Open ESB

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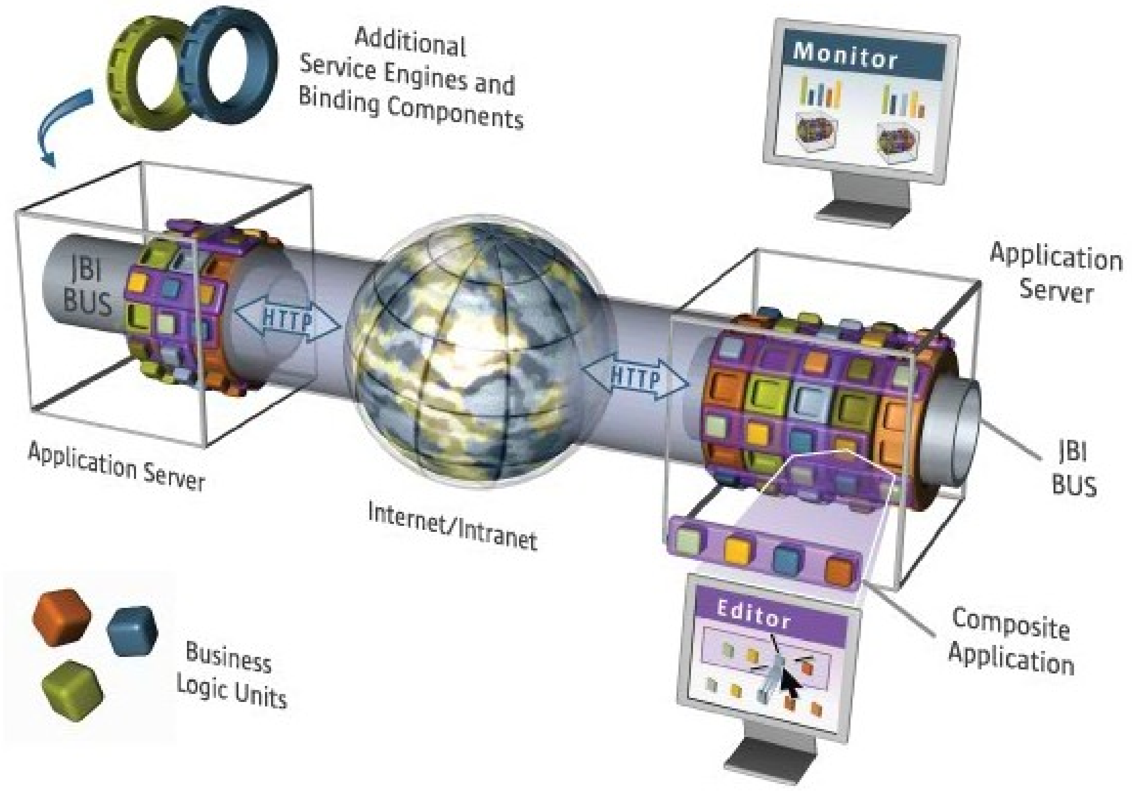
Topics

- What is Open ESB?
- What is JBI?
- JBI and GlassFish
- Usage Scenario
- Open ESB Development & Deployment Environment
- 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
- Many services

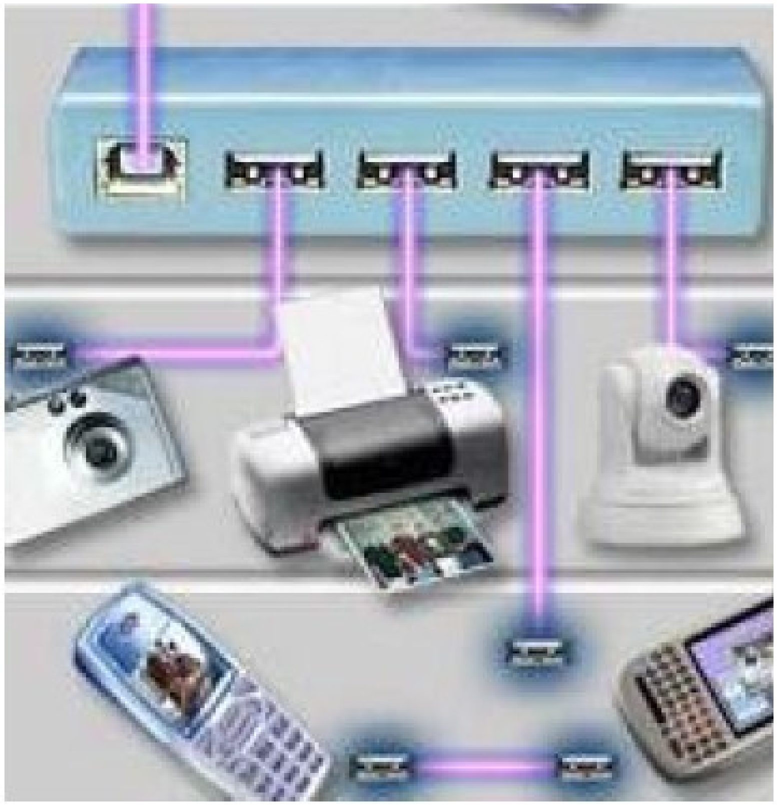


What is JBI?

Why JBI?

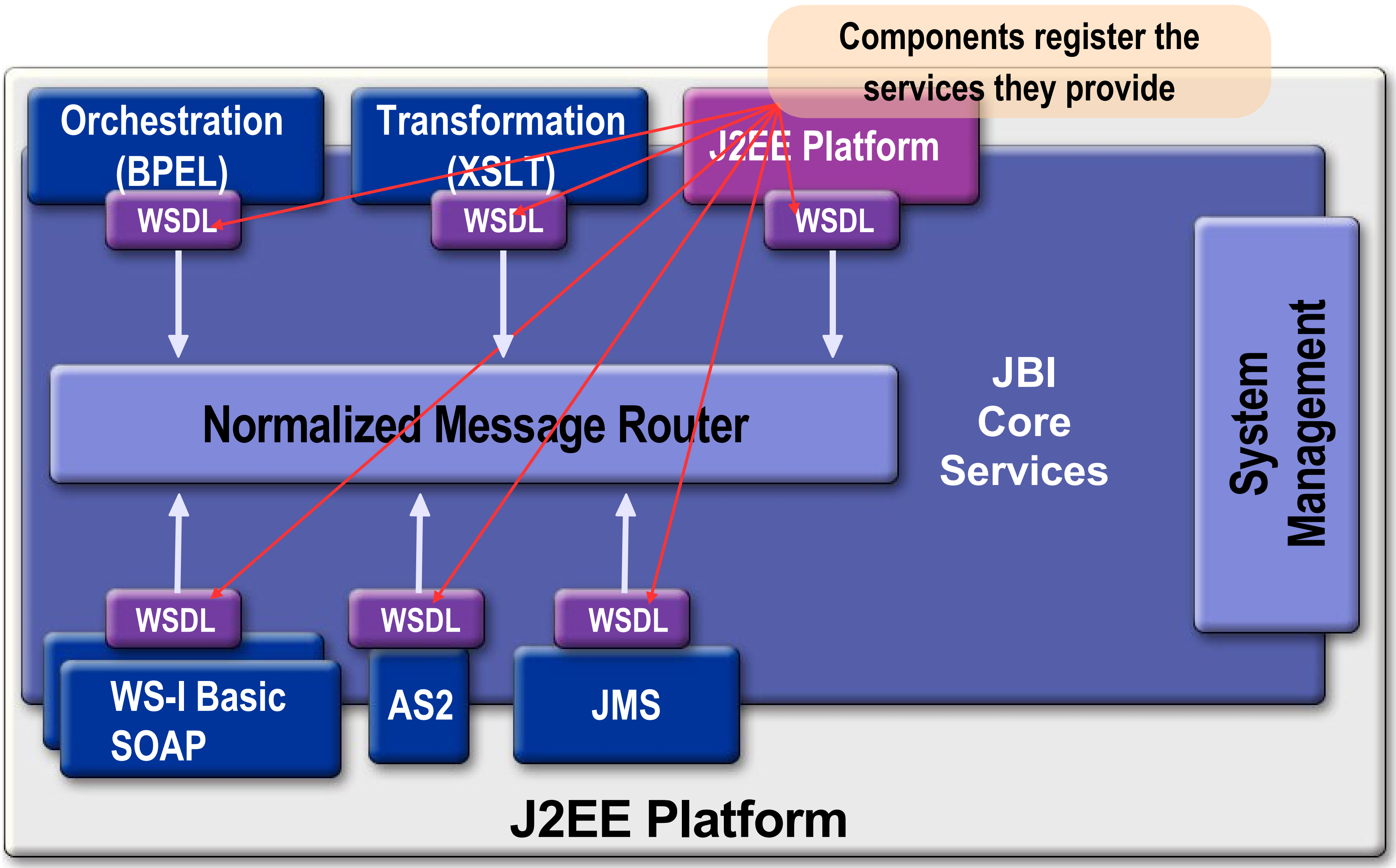
- Point-to-point integration (adaptor) model is not scalable and is hard to maintain
- The traditional EAI model has its own problems
  - > Proprietary integration server – vendor lock-in
  - > High barrier for entry for small vendors to provide best of breed solutions
- Need of an open standard that allows containers to inter-operate
  - > JBI provides open standard for integrating applications in the same way Java EE standard provides standard for building and deploying enterprise applications

What Is JBI?



- Standard “meta-container” for integrating services
  - Service can be anything
    - Business logic
    - Integration/System services
  - Service can be located locally or remotely
- Plug-in architecture
  - Service Engines (SE) – Local service or consumer
  - Binding Components – Remote service or consumer

Service Provider Self-Description



Service Engines vs. Binding Components

- From the JBI perspective, there is very little difference: both function as service providers and consumers.
- The main difference is location: where are the services being consumed or provided.
  - A service engine does these things locally, while a binding component acts as a proxy for a remote service providers and consumers.

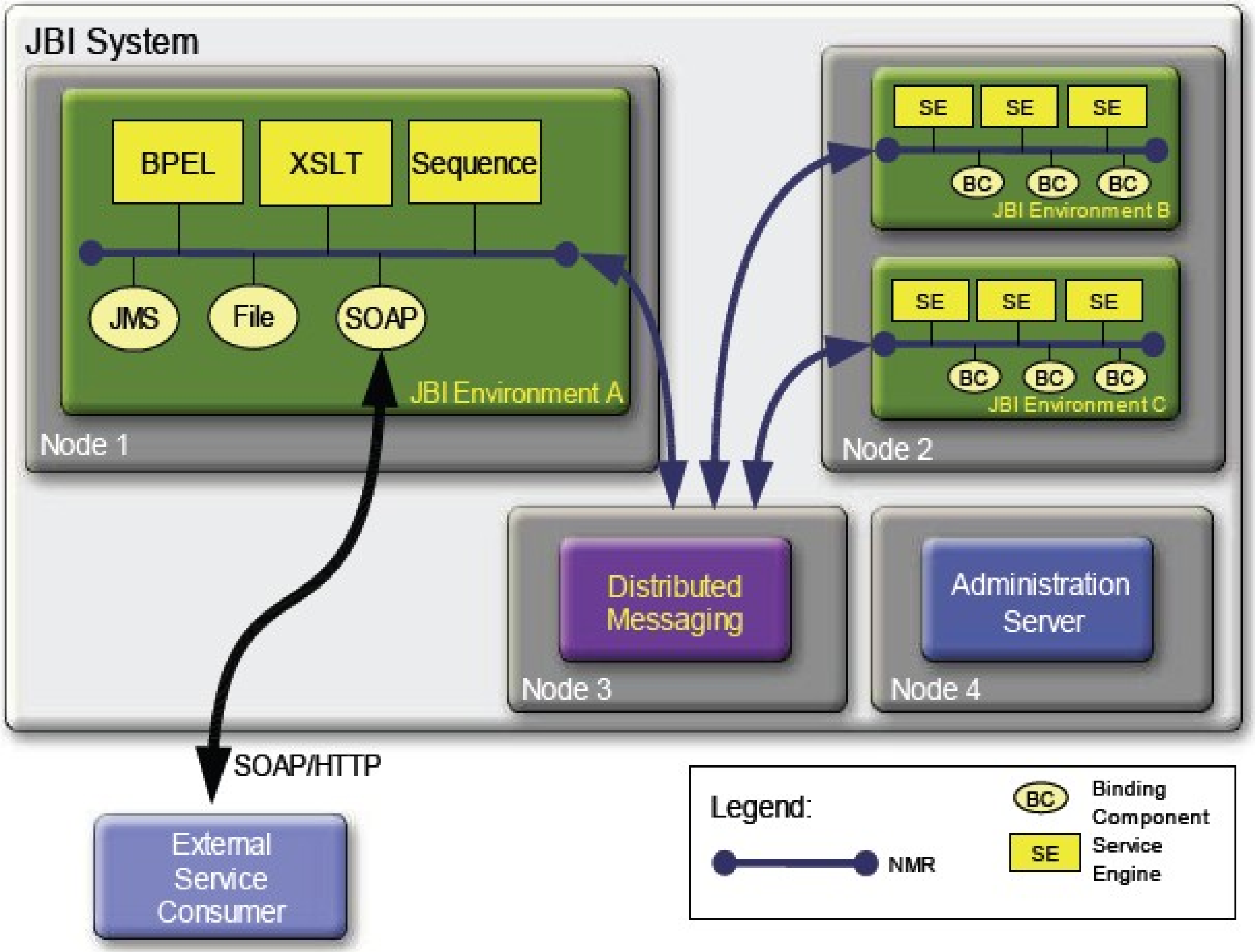
Normalized Message Router

- 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
BC
JBI Environment B
JBI Environment C
Node 2
Distributed Messaging
Node 3
Administration Server
Node 4
SOAP/HTTP
External Service Consumer
Legend:
NMR
Binding Component
Service Engine

JBI v2

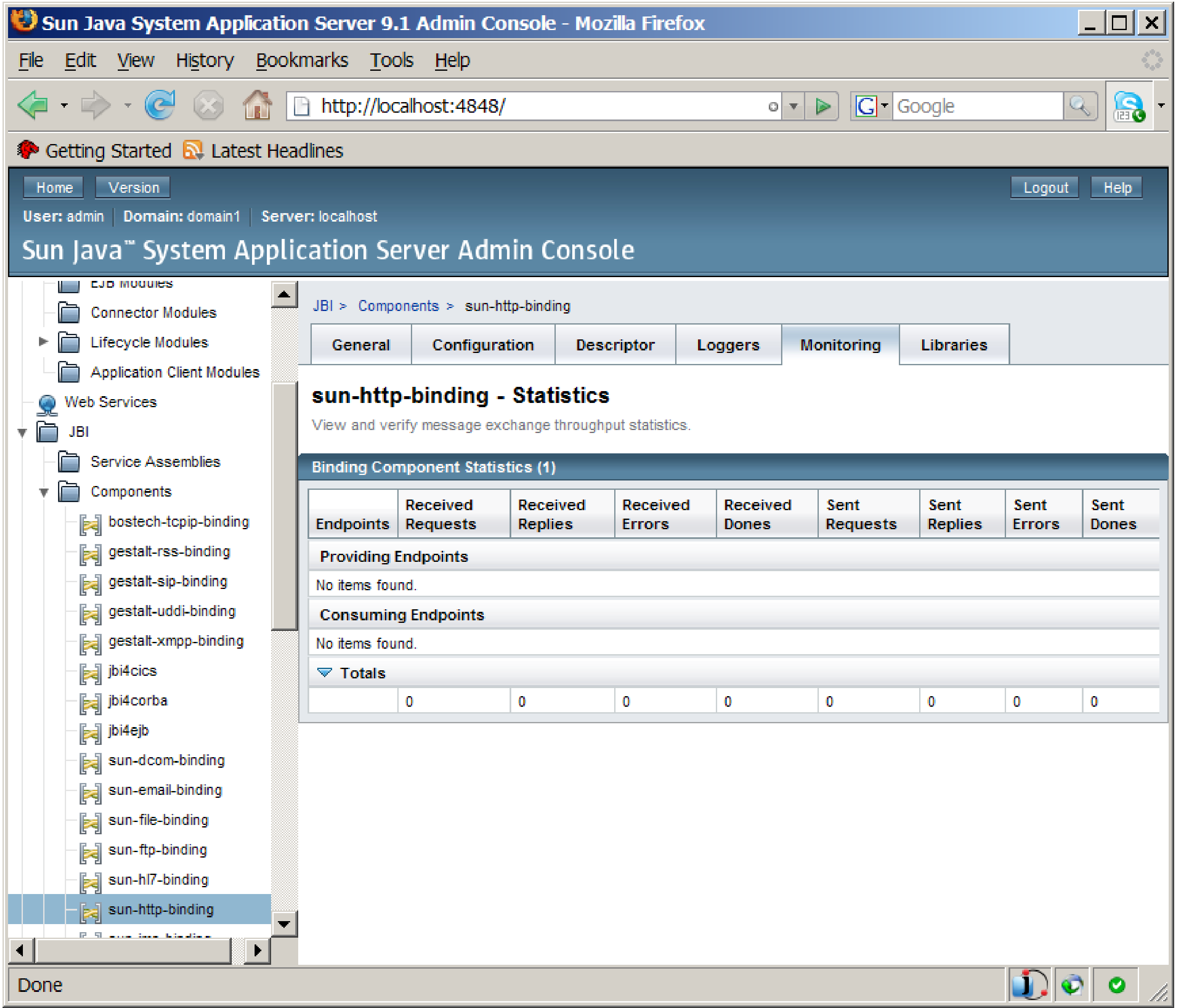
- Submitted: 2007-03-13 (JSR 312)
- Public Review: mid-2007
  - Looking more end-users on the EG
- Focus
  - Administration of clustered / distributed enviros
  - Better alignment with Java EE
  - Interceptors
  - Policy/capabilities
  - Greater coverage of JBI enablement of Composite Apps
  - Choreography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



sun-http-binding - Statistics

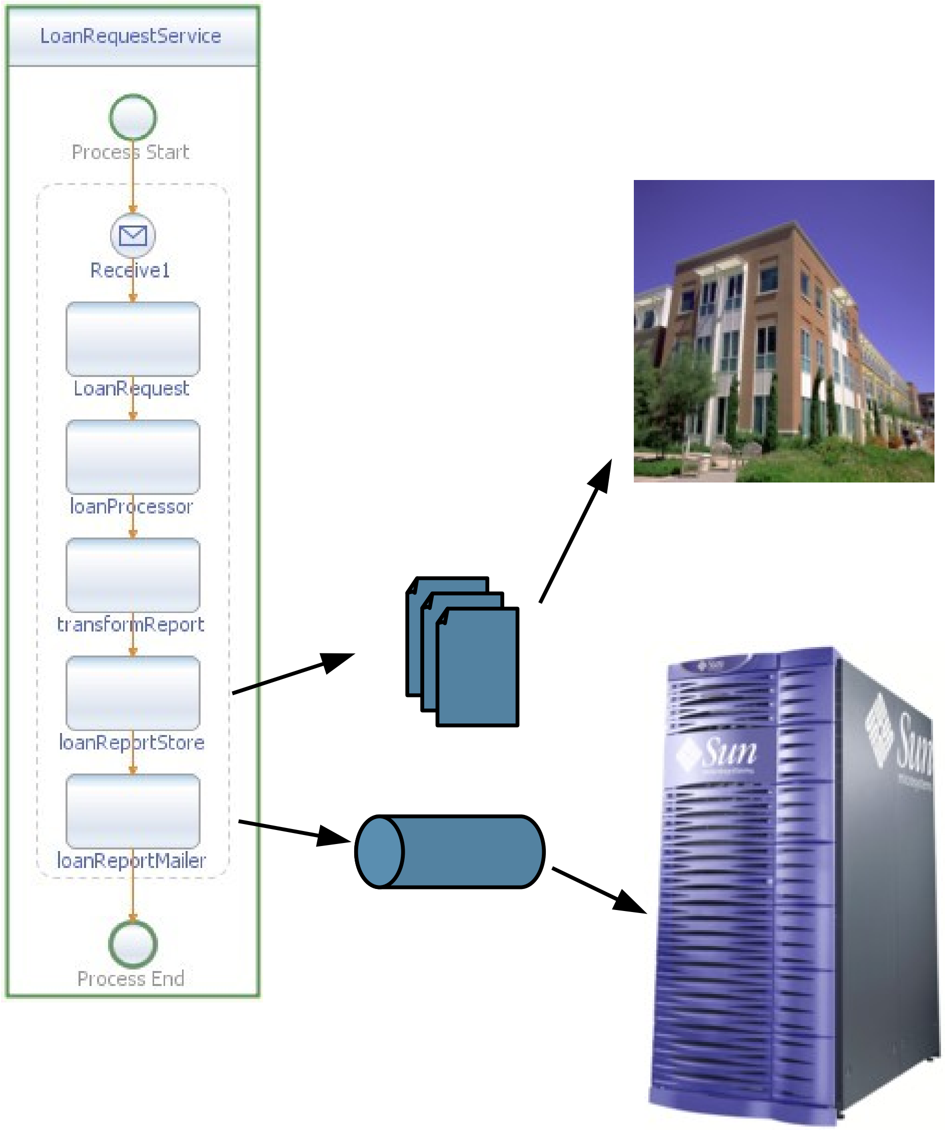
View and verify message exchange throughput statistics.

Binding Component Statistics (1)

Endpoints	Received Requests	Received Replies	Received Errors	Received Dones	Sent Requests	Sent Replies	Sent Errors	Sent Dones
Providing Endpoints								
No items found.								
Consuming Endpoints								
No items found.								
Totals								
	0	0	0	0	0	0	0	0

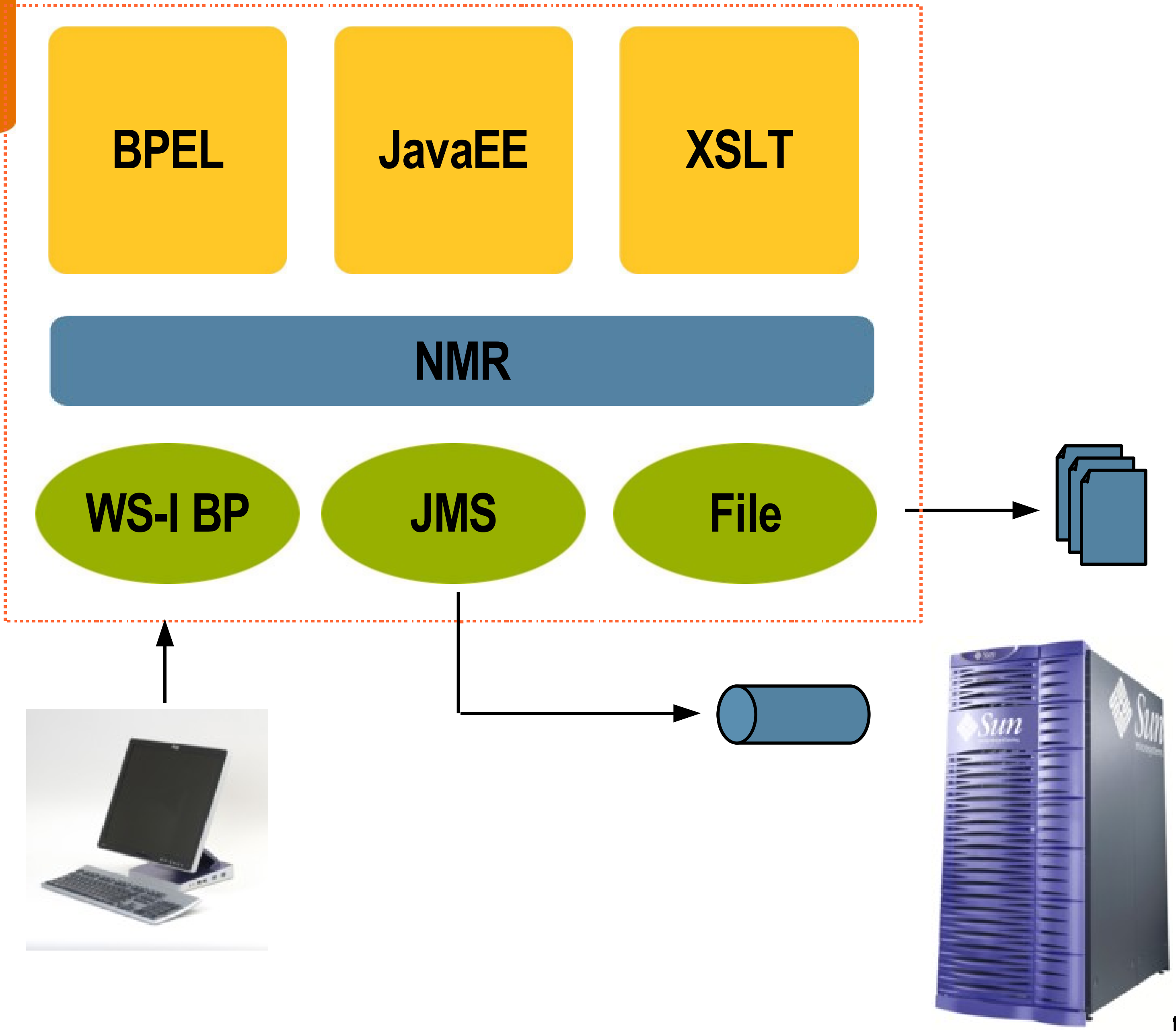
Usage Scenario

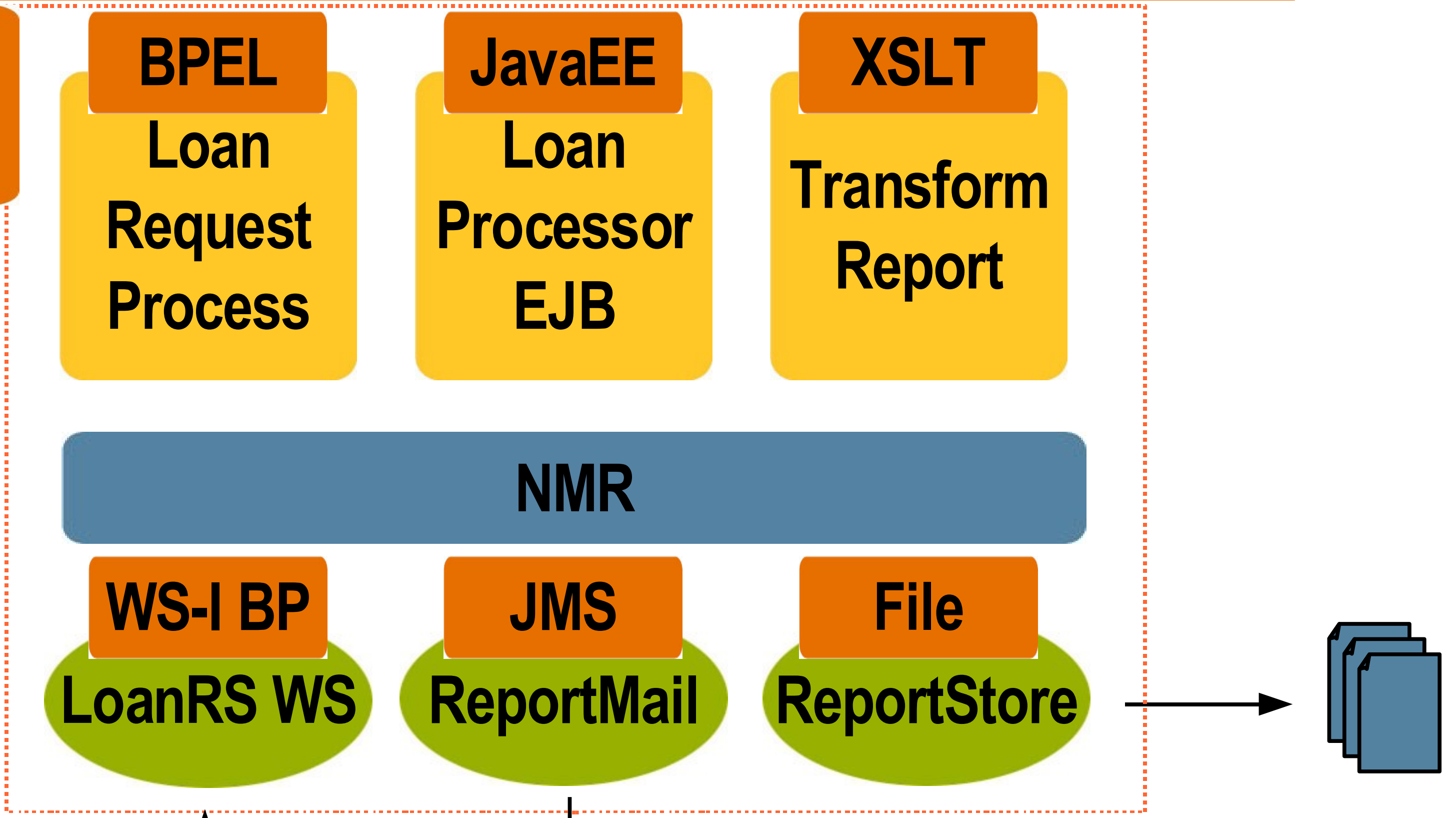
Usage Scenario: Loan Processing

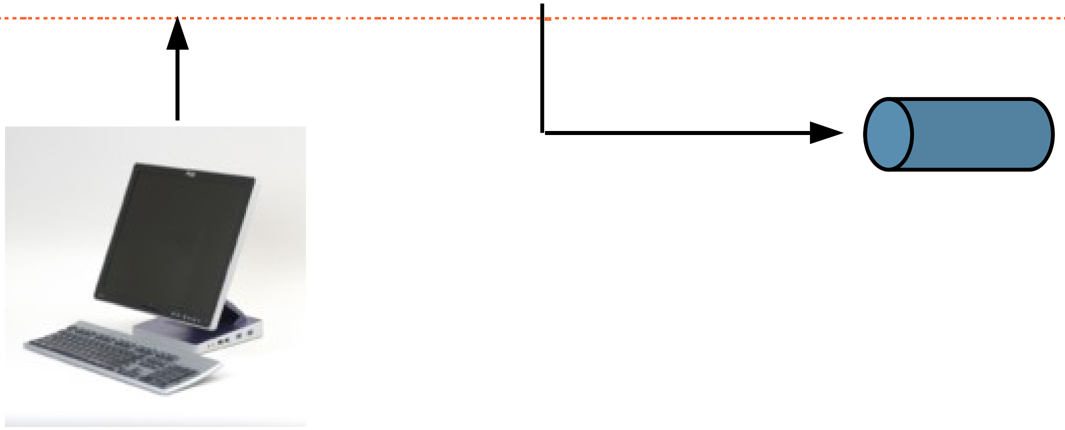


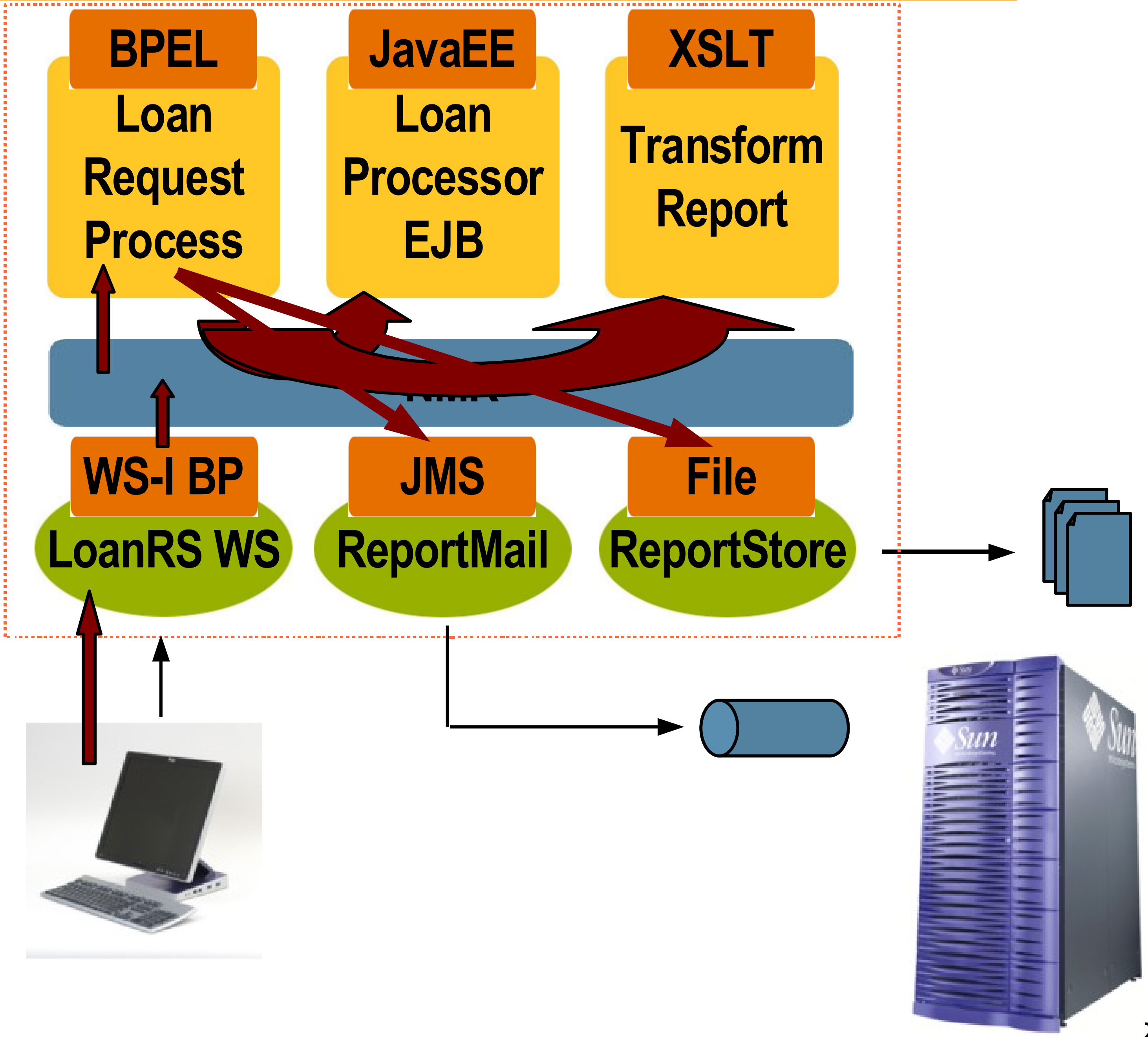
- Loan Requestor Service:
  - > LoanRequestProcess
    - > WS-I BP
    - > BPEL Orchestration
  - > LoanProcessor
    - > Java EE
  - > TransformReport
    - > XSLT
  - > LoanReportStore
    - > Business Partner thru FTP
  - > LoanReportMailer
    - > Legacy thru JMS

JBI-based Infrastructure

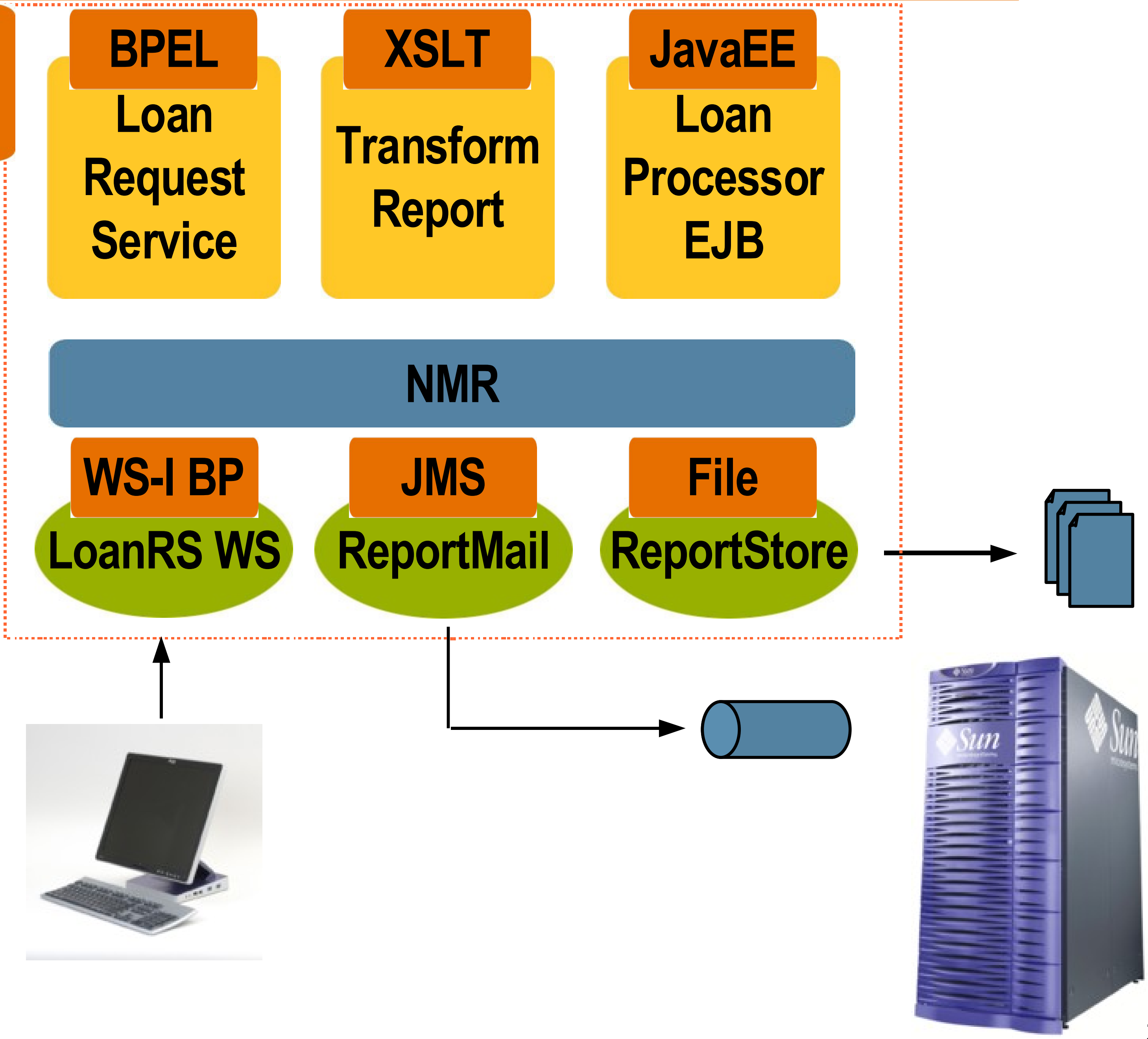


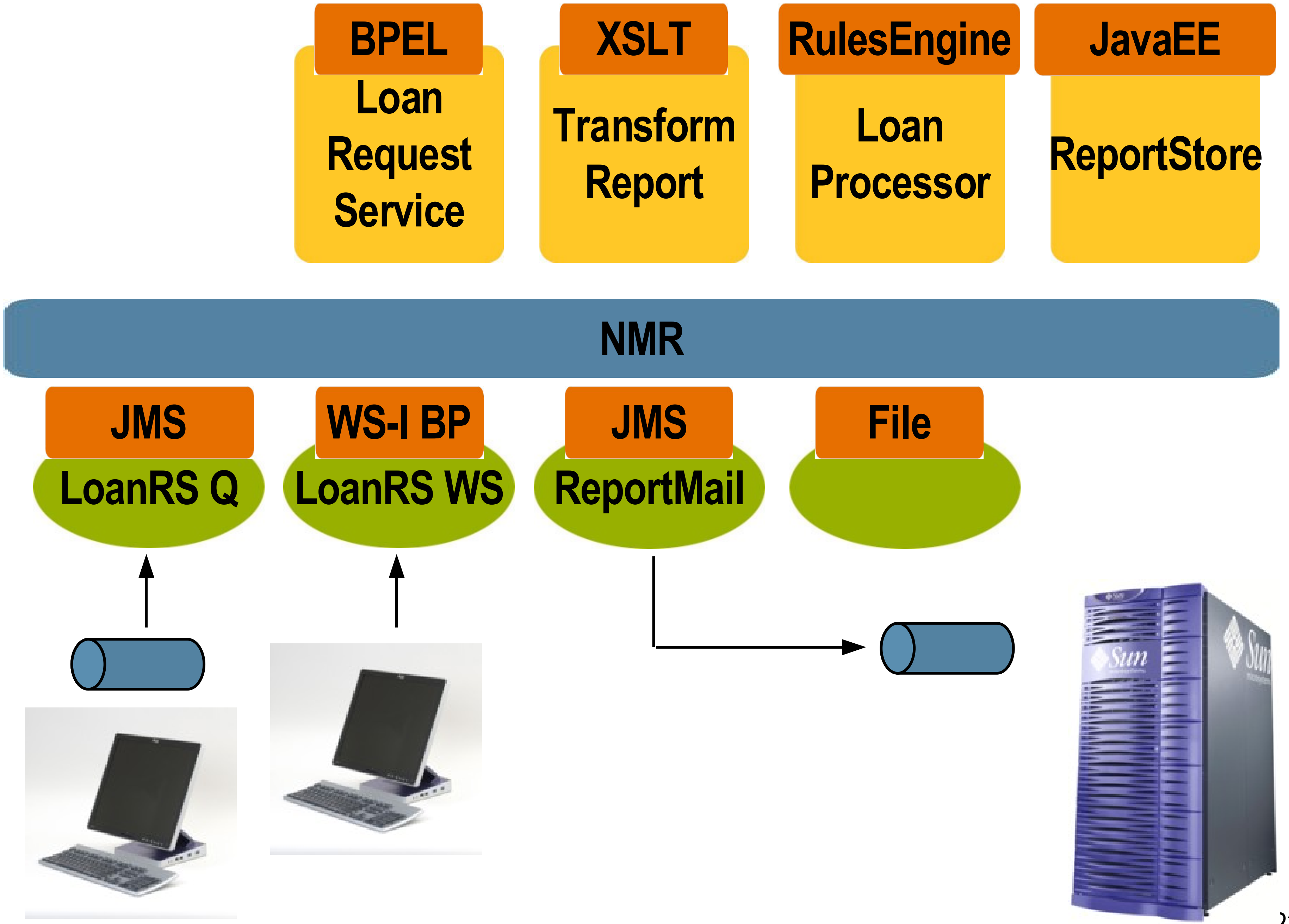

JBI-based Infrastructure
BPEL
Loan Request Process
JavaEE
Loan Processor EJB
XSLT
Transform Report
NMR
WS-I BP
LoanRS WS
JMS
ReportMail
File
ReportStore




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

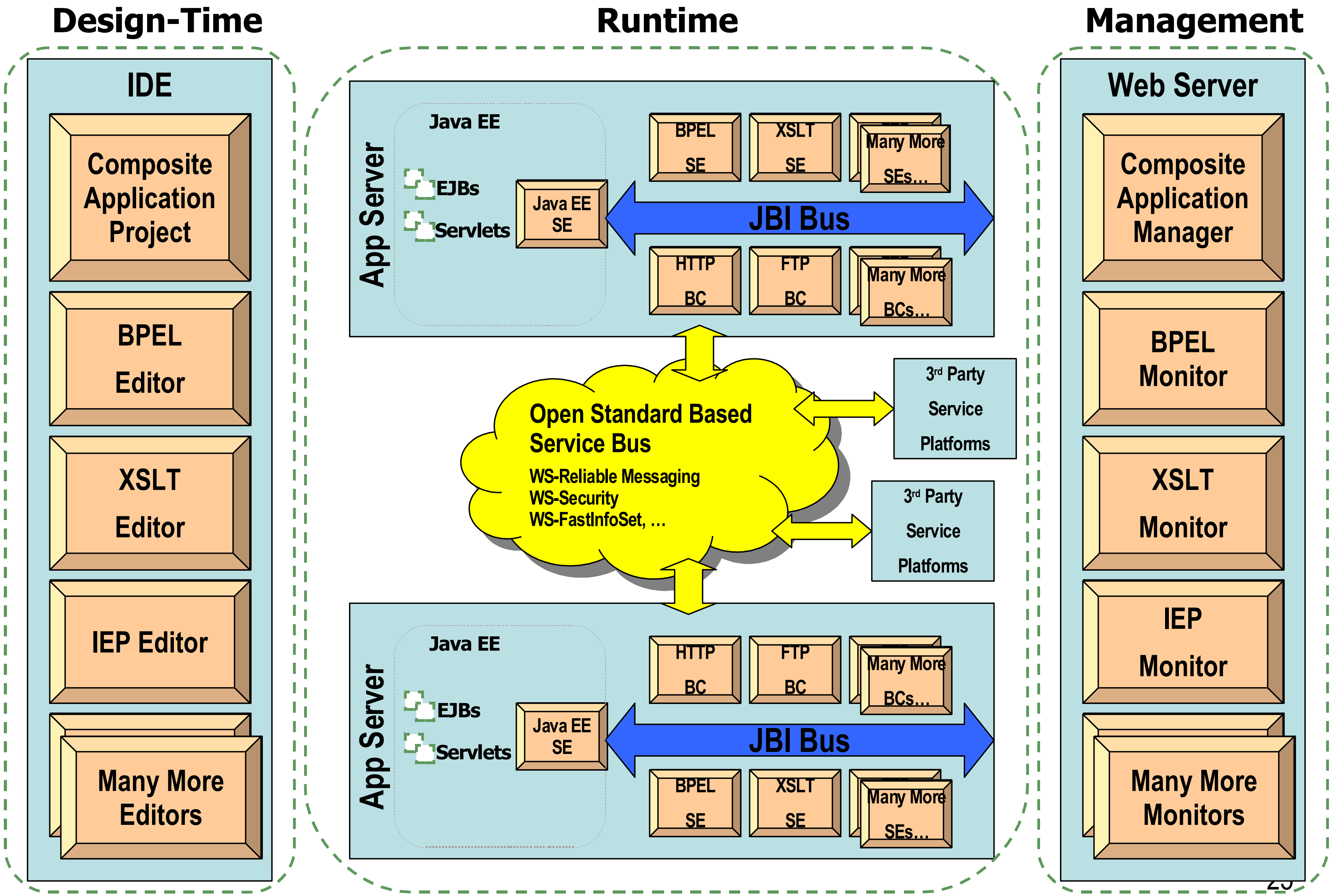
Architecture Refactoring



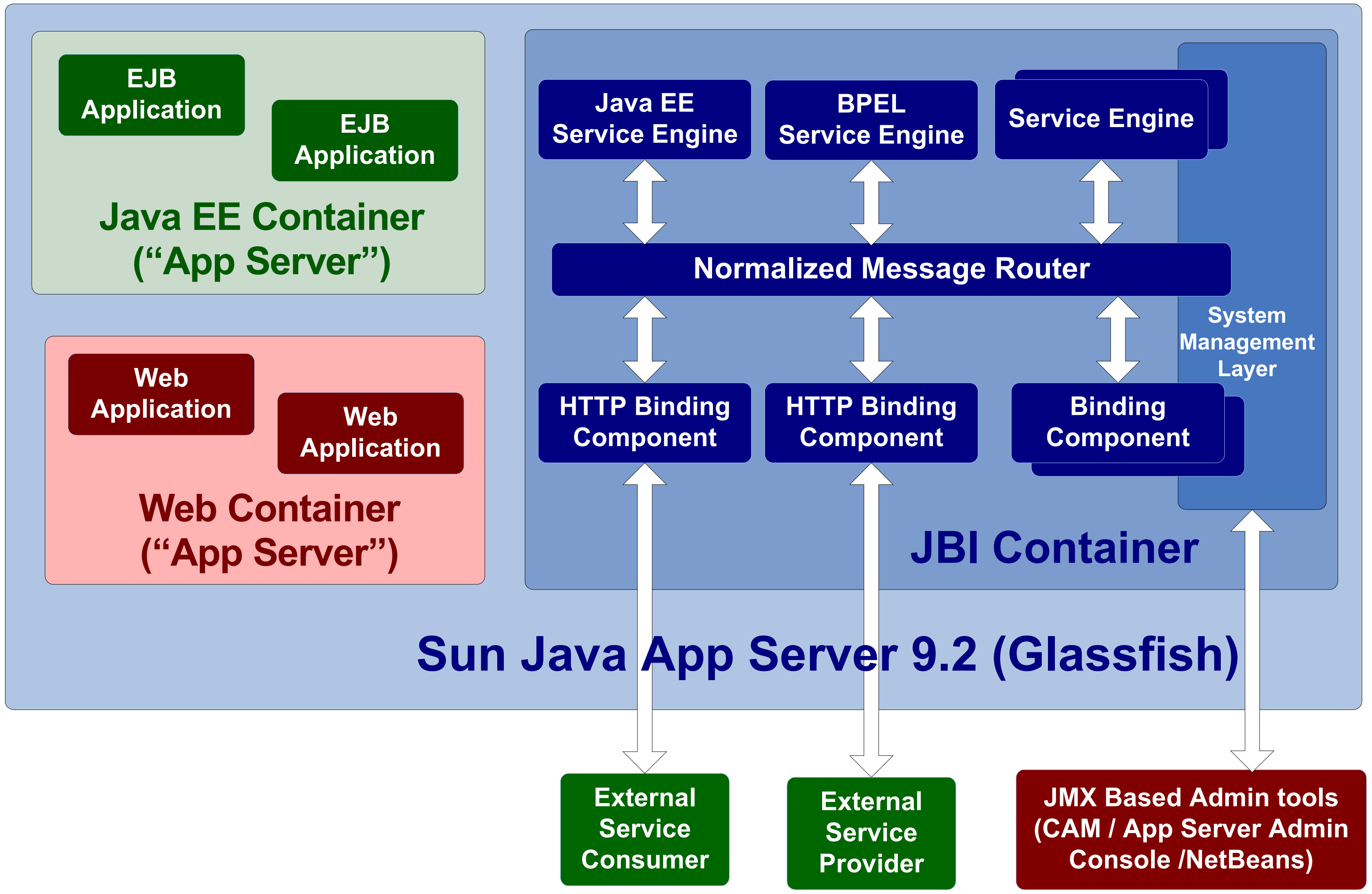

BPEL
Loan Request Service
XSLT
Transform Report
RulesEngine
Loan Processor
JavaEE
ReportStore
NMR
JMS
LoanRS Q
WS-I BP
LoanRS WS
JMS
ReportMail
File

Open ESB Development & Deployment Environment

Open ESB Environment



OpenESB Architecture

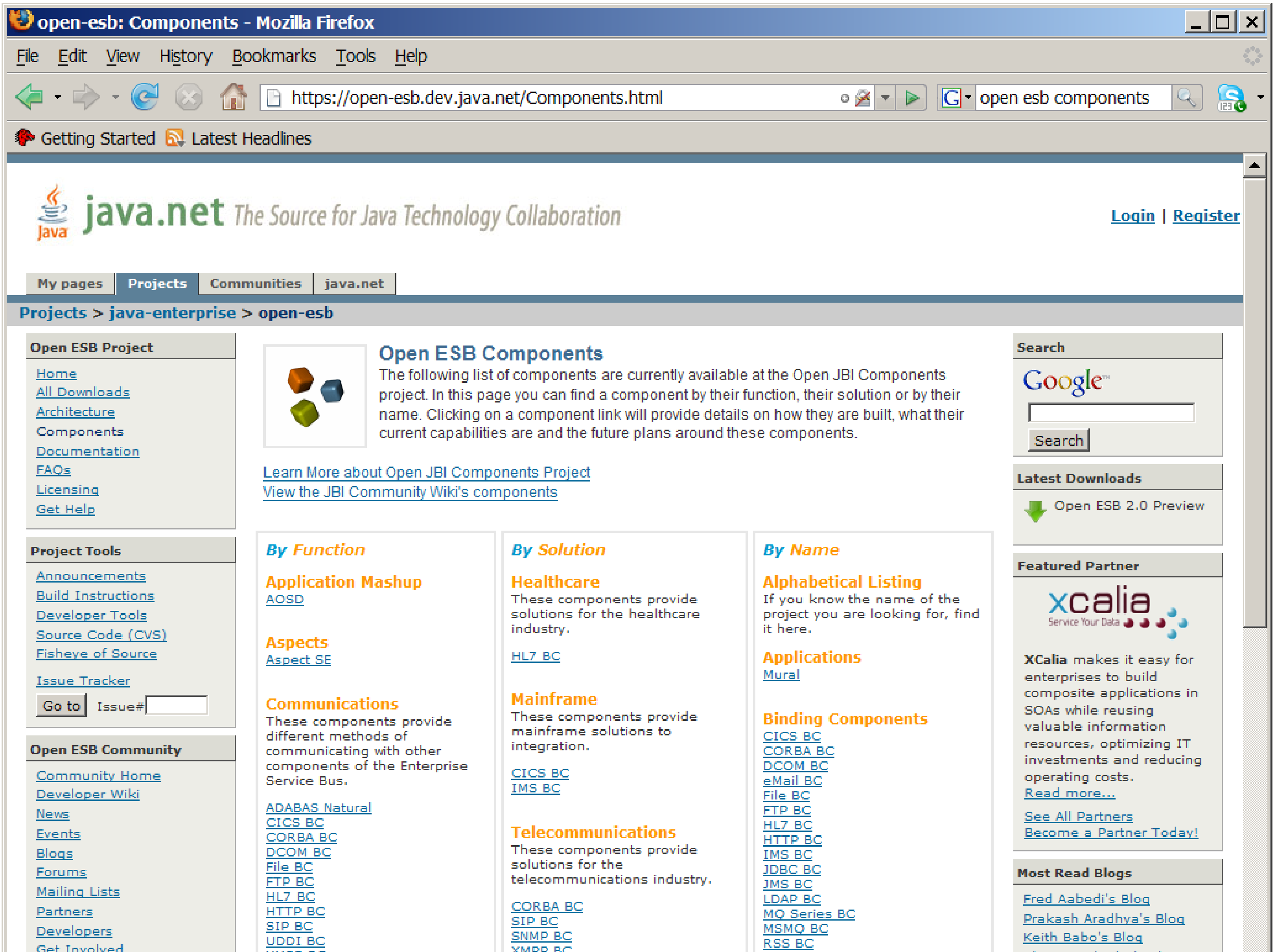

EJB Application
EJB Application
Java EE Container ("App Server")
Web Application
Web Application
Web Container ("App Server")
Java EE Service Engine
BPEL Service Engine
Service Engine
Normalized Message Router
System Management Layer
HTTP Binding Component
HTTP Binding Component
Binding Component
JBI Container
Sun Java App Server 9.2 (Glassfish)
External Service Consumer
External Service Provider
JMX Based Admin tools (CAM / App Server Admin Console /NetBeans)

Service Engines (SE) & Binding Components (BC)

JBI Components (SE's and BC's)

- 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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File Edit View History Bookmarks Tools Help
https://open-esb.dev.java.net/Components.html
open esb components
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Open ESB Project
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Project Tools
Announcements
Build Instructions
Developer Tools
Source Code (CVS)
Fisheye of Source

Issue Tracker
Go to Issue#

Open ESB Community
Community Home
Developer Wiki
News
Events
Blogs
Forums
Mailing Lists
Partners
Developers
Get Involved

Open ESB Components

The following list of components are currently available at the Open JBI Components project. In this page you can find a component by their function, their solution or by their name. Clicking on a component link will provide details on how they are built, what their current capabilities are and the future plans around these components.

Learn More about Open JBI Components Project
View the JBI Community Wiki's components

By Function

Application Mashup
AOSD

Aspects
Aspect SE

Communications
These components provide different methods of communicating with other components of the Enterprise Service Bus.

ADABAS Natural
CICS BC
CORBA BC
DCOM BC
File BC
FTP BC
HL7 BC
HTTP BC
SIP BC
UDDI BC

By Solution

Healthcare
These components provide solutions for the healthcare industry.

HL7 BC

Mainframe
These components provide mainframe solutions to integration.

CICS BC
IMS BC

Telecommunications
These components provide solutions for the telecommunications industry.

CORBA BC
SIP BC
SNMP BC

By Name

Alphabetical Listing
If you know the name of the project you are looking for, find it here.

Applications
Mural

Binding Components
CICS BC
CORBA BC
DCOM BC
eMail BC
File BC
FTP BC
HL7 BC
HTTP BC
IMS BC
JDBC BC
JMS BC
LDAP BC
MQ Series BC
MSMQ BC
RSS BC

Search
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Latest Downloads
Open ESB 2.0 Preview

Featured Partner
xcalia Service Your Data

XCalia makes it easy for enterprises to build composite applications in SOAs while reusing valuable information resources, optimizing IT investments and reducing operating costs.
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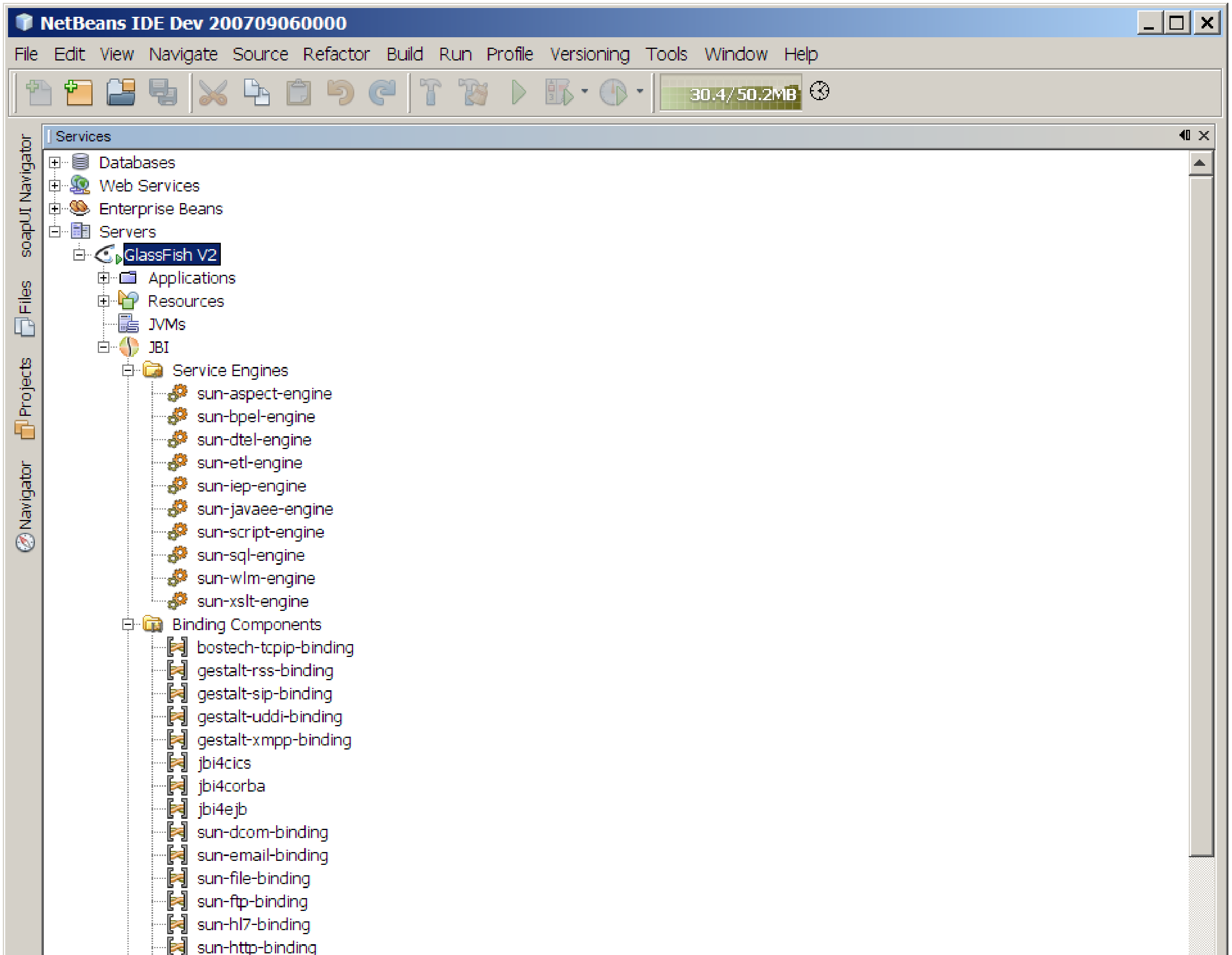
Open ESB Package Ships Many SE's/BC's


NetBeans IDE Dev 200709060000

File Edit View Navigate Source Refactor Build Run Profile Versioning Tools Window Help
30.4/50.2MB
soapUI Navigator
Files
Projects
Navigator

Services

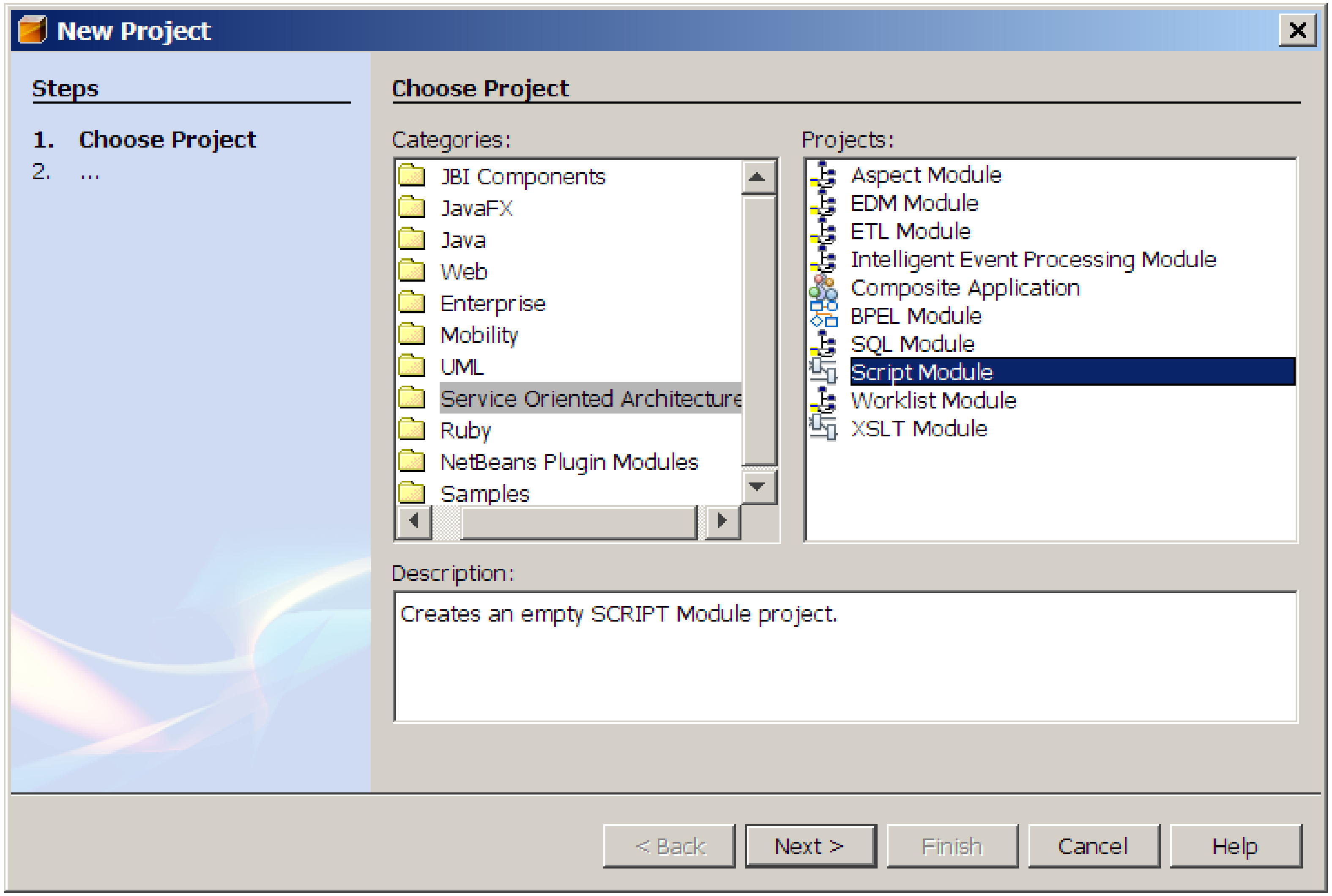
- Databases
- Web Services
- Enterprise Beans
- Servers
  - GlassFish V2
    - Applications
    - Resources
    - JVMs
    - JBI
      - Service Engines
        - sun-aspect-engine
        - sun-bpel-engine
        - sun-dtel-engine
        - sun-etl-engine
        - sun-iep-engine
        - sun-javaee-engine
        - sun-script-engine
        - sun-sql-engine
        - sun-wlm-engine
        - sun-xslt-engine
      - Binding Components
        - bostech-tcpip-binding
        - gestalt-rss-binding
        - gestalt-sip-binding
        - gestalt-uddi-binding
        - gestalt-xmpp-binding
        - jbi4cics
        - jbi4corba
        - jbi4ejb
        - sun-dcom-binding
        - sun-email-binding
        - sun-file-binding
        - sun-ftp-binding
        - sun-hl7-binding
        - sun-http-binding

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



Categories:

- JBI Components
- JavaFX
- Java
- Web
- Enterprise
- Mobility
- UML
- Service Oriented Architecture
- Ruby
- NetBeans Plugin Modules
- Samples

Projects:

- Aspect Module
- EDM Module
- ETL Module
- Intelligent Event Processing Module
- Composite Application
- BPEL Module
- SQL Module
- Script Module
- Worklist Module
- XSLT Module

Description:

Creates an empty SCRIPT Module project.

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

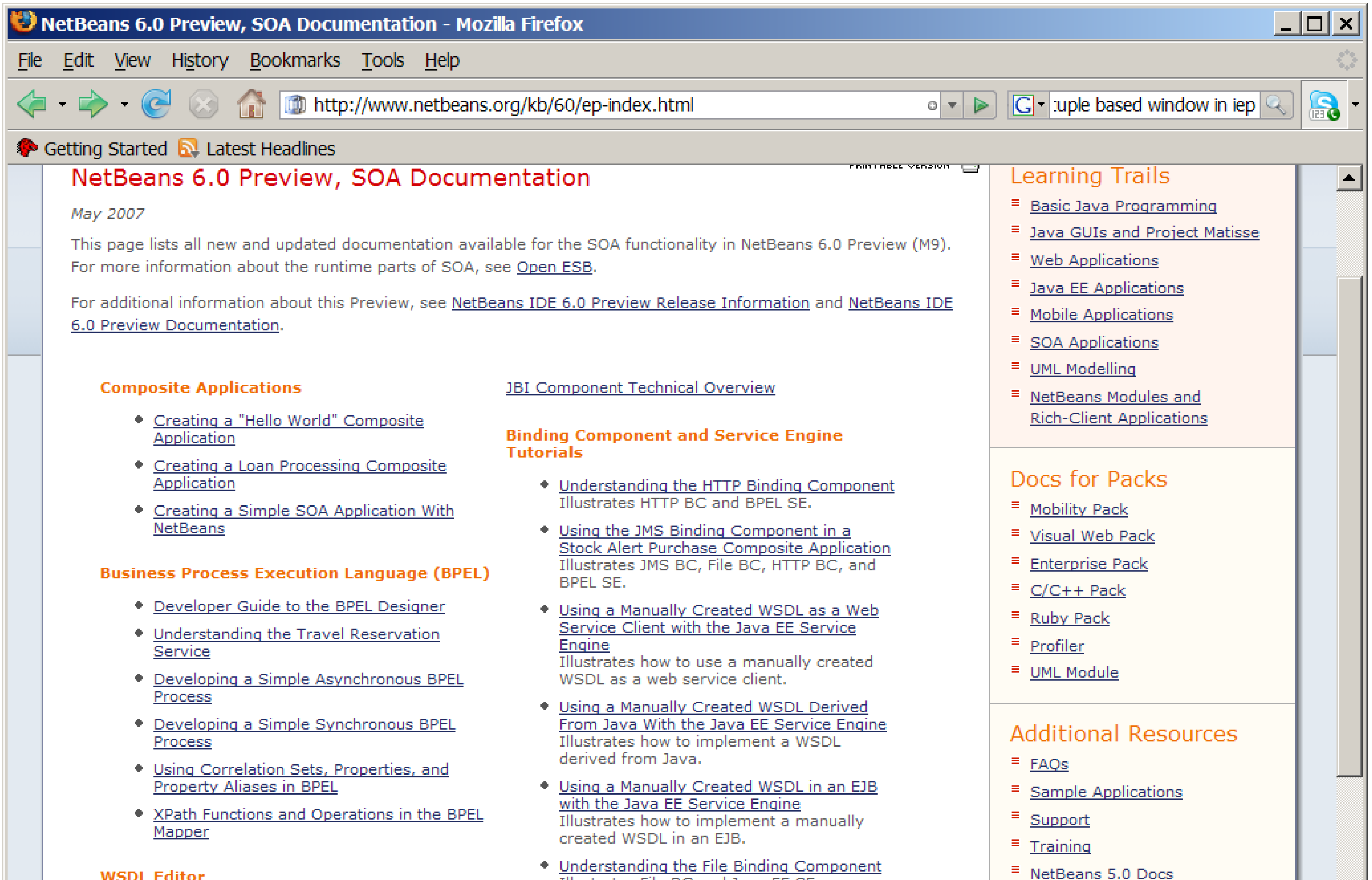
- Composite Application project is a project whose primary purpose is to assemble a deployment unit for the Java Business Integration (JBI) server
  - BPEL Module projects must be added to a Composite Application project in order to be deployed to the BPEL runtime.
- The Composite Application Project 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


NetBeans 6.0 Preview, SOA Documentation - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://www.netbeans.org/kb/60/ep-index.html
:uple based window in iep
Getting Started
Latest Headlines

NetBeans 6.0 Preview, SOA Documentation

May 2007

This page lists all new and updated documentation available for the SOA functionality in NetBeans 6.0 Preview (M9). For more information about the runtime parts of SOA, see Open ESB.

For additional information about this Preview, see NetBeans IDE 6.0 Preview Release Information and NetBeans IDE 6.0 Preview Documentation.

Composite Applications

- Creating a "Hello World" Composite Application
- Creating a Loan Processing Composite Application
- Creating a Simple SOA Application With NetBeans

Business Process Execution Language (BPEL)

- Developer Guide to the BPEL Designer
- Understanding the Travel Reservation Service
- Developing a Simple Asynchronous BPEL Process
- Developing a Simple Synchronous BPEL Process
- Using Correlation Sets, Properties, and Property Aliases in BPEL
- XPath Functions and Operations in the BPEL Mapper

WSDL Editor

JBI Component Technical Overview

Binding Component and Service Engine Tutorials

- Understanding the HTTP Binding Component
  Illustrates HTTP BC and BPEL SE.
- Using the JMS Binding Component in a Stock Alert Purchase Composite Application
  Illustrates JMS BC, File BC, HTTP BC, and BPEL SE.
- Using a Manually Created WSDL as a Web Service Client with the Java EE Service Engine
  Illustrates how to use a manually created WSDL as a web service client.
- Using a Manually Created WSDL Derived From Java With the Java EE Service Engine
  Illustrates how to implement a WSDL derived from Java.
- Using a Manually Created WSDL in an EJB with the Java EE Service Engine
  Illustrates how to implement a manually created WSDL in an EJB.
- Understanding the File Binding Component

Learning Trails

- Basic Java Programming
- Java GUIs and Project Matisse
- Web Applications
- Java EE Applications
- Mobile Applications
- SOA Applications
- UML Modelling
- NetBeans Modules and Rich-Client Applications

Docs for Packs

- Mobility Pack
- Visual Web Pack
- Enterprise Pack
- C/C++ Pack
- Ruby Pack
- Profiler
- UML Module

Additional Resources

- FAQs
- Sample Applications
- Support
- Training
- NetBeans 5.0 Docs

BPEL SE

BPEL SE

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

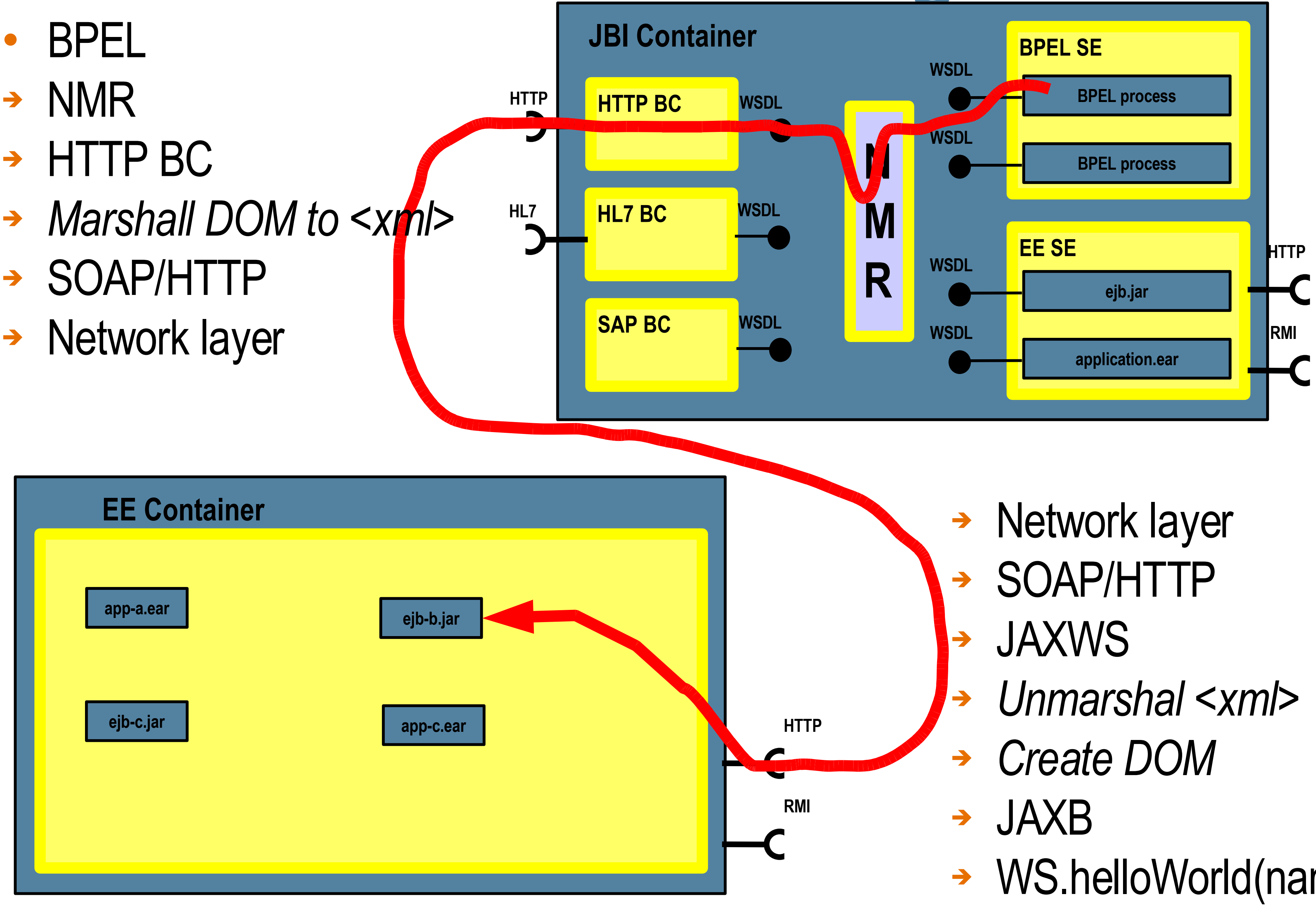
Java EE SE

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

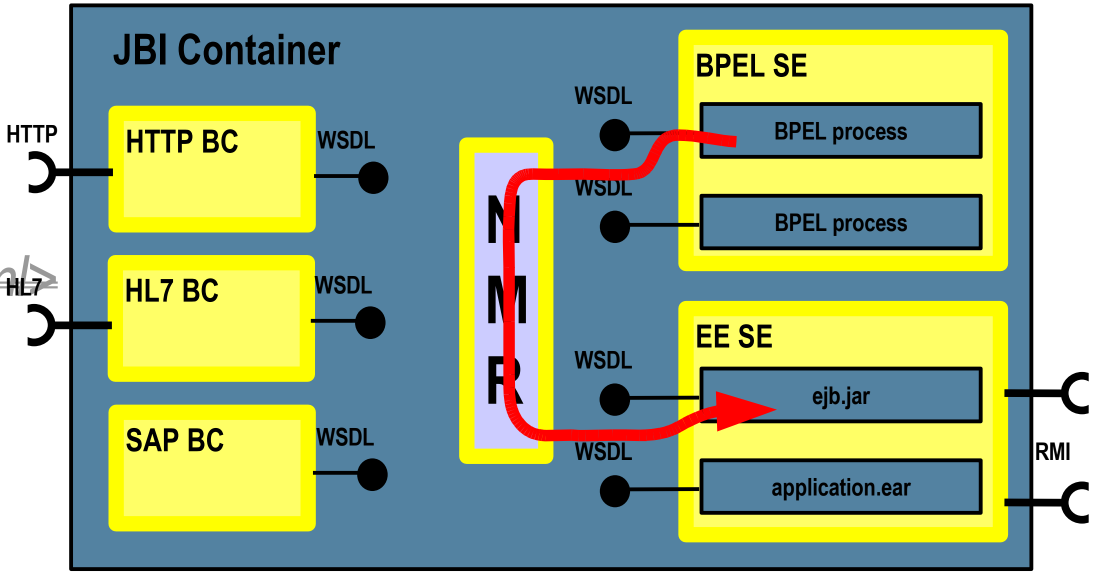
- BPEL
- ➔ NMR
- ➔ HTTP BC
- ➔ *Marshall DOM to <xml>*
- ➔ SOAP/HTTP
- ➔ Network layer



- ➔ 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)



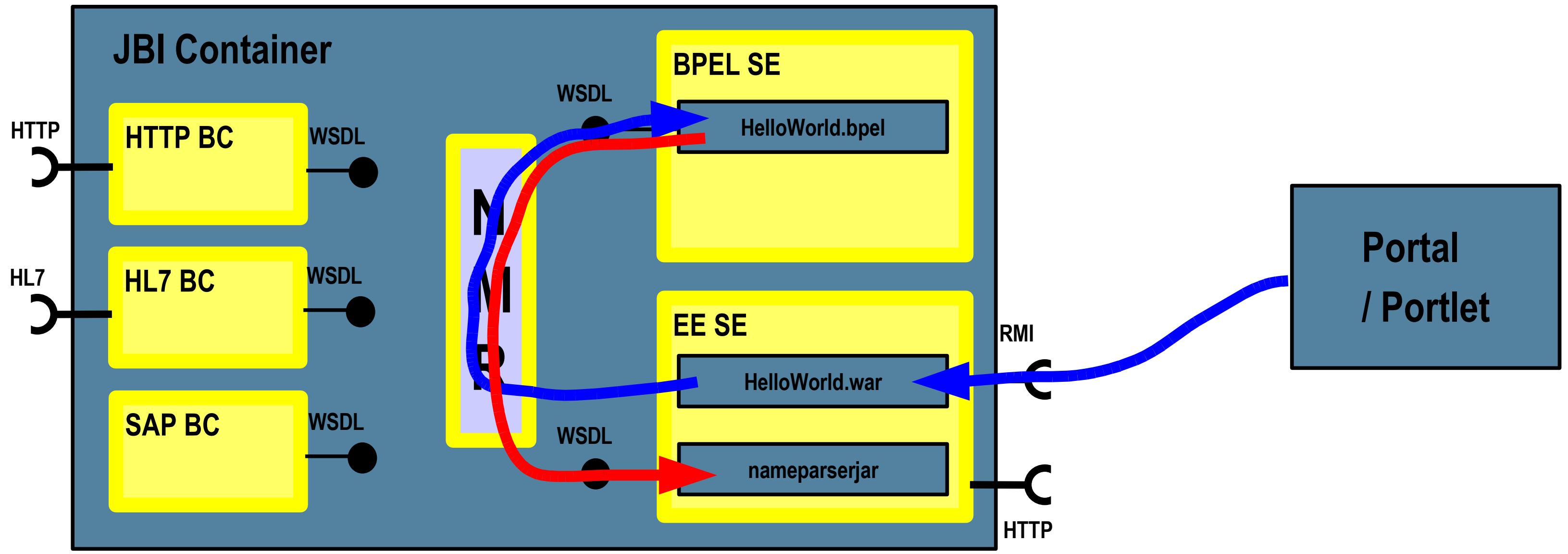
Advantages:

> **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

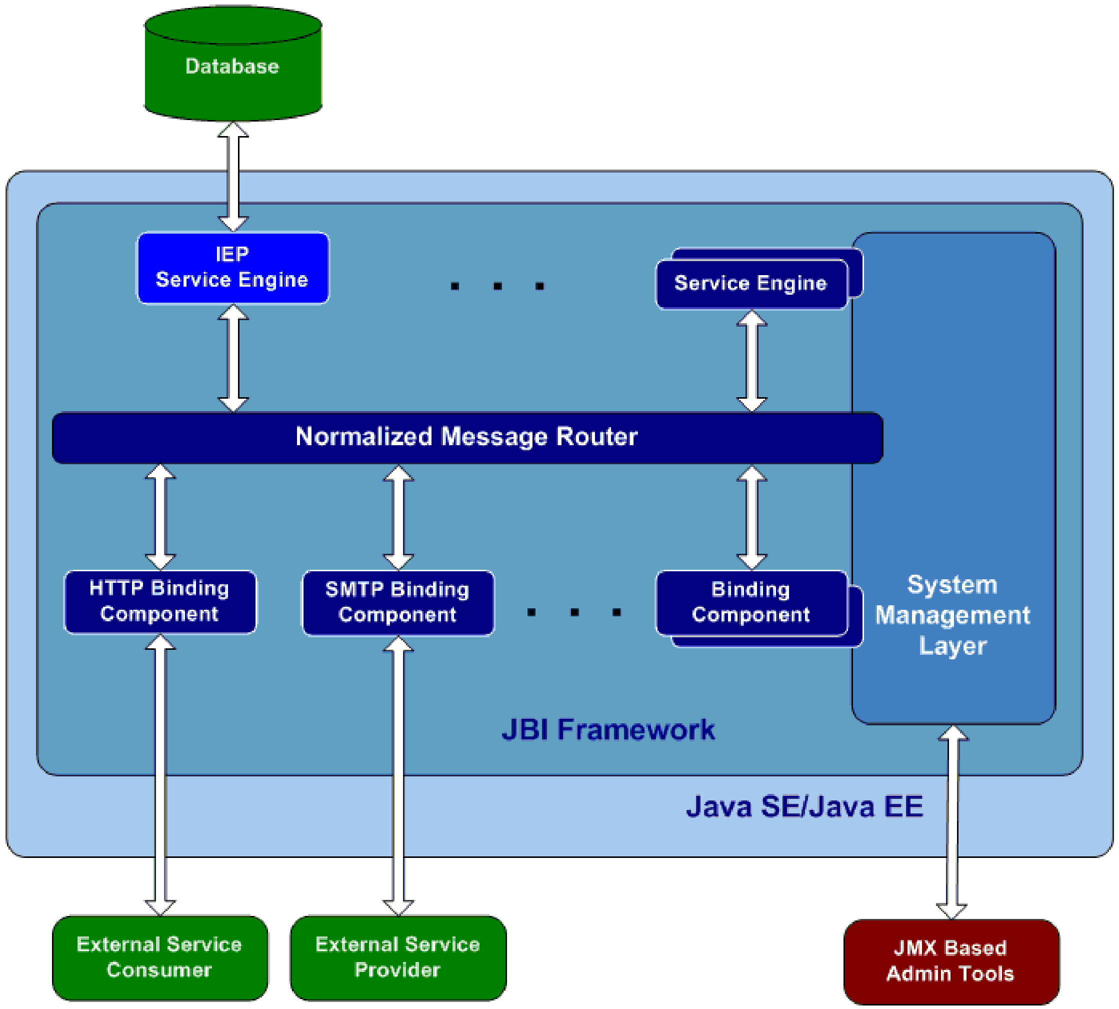


Intelligent Event Processing (IEP) SE

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

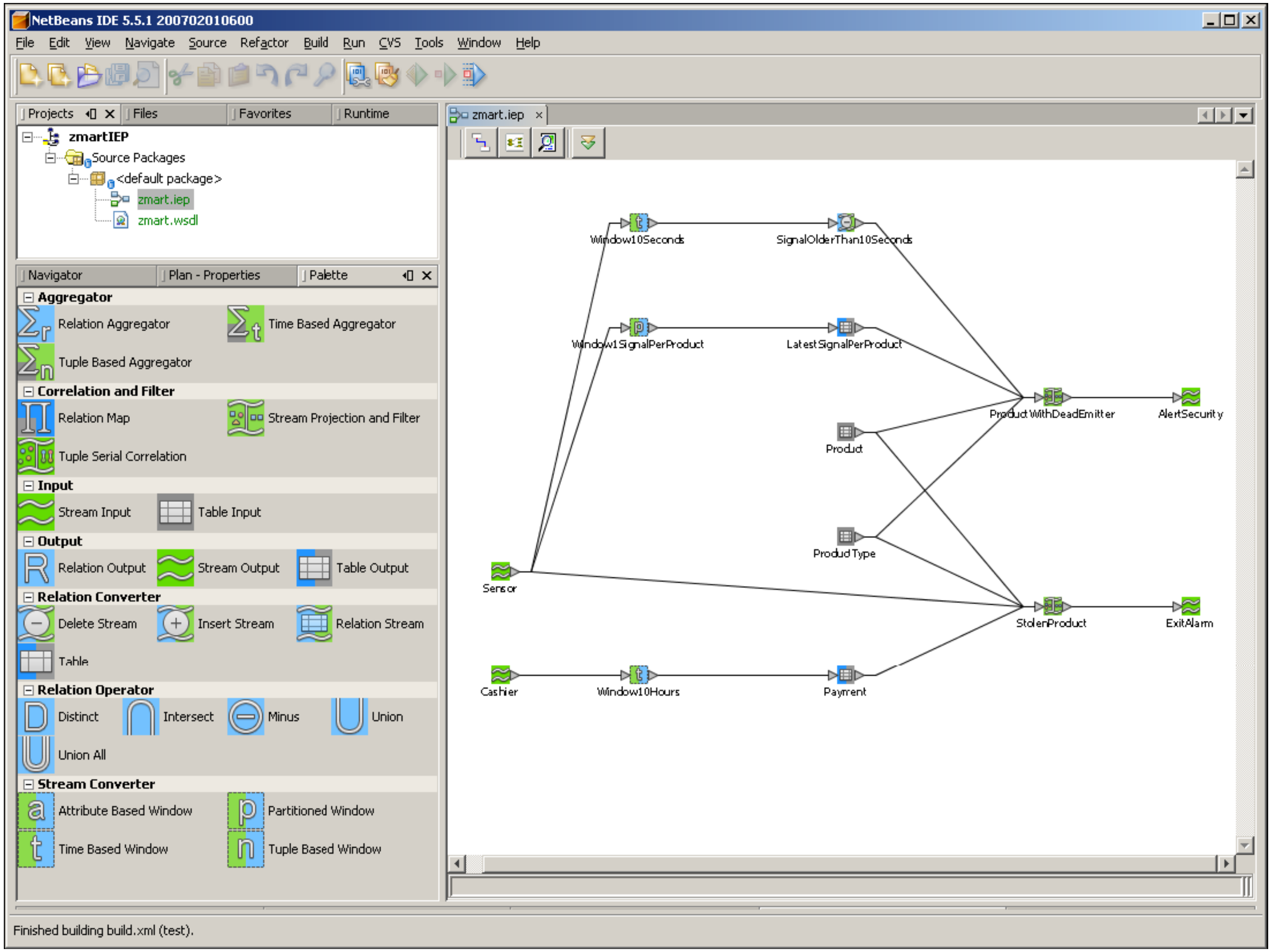
Usage Scenario

- 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

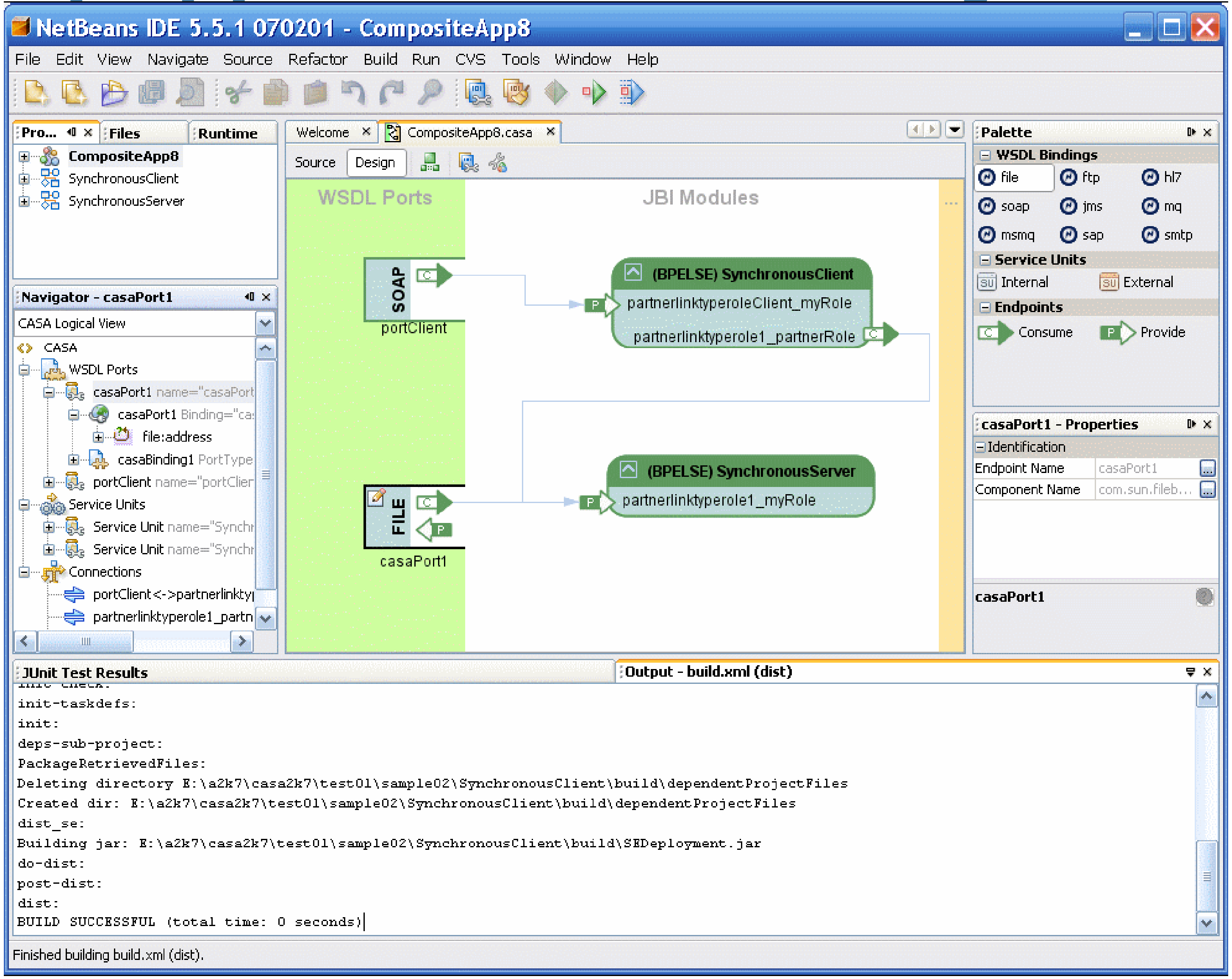
Aspect SE

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

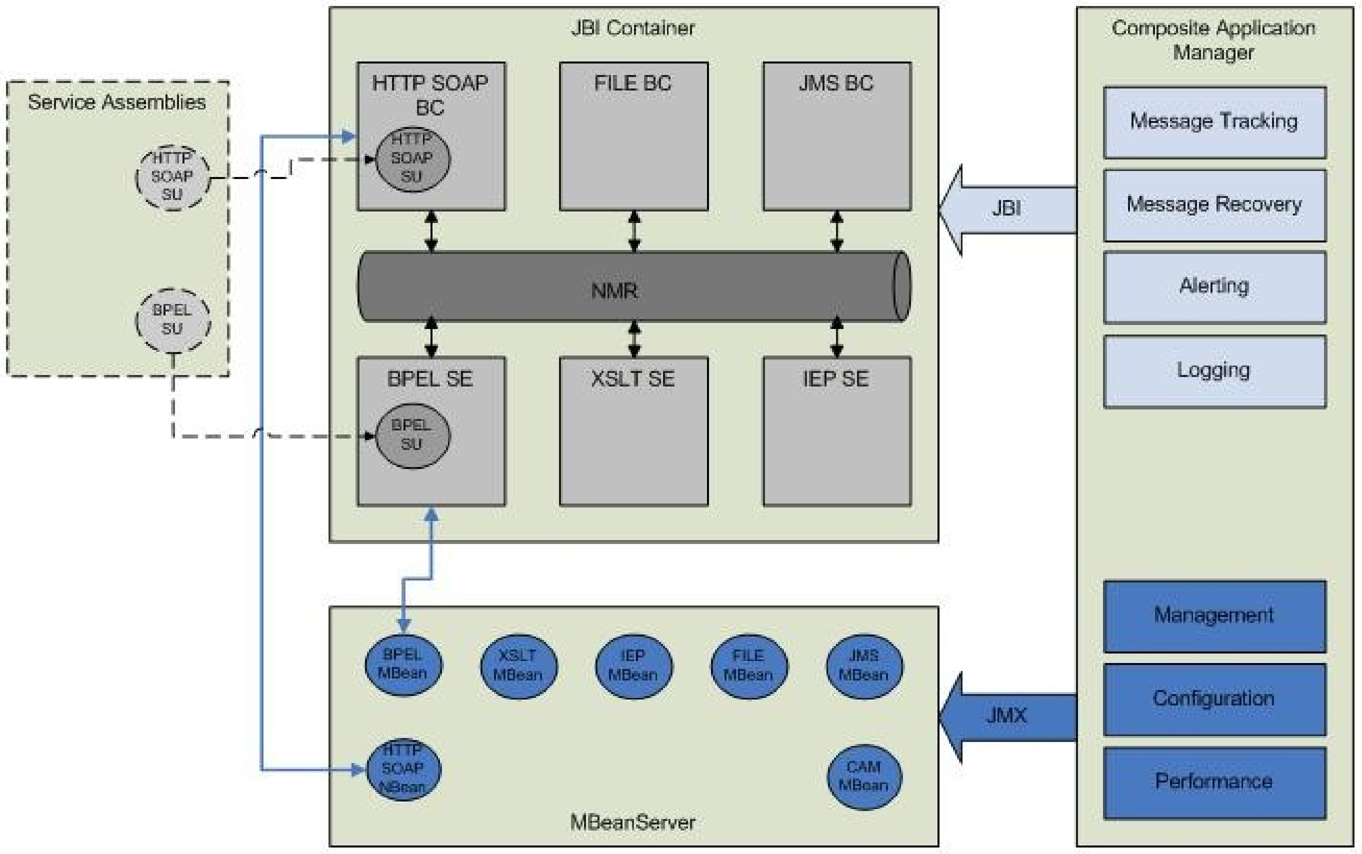
CompApp Service Assembly Editor



```
init-taskdefs:
init:
deps-sub-project:
PackageRetrievedFiles:
Deleting directory E:\a2k7\casa2k7\test01\sample02\SynchronousClient\build\dependentProjectFiles
Created dir: E:\a2k7\casa2k7\test01\sample02\SynchronousClient\build\dependentProjectFiles
dist_se:
Building jar: E:\a2k7\casa2k7\test01\sample02\SynchronousClient\build\SEDeployment.jar
do-dist:
post-dist:
dist:
BUILD SUCCESSFUL (total time: 0 seconds)
```

Finished building build.xml (dist).

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/shutdow n/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

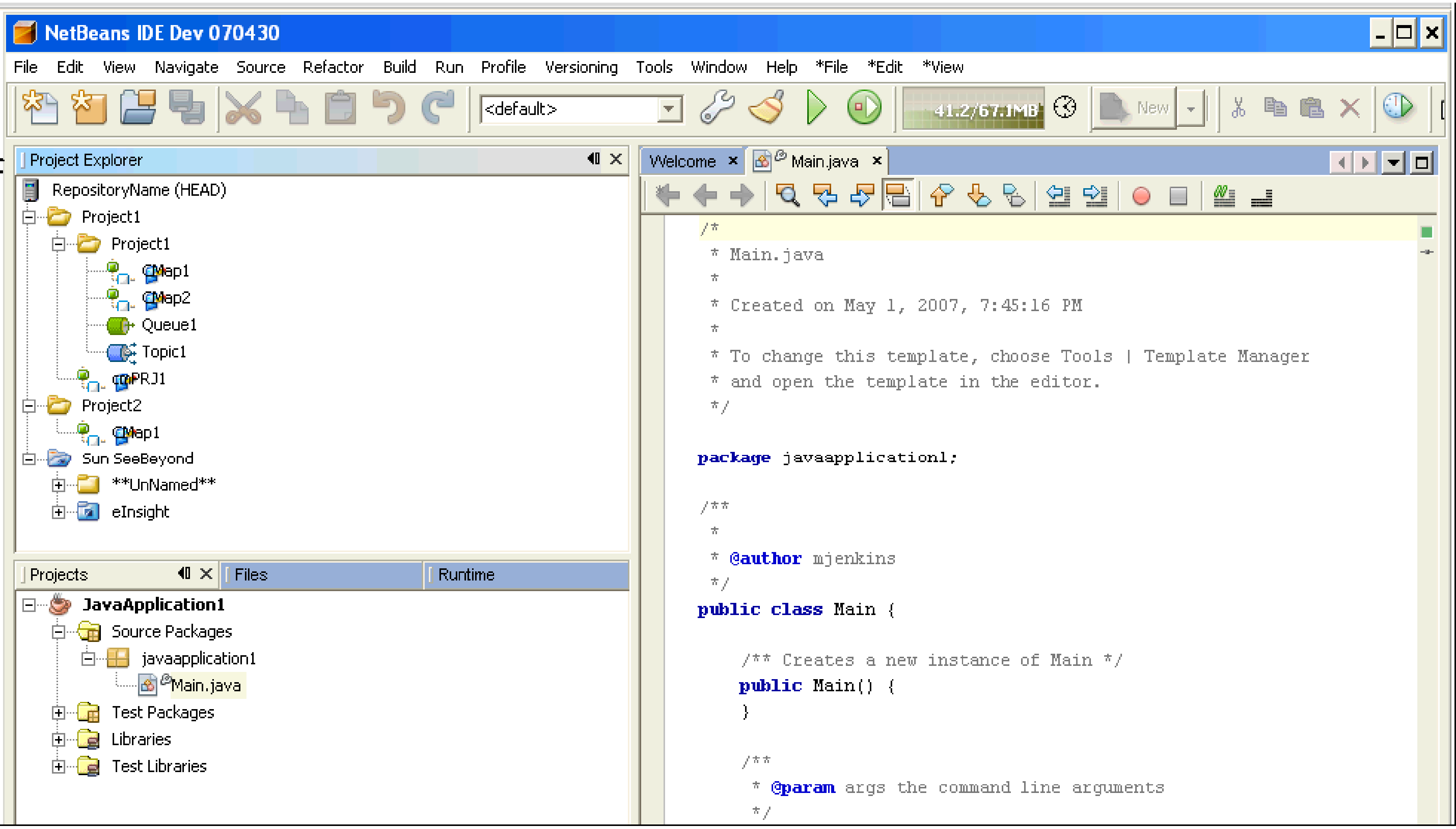
http://java.sun.com/developer/technicalArticles/J2EE/sdk_overview/

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



```
/*
 * 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/
- Open ESB Project
  - > http://open-esb.dev.java.net/
  - > https://open-jbi-components.dev.java.net/
  - > http://www.glassfishwiki.org/jbiwiki/Wiki.jsp?page=Jbicomps
- Free online course on Web services, Open ESB
  - > http://www.javapassion.com/webservices
- Examples and Demos:
  - > http://enterprise.netbeans.org/

Open ESB

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