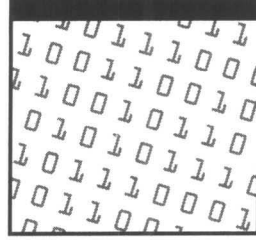


Making Use of

JSP

Madhushree Ganguli





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Introduction

The world seems to shrink each day, thanks to the ever-increasing power of the Internet. With the growth and popularity of the Internet, even distant areas across the globe seem closer today. It is indeed the era of fast communication and information exchange. To retain a commanding position in this changing world, organizations need to prepare themselves for the rapid development of Web-based applications that are platform-independent. As a result, organizations need to identify the tools required to emerge as a formidable force in the competitive world of Web-based applications. Java Server Pages, or JSP, a Sun Microsystems product, is one tool that is fast catching up as a preferred technology for creating Web-based applications.

JSP is based on the Java technology and is an extension of the Java Servlet technology. As a result, platform independence and extensibility of servlets are easily incorporated in JSP. In addition, using the Java server-side modules, JSP can fit effortlessly into the framework of a Web server with minimal overhead, maintenance, and support. The use of XML-like tags and Java-like syntax in JSP facilitate building Web-based applications with speed and ease as never before.

The power, extensibility, and portability of JSP are well described by the following statements from Sun Microsystems:

The JSP specification is the product of industry-wide collaboration with industry leaders in the enterprise software and tools market, led by Sun Microsystems. Sun has made the JSP specification freely available to the development community with the goal that every Web server and application server will support the JSP interface.

Future Direction

By working with a consortium of industry leaders, Sun has ensured that the JSP specifications remain open and portable. Over time, tool vendors and others will extend the functionality of the platform by providing customized tag libraries for specialized functions.

It is beyond doubt that JSP will rule the market in the future and become one of the most powerful languages for developing Web applications. The use of customized tags

and libraries is gaining wide acceptance in the industry as a flexible mechanism that allows segregation of the work profiles of the page author and the programmer.

Along with conceptual information, this book will also provide extensive practical exercises for the reader to gain valuable real-life exposure in creating different types of applications. The aim of this book is to make learning an enjoyable and energizing process.

Overview of JavaServer Pages

Two friends, Gwen and Griffith, decide to enroll themselves in a short course during the fall break. While Gwen's choice is interior decoration, Griffith chooses a more professional course in secretarial practice. Both friends, being computer savvy, search the Internet and come up with the same site advertising their choices of short courses. As an afterthought, both Gwen and Griffith marveled that although their choice of courses was different, the same site displayed a list of details for the two completely different courses. How was the display of the courses linked and changed according to the search criteria? What actually ensued was a request-response cycle that displayed the result pertaining to the individual query. In other words, the Web application for the site received the requests and returned dynamic content in the form of the course details. In the world of the Internet, dynamism is part and parcel of Web applications. Technologies such as Hypertext Pre Processor (PHP), Active Server Pages (ASP), and Java Server Pages (JSP) are used to create dynamic Web applications.

This book will help you understand the JSP technology that can be used to create applications to generate dynamic content. Java Server Pages allows Web developers and designers to develop easily maintainable, information-rich, dynamic Web pages. Java Server Pages separates the user interface from content generation. This enables designers to change the layout of a Web page without altering the underlying dynamic content. As a result, the workload can be clearly separated into two categories, the graphical content created by a designer or a page author and the dynamic content created by the developer or the programmer. As a result, in simple words, JSP provides a simplified, faster way to create dynamic Web content.

History of JSP

Sun Microsystems was founded in 1982. Ever since its inception, Sun Microsystems has maintained a singular vision of "The Network Is The Computer." This vision has helped Sun Microsystems remain as one of the leading providers of industrial-strength hardware, software, and services to aid companies across the world. The company has a global presence in more than 170 countries with gross annual revenue crossing the \$17 billion mark.

A significant year in the history of Sun Microsystems was 1995. This was the year when Sun received ISO 9001 certification for quality in all major country service organizations and ISO 9002 certification for all worldwide manufacturing operations. In the same year, the company unleashed Java technology, which was the first universal software platform designed for the Internet and corporate intranets. Java technology

enabled developers to write applications once and run them on computers anywhere without any modifications. If we flip back the pages of the history of Java, we'll realize that the introduction of Java was more of an accident. In fact, you'll be surprised to know that Java was originally developed not for computers but for home appliances such as ovens, toasters, and refrigerators. The accident, though, has proved to be a boon in disguise—with the popularity of the Internet neither Sun nor Java has had to look back. Java has worked hard to be accepted and recognized as a favorite language for developing Web applications.

JSP is a part of the Java family that shares the key characteristics of the Java technology: "Write Once, Run Anywhere." It is a core component of the Java 2 Enterprise Edition. JSP has inherited most of the features and benefits of both Java and Servlet technology and is fast gaining acceptance as a standard tool for building dynamic Web sites.

Features of JSP

JSP provides an attractive alternative to other dynamic scripting languages by offering the following features:

Platform independence. The use of JSP adds versatility to a Web application by enabling its execution on any computer.

Enhanced performance. The compilation process in JSP produces faster results or output.

Separation of logic from display. The use of JSP permits the HTML-specific static content and a mixture of HTML, Java, and JSP-specific dynamic content to be placed in separate files.

Ease of administration. The use of JSP eliminates the need for high-level technical expertise, thereby helping Web developers, designers, content creators, and content managers to work together and develop Java-based applications in less time and with less effort.

Ease of use. All JSP applications run on major Web servers and operating systems, including Microsoft IIS, Netscape Enterprise Server, iPlanet Web Server, and Apache Web Server. These applications are also available on Windows NT, Windows 2000, and Solaris 7.

Users of the Product/Technology

By moving Web development into the twenty-first century, Java Server Pages technology enables faster product delivery time. Here are a few examples of enterprises that are using the Java Server Pages framework to deliver break-away business strategies for both themselves and their customers:

- Knight Ridder
- Delta Airlines

- Waterstone Consulting
- Axtive Software Corporation
- MetaMarkets.com, Inc.
- Cambridge Interactive
- NMG New Media Group
- Epicentric, Inc.
- PostalWorks LLC
- Flashline.com, Inc.
- TheWorksUSA.com
- Klicman Incorporated
- TouchNet Information Systems, Inc.
- Linnebank IT
- Tradiant

Competing Products across Platforms

Competing products include Active Server Pages (ASP), Hypertext Pre Processor (PKP), and JavaScript.

JSP versus ASP. ASP is the immediate competing technology from Microsoft.

The dynamic content of JSP is written in Java, in contrast to that of ASP, which is written using an ASP-specific language, such as VBScript. As a result, complex applications can use the power of Java to reuse and embed Java components in JSP applications. Second, JSP is portable to other operating systems and servers in contrast to the allegiance of ASP to Windows NT/2000 and IIS.

JSP versus PHP. PHP is similar to ASP and JSP to a certain extent. PHP is a free, open-source, HTML-embedded, server-side scripting language. With basic HTML knowledge, however, a VBScript programmer can write ASP applications and a Java programmer can create JSP applications, whereas PHP requires learning an entirely new language. Second, by virtue of the power of Java, JSP has access to an extensive API for networking, database access, and object distribution.

JSP versus JavaScript. JavaScript is a programming language that is totally different from the server-side HTML and Java-based JSP technology. JavaScript is a client-side programming language used to build parts of HTML Web pages while the browser loads a document. As a result, the pages generated in JavaScript create dynamic content that is solely based on the client environment. JSP applications, by virtue of its being a server-side scripting language, use mechanisms such as hidden fields, session objects, cookies, and URL rewriting to access all request data transmitted during a request-response cycle. Equipped with only cookies as aids to provide request data, the client-side JavaScript

routines are unable to access the HTTP request data. Although JavaScript can be used on servers as a scripting language for IIS, JSP backed by the reliability, flexibility, and portability of Java is a more powerful technology by far.

How This Book Is Organized

This book differs from the traditional content-based approach and uses the problem-based approach to deliver the concepts of JSP. Problems used in the book are presented against the backdrop of real-life scenarios. The problem is followed by a task list that helps to solve the given problem, in the process explaining the concepts and their implementation. This practical approach will help readers understand the real-life application of the language and its use in various scenarios. Moreover, to provide an appropriate learning experience, the concepts will be supported adequately by case studies that provide a frame of reference for the reader.

Chapter 1 is a guide to the basics of the Internet and discusses the World Wide Web environment, browser and server interactions, and the HTTP request-response cycle.

Chapter 2 is a getting-started guide that begins with a brief introduction to JSP. This is followed by a discussion on the JSP life cycle and concludes with the steps used for installing and setting up the environment to execute JSP applications.

Chapter 3 attempts to highlight the advantages incorporated in JSP as an extension of Java Servlet technology. The chapter begins with a discussion of the JavaServlet architecture and life cycle. The chapter concludes with an example of a simple servlet that is used to count the number of hits for a particular page.

Chapter 4 introduces concepts related to creating a JSP application. It discusses the various components of a JSP page by using the simple "Hello World" example. The difference between static and dynamic content is also discussed using appropriate examples.

Chapter 6 delves into the all-important concept of HTML forms. All user-specific input is transferred to the server by using various controls of the HTML page. The chapter begins with an introduction to HTML forms, followed by a discussion of the various types of HTML controls that can be added to a form. Next, the mechanisms of retrieval and transfer of form values in JSP are discussed using a simple example. The chapter concludes with a JavaScript-aided client-side validation for ensuring user input in a form control.

Chapters 6, 7, and 8 discuss the different JSP-specific components one by one. Chapter 5 discusses implicit objects, including such implicit objects as request, response, session, application, and config. This is followed by a brief discussion of the importance of the scope of implicit objects.

Chapter 7 discusses two JSP components, directives and action elements. The chapter begins with the types and uses of the page, include, and taglib directives. Next, the various JSP standard actions are discussed with suitable examples. In the concluding section of the chapter, examples are used to show the difference in the usage of the include directive and the include standard action.

Chapter 8 introduces the scripting elements of JSP that are primarily used to generate the dynamic content. It discusses the use of the three types of scripting elements: scriptlets, expressions, and declarations.

Chapter 9 explains concepts relating to reusing Java bean components in a JSP page. The chapter begins with an introduction to JavaBeans, followed by a discussion on using JavaBeans in JSP. To aid a better understanding of using a bean component in a JSP page, the chapter concludes with an example that uses a Java bean instead of a direct use of JSP components to display dynamic content.

Chapter 10 moves on to discussing activities on the server side. This chapter assumes that the reader has a basic knowledge of databases, data storage in databases, RDBMS concepts, and their implementation. The chapter begins with a discussion of concepts pertaining to JDBC basics that include types of JDBC drivers, the various application architecture, and database access models. Next, the chapter explains the processes of accessing and manipulating a database by using SQL commands. Finally, a JSP application is used as a backdrop to implement database connectivity and discuss concepts such as connecting to a database, creating a table in a database, and inserting records in a database.

Chapter 11 combines the concepts of reusing bean components to implement database interactions in JSP applications. The chapter begins with an example of a login bean that is used to validate and authenticate a user. Next, the concept of connection pooling is discussed to highlight the importance of economizing the use of Web resources during a database interaction. The chapter then discusses the various classes and methods required to create a connection pool in a JSP application.

Chapter 12 delves into handling errors in JSP. The chapter begins with a discussion of error handling and the implementation of exception handling in JSP. Next, the translation and request time errors are discussed with examples.

Chapter 13 introduces another important concept of session tracking. The chapter begins by differentiating between a stateful and stateless session and the importance of the availability of session-related information in applications. It then discusses the methods of using cookies, hidden fields, session-tracking APIs, and URL rewriting for session tracking.

Chapter 14 further discusses the advanced Web programming concepts of using Simplified API for XML (SAX) and Extensible Markup Language (XML) in JSP applications. To start with, this chapter discusses the benefits of using XML. This is followed by a discussion of the SAX API and the use of various classes and methods of the SAX API to parse the contents of an XML document in JSP.

Chapter 15 delves into developing the relatively new concept of custom tags. This chapter discusses the need of custom tags in JSP to encapsulate recurring code snippets. The chapter uses examples to discuss in detail the various formats that can be adopted to add both simple and complex tags in a JSP application. In addition, the chapter also includes an example that uses a custom tag to initiate a database interaction for retrieving and displaying a particular record from the database.

Chapter 16, the final chapter, is a brief introduction to JavaMail and the importance of mailing services in our lives today. The chapter wraps up with an example that creates an application for sending a message by using the class and method declarations of the JavaMail API.

Who Should Read This Book

This book is a guide for readers with basic familiarity with HTML and the Java language. In this book the content will be covered using lucid examples, sample codes, and the appropriate use of visuals and demonstrations. The concepts will be supported adequately by case studies that will be formulated in such a way that they provide a frame of reference for the reader. Problems will be presented to the reader against the backdrop of real-life scenarios. The practical approach will help readers to understand the real-life application of the language and the use of JSP in various scenarios. In a nutshell, this book will provide a starting point for working with and creating applications in JSP.

This book is intended for programmers interested in developing dynamic Web sites by using JSP. The target audience for this book would include the following:

- Web application developers
- Technical support professionals
- Web site administrators

Novice developers of Web applications can use relevant real-world-oriented scenarios and exercises for the concepts covered as a guide to learn the basics of writing Java Server Pages.

Tools You Will Need

For performing the tasks in this book, you will need a Pentium or faster computer with a minimum 32MB RAM (64MB RAM recommended).

You will also need the following software:

Operating system: Windows NT 4.0 with Service Pack 6.0.

RDBMS: SQL 7.0.

Text Editors: Notepad or Edit Plus, for example.

Software: Java Development Kit (v 1.3).

Software: Java 2 SDK, Enterprise Edition (v 1.2.1).

What's on the Web Site

The following will be available on the site www.wiley.com/compbooks/makinguse:

- Java Development Kit (v 1.3)
- Java 2 SDK, Enterprise Edition (v 1.2.1)
- All the code snippets used in the book



Scenario

All problem statements in this book are based on the scenario of the Banco de Glendanthi. The following section elaborates on the setup of the Banco de Glendanthi and its future plans.

Banco de Glendanthi

Banco de Glendanthi was established 70 years ago in New York by Norman Cropper. Today, under the chairmanship of Marty Bates, the bank has spread across not only all states of the United States but also the world and has its regional headquarters in London, Paris, Istanbul, Cairo, Kuala Lumpur, and Singapore. The bank activities have also increased in terms of the services offered and the volume of transaction.

Broadly, the bank offers the following three financial services: financial deposits, loans, and credit facilities. Customers can open both personal and business accounts with the bank. In addition, a customer can register and can use the loan facility when certain prerequisites are fulfilled. The bank also offers a credit card facility to keep up with the current trend of plastic money.

Banco de Glendanthi also has ATM (Any Time Money) centers in most of the business quarters of the cities where it has branches. The ATM facility is a useful addition to the bank's services. Customers can deposit or withdraw money at any of the ATM centers 24 hours a day.

Over the years, the bank has gained acceptance through dedicated and personalized customer service. The financial presentation in the last general body meeting has shown that the profits of the bank have increased manifold. The board members have decided to increase profits further by encompassing the latest technologies. As a result, the board has unanimously decided to make a foray into e-banking and make their presence felt on the Internet.

During the last board meeting presided over by Marty, the following developments were observed:

- Most of the competitors of Banco de Glendanthi either had their own Web sites or were in the process of launching online banking services.
- Customer feedback in recent years has shown that most professionals find it difficult to access their accounts while traveling.
- The transfer of accounts from one place to another is mostly delayed by lengthy administrative procedures.
- The sales team is unable to cater to the large number of people wanting to open accounts or apply for loans.
- Overhead is increasing because Banco de Glendanthi has to employ a number of people to handle the increasing business.

The head of the marketing department, Lisa Holley, after extensive research on current trends in the banking market, has proposed the following changes to overcome the current limitations:

- With the growth and popularity of the Internet, online banking is proving to be very successful.
- Most people prefer online banking because it saves time and is accessible irrespective of the customer's location.
- The Internet is an effective medium to reach new customers and will also hasten the otherwise delayed processes of new customer registrations.
- Online banking will help save resources because the automation of services will reduce team size and bring down errors.

At the end of the board meeting, the proposal to set up an online site for Banco de Glendanthi is unanimously supported. The task of creating the online site for the bank is given to an upcoming software organization, Business Software Solutions Inc. James McNamee, a senior analyst at Banco de Glendanthi, is assigned the task of coordinating the project.

The project has been code-named Banco de Glendanthi Online. Paul Karlson has been nominated as the project manager, heading a team of competent designers and Java programmers. A quality assurance team and a graphics team have also been assigned to support the development team.

According to the requirements furnished by James McNamee, the online bank site should do the following:

- Allow users to view different account types:
 - Personal Checking Accounts
 - Basic Checking
 - Checking Plus+

- Business Checking Accounts
 - Basic Business Checking
 - Business Checking Biz+
- Personal Savings Accounts
 - Student Savings
 - Money Market Plus
 - Certificates of Deposit
 - Club Account
 - Passbook Savings
- Commercial Savings
 - Glendanthi Biz
- Loan Products
 - Commercial Loan Products
 - Consumer Loan Products
 - Mortgage Loan Products
- Allow users to view loan details
- Allow a first-time user to register personal details
- Allow account holders and registered users to log on
- Enable account holders and nonregistered users to browse through the services offered
- Process registrations and send details to the sales department for further processing
- Display account information to valid account holders
- Display loan application status to registered applicants

During the next few months, it will be the team's endeavor to ensure zero-defect software development in line with client requirements. After the development of the online banking site for Banco de Glendanthi, customers will no longer have to visit the bank offices to use their accounts. They can simply log on to the Web site www.BancodeGlendanthi.com and carry out transactions. People who want to open an account or apply for a loan can browse through the site and register themselves.

As a part of future plans the bank also intends to facilitate the payment of bills through the site, a service that will save customers the ordeal of tracking payment schedules. Because the bank believes firmly in customer service first, the site will make provisions for accepting customer feedback.

Whether the bank functions online or otherwise, one thing that remains unchanged is that Banco de Glendanthi values customer relationship and is a reliable financial institution offering products and services to meet individual financial goals.

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- Business Checking Accounts
 - Basic Business Checking
 - Business Checking Biz+
- Personal Savings Accounts
 - Student Savings
 - Money Market Plus
 - Certificates of Deposit
 - Club Account
 - Passbook Savings
- Commercial Savings
 - Glendanthi Biz
- Loan Products
 - Commercial Loan Products
 - Consumer Loan Products
 - Mortgage Loan Products
- Allow users to view loan details
- Allow a first-time user to register personal details
- Allow account holders and registered users to log on
- Enable account holders and nonregistered users to browse through the services offered
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