BEA WebLogic® Event Server

Getting Started With WebLogic Event Server

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Contents

CHAPTER 1

Introduction and Roadmap

This section describes the contents and organization of this guide—*Getting Started with WebLogic Event Server.*

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Document Scope and Audience

This document is a resource for software developers who develop event driven real-time applications. It also contains information that is useful for business analysts and system architects who are evaluating WebLogic Event Server or considering the use of WebLogic Event Server for a particular application.

The topics in this document are relevant during the design, development, configuration, deployment, and performance tuning phases of event driven applications. The document also includes topics that are useful in solving application problems that are discovered during test and pre-production phases of a project.

It is assumed that the reader is familiar with the Java programming language and Spring.

WebLogic Event Server Documentation Set

This document is part of a larger WebLogic Event Server documentation set that covers a comprehensive list of topics. The full documentation set includes the following documents:

- *Getting Started With WebLogic Event Server*
- *Creating WebLogic Event Server Applications*
- *WebLogic Event Server Administration and Configuration Guide*
- *EPL Reference Guide*
- *WebLogic Event Server Reference Guide*
- *WebLogic Event Server Release Notes*

See the main WebLogic Event Server documentation page for further details.

Guide to This Document

This document is organized as follows:

- This chapter, Chapter 1, "Introduction and Roadmap," introduces the organization of this guide and the features of WebLogic Event Server.
- Chapter 2, "Overview of WebLogic Event Server," provides a conceptual overview of WebLogic Event Server, typical use cases, definition of terms and acronyms, and an overview of the programming model.
- Chapter 3, "WebLogic Event Server Examples," describes in detail two of the examples provided in the distribution kit: HelloWorld and foreign exchange (FX).
- Chapter 4, "Installing WebLogic Event Server," describes how to install WebLogic Event Server.

Samples for the WebLogic Event Server Application Developer

In addition to this document, BEA Systems provides a variety of code samples for WebLogic Event Server application developers. The examples illustrate WebLogic Event Server in action, and provide practical instructions on how to perform key development tasks.

BEA recommends that you run some or all of the examples before programming and configuring your own event driven application.

The examples are distributed in two ways:

- Pre-packaged and compiled in their own domain so you can immediately run them after you install the product.
- Separately in a Java source directory so you can see a typical development environment setup.

The following two examples are provided in both their own domain and as Java source in this release of WebLogic Event Server:

- HelloWorld—Example that shows the basic elements of a WebLogic Event Server application. See Hello World Example for additional information.

  The HelloWorld domain is located in `WLEVS_HOME\samples\domains\helloworld_domain`, where *`WLEVS_HOME`* refers to the top-level WebLogic Event Server directory, such as `c:\beahome\wlevs20`.

  The HelloWorld Java source code is located in `WLEVS_HOME\samples\source\applications\helloworld`.

- ForeignExchange (FX)—Example that includes multiple adapters, streams, and complex event processor with a variety of EPL rules, all packaged in the same WebLogic Event Server application. See Foreign Exchange (FX) Example for additional information.

  The ForeignExchange domain is located in `WLEVS_HOME\samples\domains\fx_domain`, where *`WLEVS_HOME`* refers to the top-level WebLogic Event Server directory, such as `c:\beahome\wlevs20`.

  The ForeignExchange Java source code is located in `WLEVS_HOME\samples\source\applications\fx`.

WebLogic Event Server also includes an algorithmic trading application, pre-assembled and deployed in its own sample domain; the source code for the example, however, is not provided. The algorithmic trading domain is located in `WLEVS_HOME\samples\domains\algotrading_domain`.

CHAPTER 2

Overview of WebLogic Event Server

This section contains information on the following subjects:

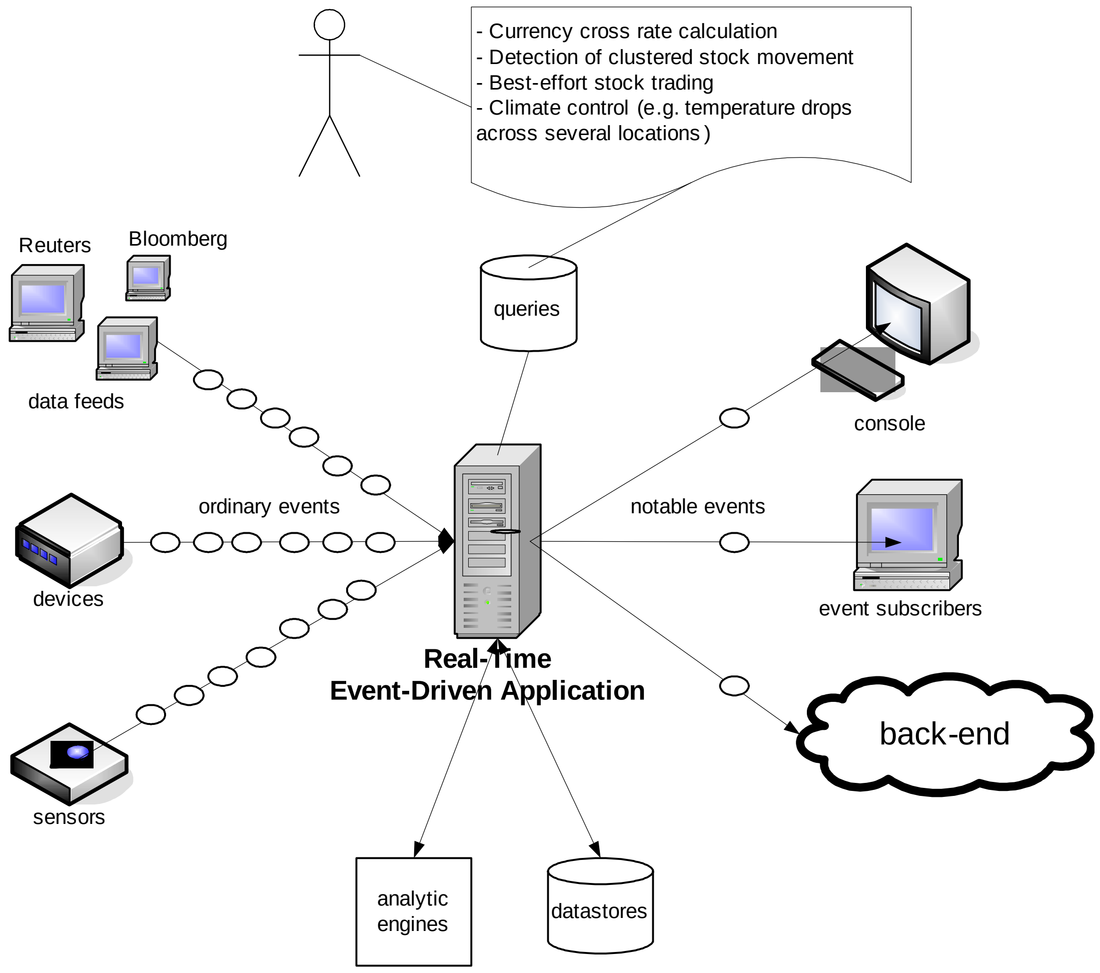
Introduction to WebLogic Event Server

WebLogic Event Server is a low latency, Java based middleware framework for event driven applications. It is a light weight application server which connects to high volume data feeds and has a complex event processing engine (CEP) to match events based on user defined rules.

WebLogic Event Server has the capability of deploying user Java code (POJOs) which contain the business logic. Running the business logic within WebLogic Event Server provides a highly tuned framework for time and event driven applications.

Conceptual Overview of WebLogic Event Server

The following graphic provides a high level view of an event-driven system:


- Currency cross rate calculation
- Detection of clustered stock movement
- Best-effort stock trading
- Climate control (e.g. temperature drops across several locations)
Reuters
Bloomberg
data feeds
queries
console
ordinary events
notable events
devices
event subscribers
Real-Time Event-Driven Application
back-end
sensors
analytic engines
datastores

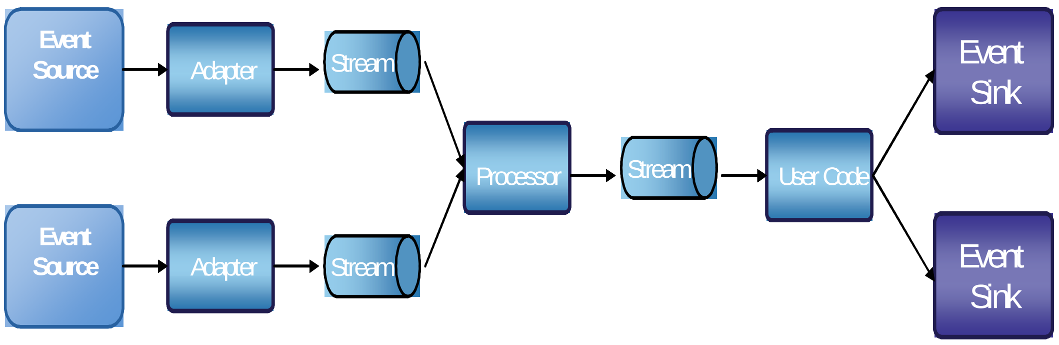
An event-driven system is generally comprised of several event sources, the real-time event-driven (WebLogic Event Server) applications, and event sinks. The event sources generate streams of ordinary event data. The WebLogic Event Server applications listen to the event streams, process these events, and generate notable events. Event sinks receive the notable events.

Event sources, event-driven applications, and event sinks are de-coupled from each other; one can add or remove any of these components without causing changes to the other components. This is an attribute of event driven architectures.

Event-driven applications are rule-driven. These rules, or queries, which are persisted using some data store, are used for processing the inbound stream of events, and generating the outbound stream of events. Generally, the number of outbound events is much lower than that of the inbound events.

WebLogic Event Server is a middleware for the development of event-driven applications. A WebLogic Event Server application is essentially an event-driven application.

Next, consider the application itself, which is hosted by the WebLogic Event Server infrastructure, a light-weight container. It can be described by the following diagram:



A WebLogic Event Server application typically comprises of four main component types. Adapters interface directly to the inbound event sources. Adapters understand the inbound protocol, and are responsible for converting the event data into a normalized data that can be queried by a processor (i.e. event processing agent, or processor). Adapters forward the normalized event data into Streams. Streams are event processing endpoints. Among other things, streams are responsible for queuing event data until the event processing agent can act upon it. The event processing agent removes the event data from the stream, processes it, and may generate new events to an output stream. The user code registers to listen to the output stream, and is triggered by the insertion of a new event in the output stream. The user code is generally just a plain-old-Java-object (POJO). The user application makes use of a set of external services, such as JMS, WS, and file writers, to forward on the generated events to external event sinks.

Event Processing Networks

Adapters, streams, processors, and business logic POJOs can be connected arbitrarily to each other, forming event processing networks (EPN). Examples of topologies of EPNs are:

- Adapter > Stream > Business Logic POJO

  Scenario: no processing is needed, aside adaptation from proprietary protocol to some normalized model.

- Adapter > Stream > Processor > Stream > Business Logic POJO

  Scenario: straight through processing to user code.

- Adapter > Stream > Processor > Stream > Business Logic POJO > Stream > Processor > Stream-> Business Logic POJO

  Scenario: two layers of event processing, the first processor creates causality between events, and the second processor aggregates events into complex events.

EPNs have two important attributes.

First, event processing networks can be used to create hierarchy of processing agents, and thus achieve very complex processing of events. Each layer of the EPN aggregates events of its layer into complex events that become simple events in the layer above it.

A second attribute of event processing networks is that it helps with integrability, that is, the quality of having separately developed components work correctly together. For example, one can add user code and reference to external services at several places in the network.

Use Cases

The use cases for WebLogic Event Server span a variety of businesses:

- Financial: Algorithmic Trading

  Automate stock trading based on market movement. Sample query: if, within any 20 second window, StockB rises by more than 2% and StockA does not, then automatically buy StockA.

- Transportation: Security and Fraud Detection

  Discover fraudalent activity by detecting patterns among events. Sample query: if a single ID card is used twice in less than 5 seconds to gain access to a city’s subway system, alert security for piggybacking.

- Energy and Telecommunications: Alarm Correlation

  Reduce false positive alarms. Sample query: When 15 alarms are received within any 5 second window, but less than 5 similar alarms detected within 30 seconds, then do nothing.

- Health Care: Patient Monitoring

  Monitor the vital signs of a patient and perform some task if a particular event happens. Sample query: When a change in medication is followed by a rise in blood pressume within 20% of maximum allowable for this patient within any 10 second window, alert nearest nurse.

Summary of WebLogic Event Server Features

The following list summarizes the main features of WebLogic Event Server:

- An application server that supports deployment of Plain Old Java applications (POJOs), or Spring applications, for handling large volumes of streaming data with low latency requirements.
- WebLogic Event Server applications are developed and deployed as event driven applications, that is, a set of custom Spring tags is used to define the event processing network in the EPN assembly file, which extends the standard Spring context file, of your application.
- The application server contains a set of real time services that include a complex event processor (CEP), adapters, and streams. The server is highly tuned for high message throughput and low latency and deterministic behavior.
- The complex event processor is a high performance, continuous query engine for processing high volumes of streaming data. It has full support for filtering, correlation, and aggregation of streaming data from one or more streams.
- The Event Processing Language (EPL), a SQL-like language that allows event data from streams to be declaratively filtered, correlated, aggregated, and merged, with the ability to insert results into other streams for further downstream processing. You define the EPL rules either in an XML file that configures the complex event processor or programmatically using APIs.
- An Adapter SDK that provides all the tools you need to create adapters that listen to incoming data feeds.

- A set of product examples that show both a simple Hello World scenario to get you started and more complex foreign exchange and algorithmic trading scenarios to showcase additional features of WebLogic Event Server.
- A load generator utility that simulates a data feed, useful for testing your application without needing to connect to a live data feed.
- A monitoring service that includes pre-built instrumentation for measuring throughput and latency at the component level.
- A static and dynamic configuration framework. Static configuration is performed using XML files; dynamic configuration is performed by accessing configuration and runtime MBeans using JMX and with the command-line utility `wlevs.Admin`.
- WebLogic Event Server is built on the BEA microServices Architecture (mSA) which uses an OSGi-based framework to manage services provided by modules or feature sets. BEA mSA provides the following services:
  - Jetty, an HTTP container for running servlets.
  - `javax.sql.DataSource` implementation and thin JDBC drivers for accessing a relational database.
  - Logging and debugging.
  - Authentication and authorization security.

Supported Configurations

For information on supported configurations, see BEA WebLogic Event Server 2.0 in *Supported Configurations: WebLogic*.

Next Steps

- Install WebLogic Event Server 2.0. Chapter 4, "Installing WebLogic Event Server."
- Run the examples from their respective domains. See:
  - "Running the HelloWorld Example from the helloworld Domain" on page 3-7
  - "Running the Foreign Exchange Example" on page 3-21

  See "Overview of the Samples Provided in the Distribution Kit" on page 3-1 for overview information.

- Build the examples from their respective source directories. See:
  - “Building and Deploying the HelloWorld Example from the Source Directory” on page 3-8
  - “Building and Deploying the Foreign Exchange Example from the Source Directory” on page 3-22
- Create your own WebLogic Event Server domain. See Creating a WebLogic Event Server Domain.
- Create a WebLogic Event Server application and deploy it to your new domain. See Creating WebLogic Event Server Applications for a description of the programming model, details about the various components that make up an application, and how they all fit together.

CHAPTER 3

WebLogic Event Server Examples

This section contains information on the following subjects:

- "Overview of the Samples Provided in the Distribution Kit" on page 3-1
- "Setting Your Development Environment" on page 3-3
- "HelloWorld Example" on page 3-6
- "Foreign Exchange (FX) Example" on page 3-19
- "Algorithmic Trading Example" on page 3-32

Overview of the Samples Provided in the Distribution Kit

WebLogic Event Server includes two complete examples: HelloWorld, which is a basic skeleton of a a typical WebLogic Event Server application, and a Foreign Exchange (FX) example that includes a multiple components.

These examples are provided in two forms, as follows:

- Out-of-the-box sample domains pre-configured to deploy an assembled application. For clarity, each example (Hello World and Foreign Exchange) is deployed to its own domain. To deploy the application you simply start a server in the domain.

  The sample helloworld domain is located in `WLEVS_HOME\samples\domains\helloworld_domain`, where `WLEVS_HOME` refers to the main WebLogic Event Server installation directory, such as `d:\beahome2\wlevs20`. See "Running the HelloWorld Example from the helloworld Domain" on page 3-7 for details.

The sample foreign exchange domain is located in *WLEVS_HOME*`\samples\domains\fx_domain`. See "Running the Foreign Exchange Example" on page 3-21 for details.

- The Java and configuration XML source for each sample is provided in a separate source directory that describes a sample development environment.

  The HelloWorld source directory is located in *WLEVS_HOME*`\samples\source\applications\helloworld`, where *WLEVS_HOME* refers to the main WebLogic Event Server installation directory, such as `d:\beahome2\wlevs20`. See "Implementation of the HelloWorld Example" on page 3-9 for details.

  The Foreign Exchange source directory is located in *WLEVS_HOME*`\samples\source\applications\fx`. See "Implementation of the FX Example" on page 3-24 for details.

WebLogic Event Server also includes an algorithmic trading application, pre-assembled and deployed in its own sample domain; the source code for the example, however, is not provided.

The sample algorithmic trading domain is located in *WLEVS_HOME*`\samples\domains\algotrading_domain`. See "Running the Algorithmic Trading Example" on page 3-33 for details.

The samples use Ant as their development tool; for details about Ant and installing it on your computer, see the Apache Ant Project.

Increasing the Performance of the Examples

To increase the throughput and latency when running the examples, and WebLogic Event Server applications in general, BEA recommends the following:

- Use the JRockit JDK included in WebLogic Real Time 2.0 and enable the deterministic garbage collector by passing the `-dgc` parameter to the command that starts the WebLogic Event Server instance for the appropriate domain:

  ```
  prompt> startwlevs.cmd -dgc
  ```

  By default the deterministic garbage collector is disabled for the examples.

- When running WebLogic Event Server on a computer with a larger amount of memory, you should set the load generator and server heap sizes appropriately for the size of the computer. On computers with sufficient memory, BEA recommend a heap size of 1 GB for the server and between 512MB - 1GB for the load generator.

Setting Your Development Environment

You must set your development environment before you can start WebLogic Event Server instances and run the examples. In particular, you must set the PATH and JAVA_HOME environment variables so that you are using the correct version of the JRockit JDK (R27.3).

There are two ways in which the R27.3 version of JRockit might have been installed on your computer:

- As part of the WebLogic Real Time 2.0 installation. This version of the JRockit JDK includes the deterministic garbage collector.
- As part of the Weblogic Event Server 2.0 installation. This version of the JRockit JDK *does not* include the deterministic garbage collector, and is provided for testing purposes only.

Although not required, BEA recommends that you run WebLogic Event Server using the JRockit JDK version included in WebLogic Real Time 2.0 for best results; however, the following procedures describe how to set your environment for either case.

For clarity, it is assumed in the following procedures that you installed WebLogic Real Time and WebLogic Event Server in different BEA home directories; however, it is also possible to install both products in the same BEA home. If you do this, both products will install JRockit, although in different directories:

- WebLogic Event Server installs its version of JRockit in the `jrockit-R27.3.0-106-1.5.0_11` directory.
- WebLogic Real Time, installs its version of JRockit in the `jrockit-realtime20_150_11` directory.

Windows

1. Update your PATH environment variable to include the `bin` directory of the JRockit JDK. Also, be sure that your PATH environment variable includes the `bin` directory of your Ant installation.

   If using the JRockit JDK installed with WebLogic Real Time 2.0:

If you installed WebLogic Real Time 2.0 in the `d:\beahome_wlrt` directory and Ant is installed in the `d:\ant` directory, set your PATH environment variable as shown:

```
prompt> set
PATH=d:\beahome_wlrt\jrockit-realtime20_150_11\bin;d:\ant\bin;%PATH%
```

If using the JRockit JDK installed with WebLogic Event Server 2.0:

If you installed WebLogic Event Server 2.0 in the `d:\beahome_wlevs` directory and Ant is installed in the `d:\ant` directory, set your PATH environment variable as shown:

```
prompt> set
PATH=d:\beahome_wlevs\jrockit-R27.3.0-106-1.5.0_11\bin;d:\ant\bin;%PATH
%
```

2. Ensure that the `JAVA_HOME` variable in the server start script points to the correct JRockit JDK. If it does not, edit the script.

   The server start script (called `startwlevs.cmd`) is located in the main domain directory. For example, the HelloWorld domain is located in `*WLEVS_HOME*\samples\domains\helloworld_domain`, where `*WLEVS_HOME*` refers to the main WebLogic Event Server installation directory, such as `d:\beahome_wlevs\wlevs20`.

   If using the JRockit JDK installed with WebLogic Real Time 2.0, the `set` command should be as follows:

   ```
   set JAVA_HOME=d:\beahome_wlrt\jrockit-realtime20_150_11
   ```

   If using the JRockit JDK installed with WebLogic Event Server 2.0, the `set` command should be as follows:

   ```
   set JAVA_HOME=d:\beahome_wlevs\jrockit-R27.3.0-106-1.5.0_11
   ```

3. Set the `JAVA_HOME` variable in your own development environment to point to the JRockit JDK.

   If using the JRockit JDK installed with WebLogic Real Time 2.0:

   ```
   prompt> set JAVA_HOME=d:\beahome_wlrt\jrockit-realtime20_150_11
   ```

   If using the JRockit JDK installed with WebLogic Event Server 2.0:

   ```
   prompt> set JAVA_HOME=d:\beahome_wlevs\jrockit-R27.3.0-106-1.5.0_11
   ```

To make it easier to reset your development environment after logging out of a session, you can create a command file, such as `setEnv.cmd`, that contains these `set` commands.

You can also set these environment variables permanently on your Windows computer by invoking the **Control Panel > System** window, clicking the **Advanced** tab, and then clicking the **Environment Variables** button. You can set the environment variables for the current user or for the entire system.

UNIX

1. Update your PATH environment variable to include the `bin` directory of the JRockit JDK. Also, be sure that your PATH environment variable includes the `bin` directory of your Ant installation.

   If using the JRockit JDK installed with WebLogic Real Time 2.0:

   If you installed WebLogic Real Time in the `/beahome_wlrt` directory and Ant is installed in the `/ant` directory, set your PATH environment variable as shown:

   ```
   prompt> PATH=/beahome_wlrt/jrockit-realtime20_150_11/bin:/ant/bin:$PATH
   ```

   If using the JRockit JDK installed with WebLogic Event Server 2.0:

   If you installed WebLogic Event Server in the `/beahome_wlevs` directory and Ant is installed in the `/ant` directory, set your PATH environment variable as shown:

   ```
   prompt>
   PATH=/beahome_wlevs/jrockit-R27.3.0-106-1.5.0_11/bin:/ant/bin:$PATH
   ```

2. Ensure that the `JAVA_HOME` variable in the server start script points to the correct JRockit JDK. If it does not, edit the script.

   The server start script (called `startwlevs.sh`) is located in the main domain directory. For example, the HelloWorld domain is located in *`WLEVS_HOME`*`/samples/domains/helloworld_domain`, where *`WLEVS_HOME`* refers to the main WebLogic Event Server installation directory, such as `/beahome_wlevs/wlevs20`.

   If using the JRockit JDK installed with WebLogic Real Time 2.0, the `JAVA_HOME` variable should be set as follows:

   ```
   JAVA_HOME=/beahome_wlrt/jrockit-realtime20_150_11
   ```

   If using the JRockit JDK installed with WebLogic Event Server 2.0, the `JAVA_HOME` variable should be set as follows:

   ```
   JAVA_HOME=/beahome_wlevs/jrockit-R27.3.0-106-1.5.0_11
   ```

3. Set the `JAVA_HOME` variable in your development environment to point to the JRockit JDK.

   If using the JRockit JDK installed with WebLogic Real Time 2.0:

```
prompt> JAVA_HOME=/beahome_wlrt/jrockit-realtime20_150_11
```

If using the JRockit JDK installed with WebLogic Event Server 2.0:

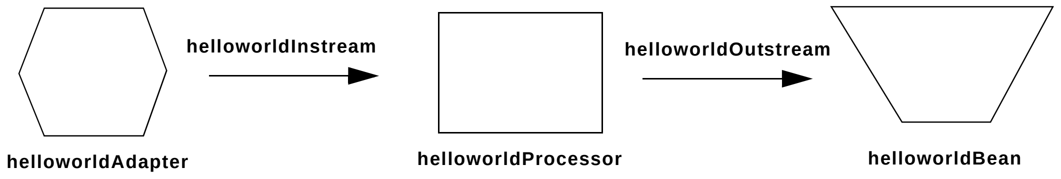
```
prompt> JAVA_HOME=/beahome_wlevs/jrockit-R27.3.0-106-1.5.0_11
```

To make it easier to reset your environment after logging out of a session, you can create a command file, such as `setEnv.sh`, that contains these commands.

HelloWorld Example

The first example that shows how to create a WebLogic Event Server application is the ubiquitous HelloWorld. The following diagram shows the components that make up the application and how they fit together, which together make up the HelloWorld *event processing network*:

Figure 3-1 The HelloWorld Event Processing Network



The example includes the following components:

- `helloworldAdapter`—Component that simply generates *Hello World* messages every second. In a real-world scenario, this component would typically read a stream of data from a source, such as a data feed from a financial institution, and convert it into a stream of events that the complex event processor can understand. The HelloWorld application also includes a HelloWorldAdapterFactory that creates instances of HelloWorldAdapter.
- `helloworldInstream`—Component that streams the events generated by the adapter (in this case *Hello World* messages) to the complex event processor.
- `helloworldProcessor`—Component that simply forwards the messages from the `helloworldAdapter` component to the POJO that contains the business logic. In a real-world scenario, this component would typically execute additional and possibly much

more complex processing of the events from the stream, such as selecting a subset of events based on a property value, grouping events, and so on.

- `helloworldOutstream`—Component that streams the events processed by the complex event processor to the POJO that contains the user-defined business logic.
- `helloworldBean`—POJO component that simply prints out a message every time it receives a batch of messages from the processor via the output stream. In a real-world scenario, this component would contain the business logic of the application, such as running reports on the set of events from the processor, sending appropriate emails or alerts, and so on.

Running the HelloWorld Example from the helloworld Domain

To run the HelloWorld application that is pre-deployed to the `helloworld` domain, you simply start an instance of WebLogic Event Server, as described in the following steps:

1. Open a command window and change to the helloworld domain directory, located in `*WLEVS_HOME*\samples\domains\helloworld_domain` directory, where `*WLEVS_HOME*` refers to the main WebLogic Event Server installation directory, such as `d:\beahome2\wlevs20`.

   ```
   prompt> cd d:\beahome2\wlevs20\samples\domains\helloworld_domain
   ```

2. Set your development environment, as described in "Setting Your Development Environment" on page 3-3.

3. Start WebLogic Event Server by running the `startwlevs.cmd` (Windows) or `startwlevs.sh` (UNIX) command:

   ```
   prompt> startwlevs.cmd
   ```

   If you are using the JRockit JDK included in WebLogic Real Time 2.0, enable the deterministic garbage collector by passing the `-dgc` parameter to the command:

   ```
   prompt> startwlevs.cmd -dgc
   ```

After server status messages scroll by, you should see the following message printed to the output about every second:

```
Message: HelloWorld - the current time is: 3:56:57 PM
```

This message indicates that the HelloWorld example is running correctly.

Building and Deploying the HelloWorld Example from the Source Directory

The HelloWorld sample source directory contains the Java source, along with other required resources such as configuration XML files, that make up the HelloWorld application. The `build.xml` Ant file contains targets to build and deploy the application to the helloworld domain; see "Description of the Ant Targets to Build Hello World" on page 3-9 for details.

Because a pre-packaged version of the Hello World application is already deployed to the helloworld domain, the following procedure shows how to build and deploy a *duplicate* of the HelloWorld application alongside the original one, rather than overwriting it.

To build and deploy the HelloWorld application, follow these steps:

1. Open a new command window and change to the HelloWorld source directory, located in *`WLEVS_HOME`*`\samples\source\applications\helloworld`, where *`WLEVS_HOME`* refers to the main WebLogic Event Server installation directory, such as `d:\beahome2\wlevs20`.

   ```
   prompt> cd d:\beahome2\wlevs20\samples\source\applications\helloworld
   ```

2. Set your development environment, as described in "Setting Your Development Environment" on page 3-3.

3. Execute the `all` Ant target to compile and create the application JAR file:

   ```
   prompt> ant all
   ```

4. Execute the `stage` Ant target to copy the application JAR file, along with its configuration XML file, to the *`WLEVS_HOME`*`\samples\domains\helloworld_domain\applications\helloworld_new` directory:

   ```
   prompt> ant stage
   ```

   This target does not override the existing Hello World application, which is located in the *`WLEVS_HOME`*`\samples\domains\helloworld_domain\applications\helloworld` directory, but rather, creates an entirely new directory.

5. Change to the *`WLEVS_HOME`*`\samples\domains\helloworld_domain` directory:

   ```
   prompt> cd d:\beahome2\wlevs20\samples\domains\helloworld_domain
   ```

6. Edit the `deployments.xml` file and change the `location` attribute of the lone `<wlevs:deployment>` tag to point to the new directory; the updated tag should look like this (updated text in bold):

```
<wlevs:deployment id="helloworld" state="start"
location="file:${wlevs.domain.home}/applications/helloworld_new/com.
bea.wlevs.example.helloworld_2.0.0.0.jar"/>
```

7. If WebLogic Event Server for the helloworld domain is running, you must restart it using the start script to deploy this new HelloWorld JAR file:

   ```
   prompt> startwlevs.cmd
   ```

   If you are using the JRockit JDK included in WebLogic Real Time 2.0, enable the deterministic garbage collector by passing the `-dgc` parameter to the command:

   ```
   prompt> startwlevs.cmd -dgc
   ```

   For details, see Stopping and Starting the Server.

After server status messages scroll by, you should see the following message printed to the output about every second:

```
Message: HelloWorld - the current time is: 3:56:57 PM
```

This message indicates that the HelloWorld example has been redeployed and is running correctly.

Description of the Ant Targets to Build Hello World

The `build.xml` file, located in the top level of the HelloWorld source directory, contains the following targets to build and deploy the application:

- `clean`—This target removes the `dist` and `output` working directories under the current directory.
- `all`—This target cleans, compiles, and jars up the application into a file called `com.bea.wlevs.example.helloworld_2.0.0.0.jar`, and places the generated JAR file into a `dist` directory below the current directory.
- `stage`—This target deploys the JAR file, along with its configuration file (`processor.xml`) to the helloworld domain by copying the two files to the `WLEVS_HOME\samples\domains\helloworld_domain\applications\helloworld_new` directory.

Implementation of the HelloWorld Example

The implementation of the HelloWorld example generally follows the main steps for creating a WebLogic Event Server application; refer to that section for a task-oriented procedure that describes the typical development process.

The HelloWorld example, because it is relatively simple, does not use all the components and configuration files described in the general procedure for creating a WebLogic Event Server application. All the files of the example are located relative to the `WLEVS_HOME\samples\source\applications\helloworld` directory, where `WLEVS_HOME` refers to the main WebLogic Event Server installation directory such as `c:\beahome\wlevs20`. BEA recommends that you use this example directory setup in your own environment, although it is obviously not required.

The files used by the HelloWorld example include:

- An EPN assembly file that describes each component in the application and how all the components are connected together. The EPN assembly file extends the standard Spring context file. The file also registers the event types used in the application. You are required to include this XML file in your WebLogic Event Server application.

  In the example, the file is called `com.bea.wlevs.example.helloworld-context.xml` and is located in the `src/main/resources/META-INF/spring` directory.

  For details, see "The HelloWorld EPN Assembly File" on page 3-11.

- Java source files for the `helloworldAdapter` component, which also includes a factory bean to create adapter instances.

  In the example, the two files are called `HelloWorldAdapter.java` and `HelloWorldAdapterFactory.java` and are located in the `src/main/java/com/bea/wlevs/adapter/example/helloworld` directory.

  For detailed descriptions of these two files and how to program the adapter Java files in general, see Programming the Adapter Class: Guidelines and Programming the Adapter Factory Class.

- Java source file that describes the `HelloWorldEvent` event type.

  In the example, the file is called `HelloWorldEvent.java` and is located in the `src/main/java/com/bea/wlevs/event/example/helloworld` directory.

  For a detailed description of this file, as well as general information about programming event types, see Creating Event Types.

- An XML file that configures the `helloworldProcessor`, `helloworldAdapter`, and `helloworldOutstream` components. An important part of this file is the set of EPL rules that select the set of events that the HelloWorld application processes. You also use the XML configuration file to enabled monitoring. You are required to include a processor configuration file in your WebLogic Event Server application, although the adapter and stream configuration is optional.

In the example, the file is called `config.xml` and is located in the `src/main/resources/META-INF/wlevs` directory.

For details, see "The HelloWorld Component Configuration File" on page 3-15.

- An XSD Schema file that describes the XML file that configures the `helloworldProcessor` and `helloworldAdapter` components. This XSD file is optional and only required if your application extends the default configuration Schema for the components; the HelloWorld application extends the default adapter configuration.

  In the example, the file is called `helloworld.xsd` and is located in the `src/main/resources/extension` directory.

  For details, see "The XSD File that Describes the Extended HelloWorld Component Configuration" on page 3-17.

- A Java file that implements the `helloworldBean` component of the application, a POJO that contains the business logic.

  In the example, the file is called `HelloWorldBean.java` and is located in the `src/main/java/com/bea/wlevs/example/helloworld` directory.

  For details about this file, and programming the business logic POJO in general, see Programming Business Logic: Guidelines.

- A `MANIFEST.MF` file that describes the contents of the OSGi bundle that will be deployed to WebLogic Event Server.

  In the example, the `MANIFEST.MF` file is located in the `src/main/main/resources/META-INF` directory

  See Assembling a WebLogic Event Server Application: Main Steps for information about creating this file, as well as a description of creating the OSGi bundle that you deploy to WebLogic Event Server.

The HelloWorld example uses a `build.xml` Ant file to compile, stage, assemble, and deploy the OSGi bundle; see "Building and Deploying the HelloWorld Example from the Source Directory" on page 3-8 for a description of this `build.xml` file if you also use Ant in your development environment.

The HelloWorld EPN Assembly File

One of the main purposes of the EPN assembly file is to define the event processing network by declaring the components of the application and how they are all connected, or in other word, which components listen to which other components. WebLogic Event Server provides a set of custom Spring tags used to declare the network. You also use the EPN assembly file to register the event types used by your application and its EPL rules.

You use the EPN assembly file in the typical way to define the application component beans in the Spring application context; the application components beans are those implemented with Java classes, such as adapters and the POJO that contains the business logic.

For full reference information about the custom Spring tags, see WebLogic Event Server Custom Spring Tags Reference or the XSD Schema file that defines the tags.

The following example shows the EPN assembly file used in the HelloWorld sample application; see the explanation after the example for details about the entries in bold.

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:osgi="http://www.springframework.org/schema/osgi"
       xmlns:wlevs="http://www.bea.com/ns/wlevs/spring"
       xsi:schemaLocation="
  http://www.springframework.org/schema/beans
  http://www.springframework.org/schema/beans/spring-beans.xsd
  http://www.springframework.org/schema/osgi
  http://www.springframework.org/schema/osgi/spring-osgi.xsd
  http://www.bea.com/ns/wlevs/spring
  http://www.bea.com/ns/wlevs/spring/spring-wlevs.xsd">

    <!-- First, create and register the adapter (and factory) that generates
hello world messages -->

    <osgi:service interface="com.bea.wlevs.ede.api.AdapterFactory">
        <osgi:service-properties>
            <prop key="type">hellomsgs</prop>
        </osgi:service-properties>
        <bean
class="com.bea.wlevs.adapter.example.helloworld.HelloWorldAdapterFactory"/>
    </osgi:service>

    <wlevs:event-type-repository>
        <wlevs:event-type type-name="HelloWorldEvent">

<wlevs:class>com.bea.wlevs.event.example.helloworld.HelloWorldEvent</wlevs:cla
ss>
        </wlevs:event-type>
    </wlevs:event-type-repository>

    <!-- Assemble EPN (event processing network) -->

    <!-- The adapter id is used by the configuration system, so needs to be
well-known -->
```

```
    <wlevs:adapter id="helloworldAdapter" provider="hellomsgs"
manageable="true">
        <!-- This property is also configure by dynamic config -->
        <wlevs:instance-property name="message" value="HelloWorld - the
currenttime is:"/>
    </wlevs:adapter>

    <!-- The processor id is used by the configuration system, so needs to be
well-known -->

    <wlevs:processor id="helloworldProcessor" manageable="true" />

    <wlevs:stream id="helloworldInstream" manageable="true">
        <wlevs:listener ref="helloworldProcessor"/>
        <wlevs:source ref="helloworldAdapter"/>
    </wlevs:stream>

    <!-- Manageable is so that we can monitor the event throughput -->

    <wlevs:stream id="helloworldOutstream" manageable="true">
        <wlevs:listener>
            <!-- Create business object -->
            <bean class="com.bea.wlevs.example.helloworld.HelloWorldBean"/>
        </wlevs:listener>
        <wlevs:source ref="helloworldProcessor"/>
    </wlevs:stream>

</beans>
```

In the preceding example:

- The `<osgi:service ...>` entry registers the `helloworldAdapterFactory` as an OSGi service. Note that the referenced interface is `com.bea.wlevs.ede.api.AdapterFactory`, the WebLogic Event Server-provided adapter factory, rather than the adapter factory specific to the HelloWorld application (`com.bea.wlevs.adapter.example.helloworld.HelloWorldAdapterFactory`).

  The `<prop>` element gives the OSGi service a type name; this type, `hellomsgs`, will be referenced later on when the helloworldAdapter is declared a component of the event processing network.

  The entry that begins `<bean id="helloworldAdapterFact" .. >` registers the `helloworldAdapterFactory` bean in the Spring application context; this class generates instances of `helloworldAdapter`.

- The `<wlevs:event-type-repository>` entry registers the event types that are used throughout the application; in the HelloWorld application, there is just a single event type: `HelloWorldEvent`, implemented with the `com.bea.wlevs.event.example.helloworld.HelloWorldEvent` class. WebLogic

Event Server automatically creates instances of this data type when needed. You can also reference this data type in the EPL rules of the application.

- The `<wlevs:adapter>`, `<wlevs:processor>`, and `<wlevs:stream>` entries together define the event processor network by declaring each component in the network; the following bullets describe the configuration of each component.
- The `<wlevs:adapter>` tag defines the adapter component of the HelloWorld application:

```
 <wlevs:adapter id="helloworldAdapter" provider="hellomsgs"
manageable="true">
   <wlevs:instance-property name="message" value="HelloWorld - the
currenttime is:"/>
</wlevs:adapter>
```

  The `id` attribute specifies a unique identifier for this component; the id will be referenced later by other components. The `provider` attribute specifies that the provider of the adapter component is the OSGi service type `hellomsgs`, declared previously when the `helloworldAdapterFactory` was declared as an OSGi service. The `manageable` attribute enables monitoring for the adapter; by default the manageability of components is disabled.

  The `<wlevs:instance-property>` child tag passes an instance variable to adapter instance; the name of the variable is `message` and the value is `HelloWorld - the current time is:`.

- The `<wlevs:processor>` tag defines the processor component of the application:

```
<wlevs:processor id="helloworldProcessor" manageable="true" />
```

  The `id` and `manageable` attributes function the same as those for `<wlevs:adapter>`.

- The `<wlevs:stream>` tags defines the two stream components of the application:

```
<wlevs:stream id="helloworldInstream" manageable="true">
    <wlevs:listener ref="helloworldProcessor"/>
    <wlevs:source ref="helloworldAdapter"/>
</wlevs:stream>

<wlevs:stream id="helloworldOutstream" manageable="true">
    <wlevs:listener>
        <bean class="com.bea.wlevs.example.helloworld.HelloWorldBean"/>
    </wlevs:listener>
    <wlevs:source ref="helloworldProcessor"/>
</wlevs:stream>
```

  The `id` and `manageable` attributes for streams function the same as those for `<wlevs:adapter>`.

The `<wlevs:stream id="helloworldInstream">` tag uses the `<wlevs:listener>` child tag to specify that the `helloworldProcessor` listens to the stream, and the `<wlevs:source>` child tag to specify that the stream gets its events from the `helloworldAdapter` component.

The `<wlevs:stream id="helloworldOutstream">` tag also uses these listener and source tags. One difference, however, is that it directly nests the definition of the business logic POJO in the `<wlevs:listener>` tag rather than reference a unique identifier. In this case, the nested tag is a standard Spring `<bean>` that specifies that the POJO is implemented with the `com.bea.wlevs.example.helloworld.HelloWorldBean` class.

The HelloWorld Component Configuration File

The HelloWorld application contains a single complex event processor, a single adapter, and a single stream, all configured with the following XML file:

```
<?xml version="1.0" encoding="UTF-8"?>

<helloworld:config
  xmlns:helloworld="http://www.bea.com/ns/wlevs/example/helloworld">

  <processor>
    <name>helloworldProcessor</name>
    <rules>
      <rule id="helloworldRule"><![CDATA[ select * from HelloWorldEvent
retain 1 event ]]></rule>
    </rules>
  </processor>

  <adapter>
    <name>helloworldAdapter</name>
    <message>HelloWorld - the current time is:</message>
  </adapter>

  <stream monitoring="true" >
      <name>helloworldOutstream</name>
      <max-size>10000</max-size>
      <max-threads>2</max-threads>
  </stream>

</helloworld:config>
```

If your application contains multiple processors, adapters or streams, you can either declare them all in a single configuration file, or create separate configuration files for each component; the method you chose depends on which you find easier to manage.

For each component you configure, you must add the `<name>` child element to explicitly declare the specific component to which you are referring. The value of the `<name>` element must correspond to the component's unique identifier of its declaration in the EPN assembly file.

For example, assume a processor is declared in the EPN assembly file as follows:

```
<wlevs:processor id="helloworldProcessor" ...>
```

Then its corresponding XML configuration would be as follows:

```
<processor>
 <name>helloworldProcessor</name>
 ...
</processor>
```

The HelloWorld example uses a single configuration file for one processor with the name `helloworldProcessor`, one adapter with the name `helloworldAdapter`, and one stream with the name `helloworldOutstream`. These names correspond with the declaration of the components in the EPN assembly file.

Note: When you create the configuration file for the components of your application, you can use the default configuration XSD Schema files, or create a custom one if you want to add additional elements. In the HelloWorld application, the adapter uses a custom configuration, and thus has its own XSD Schema file that describes the configuration file.

Because the HelloWorld application uses an extended XSD schema when configuring its components, the corresponding configuration XML file must identify the namespace for this schema rather than the default schema. In the preceding example:

```
<helloworld:config
  xmlns:helloworld="http://www.bea.com/ns/wlevs/example/helloworld">

...
```

See "The XSD File that Describes the Extended HelloWorld Component Configuration" on page 3-17 for details.

The `<processor>` element configures the processor component. The most important part of the processor configuration is the declaration of the set of Event Processing Language (EPL) rules that this processor executes; these rules select the set of events that are eventually passed to the application business object. Each rule is declared with a `<rule>` element using an XML

`![CDATA[...]]` section; all rules are grouped together with a single `<rules>` element. You can define as many rules as you want for a particular processor.

The HelloWorld application has just a single very simple rule:

```
select * from HelloWorldEvent retain 1 event
```

This rule selects all events of type `HelloWorldEvent`, but retains only one event at a time in its window. For additional information and examples about using EPL, see the EPL Reference Guide.

The `<adapter>` element configures the adapter component. The most important thing to note about the `helloworldAdapter` is that it has a custom element, `<message>`. The Java implementation of the adapter receives this information from WebLogic Event Server and then uses it in its code.

The `<stream>` element configures the `helloworldOutstream` component. First it enables monitoring of the stream using the `monitoring="true"` attribute. The monitoring attribute only takes effect if the `manageable="true"` attribute has *also* been set for this component in the EPN assembly file. The `<max-size>` and `<max-threads>` elements specify the maximum size of the stream and the maximum number of threads assigned to the stream, respectively.

The XSD File that Describes the Extended HelloWorld Component Configuration

WebLogic Event Server provides a default XSD Schema that describes the XML file which configures the components (processor, adapters, streams) of your application. If this Schema is adequate for your application, then you do not need to create an XSD file of your own.

However, sometimes it is helpful to *extend* the default component configuration with custom configuration information for your specific application; for example, the HelloWorld adds a `<message>` element that specifies the text of the message created by the `helloworldAdapter` component, as shown in "The HelloWorld Component Configuration File" on page 3-15.

If you want to extend the default configuration of the components, then you must also provide your own XSD schema file that describes the format of the new configuration files. This XSD schema file must describe the extended configurations, as well as the overall format of the configuration file. The HelloWorld application extends the default adapter configuration, but uses the default processor and stream configurations. The XSD file is shown below; see the explanation after the schema for a description of the sections in bold:

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<xs:schema xmlns="http://www.bea.com/ns/wlevs/example/helloworld"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:jxb="http://java.sun.com/xml/ns/jaxb"
xmlns:xjc="http://java.sun.com/xml/ns/jaxb/xjc"
xmlns:wlevs="http://www.bea.com/ns/wlevs/config/application"

targetNamespace="http://www.bea.com/ns/wlevs/example/helloworld"

elementFormDefault="unqualified" attributeFormDefault="unqualified"
jxb:extensionBindingPrefixes="xjc" jxb:version="1.0">

  <xs:annotation>
    <xs:appinfo>
      <jxb:schemaBindings>
        <jxb:package name="com.bea.adapter.wlevs.example.helloworld"/>
      </jxb:schemaBindings>
    </xs:appinfo>
  </xs:annotation>

  <xs:import namespace="http://www.bea.com/ns/wlevs/config/application"
schemaLocation="wlevs_application_config.xsd"/>

  <xs:element name="config">
    <xs:complexType>
      <xs:choice maxOccurs="unbounded">
        <xs:element name="adapter" type="HelloWorldAdapterConfig"/>
        <xs:element name="processor" type="wlevs:DefaultProcessorConfig"/>
        <xs:element name="stream" type="wlevs:DefaultStreamConfig" />
      </xs:choice>
    </xs:complexType>
  </xs:element>

  <xs:complexType name="HelloWorldAdapterConfig">
    <xs:complexContent>
      <xs:extension base="wlevs:AdapterConfig">
        <xs:sequence>
          <xs:element name="message" type="xs:string"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

</xs:schema>
```

The important things to note about the preceding XSD file are:

- The `<xs:schema targetNamespace..>` entry defines the target namespace; the name can be anything you want.

- The `<jxb:schemaBindings>` entry specifies that WebLogic Event Server should use JAXB to generate a Java class represents the XML conents of the configuration file; the server then passes this Java class to the adapter. The `<jxb:package>` child specifies the package name of this Java class, in this case `com.bea.adapter.wlevs.example.helloworld`.
- The `<xs:import>` entry specifies the WebLogic Event Server XSD file to import; this file defines the default configuration file and the schema types defined in this imported XSD can then be references in the custom XSD.
- The `<xs:element name="config">` lays out the structure of the custom configuration file. In particular, it says that the root element is `<config>` and it has three possible child elements, `<adapter>`, `<processor>`, and `<stream>`.

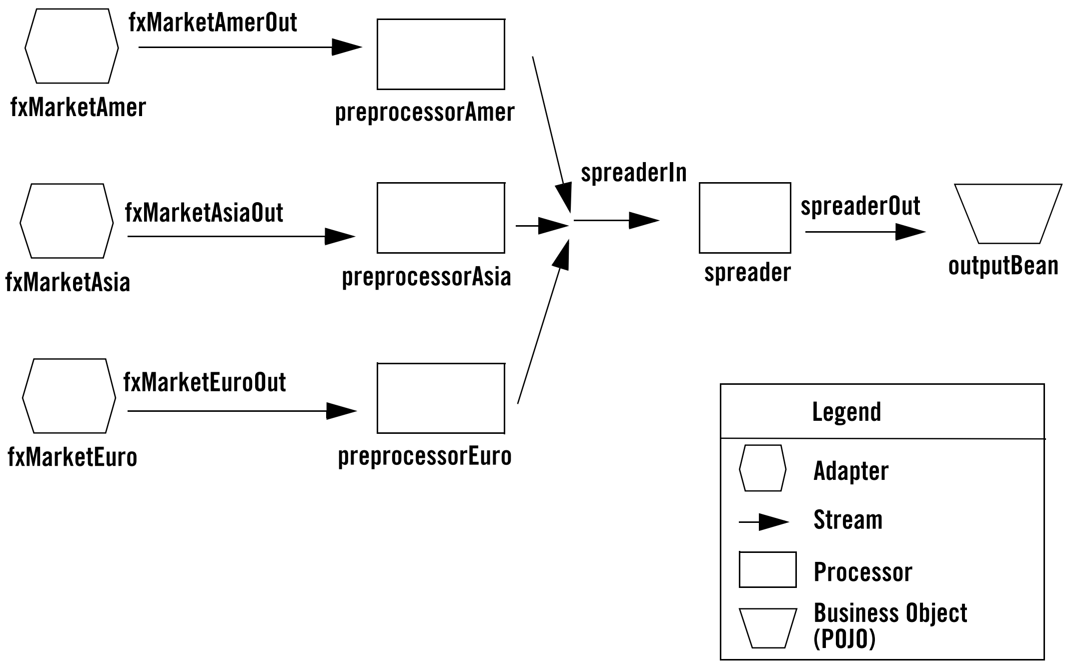
  The schema type of the `<adapter>` element is `HelloWorldAdapterConfig`, defined later in this custom XSD file. The schema taype of the `<processor>` and `<stream>` elements are the default configuration types for processors and streams: `wlevs:DefaultProcessorConfig` and `wlevs:DefaultStreamConfig`, respectively. These types are defined in the imported XSD file `wlevs_application_config.xsd`. In other words, only the adapter configuration is being changed in the custom XSD file.
- The `<xs:complexType name="HelloWorldAdapterConfig">` entry defines what the `HelloWorldAdapterConfig` schema type looks like. In particular, it uses as a base the default adapter configuration, `wlevs:AdapterConfig,` defined in the imported XSD file `wlevs_application_config.xsd`., but then adds a new element called `<message>` of data type string.

For additional details about extending the configuration of an adapter, see Extending the Configuration of an Adapter.

Foreign Exchange (FX) Example

The foreign exchange example, called FX for simplicity, is a more complex example than the HelloWorld one because it includes multiple processors that handle information from multiple data feeds. In the example, the data feeds are simulated using the WebLogic Event Server load generator utility. The following diagram describes the FX event processing network:

Figure 3-2 FX Event Processing Network



In the scenario, three data feeds, simulated using the load generator, send a constant pair of values from different parts of the world; the value pairs consist of a currency pair, such as USDEUR for US dollar - European euro, and an exchange rate between the two currencies. The `fxMarketXXX` adapters receive the data from the feeds, convert them into events, and pass them to the `preprocessorXXX` processors. Each processor performs an initial stale check to ensure that no event is more than ten seconds old and then a boundary check to ensure that the exchange rate between the two currencies is within a current boundary. The server also only selects a specific currency pair from a particular stream; for example, the server selects USDEUR from the simulated American data feed, but rejects all other pairs, such as USDAUD (Australian dollar).

After the data from each data feed provider passes this initial preparation phase, a different processor, called `spreader`, joins all events across all providers, calculates the mid-point between the maximum and minimum rate, and then applies a trader-specified spread. Finally, the processor forwards the rate to the POJO that contains the business code; in this example, the POJO simply publishes the rate to clients.

The WebLogic Event Server monitor is configured to watch if the event latency in the last step exceeds some threshold, such as no updated rates in a 30 second time-span, and if there is too much variance between two consecutive rates for the same currency pair. Finally, the last rate of each currency pair is forwarded to the dashboard.

Running the Foreign Exchange Example

For optimal demonstration purposes, BEA recommends that you run this example on a powerful computer, such as one with multiple CPUs or a 3 GHz dual-core Intel, with a minimum of 2 GB of RAM.

To run the Foreign Exchange (FX) application that is pre-deployed to the fx_domain domain, you simply start an instance of WebLogic Event Server, as described in the following steps:

1. Open a command window and change to the fx domain directory, located in `WLEVS_HOME\samples\domains\fx_domain` directory, where `WLEVS_HOME` refers to the main WebLogic Event Server installation directory, such as `d:\beahome2\wlevs20`.

   ```
   prompt> cd d:\beahome2\wlevs20\samples\domains\fx_domain
   ```

2. Set your development environment, as described in "Setting Your Development Environment" on page 3-3.

3. Start WebLogic Event Server by running the `startwlevs.cmd` (Windows) or `startwlevs.sh` (UNIX) command:

   ```
   prompt> startwlevs.cmd
   ```

   If you are using the JRockit JDK included in WebLogic Real Time 2.0, enable the deterministic garbage collector by passing the `-dgc` parameter to the command:

   ```
   prompt> startwlevs.cmd -dgc
   ```

   The FX application is now ready to receive data from the data feeds.

4. To simulate an American data feed, open a new command window and set your environment as described in "Setting Your Development Environment" on page 3-3.

5. Change to the `WLEVS_HOME\utils\load-generator` directory, where `WLEVS_HOME` refers to the main WebLogic Event Server installation directory, such as `d:\beahome2\wlevs20`.

6. Run the load generator using the `fxAmer.prop` properties file:

   ```
   prompt> runloadgen.cmd fxAmer.prop
   ```

7. Repeat steps 4 - 6 to simulate an Asian data feed, using the `fxAsia.prop` properties file:

```
prompt> runloadgen.cmd fxAsia.prop
```

8. Repeat steps 4 - 6 to simulate an European data feed, using the `fxEuro.prop` properties file:

   ```
   prompt> runloadgen.cmd fxEuro.prop
   ```

After the server status messages scroll by in the command window from which you started the server, and the three load generators start, you should see messages similar to the following being printed to the server command window:

```
{crossRate=USDJPY, internalPrice=119.09934499999781}, {crossRate=USDGBP,
internalPrice=0.5031949999999915}, {crossRate=USDJPY,
internalPrice=117.73945624999783}
```

These messages indicate that the Foreign Exchange example is running correctly. The output shows the cross rates of US dollars to Japanese yen and US dollars to UK pounds sterling.

Building and Deploying the Foreign Exchange Example from the Source Directory

The Foreign Exchange (FX) sample source directory contains the Java source, along with other required resources such as configuration XML files, that make up the FX application. The `build.xml` Ant file contains targets to build and deploy the application to the fx_domain domain, as described in "Description of the Ant Targets to Build FX" on page 3-23.

Because a pre-packaged version of the FX application is already deployed to the fx_domain domain, the following procedure shows how to build and deploy a *duplicate* of the FX application alongside the original one, rather than overwriting it.

To build and deploy the FX application, follow these steps:

1. Open a new command window and change to the FX source directory, located in *`WLEVS_HOME`*`\samples\source\applications\fx`, where *`WLEVS_HOME`* refers to the main WebLogic Event Server installation directory, such as `d:\beahome2\wlevs20`.

   ```
   prompt> cd d:\beahome2\wlevs20\samples\source\applications\fx
   ```

2. Set your development environment, as described in "Setting Your Development Environment" on page 3-3.

3. Execute the `all` Ant target to compile and create the application JAR file:

   ```
   prompt> ant all
   ```

4. Execute the `stage` Ant target to copy the application JAR file, along with its configuration XML file, to the *`WLEVS_HOME`*`\fx_domain\applications\fx_new` directory:

```
prompt> ant stage
```

This target does not override the existing FX application, which is located in the *WLEVS_HOME*\fx_domain\applications\fx directory, but rather, creates an entirely new directory.

5. Change to the *WLEVS_HOME*\samples\domains\fx_domain directory

   ```
   prompt> cd d:\beahome2\wlevs20\samples\domains\fx_domain
   ```

6. Edit the `deployments.xml` file and change the `location` attribute of the lone `<wlevs:deployment>` tag to point to the new directory; the updated tag should look like this (updated text in bold):

   ```
   <wlevs:deployment id="fxApp" state="start"
   location="file:applications/fx_new/com.bea.wlevs.example.fx_2.0.0.0.
   jar"/>
   ```

7. If WebLogic Event Server for the fx_domain domain is running, you must restart it using the start script to deploy this new FX JAR file:

   ```
   prompt> startwlevs.cmd
   ```

   If you are using the JRockit JDK included in WebLogic Real Time 2.0, enable the deterministic garbage collector by passing the `-dgc` parameter to the command:

   ```
   prompt> startwlevs.cmd -dgc
   ```

   For details, see Stopping and Starting the Server.

8. If the load generators required by the FX application are not running, start them as described in "Running the Foreign Exchange Example" on page 3-21.

After server status messages scroll by, you should see the following message printed to the output:

```
    {crossRate=USDJPY, internalPrice=119.09934499999781}, {crossRate=USDGBP,
internalPrice=0.5031949999999915}, {crossRate=USDJPY,
internalPrice=117.73945624999783}
```

This message indicates that the FX example has been redeployed and is running correctly.

Description of the Ant Targets to Build FX

The `build.xml` file, located in the top-level directory of the FX source, contains the following targets to build and stage the application:

- `clean`—This target removes the `dist` and `output` working directories under the current directory.

- `all`—This target cleans, compiles, and jars up the application into a file called `com.bea.wlevs.example.fx_2.0.0.0.jar`, and places the generated JAR file into a `dist` directory below the current directory.
- `stage`—This target deploys the JAR file, along with its configuration files (`preprocessor.xml` and `spreader.xml`) to the fx_domain domain by copying the two files to the `*WLEVS_HOME*\samples\domains\fx_domain\applications\fx_new` directory.

Implementation of the FX Example

The implementation of the foreign exchange (FX) example generally follows the main steps for creating a WebLogic Event Server application; refer to that section for a procedure that describes the typical development process.

All the files of the FX example are located relative to the `*WLEVS_HOME*\samples\source\applications\fx` directory, where `*WLEVS_HOME*` refers to the main WebLogic Event Server installation directory such as `c:\beahome\wlevs20`. BEA recommends that you use this example directory setup in your own environment, although it is obviously not required.

The files used by the FX example include:

- A EPN assembly file that describes each component in the application and how all the components are connected together. You are required to include this XML file in your WebLogic Event Server application.

  In the example, the file is called `com.bea.wlrt.example.fx-context.xml` and is located in the `src/main/resources/META-INF/spring` directory.

  For details, see "The FX EPN Assembly File" on page 3-25.

- Two XML files that configure the processor components of the application.

  The first XML file configures the `preprocessorAmer`, `preprocessorAsia`, and `preprocessorEuro` components, all in a single file.   This XML file includes the EPL rules that select particular currency pairs from particular simulated market feeds and executes the boundary conditions described in the example overview. In the example, this file is called `preprocessors.xml` and is located in the `src/main/resources/META-INF/wlevs` directory.

  The second XML file configures the `spreader` processor. This component joins together all the events that were selected by the pre-processors, calculates an internal price for the particular currency pair, and then calculates the cross rate. This file is called `spreader.xml` and is located in the `src/main/config` directory.

For details, see "The FX Processor Configuration Files" on page 3-29.

- A Java file that implements the `OutputBean` component of the application, a POJO that contains the business logic. This POJO prints out to the screen the events that it receives, programmed in the `onEvent` method. The POJO also registers into the event type repository the `ForeignExchangeEvent` event type.

  In the example, the file is called `OutputBean.java` and is located in the `src/main/java/com/bea/wlevs/example/fx` directory.

  For additional information about the WebLogic Event Server APIs referenced in the POJO, see the WebLogic Event Server Javadocs.

- A Java file that implements the `ForeignExchangeBuilderFactory`, which is the factory that generates `ForeignExchangeEvents`.

  In the example, the file is called `ForeignExchangeBuilderFactory.java` and is located in the `src/main/java/com/bea/wlevs/example/fx` directory.

  For additional information about the WebLogic Event Server APIs referenced in `ForeignExchangeBuilderFactory`, see the WebLogic Event Server Javadocs.

- A `MANIFEST.MF` file that describes the contents of the OSGi bundle that will be deployed to WebLogic Event Server.

  In the example, the `MANIFEST.MF` file is located in the `src/main/main/resources/META-INF` directory

  See Assembling a WebLogic Event Server Application: Main Steps for information about creating this file, as well as a description of creating the OSGi bundle that you deploy to WebLogic Event Server.

The FX example uses a `build.xml` Ant file to compile, stage, assemble, and deploy the OSGi bundle; see "Building and Deploying the Foreign Exchange Example from the Source Directory" on page 3-22 for a description of this `build.xml` file if you also use Ant in your development environment.

The FX EPN Assembly File

The following example shows the EPN assembly file used in the FX sample application; see the explanation after the example for details about the entries in bold.

Note: See the first few paragraphs of "The HelloWorld EPN Assembly File" on page 3-11 for a brief overview of the EPN assembly file. For full reference information about the custom Spring tags, see WebLogic Event Server Custom Spring Tags Reference or the XSD Schema file that defines the tags.

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:osgi="http://www.springframework.org/schema/osgi"
       xmlns:wlevs="http://www.bea.com/ns/wlevs/spring"
       xsi:schemaLocation="
  http://www.springframework.org/schema/beans
  http://www.springframework.org/schema/beans/spring-beans.xsd
  http://www.springframework.org/schema/osgi
  http://www.springframework.org/schema/osgi/spring-osgi.xsd
  http://www.bea.com/ns/wlevs/spring
  http://www.bea.com/ns/wlevs/spring/spring-wlevs.xsd">

    <wlevs:event-type-repository>
      <wlevs:event-type type-name="ForeignExchangeEvent">
        <wlevs:class>
         com.bea.wlevs.example.fx.OutputBean$ForeignExchangeEvent
        </wlevs:class>
        <wlevs:property name="builderFactory">
         <bean id="builderFactory"

class="com.bea.wlevs.example.fx.ForeignExchangeBuilderFactory"/>

        </wlevs:property>
      </wlevs:event-type>
    </wlevs:event-type-repository>

    <!-- Assemble EPN (event processing network) -->

    <wlevs:adapter id="fxMarketAmer" provider="loadgen">
        <wlevs:instance-property name="port" value="9011"/>
    </wlevs:adapter>

    <wlevs:adapter id="fxMarketAsia" provider="loadgen">
        <wlevs:instance-property name="port" value="9012"/>
    </wlevs:adapter>
    <wlevs:adapter id="fxMarketEuro" provider="loadgen">
        <wlevs:instance-property name="port" value="9013"/>
    </wlevs:adapter>

    <wlevs:processor id="preprocessorAmer" listeners="spreaderIn"/>
    <wlevs:processor id="preprocessorAsia" listeners="spreaderIn"/>
    <wlevs:processor id="preprocessorEuro" listeners="spreaderIn"/>

    <wlevs:stream id="fxMarketAmerOut">
        <wlevs:listener ref="preprocessorAmer"/>
        <wlevs:source ref="fxMarketAmer"/>
    </wlevs:stream>

    <wlevs:stream id="fxMarketAsiaOut">
        <wlevs:listener ref="preprocessorAsia"/>
        <wlevs:source ref="fxMarketAsia"/>
    </wlevs:stream>

    <wlevs:stream id="fxMarketEuroOut">
        <wlevs:listener ref="preprocessorEuro"/>
        <wlevs:source ref="fxMarketEuro"/>
    </wlevs:stream>

    <wlevs:stream id="spreaderOut" advertise="true">
        <wlevs:listener>
            <!-- Create business object -->
            <bean id="outputBean"
                  class="com.bea.wlevs.example.fx.OutputBean"
                  autowire="byName"/>
        </wlevs:listener>
    </wlevs:stream>

    <wlevs:processor id="spreader">
        <wlevs:listener ref="spreaderOut"/>
    </wlevs:processor>

    <wlevs:stream id="spreaderIn">
        <wlevs:listener ref="spreader"/>
    </wlevs:stream>

</beans>
```

In the preceding example:

- The `<wlevs:event-type-repository>` entry registers the event types that are used throughout the application; in the FX application, there is just a single event type: `ForeignExchangeEvent`, implemented with the `ForeignExchangeEvent` inner class of the `com.bea.wlevs.example.fx.OutputBean` POJO class. The `<wlevs:property name="builderFactory">` child tag specifies that the event builder factory class in the FX application is implemented by the `com.bea.wlevs.example.fx.ForeignExchangeBuilderFactory`.

  WebLogic Event Server automatically creates instances of the `ForeignExchangeEvent` type when needed. You can then reference this data type in the EPL rules of the application, the adapter Java class, and the POJO.

- The set of `<wlevs:adapter>`, `<wlevs:processor>`, and `<wlevs:stream>` entries set up the event processor network by declaring each component in the network. The network consists of three adapters, four processors, and five streams, as described in "FX Event Processing Network" on page 3-20.

  Each component is given a unique ID which can be referenced by other components when they declare their listeners and sources.

- The `<wlevs:adapter>` entries specify the three adapters, for example:

  ```
  <wlevs:adapter id="fxMarketAmer" provider="loadgen">
     <wlevs:instance-property name="port" value="9011"/>
  </wlevs:adapter>
  ```

  The `provider="loadgen"` attribute of each `<wlevs:adapter>` specifies that the adapters get their data from the WebLogic Event Server load generator utility. The `<wlevs:instance-property>` child tag specifies the port number to which the adapter should listen.

- The `<wlevs:processor>` entries specify the four complex event processors, for example:

  ```
  <wlevs:processor id="preprocessorAmer" listeners="spreaderIn"/>
  ```

  The `listeners` attribute, common to all component tags, specifies the component that listens to the processor; in this case, it is a stream called `spreaderIn`.

  You can also use a `<wlevs:listeners>` child tag to specify the listeners of a component:

  ```
  <wlevs:processor id="spreader">
      <wlevs:listener ref="spreaderOut"/>
  </wlevs:processor>
  ```

  In the example, the `spreaderOut` stream listens to the `spreader` processor.

- The `<wlevs:stream>` entries specify the four streams, for example:

```
    <wlevs:stream id="fxMarketAmerOut">
        <wlevs:listener ref="preprocessorAmer"/>
        <wlevs:source ref="fxMarketAmer"/>
    </wlevs:stream>
```

As with all components, you can use the `<wlevs:listener>` and `<wlevs:source>` child tags to specify the other components that act as listeners and sources for this component.

In the example, the `preprocessorAmer` processor listens to the `fxMarketAmerOut` stream, which in turn listens to the `fxMarketAmer` adapter.

The following example shows how you can nest the definition of a component inside a `<wlevs:listener>` tag:

```
<wlevs:stream id="spreaderOut" advertise="true">
    <wlevs:listener>
      <!-- Create business object -->
      <bean id="outputBean"
            class="com.bea.wlevs.example.fx.OutputBean"
             autowire="byName"/>
        </wlevs:listener>
    </wlevs:stream>
```

In the example, the `outBean` POJO, declared as a standard Spring bean using the `<bean>` tag, listens to the `spreaderOut` stream. The `advertise="true"` attribute of the `spreaderOut` stream is used to register the stream as an OSGI service in the registry.

The FX Processor Configuration Files

The FX application uses four processors: three to handle the three data feeds and one that joins the resulting events. The first three processors are configured in a single XML file, called preprocessor.xml, as shown:

```
<?xml version="1.0" encoding="UTF-8"?>

<n1:config
xsi:schemaLocation="http://www.bea.com/xml/ns/wlevs/config/application
wlevs_application_config.xsd"
 xmlns:n1="http://www.bea.com/xml/ns/wlevs/config/application"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

<processor>
    <name>preprocessorAmer</name>
    <rules>
      <rule id="UsdToEurRule"><![CDATA[
        insert into ForeignExchangeEvent
        select avg(lastPrice) as price, 'USD' as fromRate, 'EUR' as toRate
        from (select * from StockTick where symbol='USDEUR') retain 1 sec
        where lastPrice < 3.0 and lastPrice > 0.25

        ]]></rule>
      </rules>
    </processor>

    <processor>
      <name>preprocessorAsia</name>
      <rules>
        <rule id="EurToJpyRule"><![CDATA[

        insert into ForeignExchangeEvent
        select avg(lastPrice) as price, 'EUR' as fromRate, 'JPY' as toRate
        from (select * from StockTick where symbol='EURJPY') retain 1 sec
        where lastPrice < 200.0 and lastPrice > 100.0

        ]]></rule>
      </rules>
    </processor>

    <processor>
      <name>preprocessorEuro</name>
      <rules>
        <rule id="EurToGbpRule"><![CDATA[

        insert into ForeignExchangeEvent
        select avg(lastPrice) as price, 'EUR' as fromRate, 'GBP' as toRate
        from (select * from StockTick where symbol='EURGBP') retain 1 sec
        where lastPrice < 1.5 and lastPrice > 0.5

        ]]></rule>
      </rules>
    </processor>

  </n1:config>
```

The three processors in this file are all essentially the same; the differences lie only in the values used in the EPL queries for querying different items from the data feeds and applying different boundary conditions. For this reason, this section will discuss just a single one of the processors: `preprocessorAmer`.

The EPL rule fired for the american data feed is:

```
insert into ForeignExchangeEvent
select avg(lastPrice) as price, 'USD' as fromRate, 'EUR' as toRate
from (select * from StockTick where symbol='USDEUR') retain 1 sec
where lastPrice < 3.0 and lastPrice > 0.25
```

To understand the query, one must look at the various clauses, as follows:

- The `insert` clause specifies that any event selected by this EPL rule should be inserted into `ForeignExchangeEvent`; this is the object that the next processor in the network, `spreader`, performs its own EPL query against.
- The `from` clause specifies that the processor should accept only those items from the StockTick data feed in which the `symbol` value is `USDEUR` (US dollar - European euro exchange) and should reject all other items. The `from` clause specifies also specifies that the window of time for which this EPL query executes is 1 second.
- The `where` clause specifies the boundary condition to ensure that the rates for a particular item from the feed fall within an accepted range; in this case, the `LastPrice` for a particular item from the feed must be between $3.00 and $0.25.
- The `select` clause specifies which values from the selected item should be inserted into the `ForeignExchangeEvent` object; in this case, the average of all prices in the window (1 second), and then the `USD` and `EUR` symbols to specify the to and from currency rates.

The spreader processor is configured with the `spreader.xml` file, as shown:

```
<?xml version="1.0" encoding="UTF-8"?>

<n1:config
xsi:schemaLocation="http://www.bea.com/xml/ns/wlevs/config/application
wlevs_application_config.xsd"
xmlns:n1="http://www.bea.com/xml/ns/wlevs/config/application"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

<processor>
    <name>spreader</name>
    <rules>
      <rule id="spreaderRule"><![CDATA[

      select ((a.price * b.price) + 0.05) as internalPrice, a.fromRate ||
b.toRate as crossRate
      from ForeignExchangeEvent a, ForeignExchangeEvent b retain 1 sec
      where a.toRate = b.fromRate
      ]]></rule>
    </rules>
  </processor>

</n1:config>
```

In the spreader EPL rule:

- The `from` and `where` clauses join two events from the `ForeignExchangeEvent` object (which contains events selected by the three `preprocessorXXX` components) where the value of the toRate and fromRate are the same. The `from` clause also sets the processing window, again of 1 second.
- The `select` clause calculates an internal price of a particular currency, which averages the to and from rate of a the currency plus a fee of $.05, and also calculates a cross rate, which is defined as the price of one currency in terms of another currency in the market of a third country.

The result of this query is then sent to the business object POJO.

For additional information and examples about using EPL, see the EPL Reference Guide.

Algorithmic Trading Example

The Algorithmic Trading sample application receives simulated market data and verifies if the price of a security has fluctuated more than two percent. The application also detects if there is a *trend* occurring by keeping track of successive stock prices for a particular symbol; if more than three successive prices fluctuate more than two percent, this is considered a trend.

The application simulates a market data feed using the WebLogic Event Server load generator utility; in this example, the load generator generates up to 10,000 messages per second. The example includes an HTML dashboard which displays the matched events along with the latencies; events consist of a stock symbol, a timestamp, and the price.

The example demonstrates very low latencies, with minimum latency *jitter* under high throughputs. Once the application starts running, the processor matches an average of 800 messages per second. If the application is run on the minimum configured system, the example shows very low average latencies (30-300 microsecond, on average) with minimal latency spikes (low milliseconds).

The example computes and displays latency values based on the difference between a timestamp generated on the load generator and timestamp on WebLogic Event Server. Computing valid latencies requires very tight clock synchronization, such as 1 millisecond, between the computer running the load generator and the computer running WebLogic Event Server. For this reason, BEA recommends running both the load generator and WebLogic Event Server on a single multi-CPU computer where they will share a common clock.

Note: In this release, you can only run the Algorithmic Trading example from its sample domain; the source files are not provided.

Running the Algorithmic Trading Example

For optimal demonstration purposes, BEA recommends that you run this example on a powerful computer, such as one with multiple CPUs or a 3 GHz dual-core Intel, with a minimum of 2 GB of RAM.

The `algotrading` domain contains a single application: the Algorithmic Trading sample application. To run the Algorithmic Trading application, you simply start an instance of WebLogic Event Server in the domain, as described in the following steps:

1. Open a command window and change to the `algotrading` domain directory, located in *`WLEVS_HOME`*`\samples\domains\algotrading_domain` directory, where *`WLEVS_HOME`* refers to the main WebLogic Event Server installation directory, such as `d:\beahome2\wlevs20`.

   ```
   prompt> cd d:\beahome2\wlevs20\samples\domains\algotrading_domain
   ```

2. Set your development environment, as described in "Setting Your Development Environment" on page 3-3.

3. Start WebLogic Event Server by running the `startwlevs.cmd` (Windows) or `startwlevs.sh` (UNIX) command:

   ```
   prompt> startwlevs.cmd
   ```

   If you are using the JRockit JDK included in WebLogic Real Time 2.0, enable the deterministic garbage collector by passing the `-dgc` parameter to the command:

   ```
   prompt> startwlevs.cmd -dgc
   ```

   The Algorithmic Trading application is now ready to receive data from the data feeds.

4. To simulate a data feed, you will use the WebLogic Event Server load generator, as described in the following steps:

   a. Open a new command window and set your environment as described in "Setting Your Development Environment" on page 3-3.

   b. Change to the `WLEVS_HOME\utils\load-generator` directory, where `WLEVS_HOME` refers to the main WebLogic Event Server installation directory, such as `d:\beahome2\wlevs20`.

   c. Run the load generator using the `fxAmer.prop` properties file:

   ```
   prompt> runloadgen.cmd AMEX.prop
   ```

5. Start a browser and open the following HTML page:

   ```
   http://localhost:9002/demouc1/dashboard.html
   ```

   Replace *`localhost`* with the name of the computer on which WebLogic Event Server is running.

6. In the browser, click the Start Button on the HTML page. You should start seeing the events that match the EPL rules configured for this example.

CHAPTER 4

Installing WebLogic Event Server

This section contains information on the following subjects:

- "Before You Begin" on page 4-1
- "Installation Overview" on page 4-2
- "Installing WebLogic Event Server in Graphical Mode: Main Steps" on page 4-3
- "Installing WebLogic Event Server in Console Mode: Main Steps" on page 4-5
- "Installing WebLogic Event Server in Silent Mode: Main Steps" on page 4-8
- "Post-Installation Steps" on page 4-14

Before You Begin

Before you install WebLogic Event Server 2.0:

- Optionally install WebLogic Real Time 2.0. BEA recommends this step if your applications require low latency. WebLogic Event Server 2.0 performs optionally when it can access certain features from WebLogic Real Time, in particular the JRockit deterministic garbage collector. WebLogic Event Server includes its own version of JRockit, but it does not include the deterministic garbage collector.

  You can download the WebLogic Real Time 2.0 distribution from the BEA Web site at http://commerce.bea.com.

WARNING: Be sure you install the version of WebLogic Real Time that includes JRockit 5.0. The version that includes JRockit 1.4.2 is *not* compatible with WebLogic Event Server 2.0.

- Install Apache Ant, a Java-based build tool. For details, see the Apache Ant Project.

Installation Overview

You install WebLogic Event Server using a standard BEA installation program. The program can be used in the following modes:

- **Graphical mode**

  Graphical-mode installation is an interactive, GUI-based method for installing your software. It can be run on both Windows and UNIX systems. See "Installing WebLogic Event Server in Graphical Mode: Main Steps" on page 4-3.

  WARNING: If you want to run graphical-mode installation, the console attached to the machine on which you are installing the software must support a Java-based GUI. All consoles for Windows systems support Java-based GUIs, but not all consoles for UNIX systems do. If you attempt to start the installation program in graphical mode on a system that cannot support a graphical display, the installation program automatically starts console-mode installation.

- **Console mode**

  Console-mode installation is an interactive, text-based method for installing your software from the command line, on either a UNIX system or a Windows system. See "Installing WebLogic Event Server in Console Mode: Main Steps" on page 4-5.

- **Silent mode**

  Silent-mode installation is a non-interactive method of installing your software that requires the use of an XML properties file for selecting installation options. You can run silent-mode installation in either of two ways: as part of a script or from the command line. Silent-mode installation is a way of setting installation configurations only once and then using those configurations to duplicate the installation on many machines. See "Installing WebLogic Event Server in Silent Mode: Main Steps" on page 4-8.

Installing WebLogic Event Server in Graphical Mode: Main Steps

The WebLogic Event Server graphical installation program is self-explanatory, however, you can follow these steps for more information.

1. Log in to the Windows or UNIX computer on which you want to install WebLogic Event Server.

   Be sure you log in to the computer as the user that will be the main administrator of the WebLogic Event Server installation.

2. Download the product distribution file for the platform on which you want to install WebLogic Event Server.

   You can download your software from the BEA Web site at http://commerce.bea.com.

3. Launch the installation program in graphical mode using the commands listed in the following table appropriate for your platform.

Platform	Instructions
Windows	Using Windows Explorer, double-click the `wlevs20_win32.exe` file from its download directory.

UNIX	Open a command window, change to the download directory, and enter these commands:
	`prompt> chmod a+x *filename*.bin`
	`prompt> ./*filename*.bin`
	In these commands, *`filename`*`.bin` is the name of the installation program specific to your platform, for example, `wlevs20_linux32.bin` and `wlevs20_solaris64.bin`.
	If you want to create an installation log, use the `-log=full_path_to_log_file` option; for example:
	`prompt> ./*filename*.bin`
	`-log=C:\logs\server_install.log`

4. After the installation program has finished loading, you will see the standard BEA Welcome window.

Click Next.

5. In the Choose BEA Home Directory window, you can specify either an existing BEA Home directory or create a new one. BEA recommends that you use the same BEA Home directory into which you installed WebLogic Real Time, if applicable.

   The BEA Home directory is the main installation directory for all BEA products, such as `c:\beahome`. You can have one or many BEA Home directories on your computer, whichever suits your development and production environments best.

   If you decide to install into an existing BEA Home directory, the installer program checks if the directory includes the version of JRockit required by this release of WebLogic Event Server. If it finds the required JRockit installation, it does not install a new one. If, however, the installer program does not find an appropriate JRockit installation, then the program installs its own version in the BEA Home directory.

   Use the Browse button to browse your computer for an existing or new BEA Home directory.

   Click Next.

6. In the Choose Install Type window, you can choose whether to install the complete version of WebLogic Event Server (recommended) or whether you want to pick the individual components of the product that you want to install.

   Click Next.

7. If you chose Custom in the preceding step, you will see the Choose Products and Components window. Check the components you want to install.

   Note: In this version of WebLogic Event Server, the only component you can install separately is the Event Server Samples.

   Click Next.

8. In the Choose Product Installation Directories, you can change the default name of the home directory of WebLogic Event Server, `wlevs20`.

   Although you can name this directory anything you want, BEA recommends that you use the default name for clarity and standardization. For example, the documentation assumes that you install into the `wlevs20` directory.

   Click Next.

9. If you are installing on Windows, and you logged in as a user with Administrator privileges, then you will see the Choose Shortcut Location window where you can choose where you want the Start Menu folder to appear. The following table describes the options available:

If you select . . .	The following occurs . . .
All Users	Recommended. All users registered on the machine are provided with access to the installed software. Subsequently, if users without Administrator privileges use the Configuration Wizard from this installation to create domains, Start menu shortcuts to the domains are not created. In this case, users can manually create shortcuts in their local Start menu folders, if desired.
Local user	Other users registered on this machine will not have access to the Start menu entries for this installation.

If you logged in as a user without Administrator privileges, the Start menu entries are created in your user's local Start menu folder.

Click Next.

The installer program installs WebLogic Event Server. The Installation Complete window indicates that the product was installed successfully.

10. Click Done to exit the program.

Installing WebLogic Event Server in Console Mode: Main Steps

Console-mode installation is an interactive, text-based method for installing your software from the command line, on either a UNIX or Windows system.

When installing in console-mode, respond to the prompts in each section by entering the number associated with your choice or by pressing Enter to accept the default. To exit the installation process, enter `exit` (or `x`, for short) in response to any prompt. To review or change your selection, enter `previous` (or `p`, for short) at the prompt. To proceed to the following window, enter `next` (or `n`, for short).

Note: In the following procedure, Windows conventions (such as back-slashes in pathnames) are used, for example, `C:\bea\wlevs20`. When entering pathnames on a UNIX system, be sure to use UNIX conventions, instead. For example, use forward slashes in pathnames, such as `/home/bea/wlevs20`.

The following procedure steps you through the installation program.

1. Log in to the Windows or UNIX computer on which you want to install WebLogic Event Server.

   Be sure you log in to the computer as the user that will be the main administrator of the WebLogic Event Server installation.

2. Download the product distribution file for the platform on which you want to install WebLogic Event Server.

   You can download your software from the BEA Web site at http://commerce.bea.com.

3. Launch the installation program in console mode using the commands listed in the following table appropriate for your platform.

Platform	Instructions

Windows	Open a command window, change to the download directory, and enter the following command:
	`prompt> wlevs20_win32.exe -mode=console`
	If you want to create an installation log, use the `-log=`*`full_path_to_log_file`* option; for example:
	`prompt> wlevs20_win32.exe -mode=console`
	`-log=C:\logs\server_install.log`

UNIX	Open a command window, change to the download directory, and enter these commands:
	`prompt> chmod a+x `*`filename`*`.bin`
	`prompt> ./`*`filename`*`.bin -mode=console`
	In these commands, *`filename`*`.bin` is the name of the installation program specific to your platform, for example, `wlevs20_linux32.bin` and `wlevs20_solaris64.bin`.
	If you want to create an installation log, use the `-log=full_path_to_log_file` option; for example:
	`prompt> ./`*`filename`*`.bin -mode=console`
	`-log=C:\logs\server_install.log`

4. At the Welcome prompt, type `next` (or `n` for short) or press Enter to continue with the installation process.

5. In the Choose BEA Home Directory window, the list of known BEA home directories (if any) appear, as well as an option to create a new one. BEA recommends that you use the same BEA Home directory into which you installed WebLogic Real Time, if applicable.

   The BEA Home directory is the main installation directory for all BEA products, such as `c:\beahome`. You can have one or many BEA Home directories on your computer, whichever suits your development and production environments best.

   If you decide to install into an existing BEA Home directory, the installer program checks if the directory includes the version of JRockit required by this release of WebLogic Event Server. If it finds the required JRockit installation, it does not install a new one. If, however, the installer program does not find an appropriate JRockit installation, then the program installs its own version in the BEA Home directory.

   Type 1 to create a new BEA home directory, or type the number of the existing BEA Home directory.

6. If you chose 1 to create a new BEA Home directory, the installation program guides you through the required steps to create the new BEA Home. Be sure to enter the *full* path of the BEA Home directory, for example `C:\beahome2`. If you specify a directory that does not exist, the installation program creates it for you.

7. In the Choose Install Type window, you can choose whether to install the complete version of WebLogic Event Server (recommended) or whether you want to pick the individual components of the product that you want to install.

   Enter 1 for a complete install or 2 for a custom install.

8. If you chose Custom in the preceding step, you will see the Choose Components to Install window. Enter the numbers in brackets to toggle the components you want to install.

   Note: In this version of WebLogic Event Server, the only component you can install separately is the Samples.

   Enter `next` (or `n`) when you have chosen the components.

9. In the Choose Product Installation Directories, you can change the default name of the home directory of WebLogic Event Server, `wlevs20`, by entering a new value.

   Although you can name this directory anything you want, BEA recommends that you use the default name for clarity and standardization. For example, the documentation assumes that you install into the `wlevs20` directory.

   Enter `next` (or `n`) when you are done.

10. If you are installing on Windows, and you logged in as a user with Administrator privileges, then you will see the Choose Shortcut Location window where you can choose where you want the Start Menu folder to appear. The following table describes the options available:

If you select . . .	The following occurs . . .
1 "All Users"	Recommended. All users registered on the machine are provided with access to the installed software. Subsequently, if users without Administrator privileges use the Configuration Wizard from this installation to create domains, Start menu shortcuts to the domains are not created. In this case, users can manually create shortcuts in their local Start menu folders, if desired.
2 "Local user"	Other users registered on this machine will not have access to the Start menu entries for this installation.

    If you logged in as a user without Administrator privileges, the Start menu entries are created in your user's local Start menu folder.

    Enter the appropriate number.

    The installer program installs WebLogic Event Server. The Installation Complete window indicates that the product was installed successfully.

11. Type `exit` to exit the program.

Installing WebLogic Event Server in Silent Mode: Main Steps

Silent-mode installation is a non-interactive method of installing your software that requires the use of an XML properties file for selecting installation options. To install using silent mode:

1. Log in to the Windows or UNIX computer on which you want to install WebLogic Event Server.

   Be sure you log in to the computer as the user that will be the main administrator of the WebLogic Event Server installation.

2. Download the product distribution file for the platform on which you want to install WebLogic Event Server.

You can download your software from the BEA Web site at http://commerce.bea.com.

3. Create a `silent.xml` file that defines the configuration settings normally entered by a user during an interactive installation process. See "Creating a silent.xml File for Silent-Mode Installation" on page 4-11.

   Note: Incorrect entries in the `silent.xml` file can cause installation failures. To help you determine the cause of a failure, we recommend that you create a log file when you launch the installation program.

4. Launch the installation program in silent mode using the commands in the following table appropriate for your platform.

Platform	Instructions

Windows	Open a command window, change to the download directory, and enter the following command:
	`prompt> wlevs20_win32.exe -mode=silent`
	`-silent_xml=`*`path_to_xml_file`*
	In the preceding command, *`path_to_xml_file`* is the full pathname of the `silent.xml` template file you created in the preceding step.
	If you want to create an installation log, use the `-log=`*`full_path_to_log_file`* option; for example:
	`prompt> wlevs20_win32.exe -mode=silent`
	`-silent_xml=`*`path_to_xml_file`*
	`-log=C:\logs\server_install.log`

UNIX	Open a command window, change to the download directory, and enter these commands:
	`prompt> chmod a+x `*`filename`*`.bin`
	`prompt> ./`*`filename`*`.bin -mode=silent`
	`-silent_xml=`*`path_to_xml_file`*
	In these commands, *`filename`*`.bin` is the name of the installation program specific to your platform, for example, `wlevs20_linux32.bin` and `wlevs20_solaris64.bin`, and *`path_to_xml_file`* is the full pathname of the `silent.xml` template file you created in the preceding step.
	If you want to create an installation log, use the `-log=full_path_to_log_file` option; for example:
	`prompt> ./`*`filename`*`.bin -mode=silent`
	`-silent_xml=`*`path_to_xml_file`*
	`-log=C:\logs\server_install.log`

A BEA Installer window is displayed, indicating that the files are being extracted. No other prompt or text is displayed.

The installation is complete when the BEA Installer window disappears.

See "Returning Exit Codes to the Command Window" on page 4-13 for getting information about the success or failure of the silent installation.

Creating a silent.xml File for Silent-Mode Installation

When you install WebLogic Event Server in silent mode, the installation program uses an XML file (`silent.xml`) to determine which installation options should be implemented.

To create a `silent.xml` file, follow these steps:

1. Using your favorite text edit, create an empty file called `silent.xml` on the computer on which you want to install WebLogic Event Server in silent mode.
2. Copy the contents of the sample XML file, shown in "Sample silent.xml File for Silent-Mode Installation" on page 4-13, into your own `silent.xml` file.
3. In the `silent.xml` file you just created, edit the values for the keywords shown in Table 4-1 to reflect your configuration.

   For example, if you want to install into the BEA Home directory `e:\beahome`, update the corresponding `<data-value>` element as follows

   ```
   <data-value name="BEAHOME" value="e:\beahome" />
   ```
4. Save the file in the directory of your choice.

Table 4-1 Values for the silent.xml File

For this data-value name...	Enter the following value...
BEAHOME	The full pathname for the BEA Home directory of your choice.
USER_INSTALL_DIR	The full pathname for the directory where you want to install your WebLogic Event Server software.

Table 4-1 Values for the silent.xml File

For this data-value name…	Enter the following value…
INSTALL_SHORTCUT_IN_ALL_USERS_FOLDER	Windows only. Specify: • `true`, or `yes`, to create the shortcuts in the All Users folder. • `false`, or `no`, to create the shortcuts in the local users folder. The user performing the installation must have Administrator privileges to install the Start menu shortcuts in the All Users folder. The default value for this parameter, if you do not specify it, is `true`.

COMPONENT_PATHS	Specify the components and subcomponents of WebLogic Event Server you want to install on your system. Use the following values:
	`WebLogic Event Server`
	`WebLogic Event Server/Event Server`
	`WebLogic Event Server/Event Server Samples`
	For additional information about entering these values, see "Guidelines for Component Selection" on page 4-12.
	If you do not include the `COMPONENT_PATHS` data-value name in the `silent.xml` file, the complete WebLogic Event Server product is installed.

Guidelines for Component Selection

Use the following guidelines when you specify values for the `COMPONENT_PATHS` data-value name:

- When you specify a product component to be installed, all subcomponents that are installed by default in a complete installation are also installed. For example, the following entry installs both WebLogic Server and the samples:

```
<data-value name="COMPONENT_PATHS" value="WebLogic Event Server" />
```

- To install multiple components or subcomponents, separate the components with a bar (|). Do not leave a space before or after the bar.
- To specify subcomponents, you must specify a component/subcomponent combination for each entry. For example, to explicitly install WebLogic Event Server and the samples, enter the following line in the file:

  ```
  <data-value name="COMPONENT_PATHS" value="WebLogic Event Server/Event
  Server|WebLogic Event Server/Event Server Samples" />
  ```

  Note: Because this release of WebLogic Event Server includes only the server itself and samples, the preceding example is equivalent to the example in the first bullet.

Sample silent.xml File for Silent-Mode Installation

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Silent installer option: -mode=silent -silent_xml=C:\bea\silent.xml -->

<bea-installer>
  <input-fields>
      <data-value name="BEAHOME"            value="C:\bea" />
      <data-value name="USER_INSTALL_DIR"   value="C:\bea\wlevs20" />
      <data-value name="INSTALL_SHORTCUT_IN_ALL_USERS_FOLDER"   value="yes"/>
      <data-value name="COMPONENT_PATHS" value="WebLogic Event Server" />
  </input-fields>
</bea-installer>
```

Returning Exit Codes to the Command Window

When run in silent mode, the installation program generates exit codes that indicate the success or failure of the installation. These exit codes are shown in the following table.

Table 4-2 Exit Codes

Code	Description
0	Installation completed successfully
-1	Installation failed due to a fatal error
-2	Installation failed due to an internal XML parsing error

Listing 4-1 provides a sample Windows command file that invokes the installation program in silent mode and echoes the exit codes to the command window from which the script is executed.

Listing 4-1 Sample Windows Command File Displaying Silent-Mode Exit Codes

```
rem Execute the installer in silent mode
@echo off
wlevs20_win32.exe -mode=silent -silent_xml=C:\downloads\silent.xml
-log=C:\logs\products_silent.log

@rem Return an exit code to indicate success or failure of installation
set exit_code=%ERRORLEVEL%

@echo.
@echo Exitcode=%exit_code%
@echo.
@echo Exit Code Key
@echo ---------------
@echo  0=Installation completed successfully
@echo -1=Installation failed due to a fatal error
@echo -2=Installation failed due to an internal XML parsing error
@echo.
```

Post-Installation Steps

After installing WebLogic Event Server:

- Try out the product examples. For information about the examples and how to run them, see Chapter 3, "WebLogic Event Server Examples."
- Create your own WebLogic Event Server domain. See Creating a WebLogic Event Server Domain.
- Create a WebLogic Event Server application and deploy it to your new domain. See Creating WebLogic Event Server Applications for a description of the programming model, details about the various components that make up an application, and how they all fit together.