Foreword

Once you have a good grasp of the Java language and feel comfortable with applying the class libraries using the Standard Edition of the Java System Development Kit, you'll almost certainly be looking at where to go next. Progression to the Enterprise Edition of the SDK is likely to be a natural choice for many, simply because so much professional Java programming effort is deployed in developing network-based applications. However, getting into developing Web Services and Enterprise Applications generally is more of a giant leap than a small step, simply because of the vast range of programming topics, technologies, and standards you have to master. This book is a very good starting point because it provides you with a structured introduction to most of what you need to know.

The previous edition of this book provided an excellent introduction to server-side programming using the Java 2 Platform, Enterprise Edition, J2EE, and this new edition is even better, having been fully updated to cover the latest version, J2EE 1.4. In a single book package, it covers all of the key capabilities provided by the J2EE 1.4 that you are most likely to need in a real-world Java development context. Because it starts by carefully explaining what J2EE is all about and how it relates to the Java 2 Platform, Standard Edition, you'll have an appreciation of the inter-relationships between the specific topics that you need for effective server-side programming in Java from the outset. This will enable you to better see how the various technologies involved can be combined when you get into the detail.

After guiding you through the process of setting up a development environment for web applications, it continues with introductory tutorials on the core topics in server-side programming, JSP and servlets. It doesn't end there. A whole range of supportive web programming technologies are discussed, each with working examples that show you how they can be applied. These include JDBC for database access, Enterprise JavaBeans, XML of course, SOAP, WDSL, and many others.

The book is the product of a cooperative effort by several authors who are each experts in their field. Each topic has the benefit of being explained by the author who is best equipped to provide an effective tutorial on that subject. As a professional Java programmer, you need to be conversant with the latest Java technologies for the development of Web applications. You also need a good overall perspective on the most up-to-date version of J2EE and what its capabilities are. This is precisely what you get in this book.

Ivor Horton, best-selling author of computer programming books on Java, C, and C++

Introduction

First things first before we dive in. We, the authors, have read a lot of books on designing and developing software–some better than others–and spent a lot of time and money in the process. We had some very specific thoughts as we put this book together.

First and foremost, the focus of this book is on the *practical* aspects of getting started with developing distributed software for the J2EE platform. J2EE is a broad and deep subject, and getting started can be like getting a drink from a fire hose. We wanted to put together a practical approach to getting started, and spend most of our time talking about the topics that you'll use 90% (or more) of the time. We are serving up meat and potatoes here.

When we pick up a book on software development, we like to have the option of reading straight through, or to skip around and pick up the topics that we're interested in at a given time. As an introduction to J2EE, you'll learn the most if you first read through each chapter in order. Later, as you go back to particular sections, you'll find it easy to skip back to refresh your memory, so feel free to skip around in this book–we hope that we've done a good job of making each topic stand on its own, and provided examples that are straightforward and relevant.

The authors of this book are software engineers first. Like you, we have more projects than time to do them in, and we understand that you don't have extra time to waste when it comes to learning new technologies. We hope the result is a book that you will pick up frequently, highlight, bookmark, and consider a valued addition to your development resources.

Like J2SE, J2EE is comprised of several packages containing classes and interfaces that define the J2EE framework. You're already familiar with J2SE, and you got that expertise by taking the J2SE framework one topic at a time. We'll take J2EE the same way–one topic at a time.

Who Is This Book For?

This book is mainly aimed at people who already have knowledge of basic Java, and have been developing small, client-side applications for the desktop. If you have read and absorbed the information contained in an entry-level book such as *Beginning Java 2* written by Ivor Horton, then you will be well placed to begin your journey to developing server-side applications using J2EE.

If you are coming from another object-oriented language, such as C++ or C#, and you wish to begin developing enterprise-level applications with Java, then you will also benefit greatly from this book. The coding concepts, principles, and constructs are similar; you just need to watch out for the syntax differences and, obviously, the different code architecture for the different technology areas of J2EE.

What Does This Book Cover?

This book will take you from having a good grip of the basic Java language to being able to create reusable and scaleable components of J2EE, such as JavaServer Pages, Enterprise JavaBeans, and web services. At the end of the book, we will also point you in which direction to go to find out more information on your chosen areas of interest, and how you could land yourself the perfect job developing enterprise applications.

Here's a rundown of what you can expect to see as you work through the book.

- **Chapter 1: J2EE Essentials**–This chapter will lay out a roadmap of what J2EE is and how it is used as an application foundation. You'll get an introduction to the primary components of J2EE and how they fit together.
- **Chapter 2: Getting Set**–Having your machine configured correctly is essential if you want to be able to run the sample code presented in this book. This chapter walks through the installation, configuration, and testing of the core components of J2EE.
- **Chapter 3: JavaServer Pages**–An introduction to the world of server-side web programming using JSP pages. This chapter covers how to write simple JSP pages, covering the fundamentals of the technology and how they can be very useful in your web applications.
- **Chapter 4: Advanced JSP Topics**–In this chapter, we follow on from the basics of JSP, and look at some deeper features of the technology, such as the expression language, custom actions, and the JSP Standard Tag Library.
- **Chapter 5: Servlets**–Next, we cover another highly used component in J2EE web applications–servlets, which are designed to be extensions to servers and to extend the capabilities of servers and provide dynamic behavior.
- **Chapter 6: Working with Databases**–At some point in developing a J2EE application, you will very likely need to store and manipulate data stored in a data source. This is where JDBC comes in, and this chapter introduces this functionality where we access the Cloudscape database.

- ❑ **Chapter 7: Advanced Topics in JDBC**–After learning the basic data access functionality in the previous chapter, you will see deeper topics of JDBC in this chapter, covering prepared statements and stored procedures, transactions, and locking.
- ❑ **Chapter 8: EJB Fundamentals**–In this part of the book, we begin to look at a feature of J2EE dedicated to expressing the business logic of an application–Enterprise JavaBeans or EJBs. This chapter mainly focuses on an overview of EJB technology and looks at session beans in detail.
- ❑ **Chapter 9: EJB Entity Beans**–This second chapter on EJBs looks at another type of EJB, entity beans, and how they relate and fit in with other types of bean. We cover two different types of persistence and take a look at the EJB Query Language.
- ❑ **Chapter 10: More EJB Topics**–Creating container-managed relationships and combining the use of JDBC and EJBs are the two topics of this chapter. We also build on the EJB-QL knowledge gleaned from the previous chapter by looking at EJB-QL select methods.
- ❑ **Chapter 11: Design Patterns and Message-Driven Beans**–In the final EJB chapter of the book, we look at what design patterns are, and how they can be applied to your EJB applications and what benefits they bring. We also cover the final type of bean–message-driven beans.
- ❑ **Chapter 12: Web Services and JAX-RPC**–The next major topic in the book covers concepts of enabling distributed applications via the magic of web services. We will look at topics such as the fundamentals, guidelines and good practices, and other issues that you should be aware of when creating web services.
- ❑ **Chapter 13: More J2EE Web Services Topics**–In the second web services chapter of this book, we move on to combining different J2EE technologies. You will see how to implement a session bean as a web service, and also how to implement a stateful web service.

What You Need to Use This Book

The prerequisite system and software requirements for this are very small. Since you already have a background in Java, then you will no doubt have a version of the J2SE SDK installed on your machine already. In this book, we've used the latest version of the Standard Edition software development kit, which was J2SE 1.4.2. Throughout the book, we have used Microsoft Windows as our operating system but since Java has a "write once, run anywhere" motto, you can use another platform such as Solaris or Linux without any major changes to the code you see.

The only other piece of software you need to download and install to run the examples and follow the discussions in this book is the J2EE 1.4 SDK. We used the final version, released in November 2003, when writing this book.

Style Conventions

We have used certain layout and font styles in this book that are designed to help you to differentiate between the different kinds of information. Here are examples of the styles that are used, with an explanation of what they mean.

As you'd expect, we present code in two different ways: code used inline with text, and code that is displayed on its own. When we need to mention keywords and other coding specifics within the text (for example, in discussion relating to an `if...else` construct or the `beans` package) we use the single-width font as shown in this sentence. If we want to show a more substantial block of code, then we display it like this:

```
package beans;
import java.rmi.RemoteException;
import javax.ejb.EJBHome;
import javax.ejb.CreateException;

public interface SimpleSessionHome extends EJBHome {
  // The create() method for the SimpleSession bean
  public SimpleSession create()
    throws CreateException, RemoteException;
}
```

Sometimes, you will see code in a mixture of gray and white backgrounds, like this:

```
package beans;

import java.rmi.RemoteException;
import javax.ejb.EJBObject;

public interface SimpleSession extends EJBObject {
  // The public business method on the SimpleSession bean
  public String getEchoString(String clientString)
    throws RemoteException;
}

  private void Page_Load(object sender, System.EventArgs e)
  {
    HeaderIconImageUrl = Request.ApplicationPath + "/Images/winbook.gif";
    HeaderMessage = "Informative Page";
  }
```

In cases like this, we use the gray shading to draw attention to a particular section of the code–perhaps because it is new code, or it is particularly important to this part of the discussion.

Sometimes, you will need to type in commands on the command line. We will display situations like that using the following style:

```
> set classpath=.;%J2EE_HOME%\lib\j2ee.jar
> javac -d . client/*.java
```

We show the prompt using a > symbol and then highlight in the **bold** commands you need to type.

Advice, hints, and background information come in this type of font.

> **Important pieces of information come in boxes like this.**

Bullets appear indented, with each new bullet marked as follows:

- ❑ **Important Words** are in a bold type font.
- ❑ Words that appear on the screen, or in menus like File or Window, are in a similar font to the one you would see on a Windows desktop.
- ❑ Keys that you press on the keyboard like *Ctrl* and *Enter*, are in italics.

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