

# *contents*

---

*preface to the second edition* xxv

*preface to the first edition* xxix

*acknowledgments* xxxi

*about this book* xxxiii

*about the authors* xxxxviii

*authors online* xxxxix

*about the cover illustration* xl

---

## I *Introduction* 1

1.1 What is JSP? 2

1.2 Dynamic content on the web 2

*Why dynamic content?* 3 • *Common Gateway*

*Interface* 4 • *Template systems* 5 • *Java on*  
*the Web* 8 • *How XML fits in* 11

1.3 The role of JSP 13

*The JavaBeans component architecture* 13

*JSP and Java 2 Platform Enterprise Edition* 15

---

## 2 *HTTP and servlets* 17

2.1 The Hypertext Transfer Protocol (HTTP) 18

*HTTP basics* 18 • *GET versus POST* 21

2.2 Java servlets 23

*How a web server uses servlets* 24 • *The anatomy of a servlet* 24 • *A servlet example* 26

---

## 3 *First steps* 30

3.1 Simple text 31

3.2 Dynamic content 32

*Conditional logic* 33 • *Iteration* 34

*Non-HTML output* 37

3.3 Processing requests and managing sessions 38

*Accessing request parameters* 38 • *Using sessions* 39

3.4 Separating logic from presentation 41

*Reusing logic with JavaBeans* 42

*Abstracting logic with custom tags* 44

3.5 Review of examples 45

---

## 4 *How JSP works* 46

4.1 The structure of JSP pages 47

*Directives and scripting elements* 47

*Standard and custom actions* 48

4.2 Behind the scenes 52

*Translation to servlets* 52 • *Translation versus execution* 54

4.3 What the environment provides 56

*Automatic servlet generation* 56 • *Buffered output* 57

*Session management* 59 • *Exception handling* 63

*Implicit objects* 64 • *Support for JavaBeans and HTML forms* 64

---

**5***Programming JSP scripts* 65

- 5.1 Scripting languages 66
- 5.2 JSP tags 68
- 5.3 JSP directives 68
  - Page directive* 68 • *Include directive* 80
  - Tag library directive* 82
- 5.4 Scripting elements 83
  - Declarations* 84 • *Expressions* 88 • *Scriptlets* 91
- 5.5 Flow of control 93
  - Conditionalization* 93 • *Iteration* 94
  - Exception handling* 94 • *A word of caution* 97
- 5.6 Comments 97
  - Content comments* 98 • *JSP comments* 98
  - Scripting language comments* 99

---

**6***Actions and implicit objects* 101

- 6.1 Implicit objects 102
  - Servlet-related objects* 104 • *Input/Output* 105
  - Contextual objects* 112 • *Error handling* 120
- 6.2 Actions 121
  - Forward* 122 • *Include* 125 • *Plug-in* 128
  - Bean tags* 128

---

**7***Using JSP components* 129

- 7.1 The JSP component model 130
  - Component architectures* 130 • *Benefits of a component architecture* 131 • *Component design for web projects* 132 • *Building applications from components* 133

7.2	JavaBean fundamentals	135
	<i>The different types of JavaBeans</i>	138
7.3	JSP bean tags	140
	<i>Tag-based component programming</i>	140
	<i>Accessing JSP components</i>	142
	<i>Initializing beans</i>	150
	<i>Controlling a bean's scope</i>	157

---

## **8** *Developing JSP components* 165

8.1	What makes a bean a bean?	166
	<i>Bean conventions</i>	166
	<i>The bean constructor</i>	167
	<i>Defining a bean's properties</i>	168
	<i>Indexed properties</i>	172
	<i>Implementing bean properties as cursors</i>	176
	<i>Boolean properties</i>	178
	<i>JSP type conversion</i>	179
	<i>Configuring beans</i>	181
8.2	Some examples	182
	<i>Example: a TimerBean</i>	182
	<i>A bean that calculates interest</i>	184
8.3	Bean interfaces	189
	<i>The BeanInfo interface</i>	189
	<i>The Serializable interface</i>	190
	<i>The HttpSessionBindingListener interface</i>	190
	<i>Other features of the Bean API</i>	191
8.4	Mixing scriptlets and bean tags	192
	<i>Accessing beans through scriptlets</i>	192
	<i>Accessing scriptlet created objects</i>	193

---

## **9** *Working with databases* 198

9.1	JSP and JDBC	199
	<i>JNDI and data sources</i>	200
	<i>Prepared statements</i>	201

9.2	Database driven JSPs	202
	<i>Creating JSP components from table data</i>	202
	<i>JSPs and JDBC data types</i>	205
	<i>Maintaining persistent connections</i>	205
	<i>Handling large sets of results</i>	211
	<i>Transaction processing</i>	216
9.3	Example: JSP conference booking tool	217
	<i>Project overview</i>	217
	<i>Our database</i>	218
	<i>Design overview</i>	218

---

## 10 *Architecting JSP applications* 229

10.1	Web applications	230
	<i>Web application flow</i>	232
	<i>Architectural approaches</i>	233
10.2	Page-centric design	233
	<i>Role-based pages</i>	233
	<i>Managing page flow with action targets</i>	236
	<i>Building composite pages</i>	238
	<i>Limitations of the page-centric approach</i>	241
10.3	Servlet-centric design	242
	<i>Hello, World—with servlets</i>	243
	<i>JSP and the servlet API</i>	244
	<i>Servlets for application control</i>	247
	<i>Servlets for handling application logic</i>	248
	<i>Servlets as single entry points</i>	249
	<i>Handling errors in the servlet</i>	252
	<i>Example: servlet-centric employee browser</i>	253
	<i>EmployeeBean</i>	255
	<i>FetchEmployeeServlet</i>	258
	<i>JSP employee list</i>	261
	<i>JSP page viewer</i>	262
10.4	Enterprise JavaBeans	263
	<i>What are Enterprise JavaBeans?</i>	263
	<i>JavaBeans vs. EJBs</i>	264
	<i>Application servers and EJB containers</i>	264
	<i>Application design with EJBs</i>	265

10.5	Choosing an appropriate architecture	266
	<i>Application environment</i>	267
	<i>Enterprise software requirements</i>	268
	<i>Performance, scalability, and availability</i>	269
	<i>Technical considerations</i>	269
	<i>Organizational considerations</i>	270

---

## **11** *An example JSP project* 272

11.1	An FAQ system	273
	<i>Project motivations</i>	273
	<i>Application requirements</i>	273
	<i>Application modules</i>	275
	<i>Building an FAQ component</i>	276
11.2	The storage module	278
	<i>Database schema</i>	279
	<i>The FaqRepository class</i>	279
	<i>Storage module exceptions</i>	285
11.3	The administration module	286
	<i>The administration servlet</i>	287
	<i>The main menu</i>	293
	<i>Adding an FAQ</i>	297
	<i>Deleting an FAQ</i>	300
	<i>Updating an FAQ</i>	306
11.4	The web access module	311
	<i>The FaqServlet</i>	312
	<i>Viewing a single FAQ</i>	313
	<i>Viewing all the FAQs</i>	314
	<i>A table of contents view</i>	315
	<i>Plain text view</i>	317

---

## **12** *Introducing filters and listeners* 318

12.1	Life-cycle event listeners	319
	<i>Session listeners</i>	319
	<i>Application listeners</i>	324
12.2	Filters	326
	<i>How filters work</i>	327
	<i>Filter classes</i>	330
	<i>Wrapper classes</i>	332
12.3	Using filters and listeners	333

---

## 13

### *Applying filters and listeners* 334

- 13.1 Application description 335
  - 13.2 User authentication 337
    - User account representation* 337 • *User management interface* 338 • *User management implementation* 339
  - 13.3 Web authentication 341
    - Session interactions* 341 • *Login servlet* 344
    - Login pages* 350 • *Content pages* 353
    - Logout servlet* 357 • *Logout pages* 358
  - 13.4 Access control filters 360
    - Authentication filter* 361 • *Role filter* 364
  - 13.5 Logging listener 368
    - HttpSessionListener methods* 369
    - HttpSessionAttributeListener methods* 369
  - 13.6 Content filter 372
    - Filter methods* 373 • *Response wrapper inner class* 375
    - Output stream inner class* 376 • *More filter methods* 377
    - Filter results* 380 • *Other content filters* 381
- 

## 14

### *Deploying JSP applications* 384

- 14.1 This means WAR 385
  - WAR is XML* 386 • *Waging WAR* 389
- 14.2 The art of WAR 390
  - WAR materiel* 390 • *Drafting deployment descriptors* 396
- 14.3 Maintaining a WAR footing 415

## 15 Performing common JSP tasks 418

15.1 Handling cookies 419

*Managing cookies 419 • The Cookie class 420*

*Example 1: setting a cookie 421*

*Example 2: retrieving a cookie 422*

15.2 Creating error pages 425

*An erroneous page 426 • Data collection methods 427*

*Sending electronic mail 432 • The error page 433*

15.3 Mixing JSP and JavaScript 437

15.4 Building interactive interfaces 441

*Sticky widgets 441 • Utility methods 442*

*The example form 443 • Setting up the form 445*

*Text and hidden fields 446 • Text areas 447*

*Radio buttons 447 • Select boxes 448*

*Check boxes 448 • Form source 449*

15.5 Validating form data 451

*Client- and server-side validation 451*

*Example: server-side validation 452*

15.6 Building a shopping cart 458

*Overview 459 • The catalog page 460*

*ShoppingCartItem and InventoryManager 460*

*The ShoppingCart bean 464*

*Displaying the shopping cart 466*

15.7 Miscellaneous tasks 467

*Determining the last modification date 467*

*Executing system commands 468*

---

## 16 Generating non-HTML content 470

- 16.1 Working with non-HTML content 471
  - The importance of MIME* 471 • *Controlling the content type* 472 • *Detecting your client* 472
  - Designing multiformat applications* 473
  - Controlling the file extension* 474
- 16.2 Text content formats 475
  - Plain text output* 475 • *WYGIWYG output (what you generate is what you get)* 476
- 16.3 XML documents 477
  - Creating voice XML documents* 479
- 16.4 External content 482
  - JSP style sheets* 483 • *JavaScript* 485
- 16.5 Advanced content formats 487
  - Excel spread sheets* 488 • *Code generation* 489

---

## 17 JSP by example 493

- 17.1 A rotating banner ad 494
  - The BannerBean* 494 • *Using the bean* 495
- 17.2 A random quote generator 497
  - The QuoteBean* 497 • *Using the bean* 498
- 17.3 The Tell a Friend! sticker 499
  - The sticker* 500 • *The MailForm page* 502
  - Sending the mail* 503
- 17.4 A JSP Whois client 505
  - The Whois protocol* 505 • *Requirements and design considerations* 507 • *The WhoisBean* 507
  - Building the front end* 515

17.5	An index generator	517
	<i>A basic implementation</i>	518
	<i>An improved version</i>	520
	<i>Going further</i>	525
17.6	A button to view JSP source	525
	<i>Displaying the source</i>	525
	<i>Limitations of the view source program</i>	527
	<i>Adding a view source button \to a page</i>	527
	<i>Viewing source through a bookmark</i>	528

---

## 18 *Creating custom tags* 529

18.1	Role of custom tags	530
18.2	How tag libraries work	531
18.3	Tag library descriptors	535
	<i>Library elements</i>	535
	<i>Validator elements</i>	537
	<i>Listener elements</i>	538
	<i>Tag elements</i>	538
	<i>Variable elements</i>	540
	<i>Attribute elements</i>	541
	<i>Example element</i>	543
18.4	API overview	544
	<i>Tag handlers</i>	544
	<i>Tag handler life-cycle</i>	550
	<i>Helper classes</i>	556
	<i>Auxiliary classes</i>	559
18.5	Example tag library	559
18.6	Content substitution	560
18.7	Tag attributes	563
18.8	Content translation	567
	<i>URL rewriting</i>	568
	<i>HTML encoding</i>	572
18.9	Exception handling	575
18.10	To be continued	580

---

**19***Implementing advanced custom tags* 582

- 19.1 Tag scripting variables 583
    - Example tag* 583 • *Scripting variable JavaBean* 585
  - 19.2 Flow of control 587
    - Conditionalization* 588 • *Iteration* 595
  - 19.3 Interacting tags 613
    - Interaction mechanisms* 614 • *Index tag* 616
  - 19.4 The final ingredient 619
- 

**20***Validating custom tag libraries* 621

- 20.1 Two representations of JSP 622
  - 20.2 JSP pages as XML documents 624
    - The root element* 625 • *Template text* 626
    - Scripting elements* 627 • *Request-time attribute values* 627
    - Directives and actions* 629 • *Sample page* 629
  - 20.3 Tag library validation 631
  - 20.4 Example validators 634
    - Copying validator* 635 • *Script-prohibiting validator* 638
    - Error handling* 642 • *Content handler* 645
    - Nesting validator* 651
  - 20.5 Packaging the tag library 660
    - Packaging a single library* 661
    - Packaging multiple libraries* 662
  - 20.6 For further information 666
- 

**A***Changes in the JSP 1.2 API* 669

- A.1 Introduction 669
- A.2 Changes to the API 670
  - Java 2, Version 1.2 now a requirement* 670

	<i>Servlet API 2.3 required</i>	670	▪ <i>XML syntax now fully supported</i>	670	▪ <i>Determining the real path</i>	671
	<i>Redirects are not relative to the servlet context</i>	671				
	<i>Restricted names</i>	671	▪ <i>Page encoding attribute</i>	671		
	<i>Flush on include no longer required</i>	671				
A.3	Web application changes	672				
	<i>New 2.3 web application DTD</i>	672	▪ <i>Handling of white space</i>	672	▪ <i>Resolving path names in the web.xml file</i>	672
	<i>Request mappings</i>	672	▪ <i>Dependency on installed extensions</i>	672		
A.4	Custom tag improvements	673				
	<i>Translation time validation</i>	673	▪ <i>New tag interfaces</i>	673	▪ <i>Changes to the TLD</i>	673
A.5	JavaBean changes	674				
	<i>Bean tags cannot implicitly access scriptlet objects</i>	674				
	<i>Fully qualified class names required</i>	674				
A.6	New servlet features	674				
	<i>Servlet filters</i>	675	▪ <i>Application events</i>	675		

---

## B *Running the reference implementation* 676

B.1	Prerequisites	677
B.2	Downloading and installing Tomcat	677
B.3	Web applications and Tomcat	681

---

## C *Incorporating Java applets* 683

C.1	Browser support for Java	683		
C.2	The plug-in action	685		
	<i>Required attributes</i>	685	▪ <i>Optional attributes</i>	687
	<i>Parameters</i>	688	▪ <i>Fallback text</i>	689
C.3	Example: applet configuration	690		

---

**D** *JSP resources* 697

- D.1 Java implementations 697
  - D.2 JSP-related web sites 697
  - D.3 JSP FAQs and tutorials 698
  - D.4 JSP containers 698
  - D.5 Java application servers with JSP support 699
  - D.6 JSP development tools 700
  - D.7 Tools for performance testing 700
  - D.8 Mailing lists and newsgroups 700
- 

**E** *JSP syntax reference* 702

- E.1 Content comments 702
- E.2 JSP comments 703
- E.3 <jsp:declaration> 704
- E.4 <jsp:directive.include> 705
- E.5 <jsp:directive.page> 706
- E.6 <jsp:directive.taglib> 707
- E.7 <jsp:expression> 708
- E.8 <jsp:forward> 709
- E.9 <jsp:getProperty> 710
- E.10 <jsp:include> 711
- E.11 <jsp:plugin> 712
- E.12 <jsp:scriptlet> 713
- E.13 <jsp:setProperty> 714
- E.14 <jsp:useBean> 715

## F JSP API reference 718

F.1 JSP implicit objects 719

F.2 Package javax.servlet 719

- Interface Filter<sup>†</sup>* 719 • *Interface FilterChain<sup>†</sup>* 719
- Interface FilterConfig<sup>†</sup>* 720 • *Class GenericServlet* 720
- Interface RequestDispatcher* 720 • *Interface servlet* 721
- Interface ServletConfig* 721 • *Interface ServletContext* 721
- Interface ServletContextAttributeEvent<sup>†</sup>* 722
- Interface ServletContextAttributeListener<sup>†</sup>* 722
- Interface ServletContextEvent<sup>†</sup>* 722
- Interface ServletContextListener<sup>†</sup>* 723
- Class ServletException* 723 • *Class ServletInputStream* 723
- Class ServletOutputStream* 724
- Interface ServletRequest* 724
- Class ServletRequestWrapper<sup>†</sup>* 725
- Interface ServletResponse* 726
- Class ServletResponseWrapper<sup>†</sup>* 726
- Interface SingleThreadModel* 727
- Class UnavailableException* 727

F.3 Package javax.servlet.http 727

- Class cookie* 727 • *Class HttpServlet* 728
- Interface HttpServletRequest* 729
- Class HttpServletRequestWrapper<sup>†</sup>* 730
- Interface HttpServletResponse* 730
- Class HttpServletResponseWrapper<sup>†</sup>* 732
- Interface HttpSession* 733
- Interface HttpSessionActivationListener<sup>†</sup>* 733
- Interface HttpSessionAttributeListener<sup>†</sup>* 733
- Class HttpSessionBindingEvent* 734

<i>Interface HttpSessionBindingListener</i>	734
<i>Class HttpSessionEvent<sup>†</sup></i>	734
<i>Interface HttpSessionListener<sup>†</sup></i>	735 • <i>Class HttpUtils</i> 735
F.4 Package javax.servlet.jsp	735
<i>Interface HttpJspPage</i>	735 • <i>Class JspEngineInfo</i> 736
<i>Class JspException</i>	736 • <i>Class JspFactory</i> 736
<i>Interface JspPage</i>	737 • <i>Class JspTagException</i> 737
<i>Class JspWriter</i>	737 • <i>Class PageContext</i> 738
F.5 Package javax.servlet.jsp.tagext	740
<i>Class BodyContent</i>	740 • <i>Interface BodyTag</i> 740
<i>Class BodyTagSupport</i>	740 • <i>Interface IterationTag<sup>†</sup></i> 741
<i>Class PageData<sup>†</sup></i>	741 • <i>Interface Tag</i> 741
<i>Class TagAttributeInfo</i>	742 • <i>Class TagData</i> 742
<i>Class TagExtraInfo</i>	743 • <i>Class TagInfo</i> 743
<i>Class TagLibraryInfo</i>	744
<i>Class TagLibraryValidator<sup>†</sup></i>	744
<i>Class TagSupport</i>	744 • <i>Class TagVariableInfo<sup>†</sup></i> 745
<i>Interface TryCatchFinally<sup>†</sup></i>	745 • <i>Class VariableInfo</i> 745

---

*index* 747