Open ESB

- **Sang Shin**
  - Java Technology Evangelist
- Sun Microsystems, Inc.
-
- **Raffaele Spazzoli**
- Imola Informatica
-

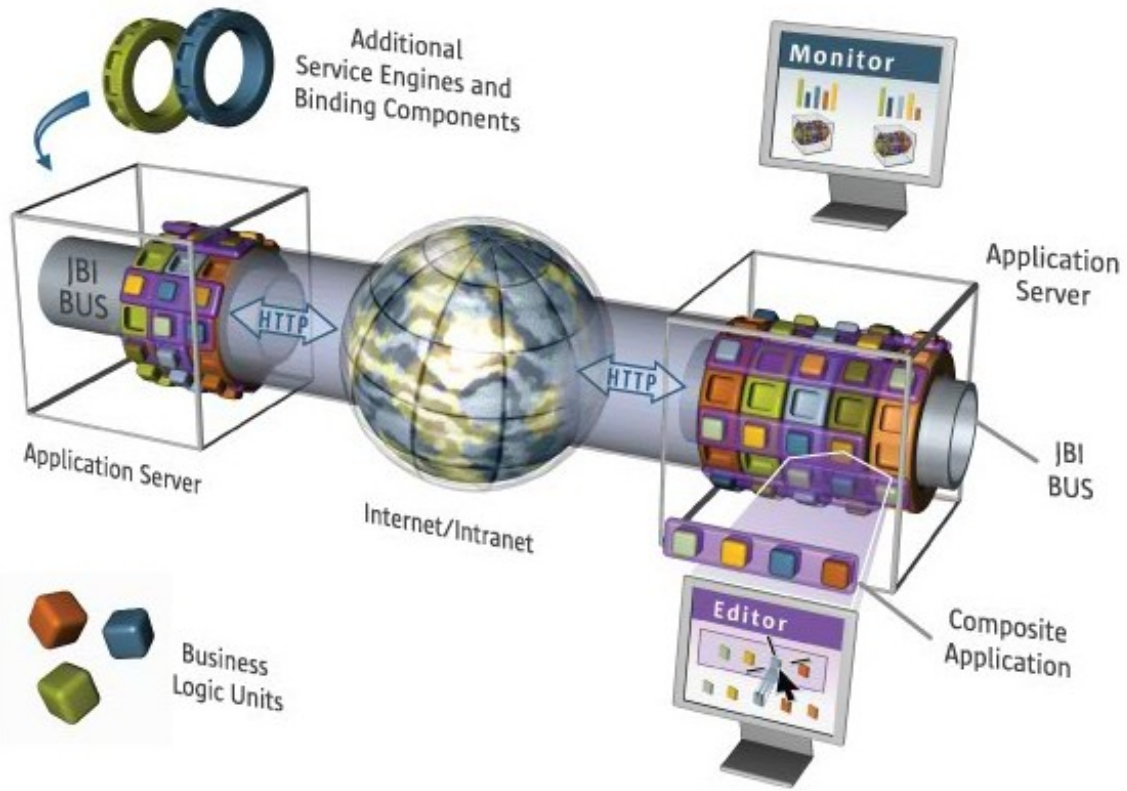
Topics

- What is Open ESB?
- What is JBI?
- JBI and GlassFish
- Usage Scenario
- Open ESB Development & Deployment Enviornment
- SE's and BC's (available right now)
- NetBeans support of Open ESB
- Java EE SE, IEP SE, Aspect SE, etc
- IEP (Intelligent Event Processing) SE Demo

What is Open ESB?

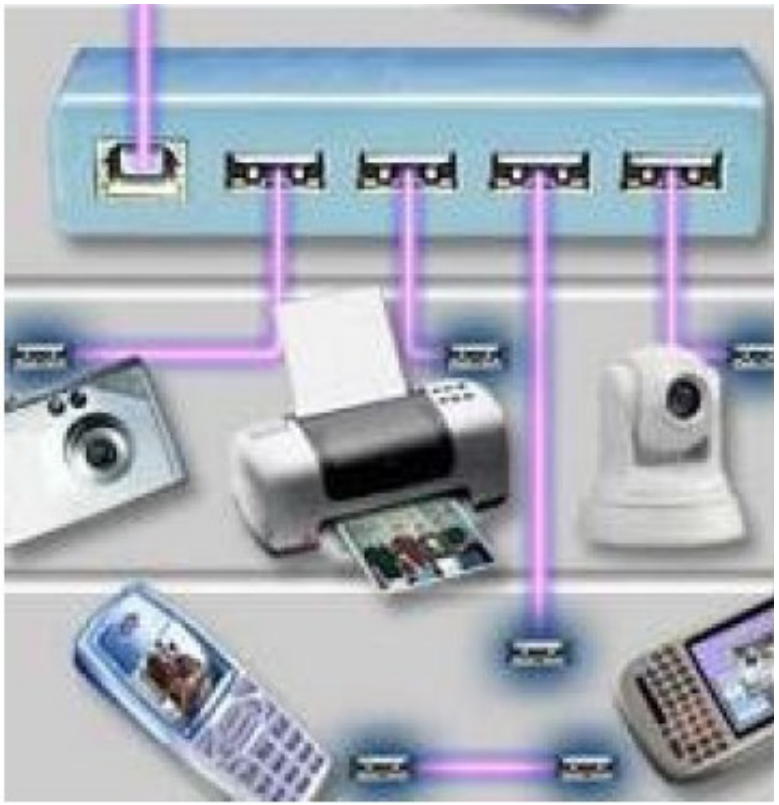
Open ESB

- Open Source Enterprise Service Bus runtime implemented atop the Java Business Integration (JBI) foundation
  - > http://open-esb.org/
- Runs within Glassfish/ Sun App Server



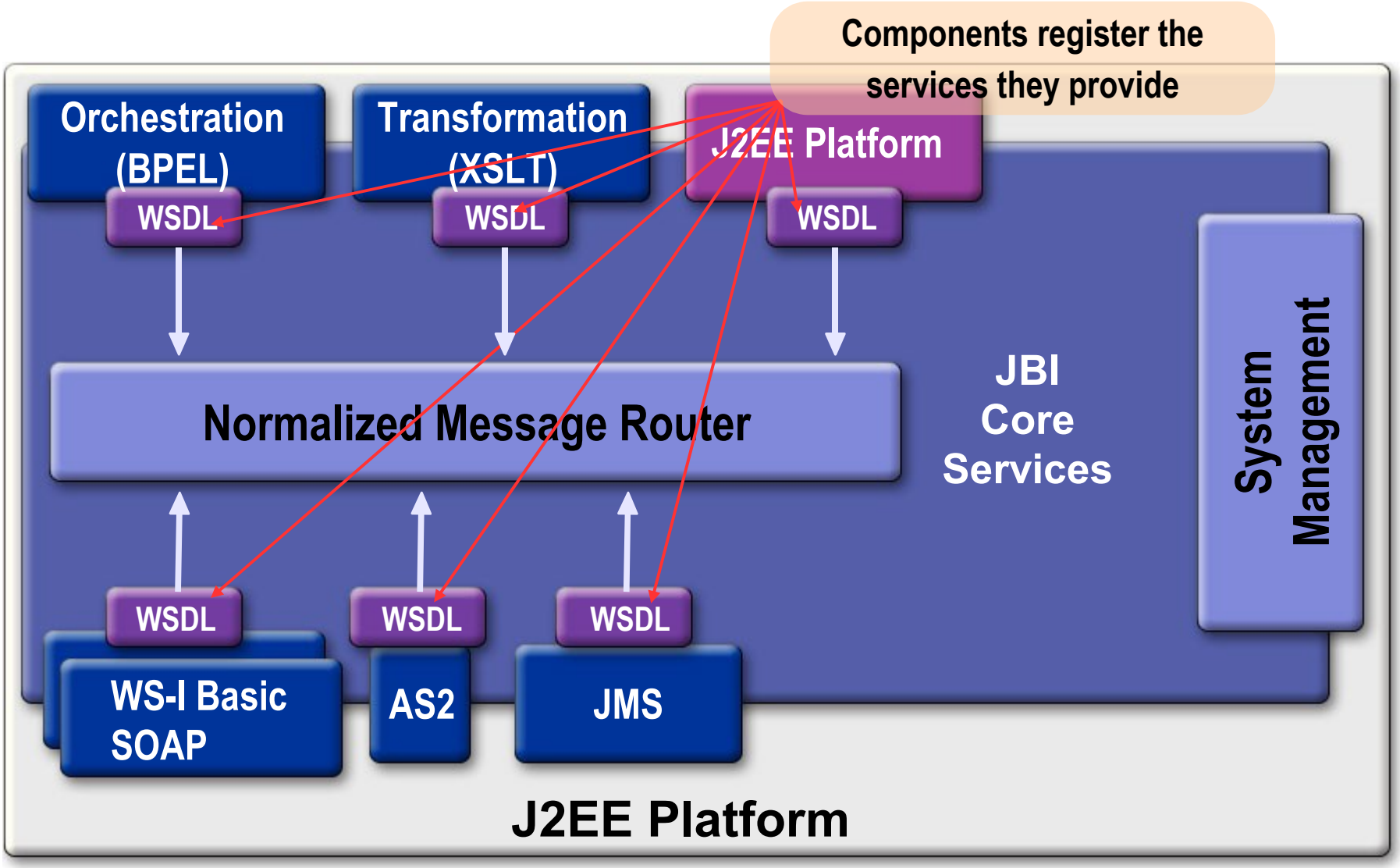
What is JBI?

What Is JBI?



- Standard “meta-container” for integrated services
- Provides for plug-in:
  - Service Engines (SE): business logic
  - Binding Components: communications protocols
- Standard deployment model
- Loose coupling via WSDL message exchanges between WSDL described Services

Service Provider Self-Description



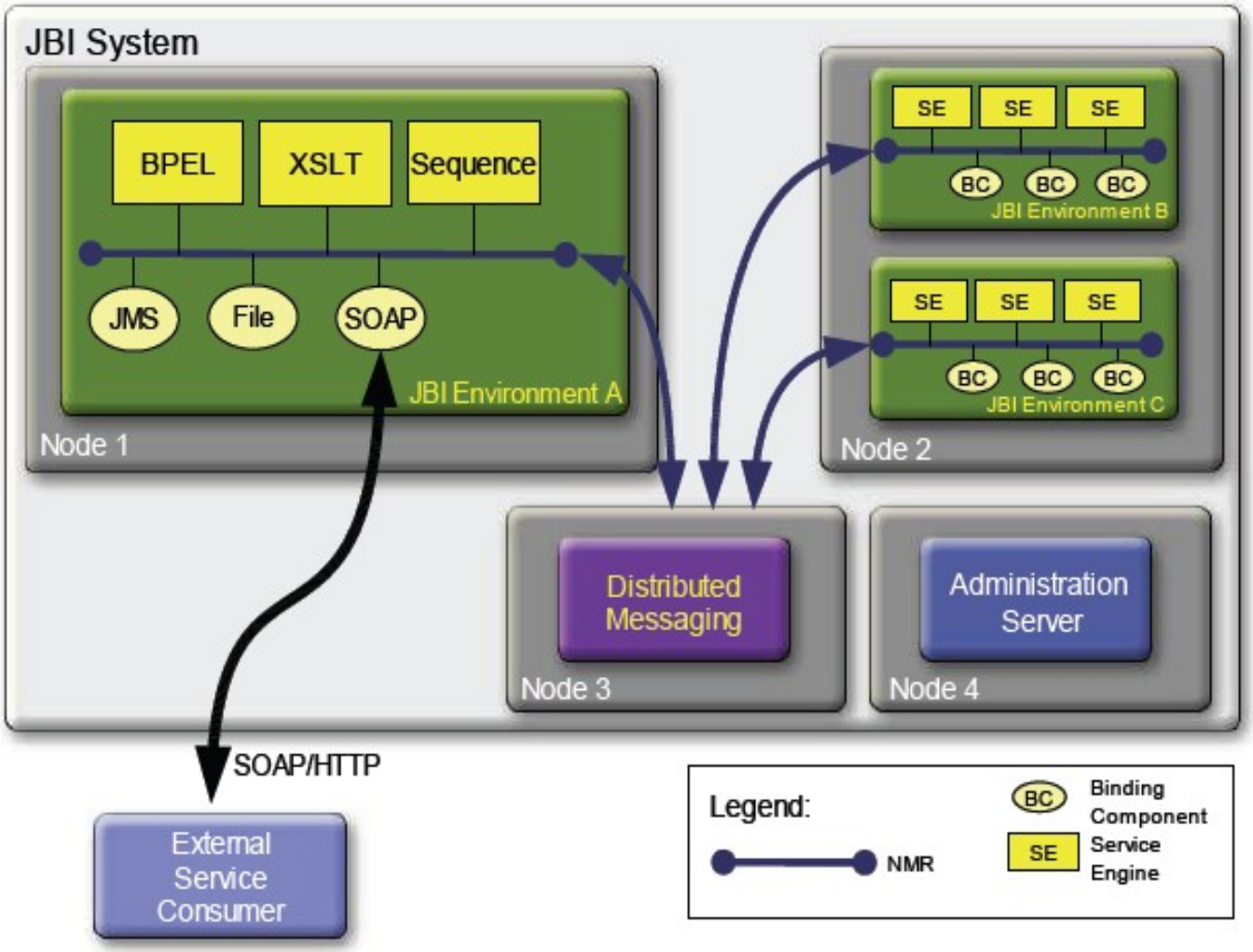
Normalized Message Router

- Key to interoperation between components
- Mediated Message Exchange
- Normalized Message
  - Abstract Message (payload) +
  - Message Properties (metadata)
- Message Exchange Pattern
  - Support for simple communications primitives

Administration

- Component Life Cycle (containers)
  - Installation
- Packaging and Deployment to Components
  - Service Units
  - Service Assemblies

JBI and ESBs


JBI System
BPEL
XSLT
Sequence
JMS
File
SOAP
JBI Environment A
Node 1
SE
SE
SE
BC
BC
BC
JBI Environment B
SE
SE
SE
BC
BC
BC
JBI Environment C
Node 2
Distributed Messaging
Node 3
Administration Server
Node 4
SOAP/HTTP
External Service Consumer
Legend:
NMR
BC
Binding Component
SE
Service Engine

JBI v2

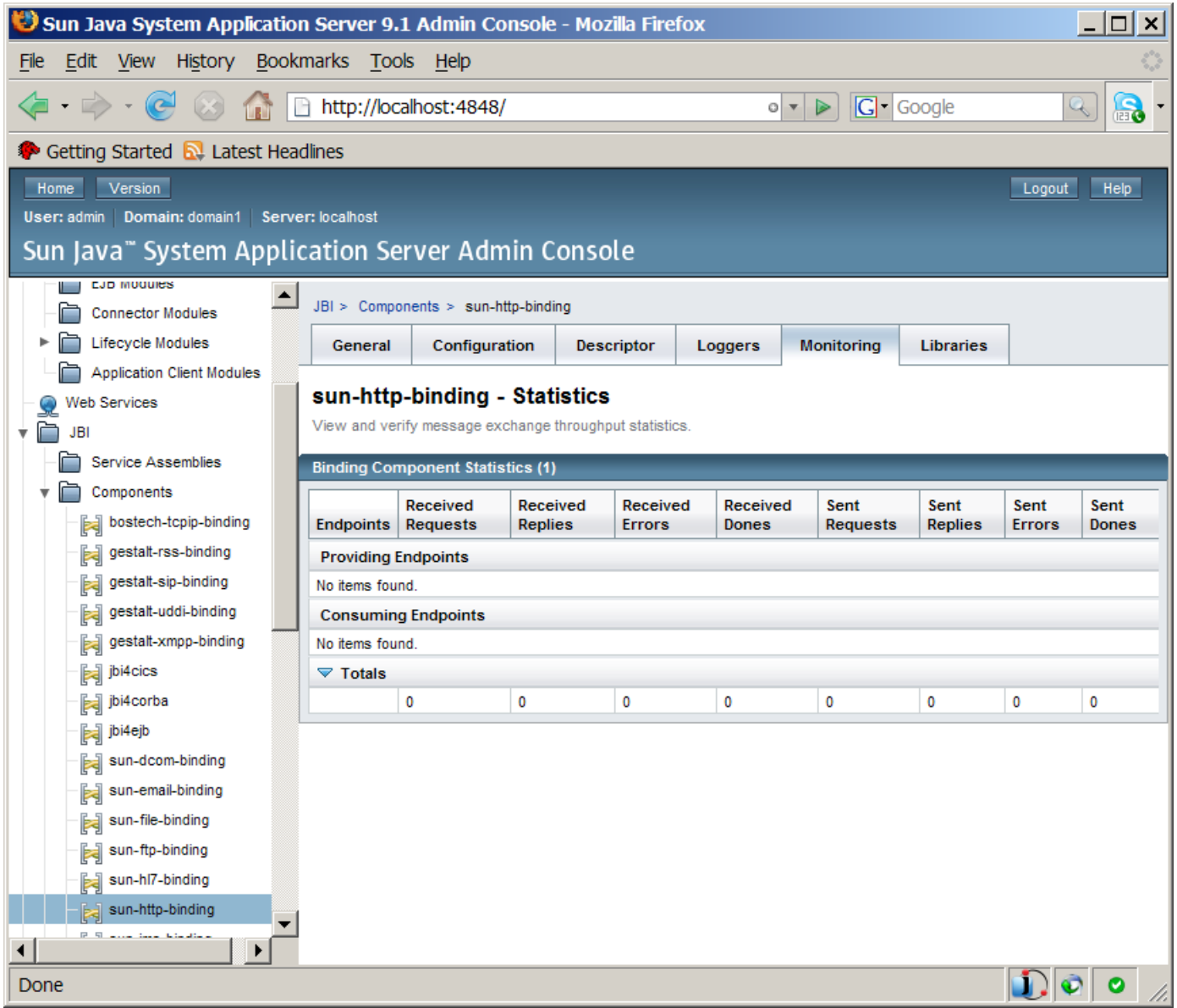
- Submitted: 2007-03-13 (JSR 312)
- Public Review: mid-2007
  - Looking more end-users on the EG
- Focus
  - Administration of clustered / distributed enviros
  - Better alignment with Java EE
  - Interceptors
  - Policy/capabilities
  - Greater coverage of JBI enablement of Composite Apps
  - Choreography
  - SCA alignment

JBI and GlassFish

JBI Support in GlassFish

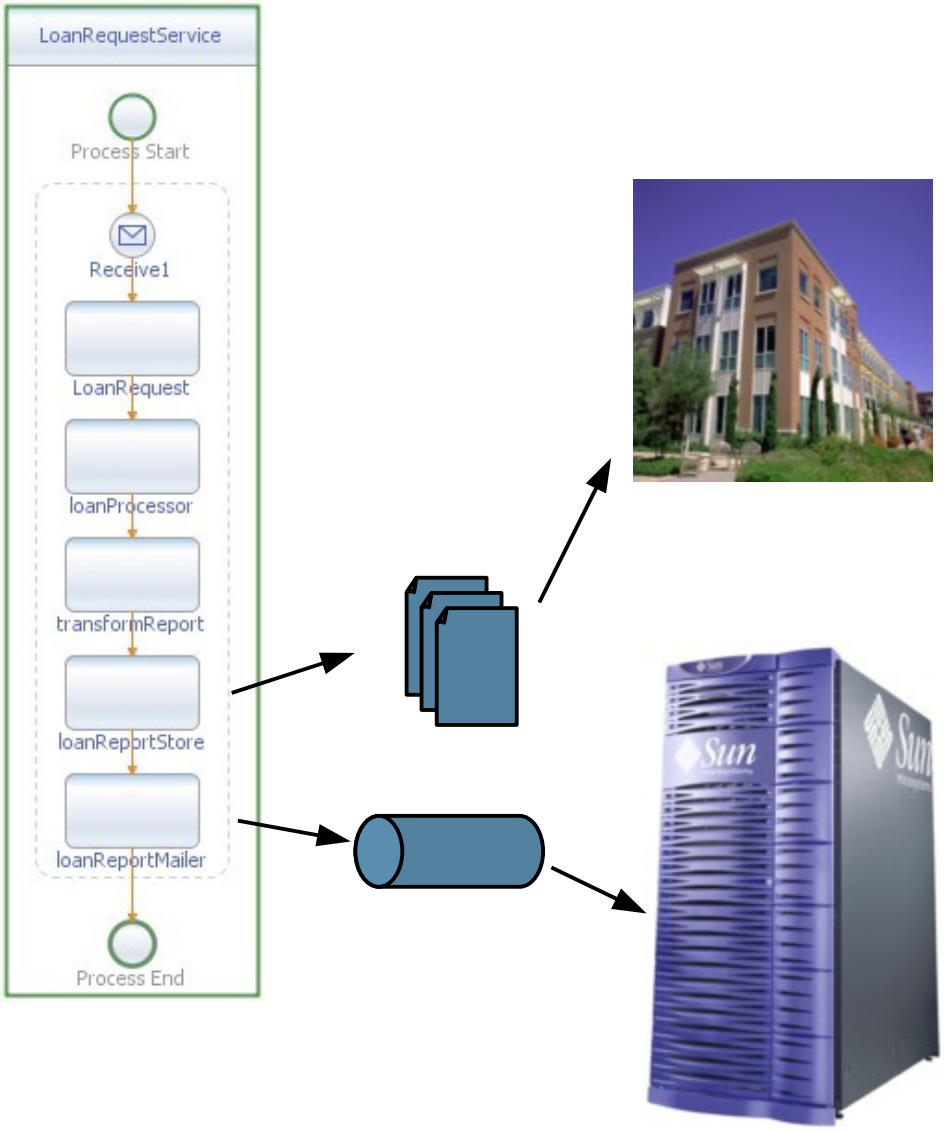
- A JBI runtime has been integrated with GlassFish V2
- GlassFish admin console now supports JBI
- Java EE Service Engine act as the bridge between Java EE applications and JBI
- A Java EE application archive (ear/war/jar) can be packaged in a JBI composite application
- JBI runtime has been enhanced to adhere to the appserver clustering architecture
  - Each instance in the appserver cluster will also have a JBI runtime in it

JBI in Admin Console



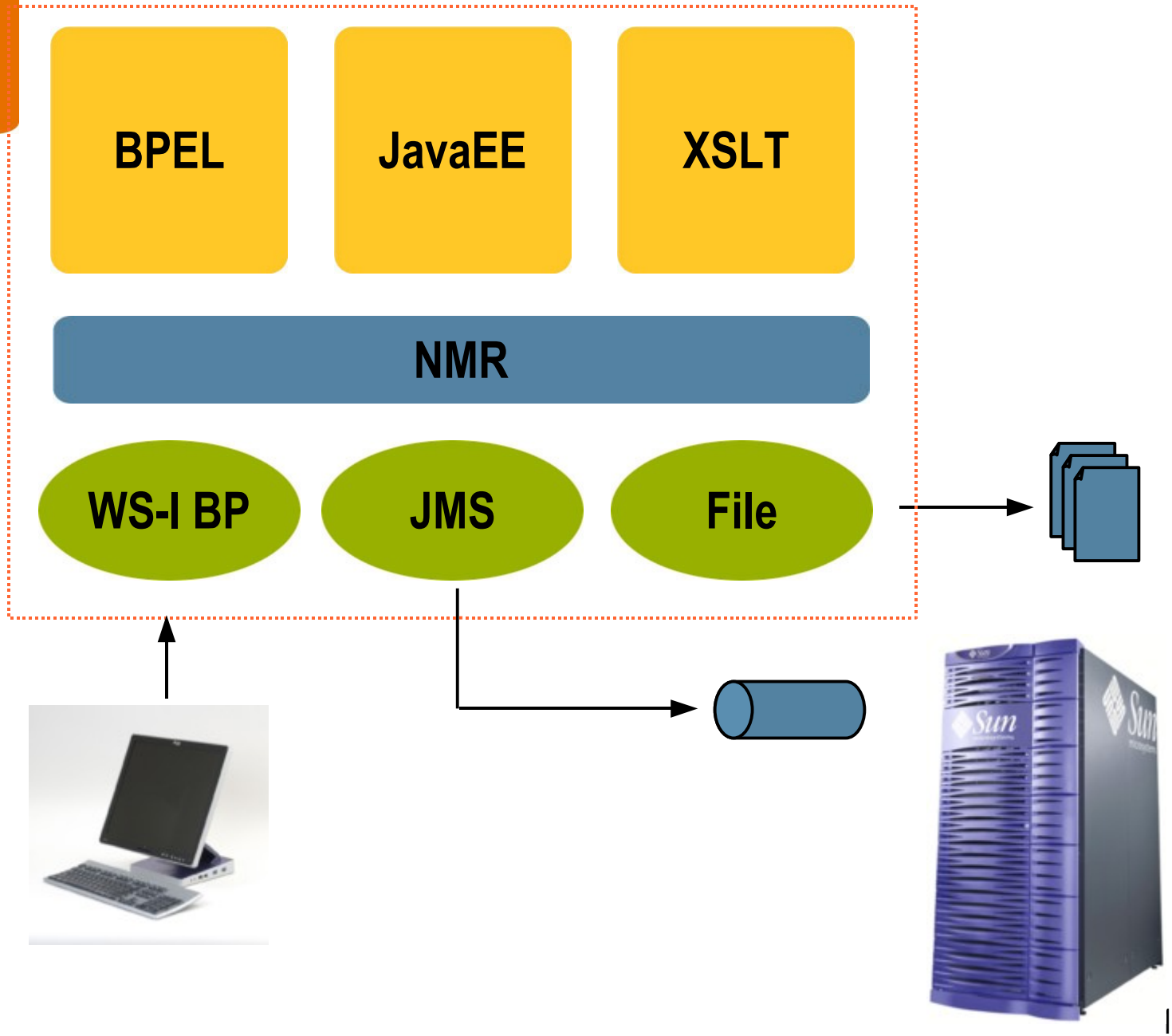
Usage Scenario

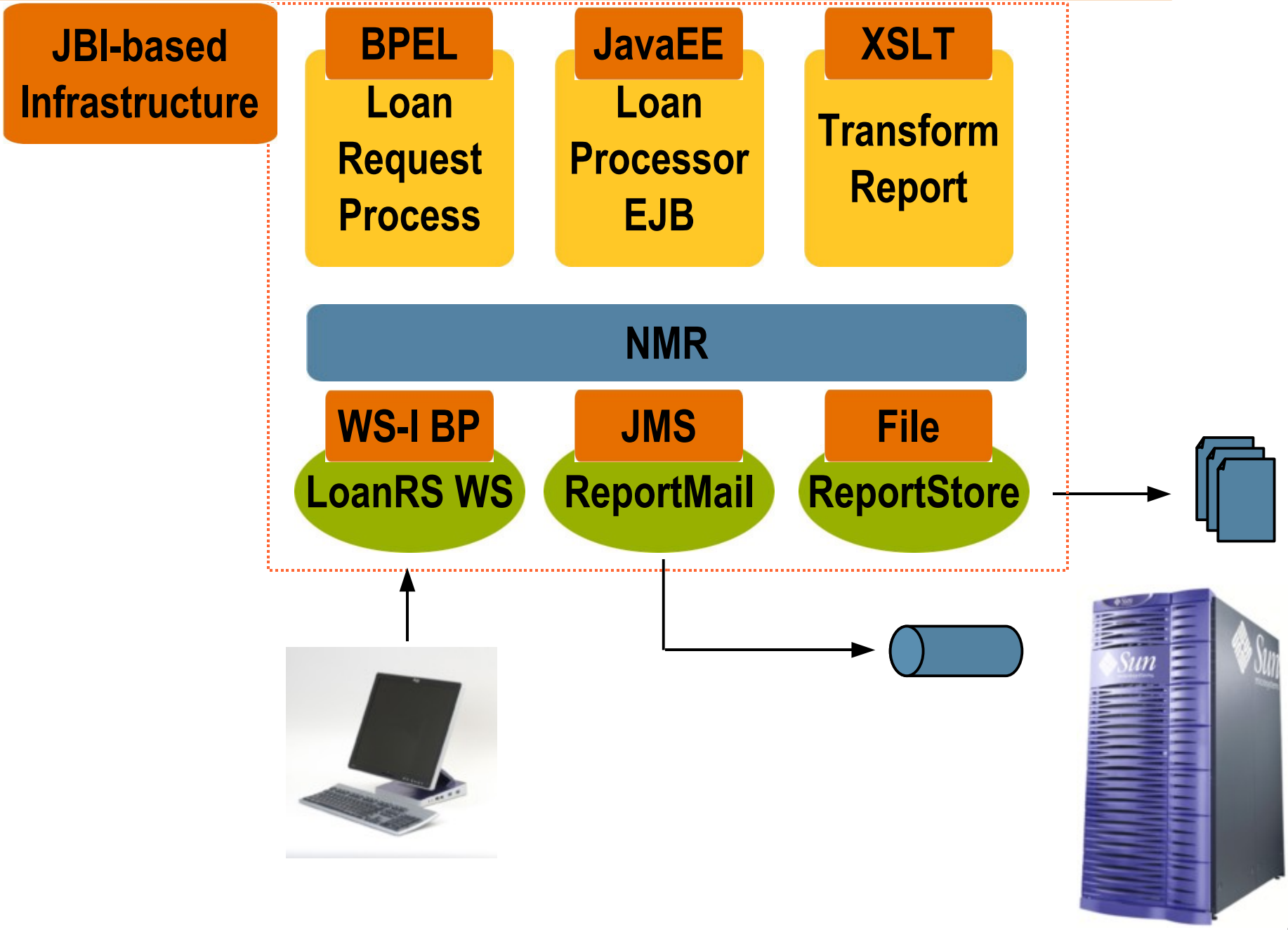
Usage Scenario: Loan Processing

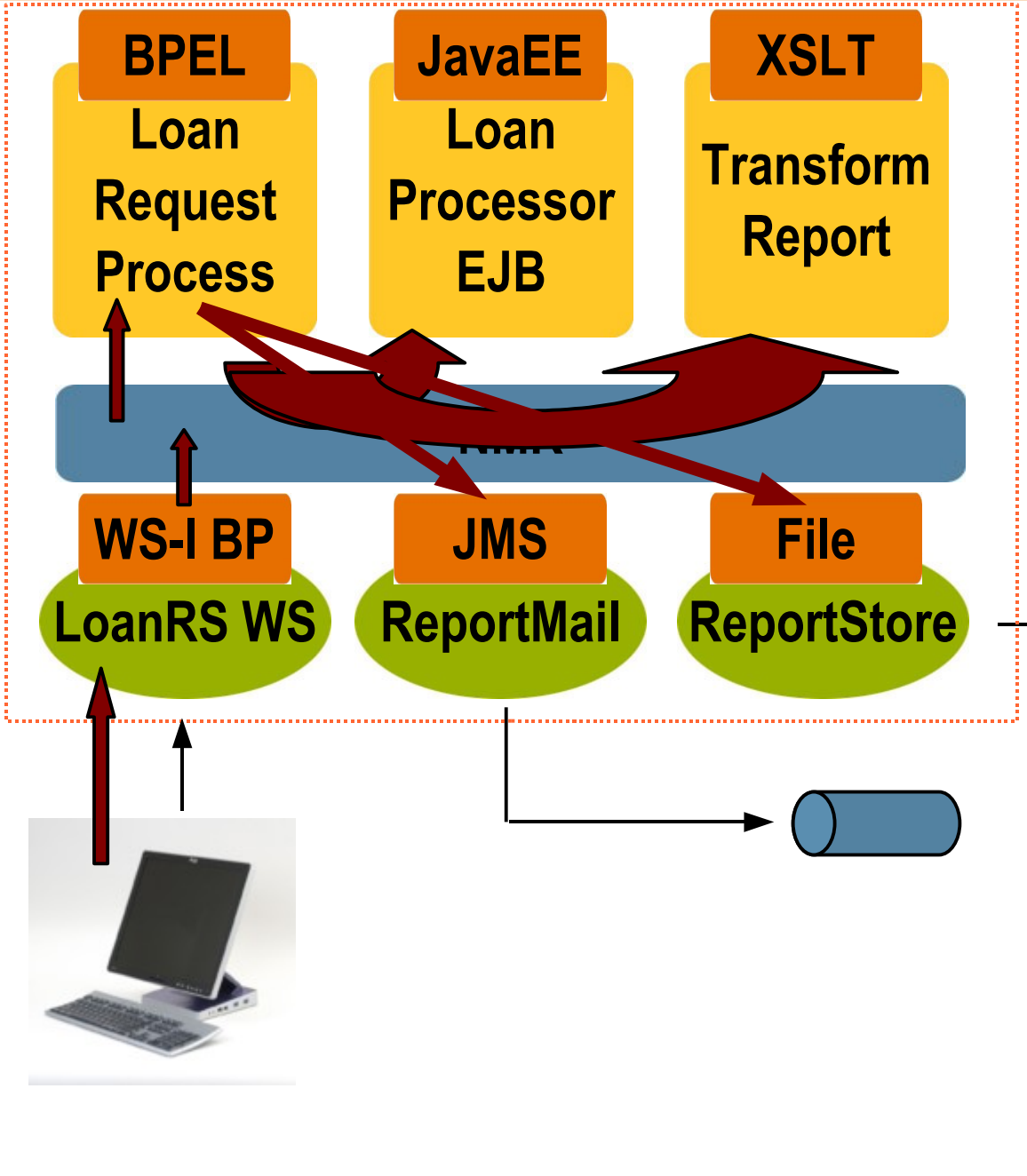


- Loan Requestor Service:
  - LoanRequestProcess
    - WS-I BP
    - BPEL Orchestration
  - LoanProcessor
    - JavaEE
  - TransformReport
    - XSLT
  - LoanReportStore
    - Business Partner thru FTP
  - LoanReportMailer
    - Legacy thru JMS

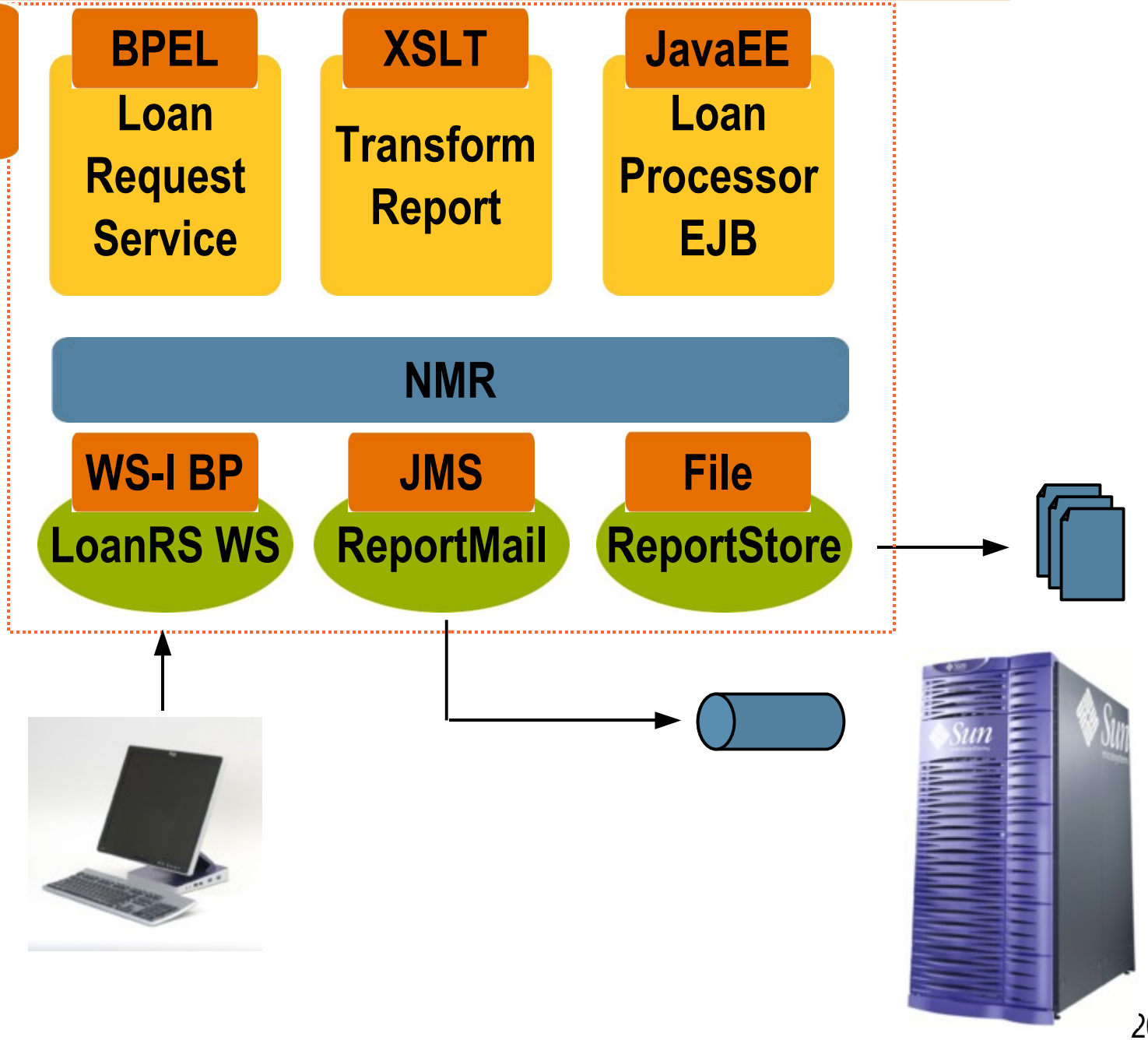
JBI-based Infrastructure

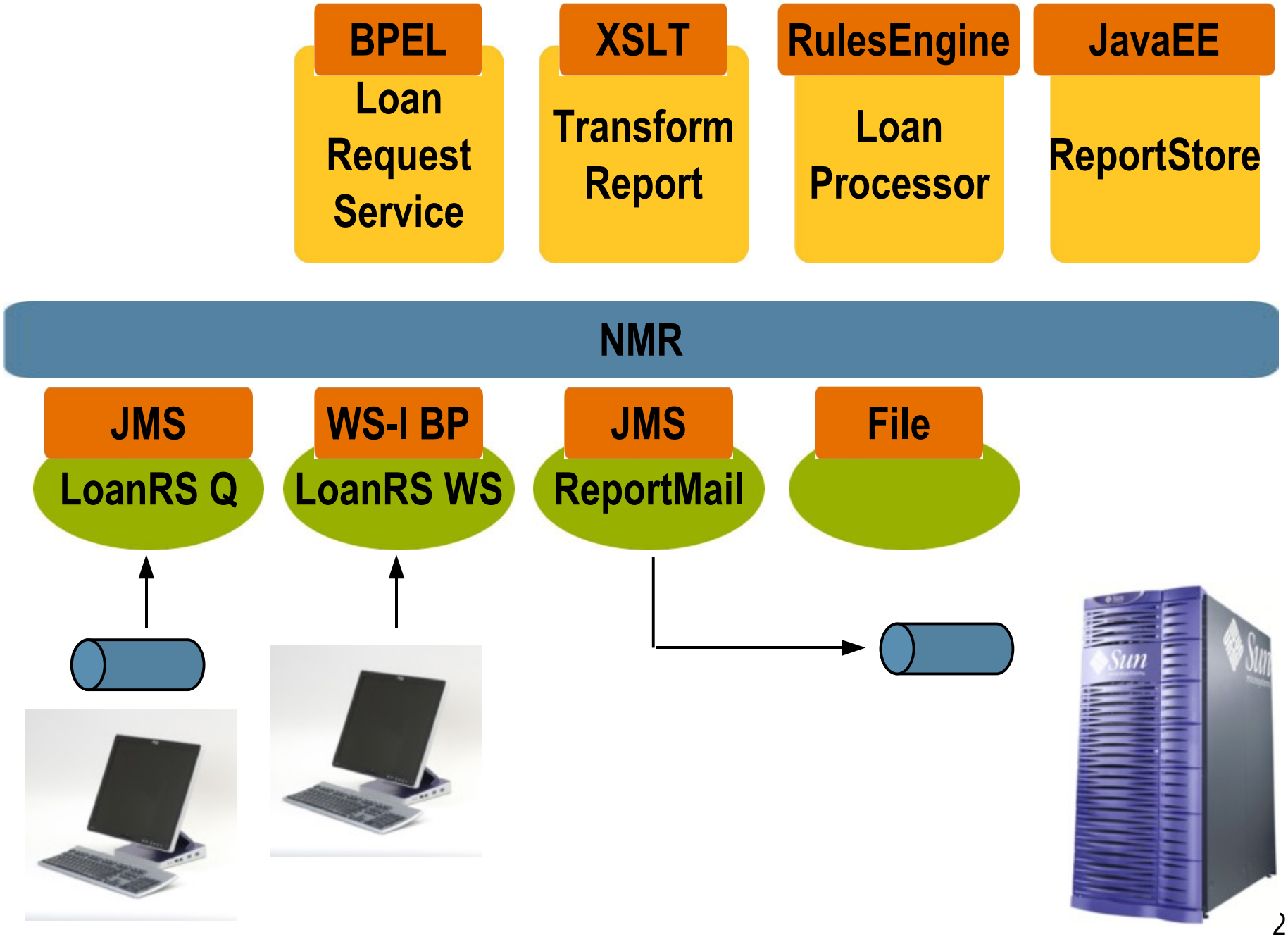



JBI-based Infrastructure
BPEL
Loan Request Process
JavaEE
Loan Processor EJB
XSLT
Transform Report
NMR
WS-I BP
LoanRS WS
JMS
ReportMail
File
ReportStore


BPEL
Loan Request Process
JavaEE
Loan Processor EJB
XSLT
Transform Report
WS-I BP
LoanRS WS
JMS
ReportMail
File
ReportStore

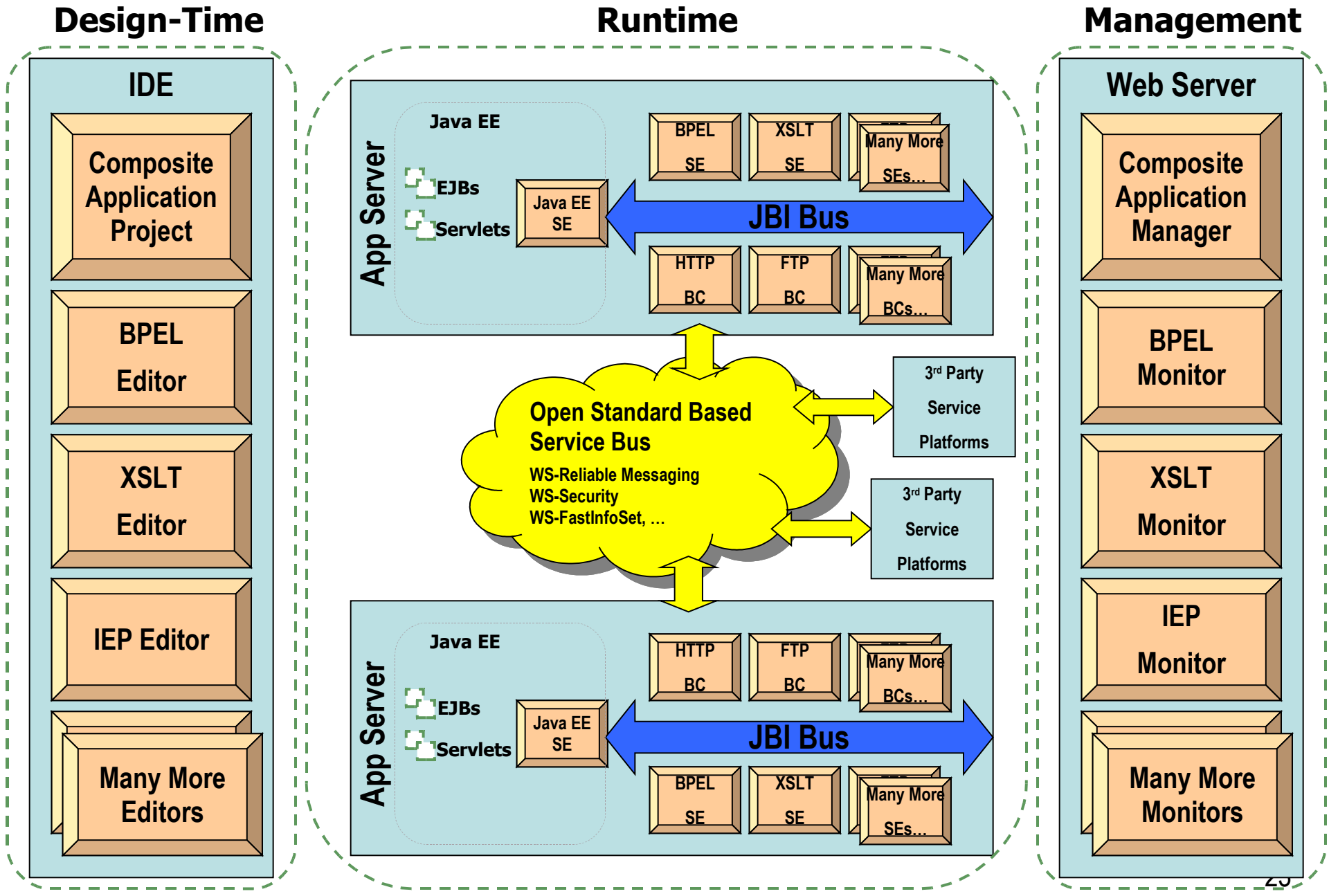
Architecture Refactoring



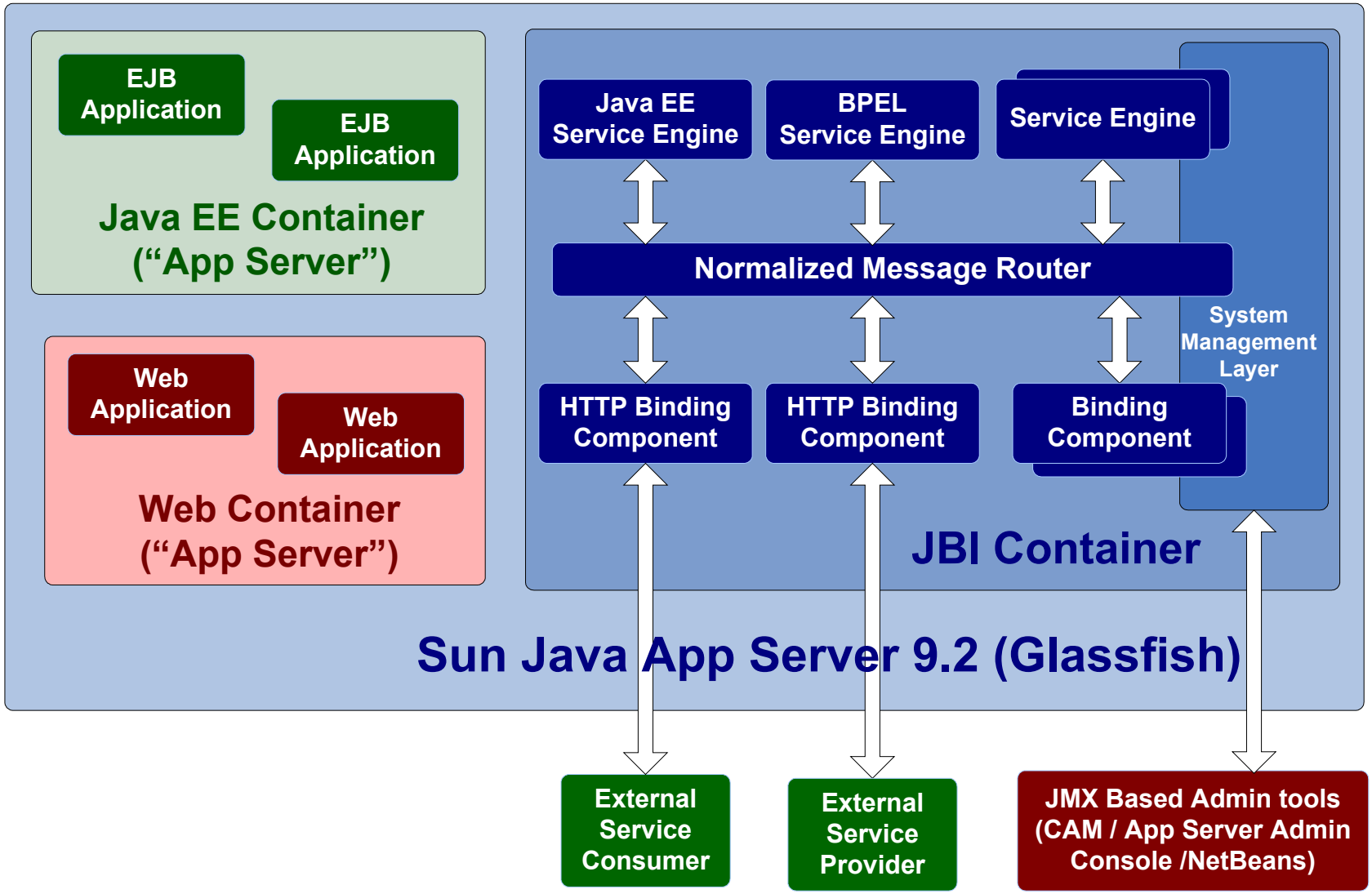

BPEL
Loan Request Service
XSLT
Transform Report
RulesEngine
Loan Processor
JavaEE
ReportStore
NMR
JMS
LoanRS Q
WS-I BP
LoanRS WS
JMS
ReportMail
File

Open ESB Development & Deployment Environment

Open ESB Environment



OpenESB Architecture

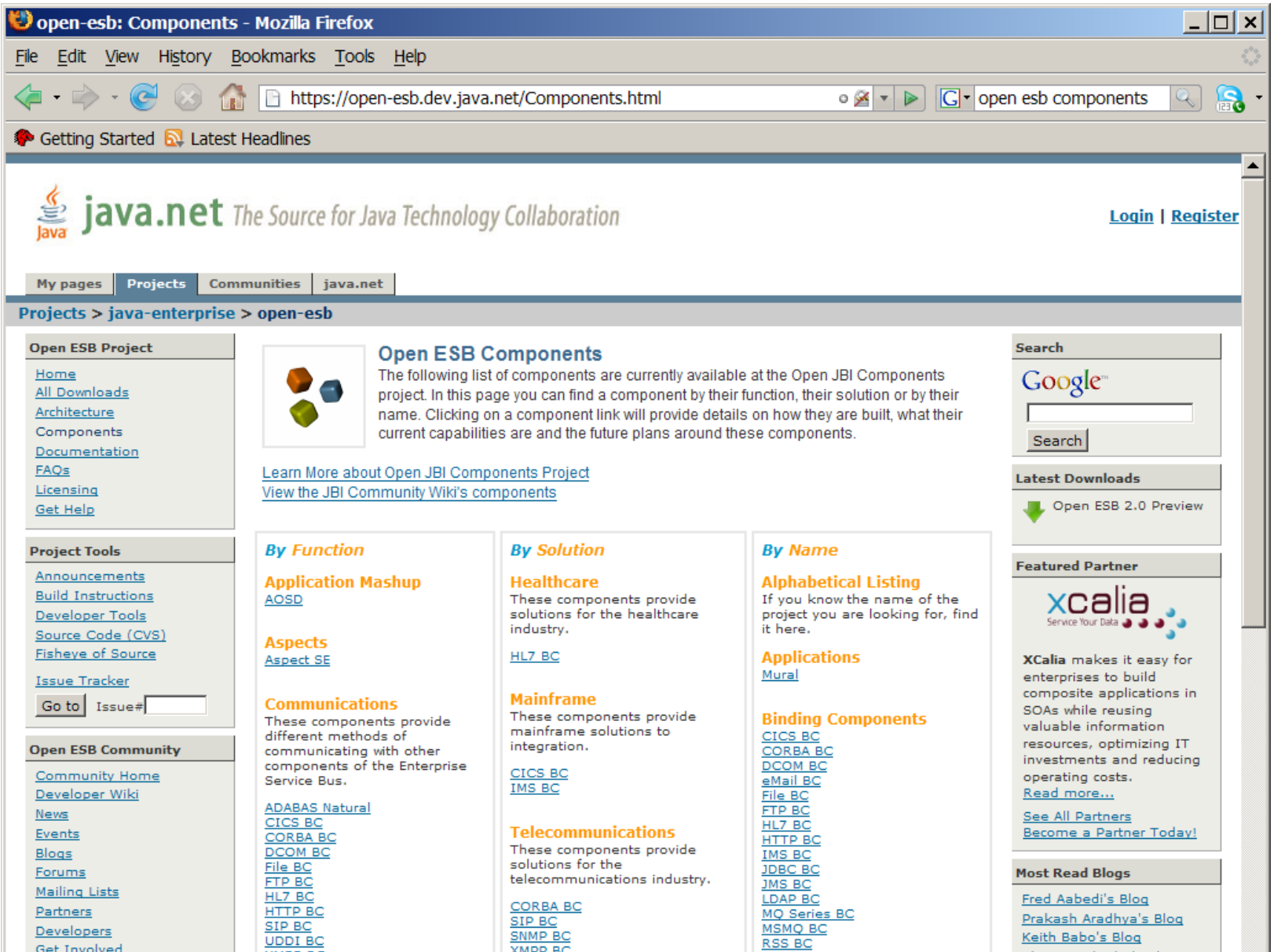


Service Engines (SE) & Binding Components (BC)

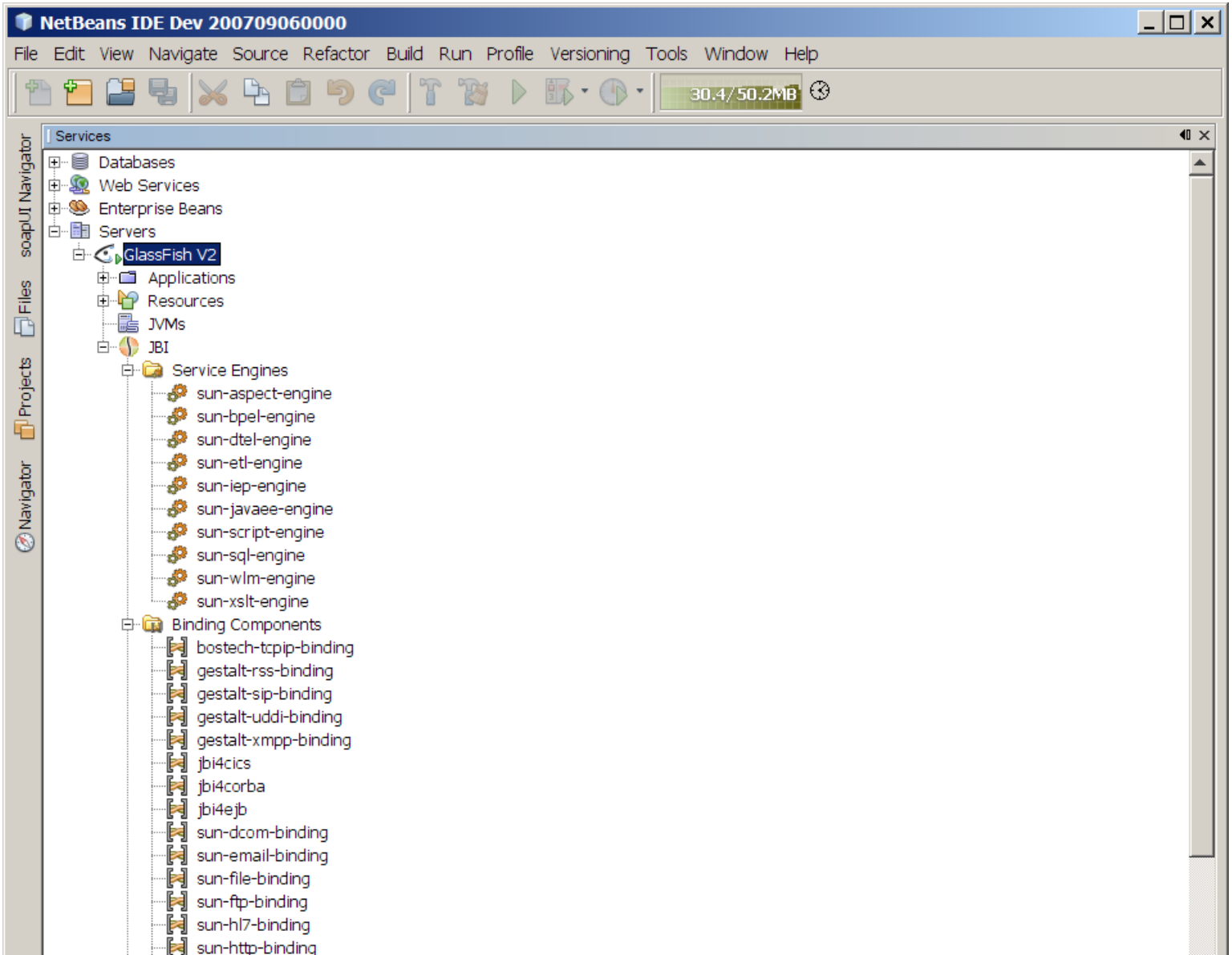
JBI Components

- Service Engines
  - BPEL SE
  - XSLT SE
  - JavaEE SE
  - IEP SE
  - ETL SE
  - SQL SE
  - Workflow SE
- Binding Comps
  - MQSeries BC
  - HL7 BC
  - SAP BC
  - SMTP BC
  - HTTP BC
  - JMS BC
  - File BC
  - CICS BC
  - DCOM BC
  - CORBA BC
  - ...
- Other
  - Clustering
  - CASA
  - JBI Mock
  - WSIT Tech
- In Progress
  - CAM
  - Aspect SE
  - Encoding SE
  - Rules SE
  - Scripting SE

open-esb.dev.java.net/Components.html



Open ESB Package Ships Many SE's/BC's

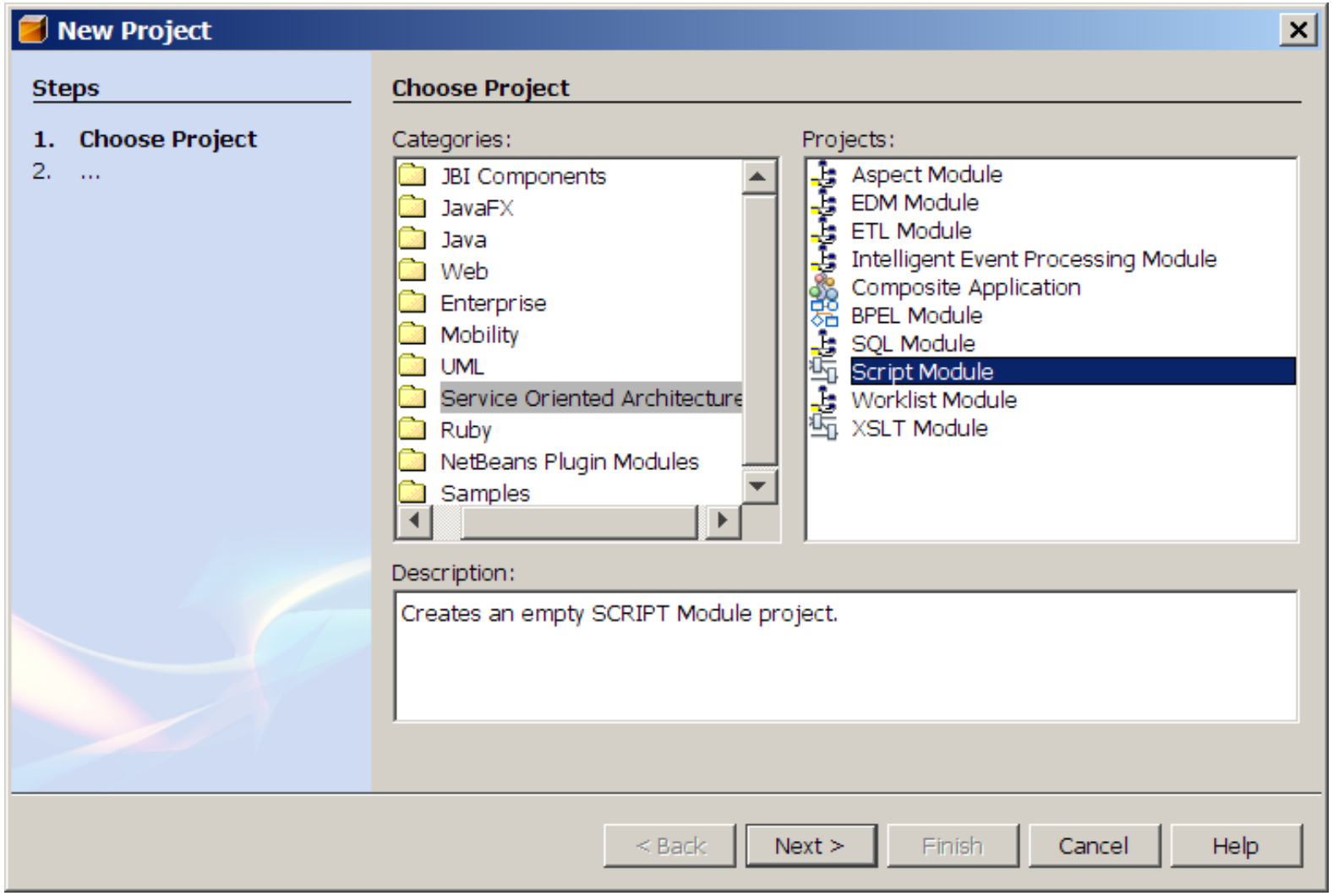


NetBeans Support of Open ESB

Types of SOA "NetBeans" Projects

- When creating a composite application, you typically use the following types of SOA "NetBeans" projects:
  - BPEL Module project (NetBeans 6.0)
  - XSLT Module project (NetBeans 6.0)
  - SQL Module project (NetBeans 6.0)
  - Composite Application project (NetBeans 6.0)
  - IEP Module project (OpenESB package)
  - Worklist Module project (OpenESB package)
  - ETL (Extract, Transform, and Load) (OpenESB package)
  - EDM (Enterprise Data Mashup) (OpenESB package)
  - And more

Types of SOA "NetBeans" Projects



BPEL Module Project

- BPEL Module project is a group of source files which includes
  - XML Schema (*.xsd) files
  - WSDL files
  - BPEL files
- Within a BPEL Module project, you can author a business process compliant with the WS-BPEL 2.0 language specification.
- Will be added to a Composite application as a JBI module

Composite Application Project

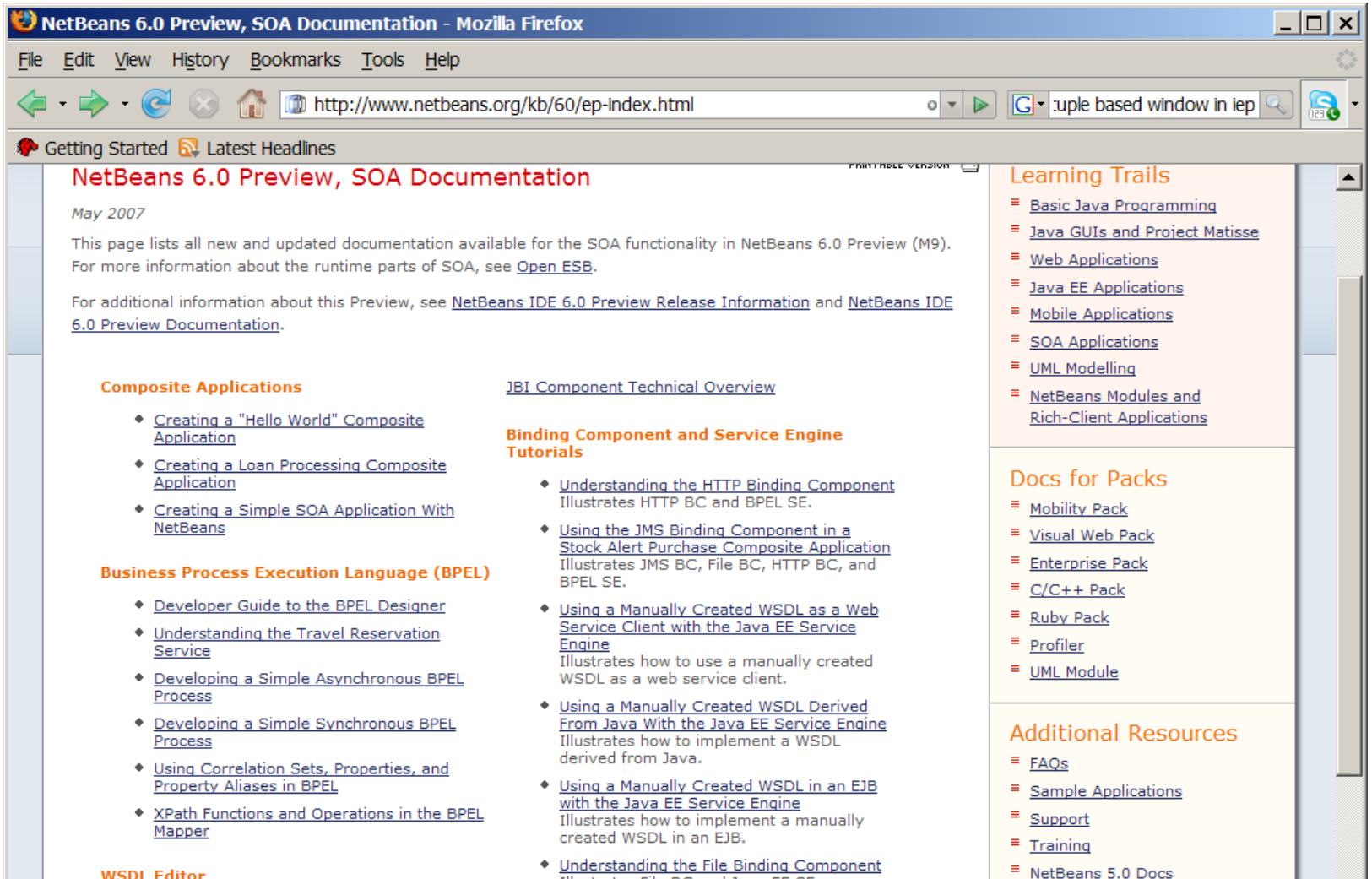
- Composite Application project is a project whose primary purpose is to assemble a deployment unit for the Java Business Integration (JBI) server
  - BPEL Module projects must be added to a Composite Application project in order to be deployed to the BPEL runtime.
- The Composite Application Project can also be used to create and execute test cases that can then be run, in JUnit fashion, against the deployed BPEL processes.

Composite Application Project

- With a Composite Application project, you can:
  - Assemble an application that uses multiple project types (BPEL, XSLT, IEP, SQL, etc.)
  - Configure external/edge access protocols (SOAP, JMS, SMTP, and others)
  - Build JBI deployment packages
  - Deploy the application image to the target JBI server
  - Monitor the status of JBI server components and applications

Lots of Step by Step Tutorials

- http://www.netbeans.org/kb/60/ep-index.html



BPEL SE

BPEL SE

- Standards
  - BPEL 2.0 (subset)
  - WSDL1.1
- BPEL SE Configuration
  - num threads
  - persistence
  - failover
- BPEL Editor
  - BPMN
  - Debugger

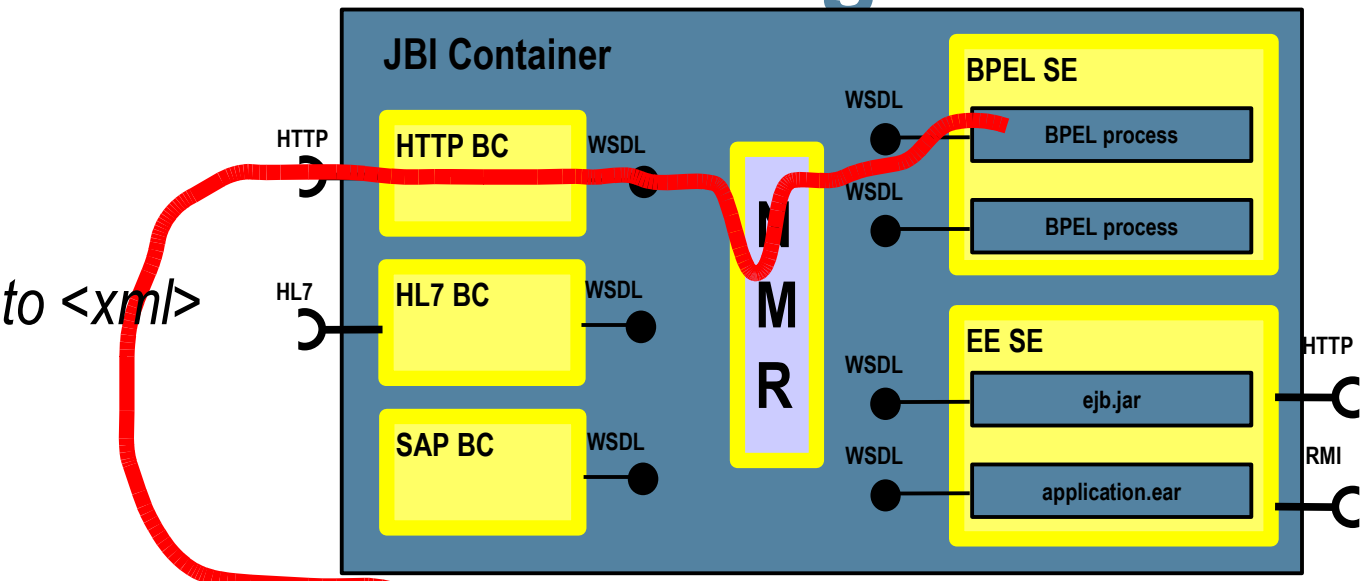
Java EE SE

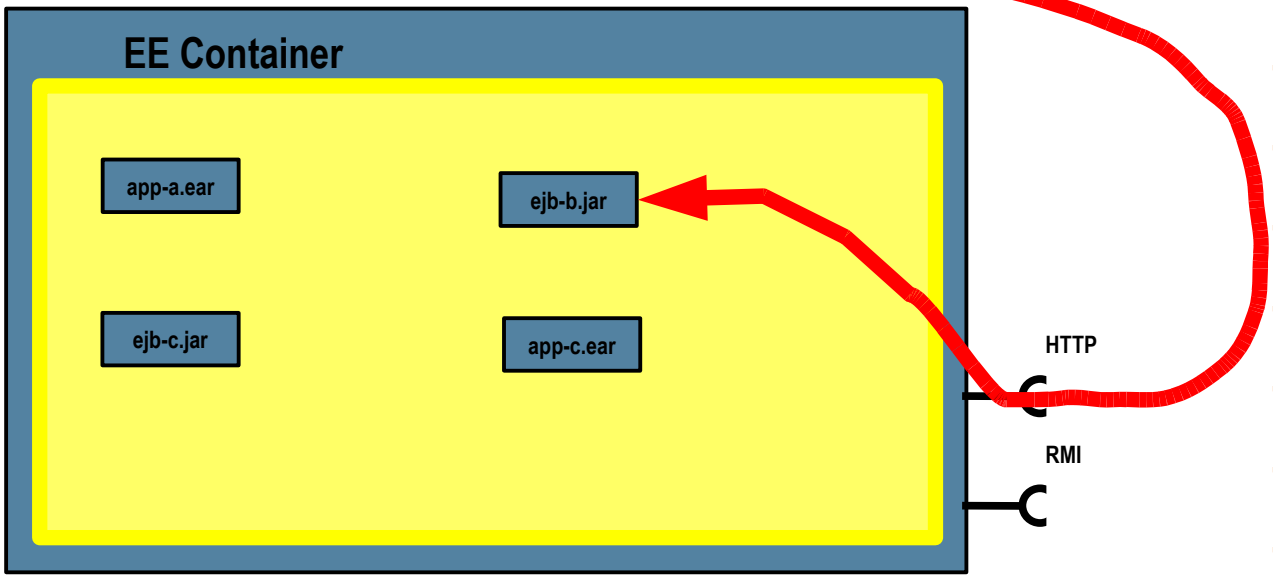
JavaEE SE

- Ideal place to execute complex business logic
- Bridge between JavaEE container and JBI container
- Provides support for
  - Transactions
  - Resource Pooling
  - Security
- Code re-use – Invoke your EJBs/web applications from OpenESB components (BPEL SE)
- Ability to expose your EJB/Web applications to multiple transports (using BCs) – just add bindings to your WSDL

Scenario 1: Remote throughHTTP BC

- BPEL
- NMR
- HTTP BC
- *Marshall DOM to <xml>*
- SOAP/HTTP
- Network layer

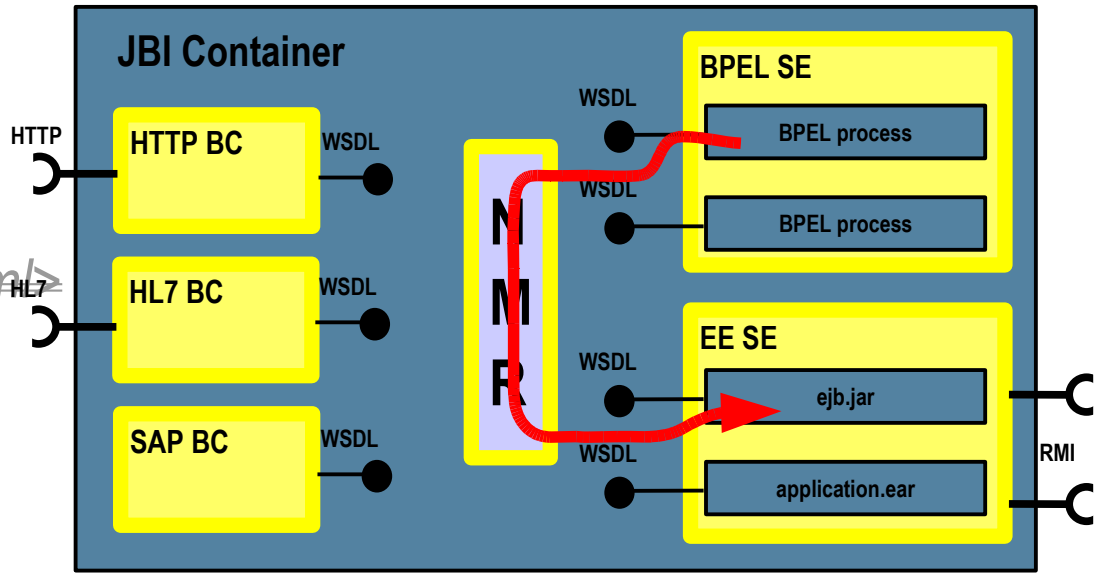




- Network layer
- SOAP/HTTP
- JAXWS
- *Unmarshal <xml>*
- *Create DOM*
- JAXB
- WS.helloWorld(name)

Scenario 2: Local through NMR

- BPEL
- NMR
- ~~HTTP BC~~
- ~~*Marshall DOM to <xml>*~~
- ~~SOAP/HTTP~~
- ~~Network layer~~
- ~~SOAP/HTTP~~
- JAXWS
- ~~*Unmarshal <xml>*~~
- ~~*Create DOM*~~
- JAXB
- WS.helloWorld(name)



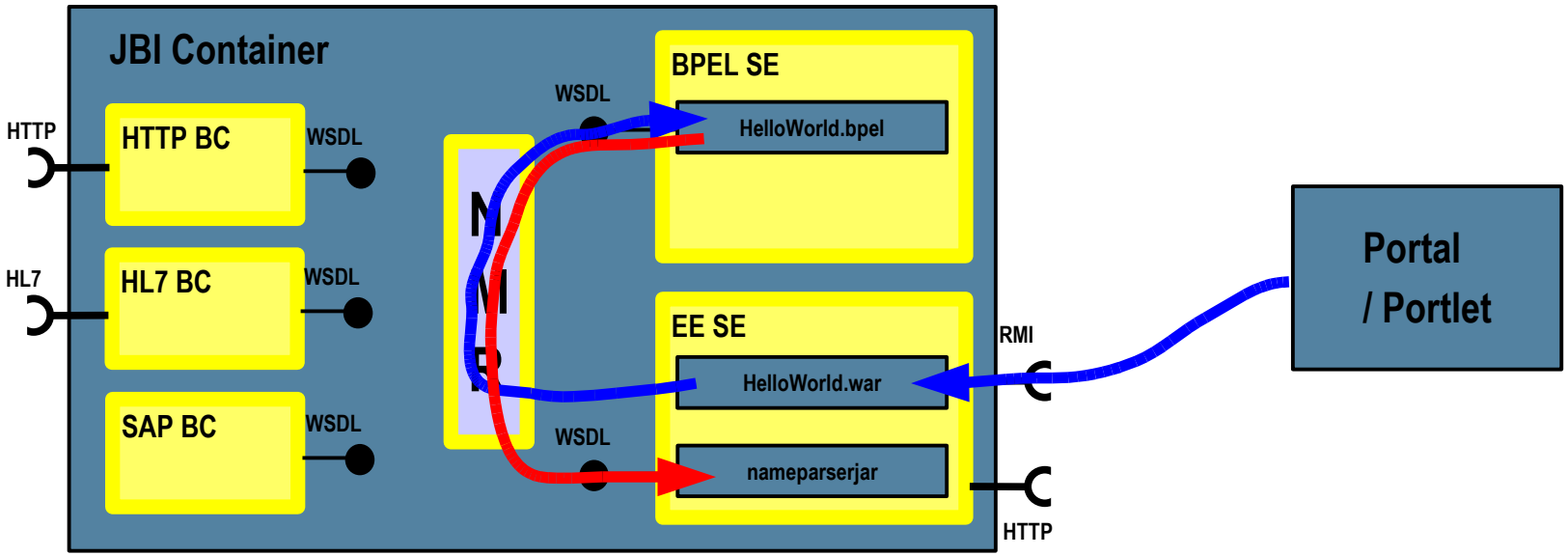
Advantages:

- Performance
- Transaction propagation
- Security context propagation

Likewise: EJB to BPEL

Scenario: Portal + EE + BPEL

- Portlet gets name, invokes WAR which calls BPEL to orchestrate process
- BPEL activity requires complex business logic
  - executes faster in EJB right

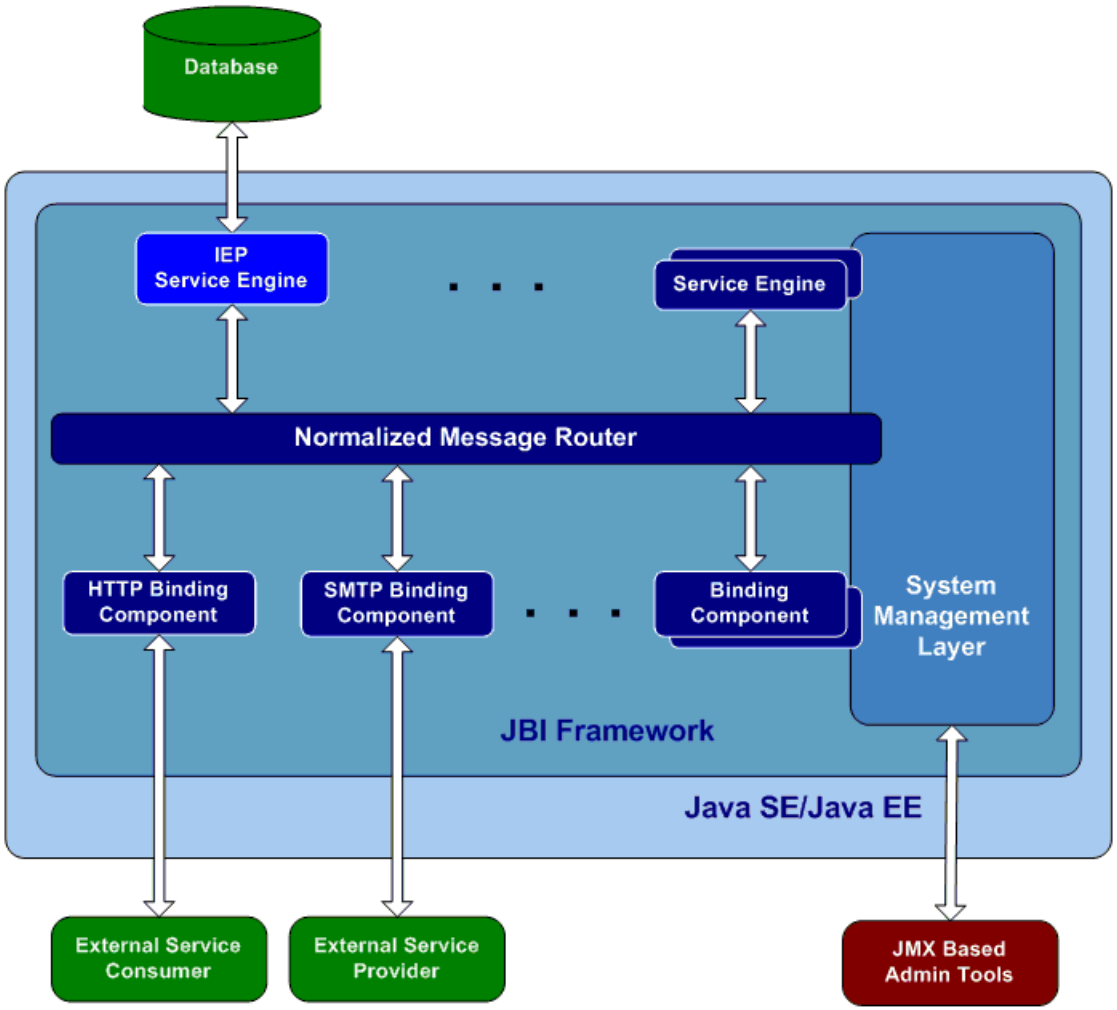


Intelligent Event Processing (IEP) SE

Intelligent Event Processing (IEP) SE

- Handles real time events and process them to higher level events which then can be used for further analysis or monitoring.
  - Aggregation
  - Filtering
  - Correlation
  - Partition
- Provides real time event notifications and triggers
  - Update database in realtime

IEP SE


Database
IEP
Service Engine
Service Engine
Normalized Message Router
HTTP Binding
Component
SMTP Binding
Component
Binding
Component
System
Management
Layer
JBI Framework
Java SE/Java EE
External Service
Consumer
External Service
Provider
JMX Based
Admin Tools

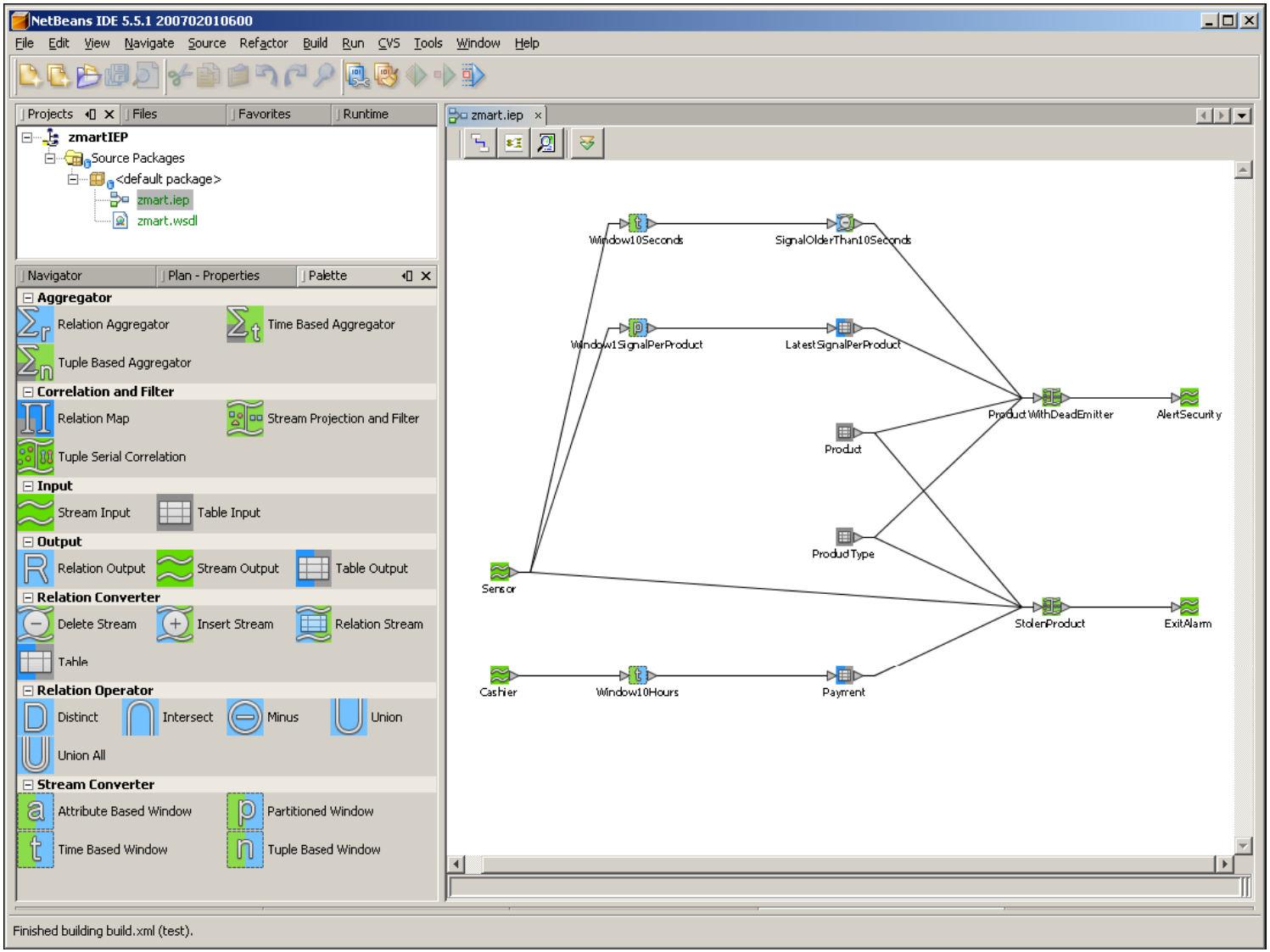
Usage Scenario

- Many modern applications require long-running, or continuous, queries over continuous unbounded streams of data.
- The need exists to detect business-critical issues as they happen, and to route, filter and pre-process data continuously over an indeterminate period of time.
- Event processing involves the continuous processing and analysis of high volume, high-speed data streams from inside and outside an organization.

IEP Operators

- **Input**
  - Stream-Input
  - Table-Input
- **Output**
  - Stream-Output
  - Relation-Output
  - Table-Output
- **Correlation and Filtering**
  - Stream-Project-and-Filter
  - Tuple-Serial-Correlation
  - Relation-Map
- **Aggregator**
  - Time-Based-Aggregator
  - Tuple-Based-Aggregator
  - Relation-Aggregator.
- **Stream Converter**
  - Tuple-Based-Window
  - Time-Based-Window
  - Attribute-Based-Window
  - Partitioned-Window
- **Relation Converter**
  - Insert-Stream
  - Delete-Stream
  - Relation-Stream
  - Table
- **Relation Operator**
  - Distinct
  - Union
  - Union-All
  - Minus

IEP Support in NetBeans



Intelligent Event Processing (IEP) SE Demo

You can try this demo yourself!
http://www.javapassion.com/handsonlabs/openesbiep/

Demo Scenario

- External program keep sending stock quote data stream events to the IEP (through JBI)
  - The IEP receives the stock quote stream as real time events
- The IEP send notifications to the database and the database gets updated continuously

Steps to follow

1. Create IEP module project
   - Create *quotes.iep*
   - Generate *quotes.wsdl*
2. Create a Composite application
   - Add IEP module to the Composite application
3. Run the test application that sends stock quote stream to the composite application

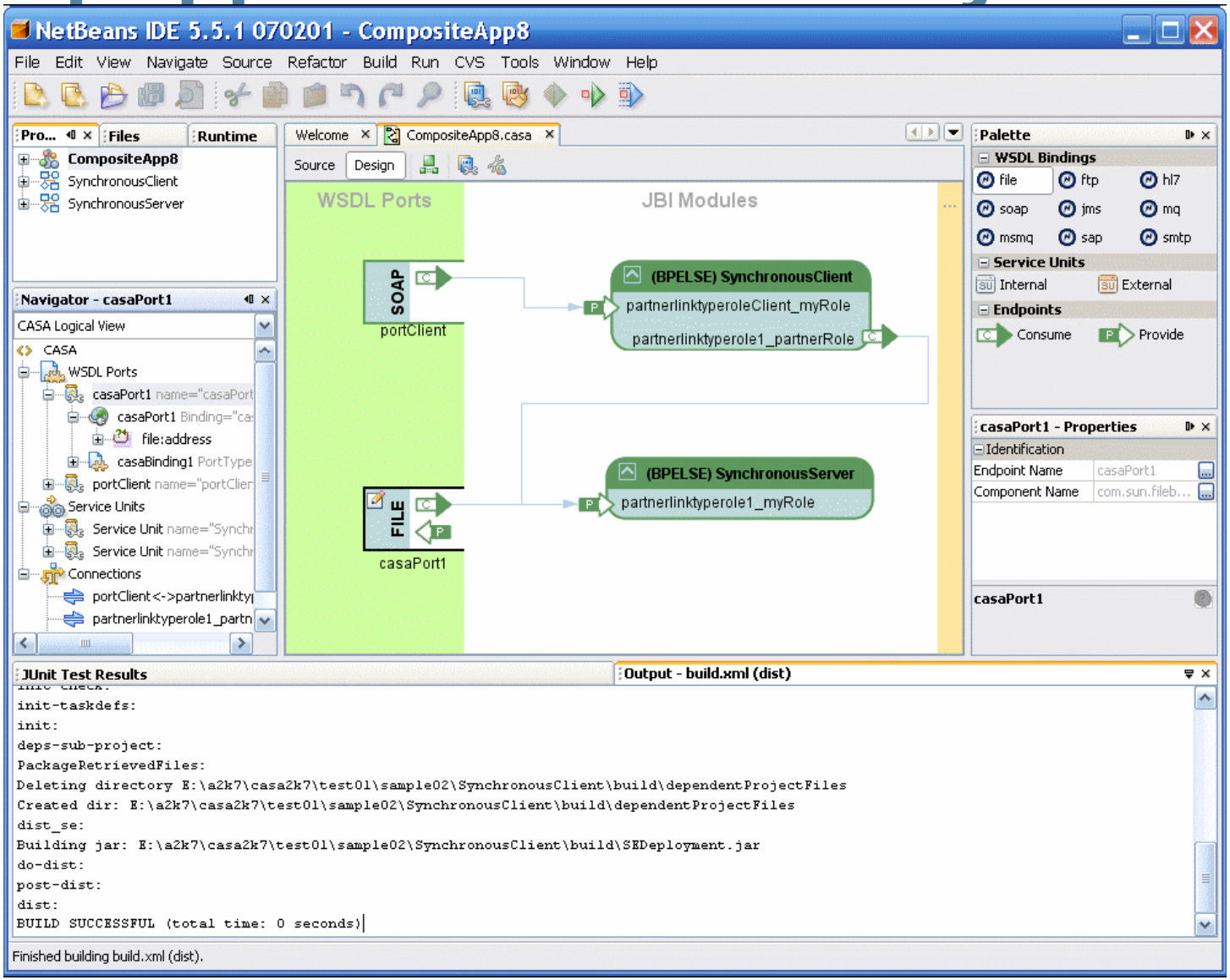
Aspect SE

Aspect SE

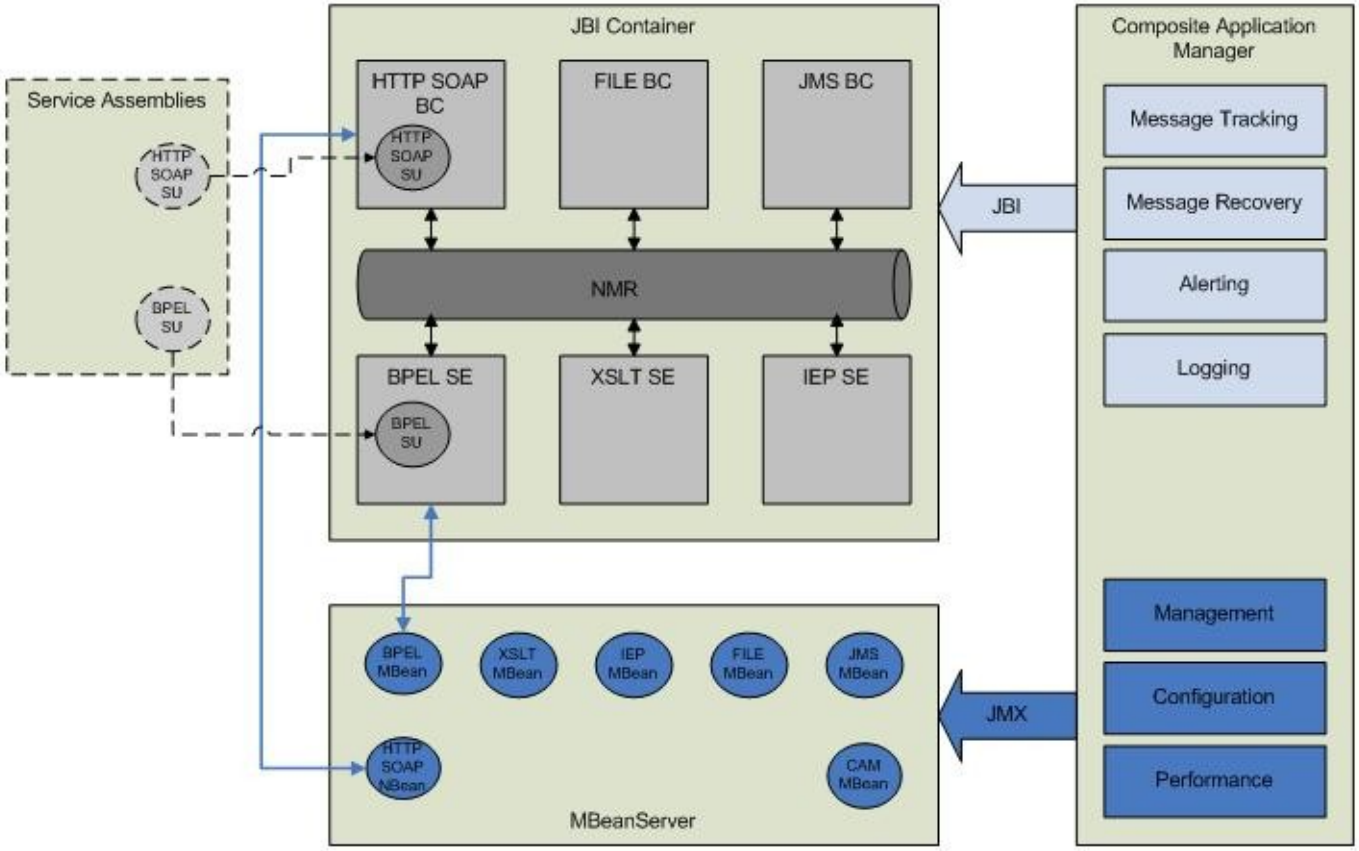
- Aspects help to encapsulate cross-cutting expressions in one place.
- By applying an Advice, at various points in an application called Join-Points, Aspects can alter the behavior of the non-aspect parts of a software application.
- There are two types of aspect patterns that are addressed:
  - Gateway Pattern
  - Aspect-Weaving Pattern

CASA

CompApp Service Assembly Editor



CompApp Manager



System Architecture Overview

- collect statistics for endpoints, SUs / SAs
- monitor and configure runtime parameters for a managed component
- control managed components (e.g. start/stop/shutdown/etc)

OpenESB: Projects

- Glassfish JBI Integration
  - Place where JBI runtime will be implemented
  - will become the OpenJBI project
- Open JBI Components
  - Component Development
  - “Independant” of OpenESB. E.g., could be used in other JBI based environment. E.g., JBossESB
- Open ESB
  - Umbrella Project, includes runtime and components
- Open B2B
  - B2B specific components: HIPAA, RFID, EDI, ebXML
- Netbeans Enterprise Pack

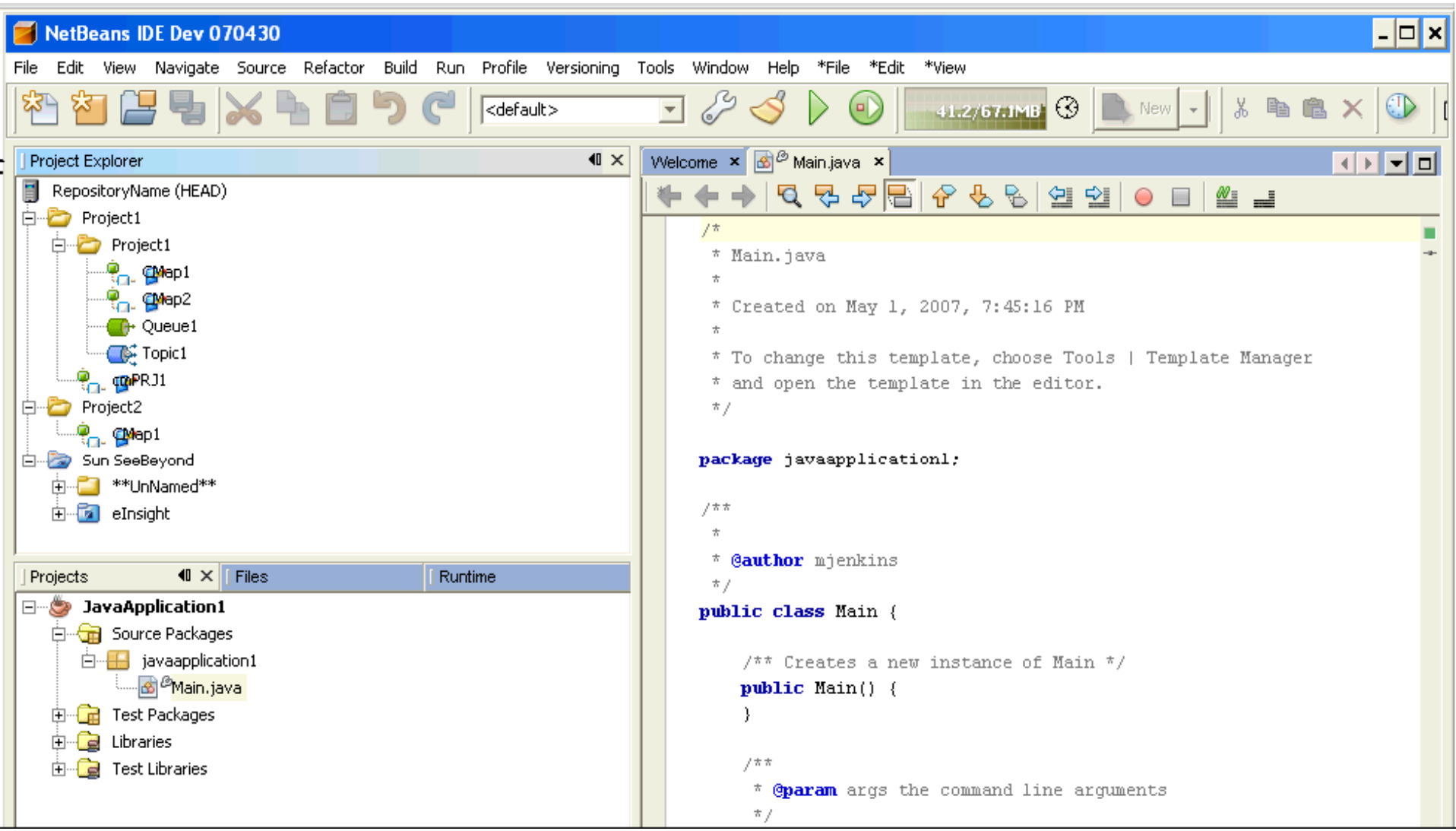
Open ESB Distribution

- Open ESB
  - JBI Runtime
  - Full collection of OpenESB components
  - NetBeans based tooling (see Tooling section of presentation)
  - Latest builds
- Java Application Platform SDK
  - Glassfish
  - JBI Runtime
  - Milestone of OpenESB components
  - Includes other open source projects
    - Portal, OpenSSO, etc

- **http://open-esb.dev.java.net**
- **http://java.sun.com/developer/technicalArticles/J2EE/sdk_overview**
- **http://enterprise.netbeans.org/**

Open ESB and JavaCAPS

- Open ESB
  - JBI Runtime
  - Glassfish v2 AppServer
  - Full collection of OpenESB components
  - NetBeans v6 based tooling
  - Combination of Sun and 3rd party components
  - Constantly evolving
  - Community Support
- JavaCAPS 5.2 ++
  - JBI Runtime + JavaCAPS 5.1 Runtime
  - Glassfish v2 AppServer
  - Selection of OpenESB components
  - NetBeans v6 based tooling (incl Enterprise Designer components)
  - Combination of Sun and 3rd party components
  - Sun Support


NetBeans IDE Dev 070430
File Edit View Navigate Source Refactor Build Run Profile Versioning Tools Window Help *File *Edit *View
<default>
41.2/67.1MB
New
Project Explorer
RepositoryName (HEAD)
Project1
Project1
Map1
Map2
Queue1
Topic1
PRJ1
Project2
Map1
Sun SeeBeyond
UnNamed
eInsight
Projects
Files
Runtime
JavaApplication1
Source Packages
javaapplication1
Main.java
Test Packages
Libraries
Test Libraries
Welcome
Main.java
/*
* Main.java
*
* Created on May 1, 2007, 7:45:16 PM
*
* To change this template, choose Tools | Template Manager
* and open the template in the editor.
*/
package javaapplication1;
/**
*
* @author mjenkins
*/
public class Main {
/** Creates a new instance of Main */
public Main() {
}
/**
* @param args the command line arguments
*/

More Info

- JBI
  - http://www.jcp.org/en/jsr/detail?id=208
  - http://java.sun.com/integration/
- OpenESB Project
  - http://open-esb.dev.java.net/
  - https://open-jbi-components.dev.java.net/
  - http://www.glassfishwiki.org/jbiwiki/Wiki.jsp?page=Jbicomps
- JavaEE SDK
  - http://java.sun.com/javaee/downloads/index.jsp
- Examples and Demos:
  - http://enterprise.netbeans.org/

OpenESB

- **Sang Shin**
  - Java Technology Evangelist
- Sun Microsystems, Inc.