany.sca.http.jetty.JettyServer addServletMapping

INFO: Added Servlet mapping: http://L3&W203:8080/CalculatorServiceComponent

Calculator running

3 + 2 = 5.0

3 - 2 = 1.0

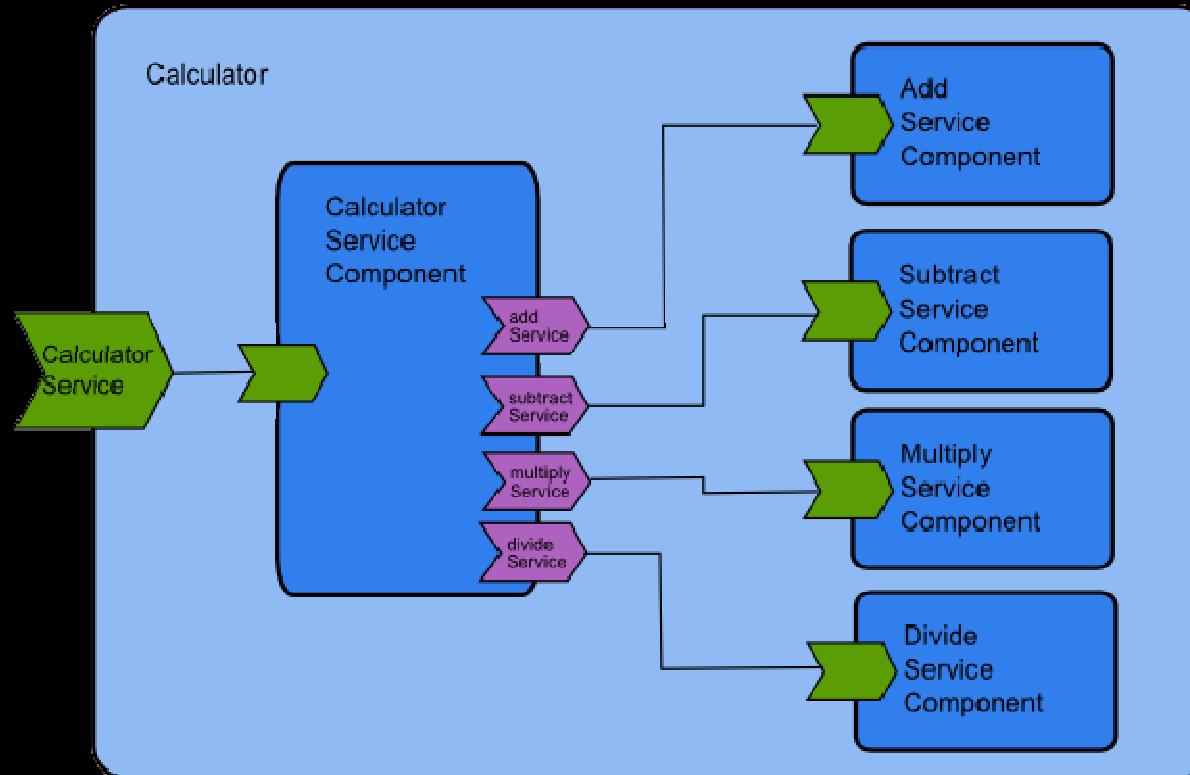
3 * 2 = 6.0

3 / 2 = 1.5

Stopping ...

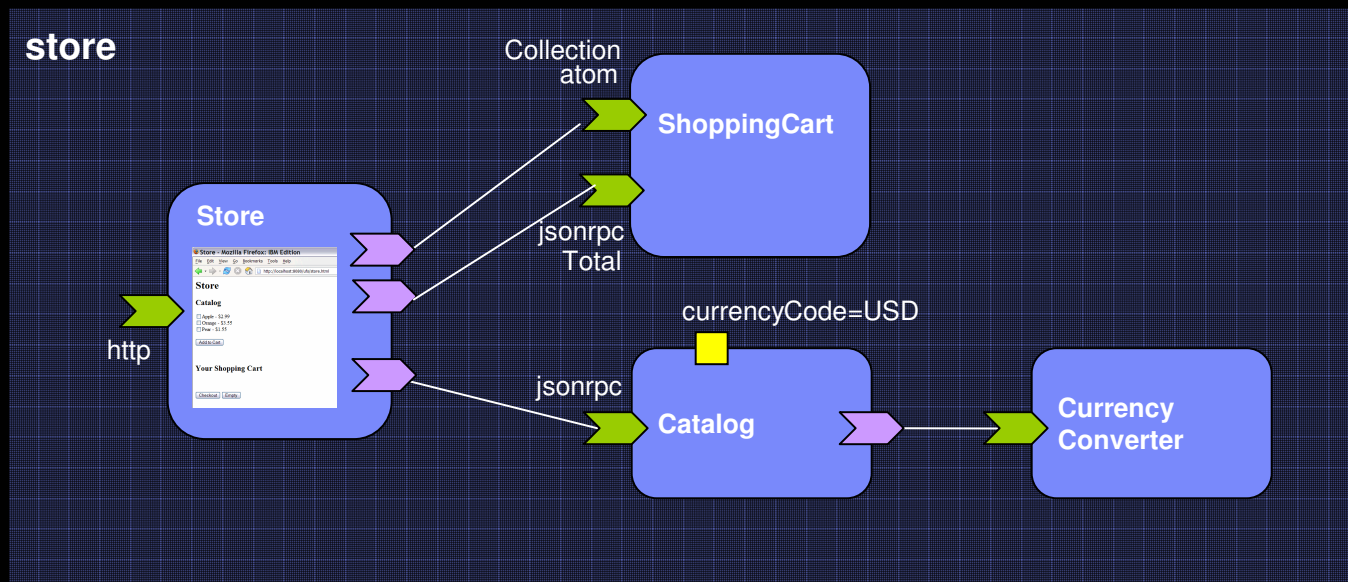
composite/component/reference/binding.ws Writable Smart Insert 58 : 91

Simple Example - Calculator



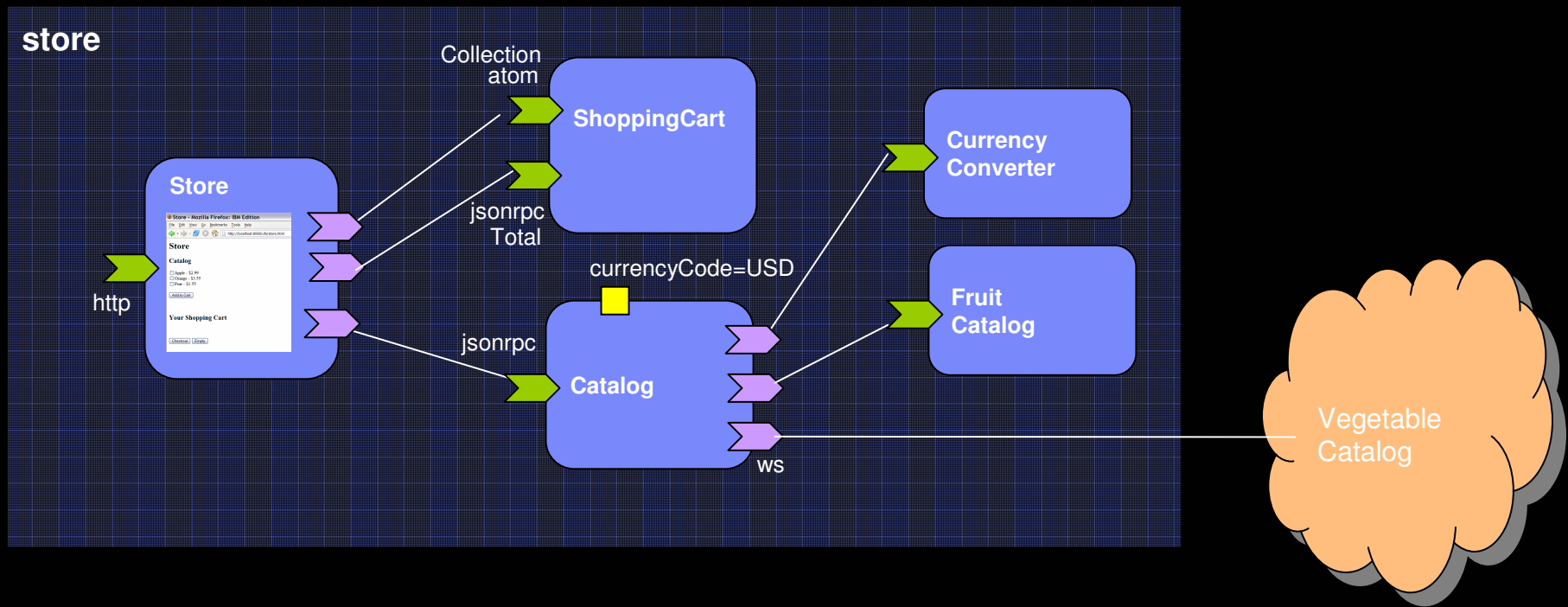
A More Interesting Example - The Fruit Store

Creating an Online Business



The Power Of Assembly - The Fruit&Vegetable Store

Merger or Acquisition





SOA In Focus

WebSphere SOA Feature Pack Beta

Where To Get WebSphere SOA Feature Pack Beta

- **IBM WebSphere Application Server Version 6.1 Feature Pack for SOA**
 - <https://www14.software.ibm.com/iwm/web/cc/earlyprograms/websphere/soawas61/>
- **There is a support forum**
 - <http://www.ibm.com/developerworks/forums/forum.jspa?forumID=956&start=0>

Design Principles

- **Embrace Tuscany Open Source Java implementation**
- **Extend WAS and Tuscany with value-add capabilities**
- **Integrate and deliver extensions in a timely fashion**
- **Remain current on SCA specifications**
- **Remain current on WAS releases**

Scope – OSOA SCA V1.0 Specifications

- **Assembly – Language neutral assembly and composition**
- **Java – APIs and annotations for building Java components**
- **Bindings – Connectivity and integration with existing, deployed and running SOA services**
 - Web services, EJBs, JMS and SCA default binding
- **Policy**
 - ACID 2PC transactions, security for Web services
- **SDO – XML based business data containers**

Functional Scope

- **Coarse Grained Component Development**
 - <http://www-128.ibm.com/developerworks/webservices/library/ws-soa-granularity/>
- **Service Composition and Assembly**
- **Declarative SCA Policy**
- **Native SCA packaging model**
- **Single SCA “Domain” in a WAS Cell**
- **WAS ND clusters**

Out of Scope Function

- **Process choreography components:**
 - BPEL, Business rules, Selectors, Mediations, etc.

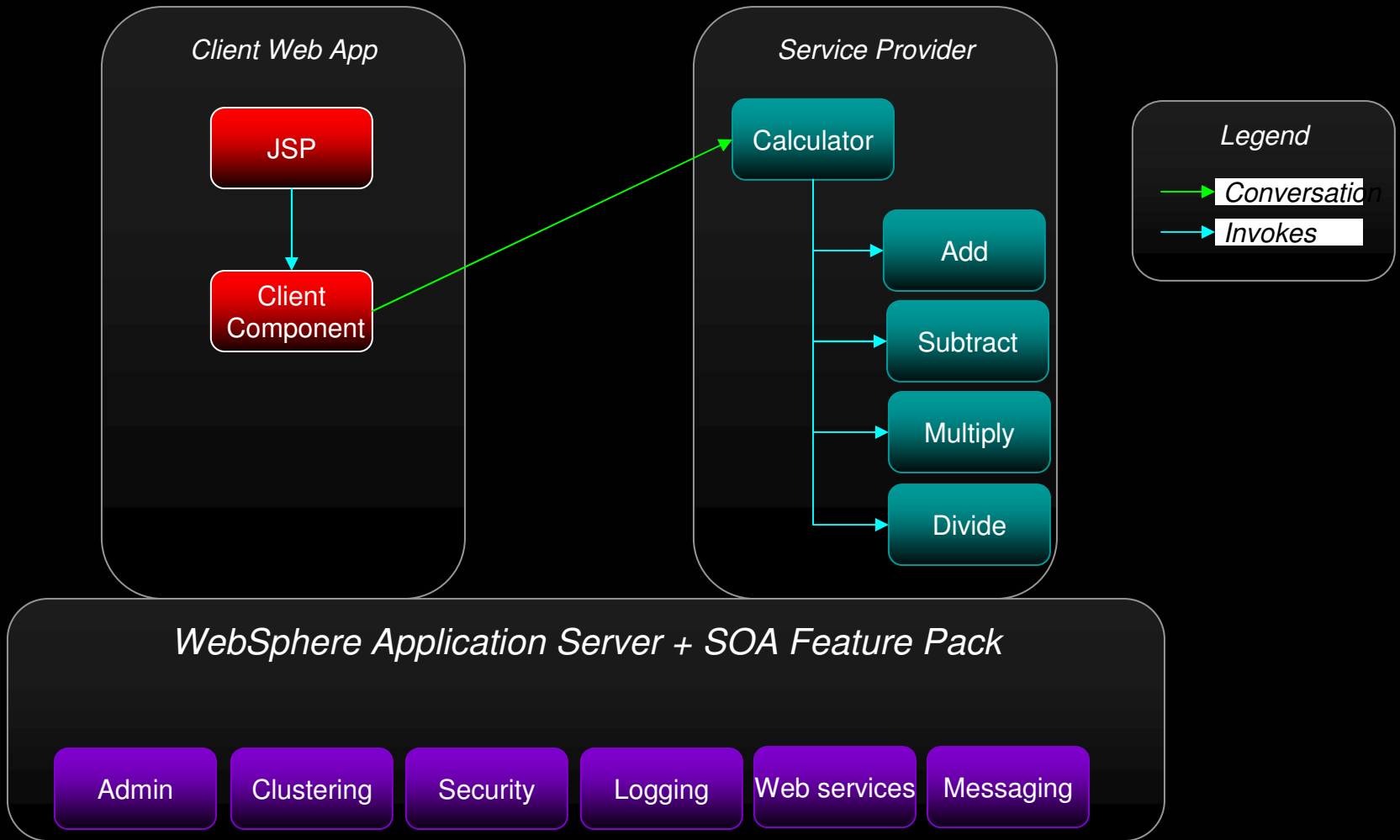
- **WSDL 2.0, SOAP 1.2**

- **Non-Java programming languages**

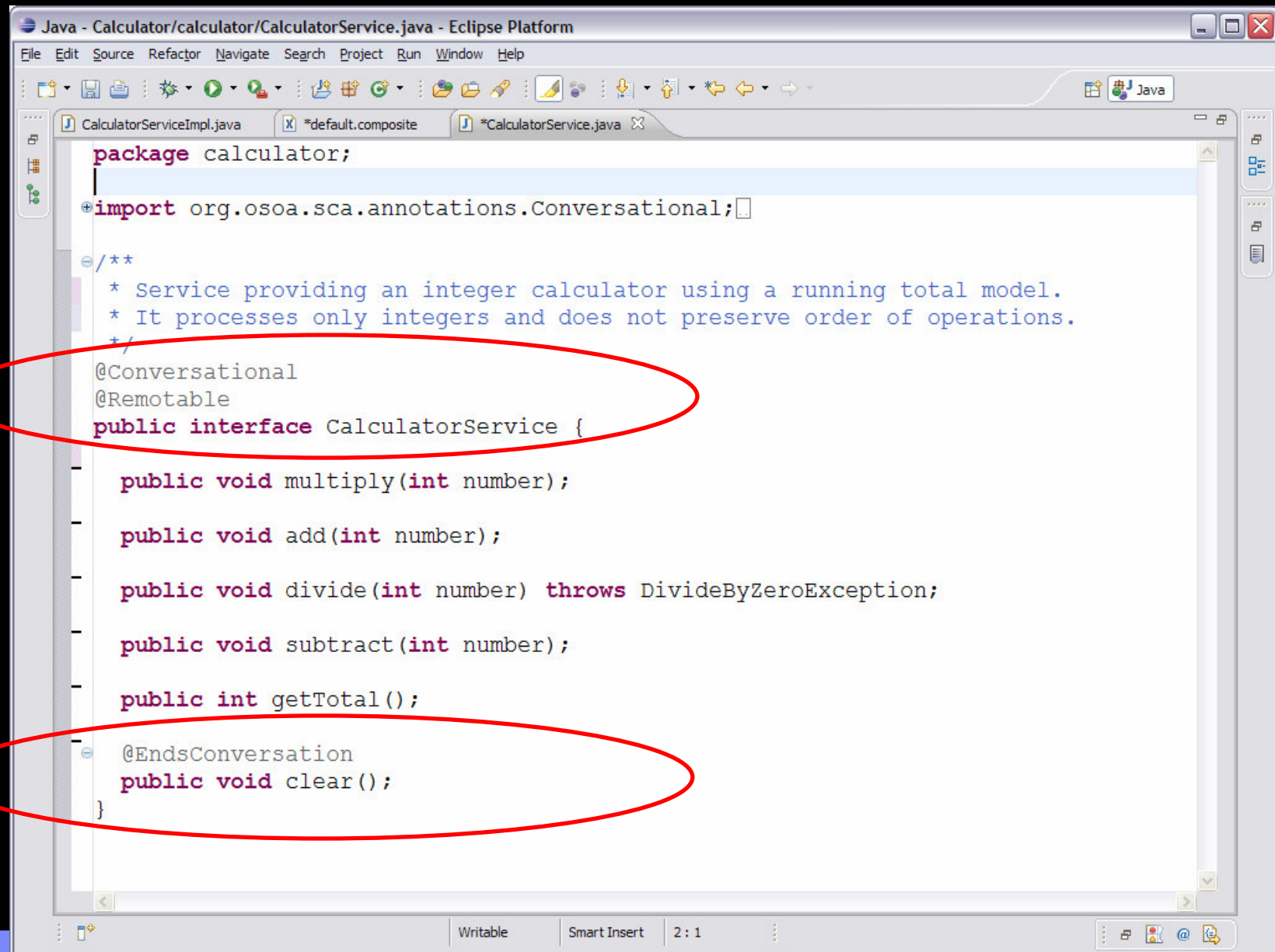
- **EJB3**

- **DAS**

Calculator Example – Service Composition



Service Composition – Service Interface



```
Java - Calculator/calculator/CalculatorService.java - Eclipse Platform
File Edit Source Refactor Navigate Search Project Run Window Help

CalculatorServiceImpl.java *default.composite *CalculatorService.java

package calculator;

import org.osoa.sca.annotations.Conversational;

/**
 * Service providing an integer calculator using a running total model.
 * It processes only integers and does not preserve order of operations.
 */
@Conversational
@Remotable
public interface CalculatorService {

    public void multiply(int number);

    public void add(int number);

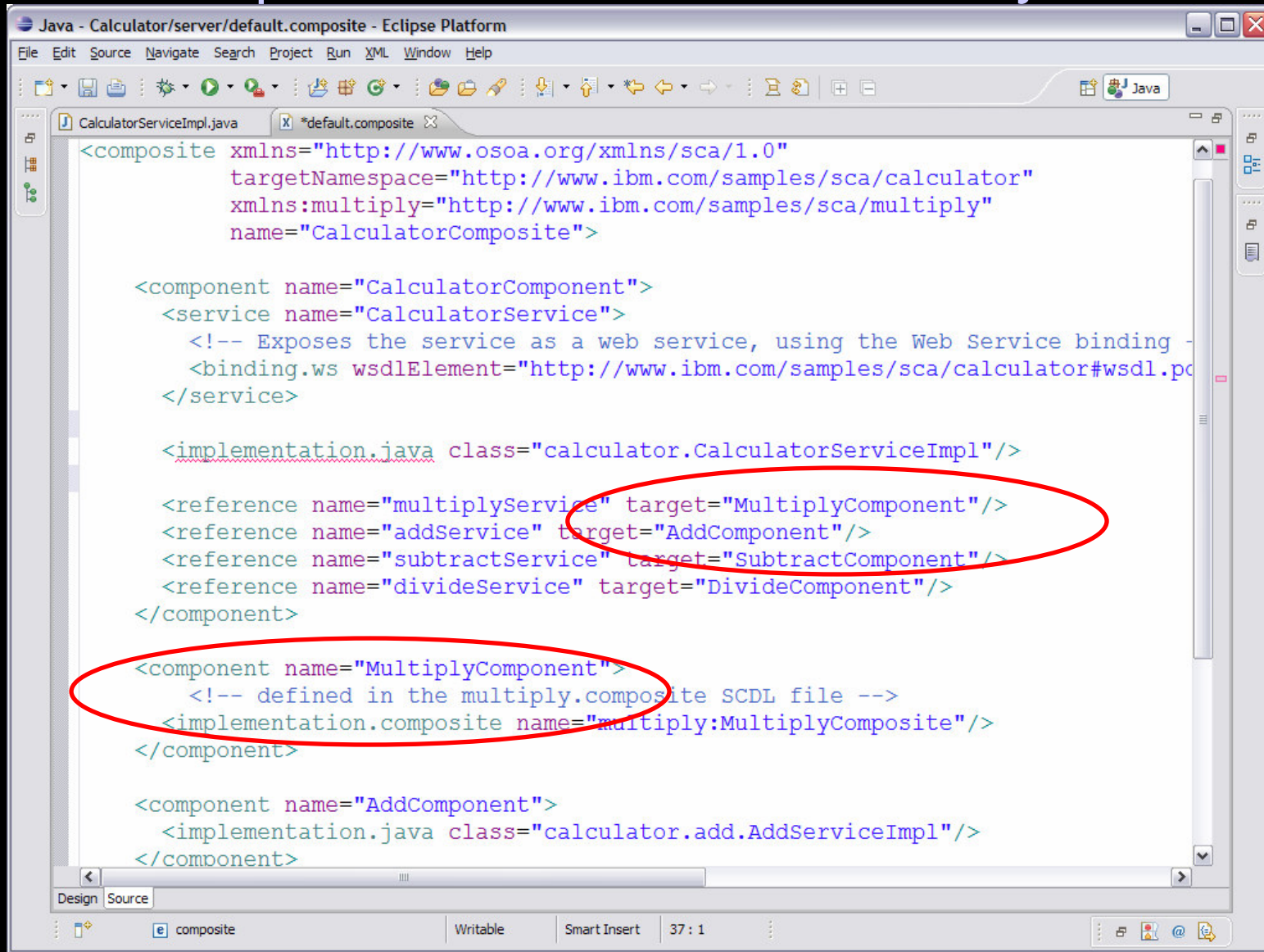
    public void divide(int number) throws DivideByZeroException;

    public void subtract(int number);

    public int getTotal();

    @EndsConversation
    public void clear();
}
```


Service Composition – Provider Assembly



```
<composite xmlns="http://www.osoa.org/xmlns/sca/1.0"
  targetNamespace="http://www.ibm.com/samples/sca/calculator"
  xmlns:multiply="http://www.ibm.com/samples/sca/multiply"
  name="CalculatorComposite">

  <component name="CalculatorComponent">
    <service name="CalculatorService">
      <!-- Exposes the service as a web service, using the Web Service binding -
      <binding.ws wsdlElement="http://www.ibm.com/samples/sca/calculator#wsdl.pc
    </service>

    <implementation.java class="calculator.CalculatorServiceImpl"/>

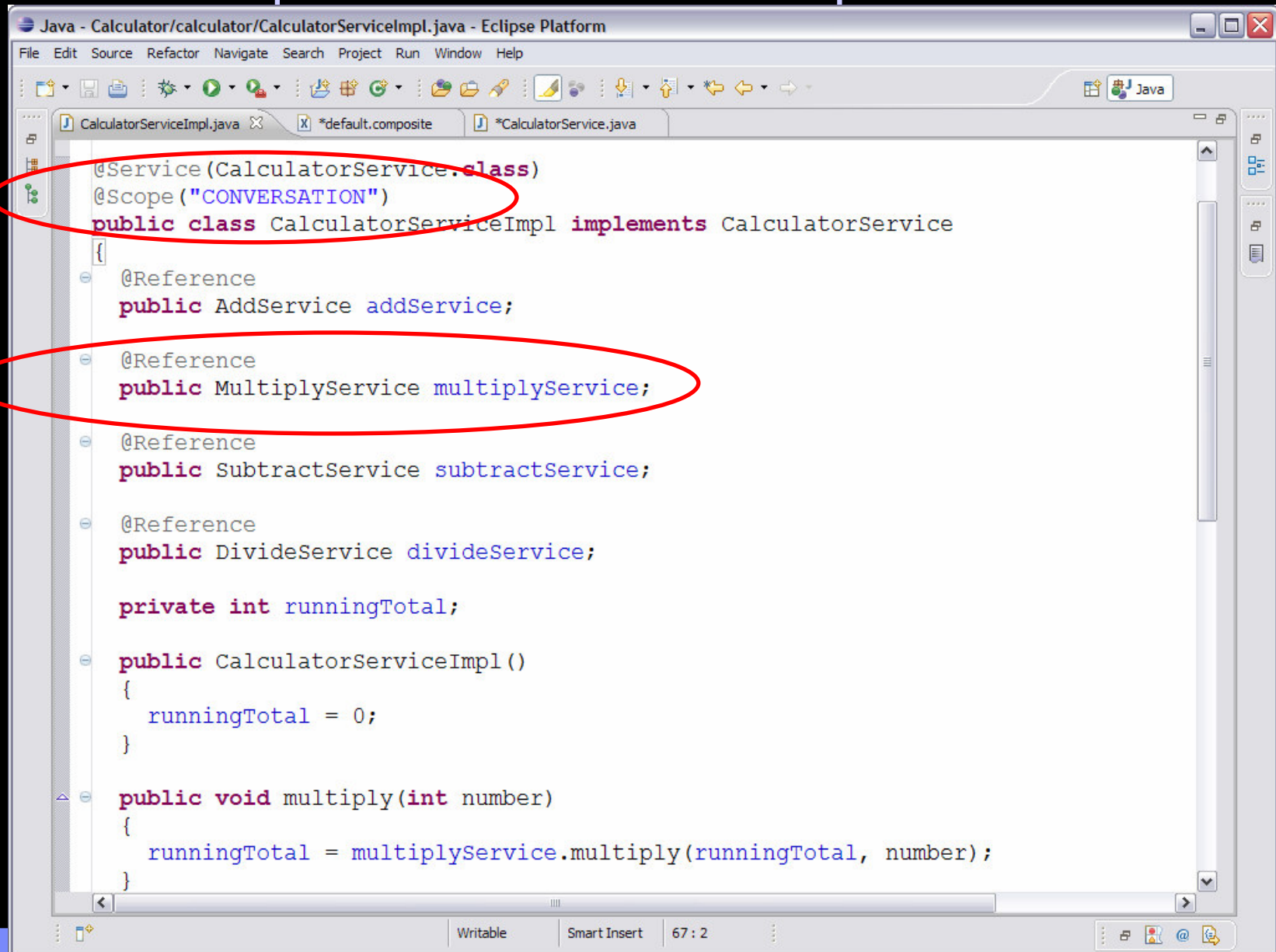
    <reference name="multiplyService" target="MultiplyComponent"/>
    <reference name="addService" target="AddComponent"/>
    <reference name="subtractService" target="SubtractComponent"/>
    <reference name="divideService" target="DivideComponent"/>
  </component>

  <component name="MultiplyComponent">
    <!-- defined in the multiply.composite SCDL file -->
    <implementation.composite name="multiply: MultiplyComposite"/>
  </component>

  <component name="AddComponent">
    <implementation.java class="calculator.add.AddServiceImpl"/>
  </component>

</composite>
```

Service Composition – Provider Implementation



```
Java - Calculator/calculator/CalculatorServiceImpl.java - Eclipse Platform
File Edit Source Refactor Navigate Search Project Run Window Help

CalculatorServiceImpl.java *default.composite *CalculatorService.java

@Service (CalculatorService.class)
@Scope ("CONVERSATION")
public class CalculatorServiceImpl implements CalculatorService
{
    @Reference
    public AddService addService;

    @Reference
    public MultiplyService multiplyService;

    @Reference
    public SubtractService subtractService;

    @Reference
    public DivideService divideService;

    private int runningTotal;

    public CalculatorServiceImpl ()
    {
        runningTotal = 0;
    }

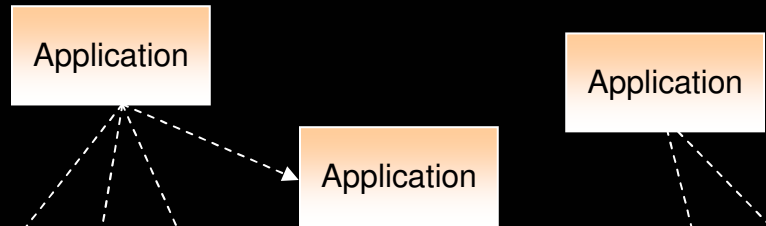
    public void multiply(int number)
    {
        runningTotal = multiplyService.multiply(runningTotal, number);
    }
}
```

SCA Admin Experience

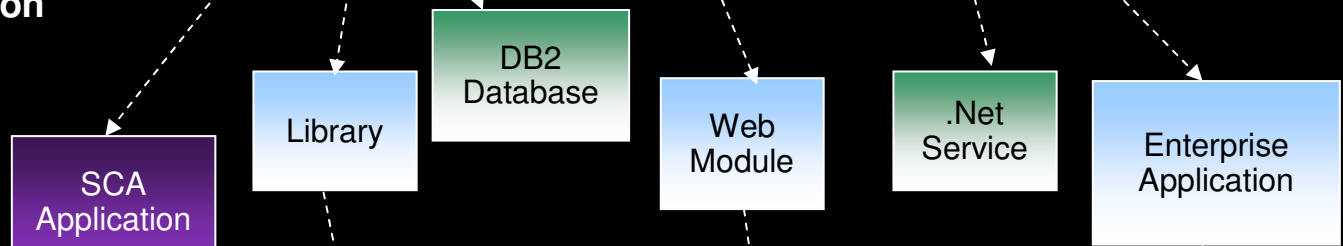
- **Pure SCA Contribution packaging model**
- **SCA Applications are Business Applications**
- **Drill into SCA Service Components**

Applications As Compositions - BLA

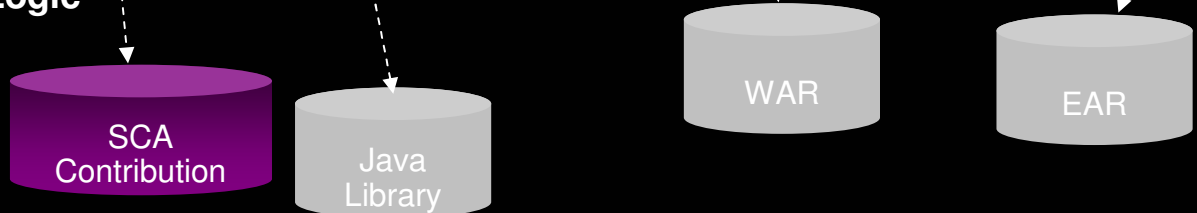
Composition



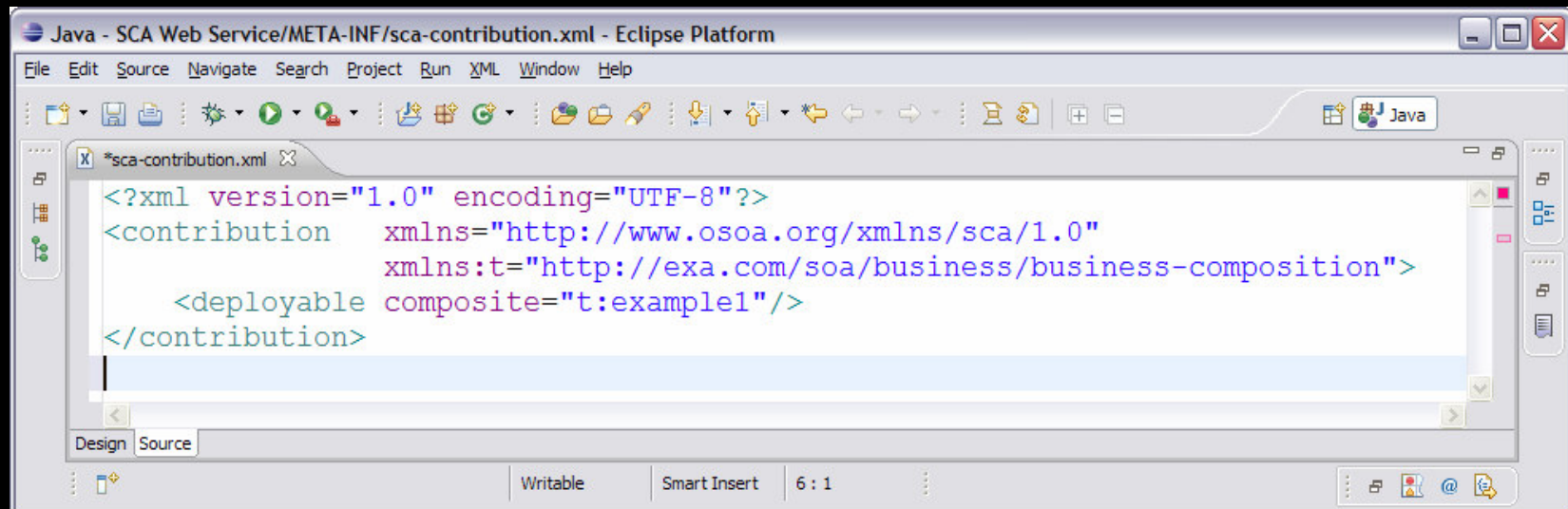
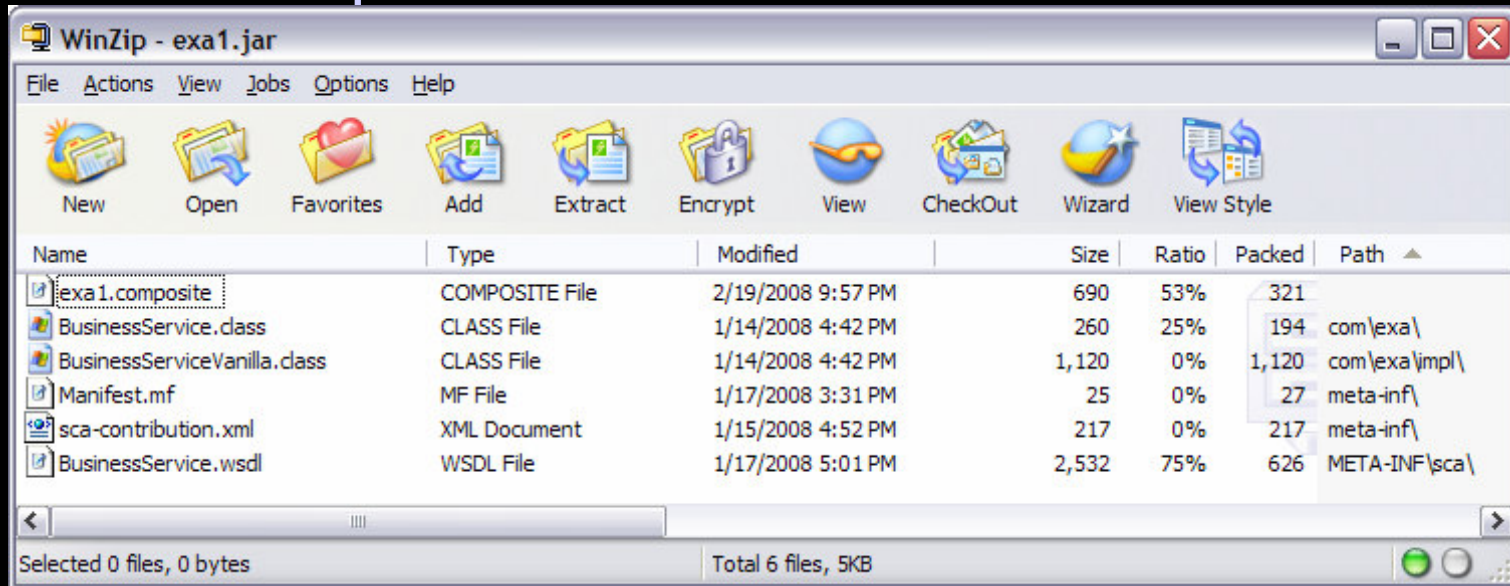
Configuration



Business Logic



SCA Admin Experience – Pure SCA



Admin Experience – SCA Contribution

Integrated Solutions Console - Microsoft Internet Explorer

Address: https://localhost:9046/ibm/console/secure/securelogin.do

Integrated Solutions Console **Welcome booz** Help | Logout

View: All tasks

- Welcome
- Guided Activities
- Servers
- Applications
 - Enterprise Applications
 - Install New Application
 - Business Level Applications
 - Assets**
- Resources
- Security
- Environment
- Services
- System administration
- Users and Groups
- Monitoring and Tuning
- Troubleshooting
- Service integration
- UDDI

Assets

Assets

Use this page to manage assets in the asset repository.

Preferences

Import Delete Update Export

Select	Name	Description
<input type="checkbox"/>	exa1.jar	Business Service example1

Total 1

Help

Field help
For field help information, select a field label or list marker when the help cursor appears.

Page help
[More information about this page](#)

Command Assistance
[View administrative scripting command for last action](#)

Admin Experience – Business Level Applications

The screenshot shows the IBM Integrated Solutions Console in Microsoft Internet Explorer. The browser address bar shows `https://localhost:9046/ibm/console/secure/securelogin.do`. The page title is "Integrated Solutions Console" and it says "Welcome booz".

The left sidebar contains a navigation tree with categories like "Welcome", "Guided Activities", "Servers", "Applications", "Resources", "Security", "Environment", "Services", "System administration", "Users and Groups", "Monitoring and Tuning", "Troubleshooting", "Service integration", and "UDDI". Under "Applications", "Business Level Applications" is selected.

The main content area is titled "Business Level Applications" and includes instructions: "Use this panel to manage business level applications." Below this are "Preferences" buttons (Start, Stop, New, Delete) and a table of applications.

Select	Name	Description	Status
<input type="checkbox"/>	example1	example1 is a web service	

Total 1

On the right, there is a "Help" panel with sections for "Field help", "Page help" (with a link to "More information about this page"), and "Command Assistance" (with a link to "View administrative scripting command for last action").

Admin Experience – SCA Composite

Integrated Solutions Console - Microsoft Internet Explorer

Address: https://localhost:9046/ibm/console/secure/securelogin.do

Integrated Solutions Console Welcome booz Help | Logout

View: All tasks

Business Level Applications > example1 > example1

Use this page to manage the composition unit.

General Properties

Name: example1

Description: example1

Description: WebSphere:assetname=exa1.jar,assetversion=1.0

Target mapping

Current target: WebSphere:node=dboozNode02,server=server1

Modify target...

SCA composite components

Component Name	Component Implementation
BasicBusinessComponent	com.exe.impl.BusinessServiceVanilla

SCA composite services

Service Name	Service Promote
None	Service Promote

SCA composite references

Reference Name	Reference Promote	Reference Target
----------------	-------------------	------------------

Additional Properties

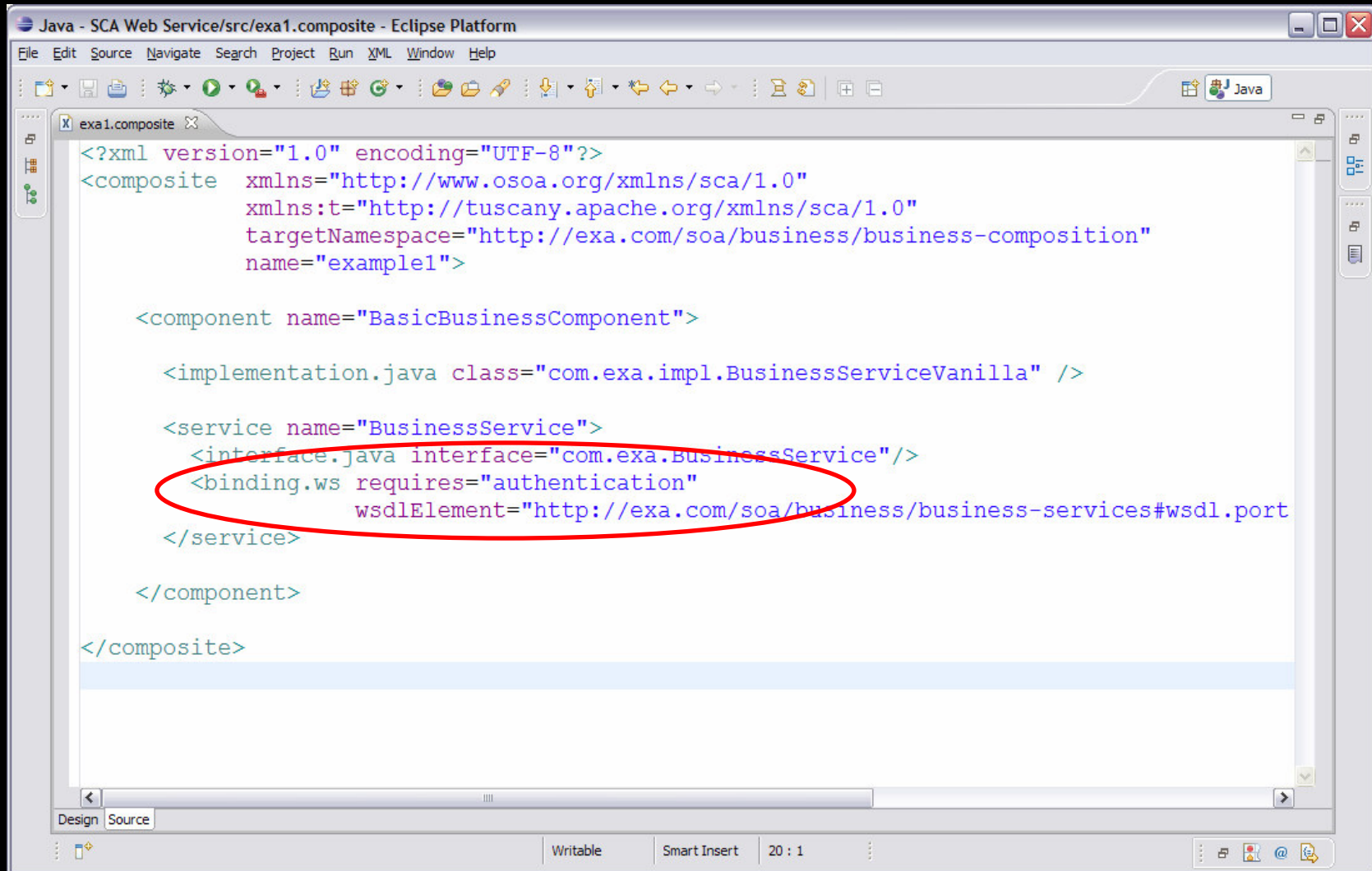
- Provide HTTP endpoint URL information
- View SCDL
- View Domain

Security Policy Example

- **Add a requirement (SCA intent) for authentication**

- **Bind the intent to a concrete policy**

Security Policy Example – SCA Intent



```
<?xml version="1.0" encoding="UTF-8"?>
<composite xmlns="http://www.oesa.org/xmlns/sca/1.0"
  xmlns:t="http://tuscany.apache.org/xmlns/sca/1.0"
  targetNamespace="http://exa.com/soa/business/business-composition"
  name="example1">

  <component name="BasicBusinessComponent">

    <implementation.java class="com.exe.impl.BusinessServiceVanilla" />

    <service name="BusinessService">
      <interface.java interface="com.exe.BusinessService"/>
      <binding.ws requires="authentication"
        wsdlElement="http://exa.com/soa/business/business-services#wsdl.port"
      />
    </service>

  </component>

</composite>
```

Security Policy Example – Map to PolicySet

Integrated Solutions Console - Microsoft Internet Explorer

Address: https://localhost:9046/ibm/console/login.do?action=secure

Integrated Solutions Console **Welcome booz** Help | Logout

Business Level Applications [Close page](#)

Create new business level application

Use this page to create a new business level application.

→ Step 1: Attach policyset
Step 2: Set options
Step 3: Map composition unit to a target
Step 4: Summary

Attach policyset

Specify policy set for the composite defined in this SCA application.

Include default policy sets. Default PolicySets specify common QoS characteristics for generic message format. Evaluate whether they provide adequate QoS characteristics for your services before applying Default PolicySets.

Attach Detach

	/Service Reference/Binding	Type	Intents	Matched policy sets	Attached policy set
LTPA SecureConversation					
Username RAMP default					
Username WSSecurity default					
WSHTTPS default					
WSTransaction					
RAMP default					
WSReliableMessaging default		Composite			
WSReliableMessaging persistent	Component	Component			
WSSecurity default					
Username SecureConversation		Component/Service			
LTPA WSSecurity default					
WSAddressing default					
LTPA RAMP default					
WSReliableMessaging 1_0					
SSL WSTransaction					
SecureConversation					
	Component/Service/Web Services Binding		authentication	LTPA SecureConversation, Username RAMP default, Username WSSecurity default, WSHTTPS default, Username SecureConversation, LTPA WSSecurity default, LTPA RAMP default	

Next Cancel

javascript:selectMenuItem('button.attach','LTPA SecureConversation','hiddenButton95841825316904')

Local intranet

Security Policy Example – Service Providers

Integrated Solutions Console - Microsoft Internet Explorer

Address: https://localhost:9046/lbm/console/login.do?action=secure

Integrated Solutions Console **Welcome booz** Help | Logout

Service providers

Service providers > BusinessService1

Use this page to manage policy sets and bindings or to access additional information for this service provider.

Configuration

General Properties

Service provider

Detail properties

- WSDL document

Application

- example1

Policy set attachments

Attach policy sets to the service, endpoints, or operations and assign the default bindings, create new bindings, or assign existing custom bindings for the attached policy sets. Note that you can view or modify the default bindings from the cell- or server-level security panels. Also note that you can only directly attach a policy set to an operation if the policy set has WS-Addressing enabled or if the WSDL specifies WS-Addressing headers.

Preferences

Attach Detach Assign Binding

Select	Service/Endpoint/Operation	Attached policy set	Binding
<input type="checkbox"/>	BusinessService1	WSSecurity default	Default
<input type="checkbox"/>	BusinessService1SoapPort	WSSecurity default (inherited)	Default (inherited)

Total 2

Help

Field help
 For field help information, select a field label or list marker when the help cursor appears.

Page help
[More information about this page](#)

Command Assistance
[View administrative scripting command for last action](#)

Cross Server Wiring – With the SCA Binding

- **Two SCA Components, one is wired to the other**
- **Packaged in separate Contributions**
- **Deployed to separate WAS servers**

Cross Server Wiring – Two contributions

```
Java - SCA Web Service/src/exa1.composite - Eclipse Platform
File Edit Source Navigate Search Project Run XML Window Help
exa1.composite
<component name="BasicBusinessComponent">
  <implementation.java class="com.exa.impl.BusinessServiceVanilla" />
  <service name="BusinessService">
    <interface.java interface="com.exa.BusinessService"/>
    <binding.ws wsdlElement="http://exa.com/soa/business/business-services#wsdl.port" />
  </service>
</component>
```

```
Java - SCA Web Service/src/exa2.composite - Eclipse Platform
File Edit S
exa2.composite
<component name="OtherBusinessComponent">
  <reference name="business" target="BasicBusinessComponent">
    <interface.java interface="com.exa.BusinessService"/>
  </reference>
  <implementation.java class="com.exa.impl.BusinessServiceRef" />
  <service name="OtherService">
    <interface.java interface="com.exa.OtherService"/>
  </service>
</component>
```

Cross Server Wiring – Server1

Integrated Solutions Console - Microsoft Internet Explorer

Address: https://localhost:9045/lbm/console/login.do?action=secure

Integrated Solutions Console **Welcome booz** [Help](#) | [Logout](#)

Business Level Applications [Close page](#)

Business Level Applications > Example3 > example1

Use this page to manage the composition unit.

General Properties

Name: example1

Description: example1

Description: WebSphere:assetname=exa1.jar,assetversion=1.0

Target mapping

Current target: WebSphere:node=dboozNode02,server=server1

[Modify target...](#)

Additional Properties

- [Provide HTTP endpoint URL information](#)
- [View SCDL](#)
- [View Domain](#)

SCA composite components

Component Name	Component Implementation
BasicBusinessComponent	com.exa.impl.BusinessServiceVanilla

Cross Server Wiring – Server2

The screenshot shows the IBM Integrated Solutions Console interface in Microsoft Internet Explorer. The browser address bar shows the URL: `https://localhost:9045/ibm/console/login.do?action=secure`. The page title is "Welcome booz".

The left sidebar contains a navigation tree with the following items:

- View: All tasks
- Welcome
- Guided Activities
- Servers
- Applications
 - Enterprise Ap
 - Install New Ap
 - Business Level
 - Assets
- Resources
- Security
- Environment
- Services
- System administration
 - Cell
 - Save Change
 - Deployment r
 - Nodes
 - Node agents
 - Node groups
 - Console Prefe

The main content area displays "Business Level Applications" and "Business Level Applications > Example3 > example2". Below this, there is a "General Properties" section with the following fields:

- Name:
- Description:
- Description:

The "Target mapping" section is circled in red and contains:

- Current target: `WebSphere:node=dboosNode02,server=server2`
- Modify target... button

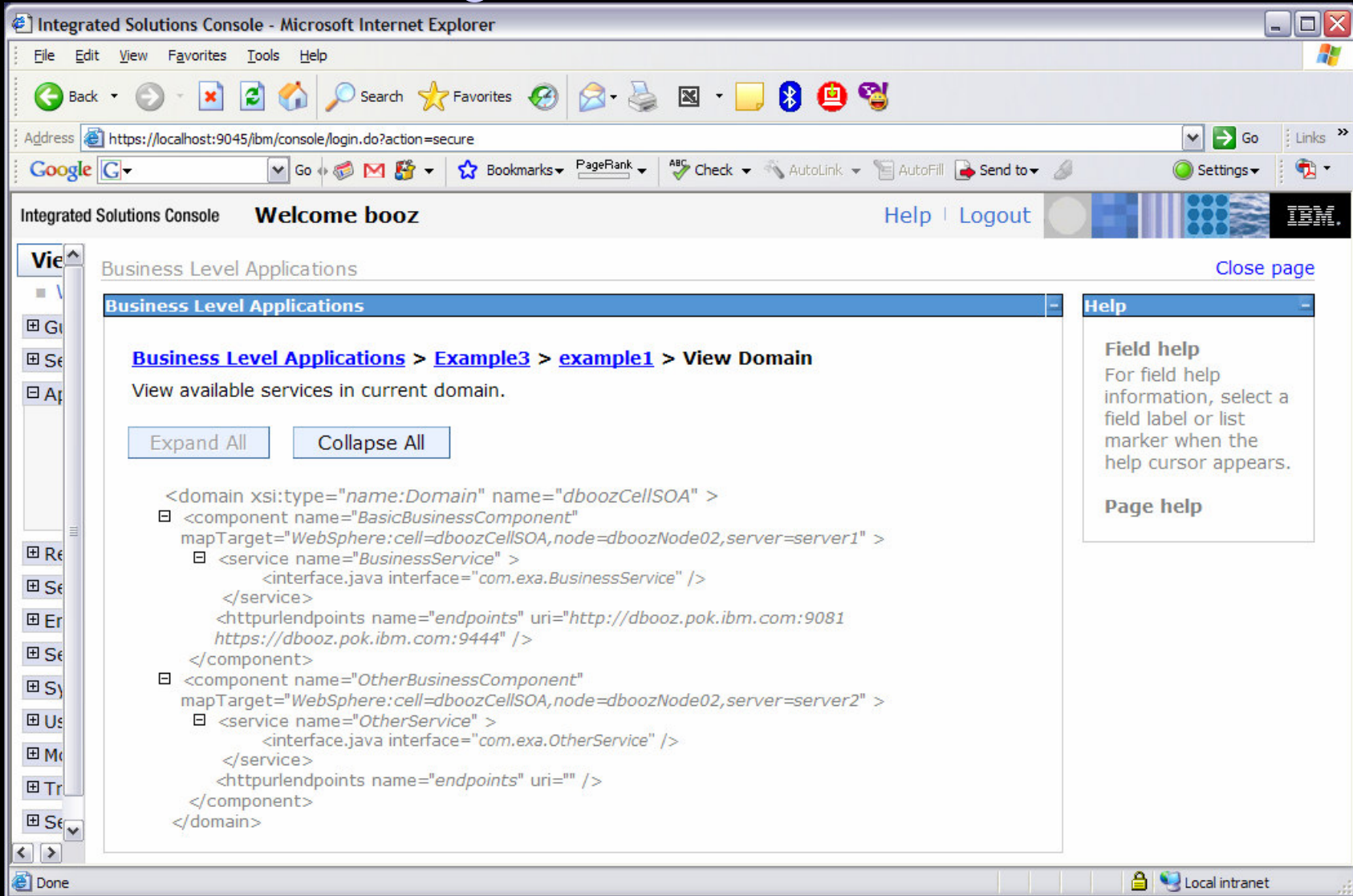
The "Additional Properties" section contains links:

- Provide HTTP endpoint URL information
- View SCDL
- View Domain

At the bottom, the "SCA composite components" table is shown:

Component Name	Component Implementation
OtherBusinessComponent	com.exa.impl.BusinessServiceRef

Cross Server Wiring – Cell wide SCA Domain



Integrated Solutions Console - Microsoft Internet Explorer

Address: https://localhost:9045/ibm/console/login.do?action=secure

Integrated Solutions Console **Welcome booz** Help | Logout

Business Level Applications [Close page](#)

Business Level Applications

[Business Level Applications](#) > [Example3](#) > [example1](#) > **View Domain**

View available services in current domain.

```

<domain xsi:type="name:Domain" name="dboozCellSOA" >
  <component name="BasicBusinessComponent"
    mapTarget="WebSphere:cell=dboozCellSOA,node=dboozNode02,server=server1" >
    <service name="BusinessService" >
      <interface.java interface="com.exa.BusinessService" />
    </service>
    <httpEndpoints name="endpoints" uri="http://dbooz.pok.ibm.com:9081
      https://dbooz.pok.ibm.com:9444" />
    </component>
  <component name="OtherBusinessComponent"
    mapTarget="WebSphere:cell=dboozCellSOA,node=dboozNode02,server=server2" >
    <service name="OtherService" >
      <interface.java interface="com.exa.OtherService" />
    </service>
    <httpEndpoints name="endpoints" uri="" />
    </component>
</domain>

```

Field help
For field help information, select a field label or list marker when the help cursor appears.

Page help



SOA In Focus

Questions & Answers



SOA In Focus

Backup

SCA Quick Tour ...

- **Construction**
- **Assembly**
- **Deployment**

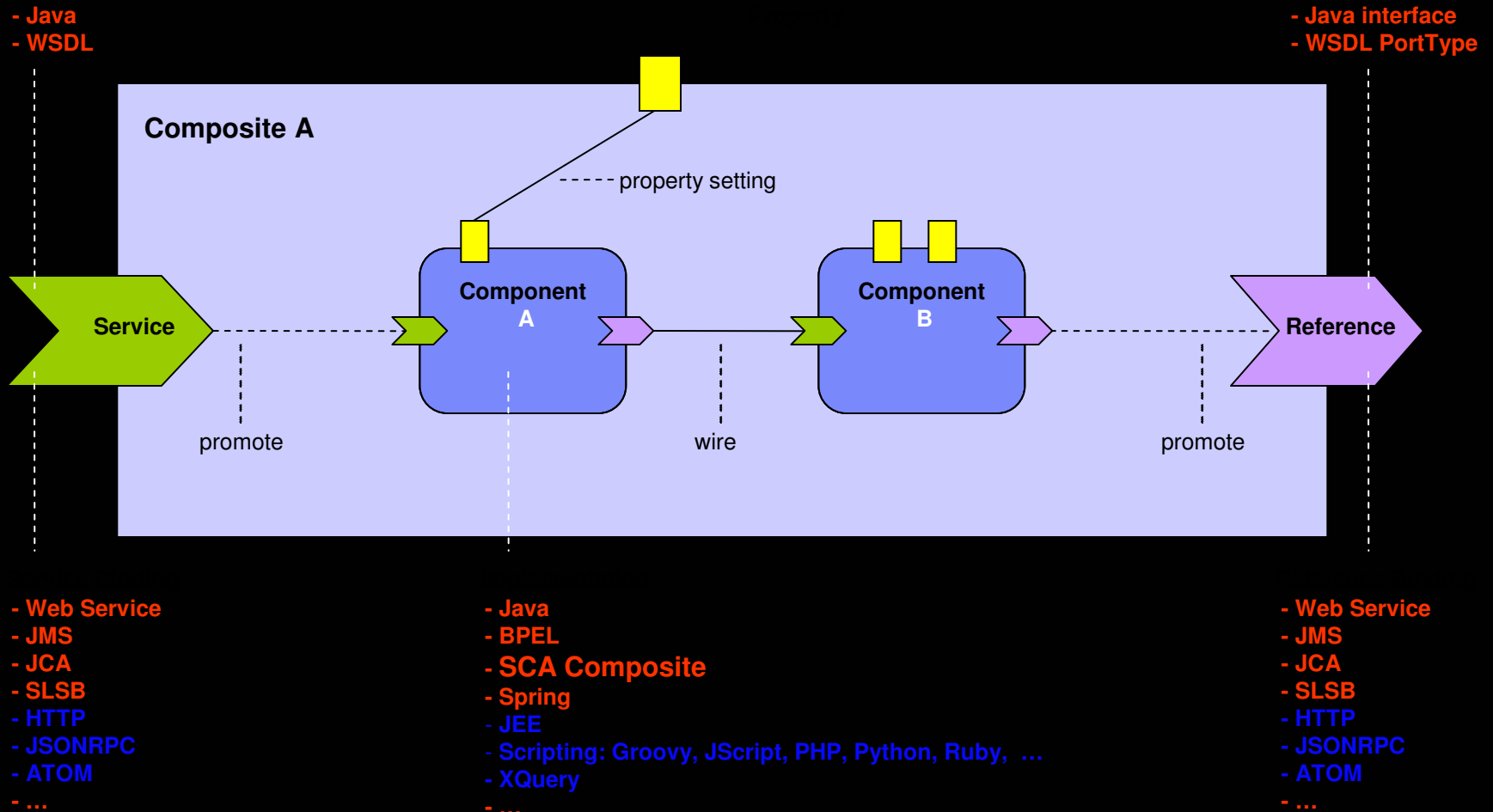
SCA - Construction

- **Constructing service component implementations**
 - Implementer focuses on business logic
 - Implementer chooses the language that fits the business problem
 - No code is dependent on the means of accessing the service

- **Defining service dependencies**
 - Use business services without knowing how they will be accessed
 - Only the interface is known

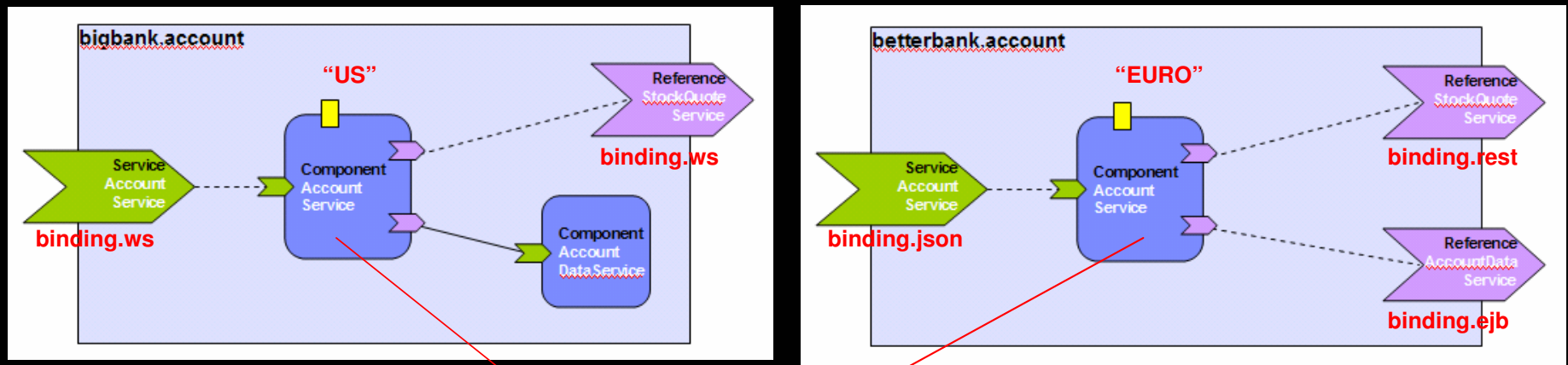
- **Defining other configuration features**
 - Properties
 - Policies

SCA - Assembly



SCA - Assembly

Building Solutions from Assets



implementation

implementation

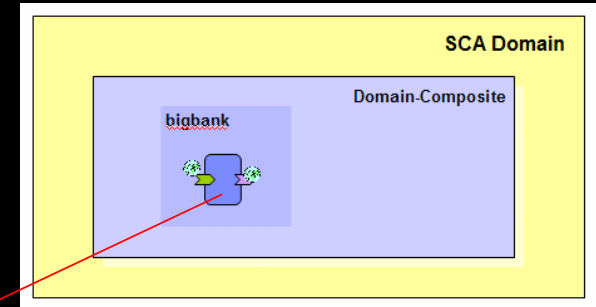
```

@Serializable
public interface AccountService {
    AccountReport getAccountReport(String customerID);
}

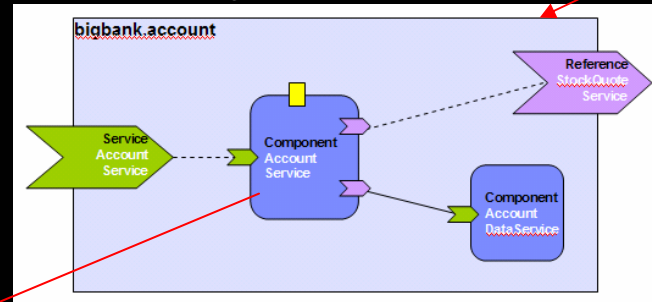
public class AccountServiceImpl implements AccountService {
    ...
    @Reference
    public void setAccountDataService(AccountDataService value) {
        accountDataService = value;
    }
    @Reference
    public void setStockQuoteService(StockQuoteService value) {
        stockQuoteService = value;
    }
    @Property
    public void setCurrency(String value) {
        currency = value;
    }
    ...
}
    
```

SCA - Deployment

Deployment



Assembly



Construction

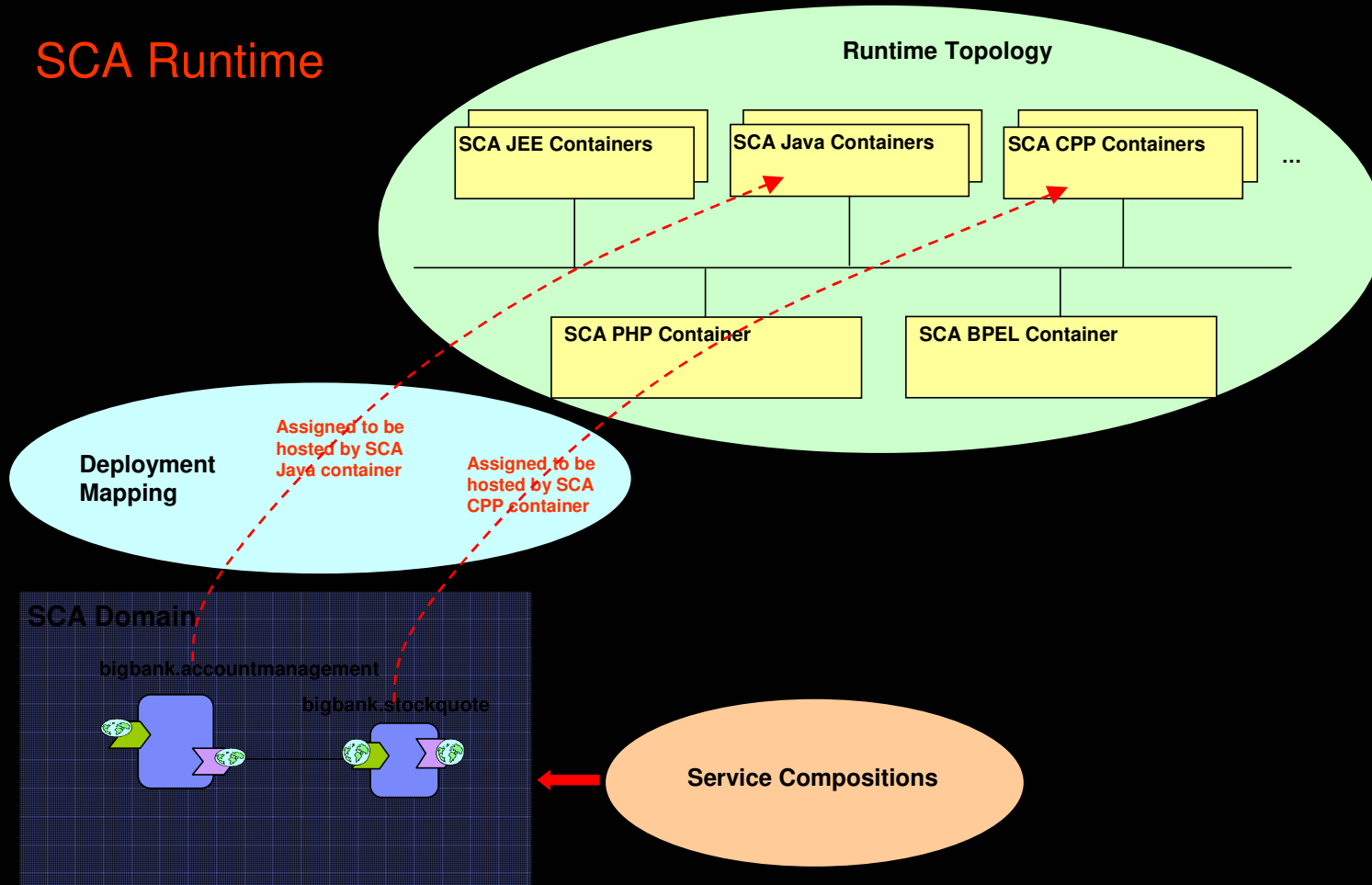
```

@Removable
public interface AccountService {
    AccountReport getAccountReport(String customerID);
}

public class AccountServiceImpl implements AccountService {
    ...
    @Reference
    public void setAccountDataService(AccountDataService value) {
        accountDataService = value;
    }
    @Reference
    public void setStockQuotesService(StockQuotesService value) {
        stockQuotesService = value;
    }
    @Property
    public void setCurrency(String value) {
        currency = value;
    }
    ...
}
    
```


SCA - Deployment

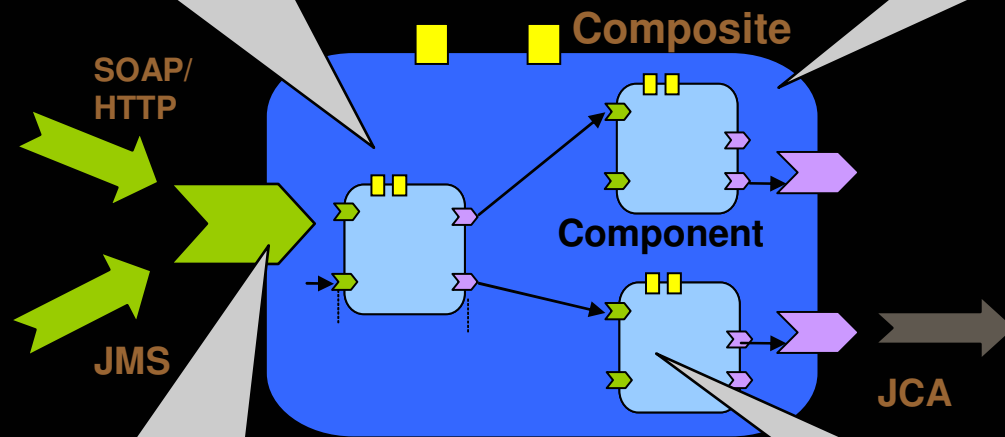
SCA Runtime



SCA - Which Specification?

How do I define, use and administer policies for non-functional aspects (QoS, etc)?
 → **SCA Policy Framework Spec**

How do I define, configure and assemble components to create composites?
 → **SCA Assembly Spec**



How do I configure SCA services/references to use SOAP/HTTP or JMS or JCA, ...
 → **SCA WS Binding Spec, ...**

How do I develop SCA components in BPEL? Or in Java? Or C++, PHP, ...
 → **SCA xyz Client & Impl Spec**