

Table Of Contents

SECTION I: OVERVIEW OF JAVA ENTERPRISE EDITION 5

1. INTRODUCTION TO JAVA	1
HISTORY OF JAVA.....	2
BASIC JAVA ARCHITECTURE	3
The Java Programming Language	4
The Java Class File	4
Java Runtime Environment.....	6
The Java Virtual Machine	6
The Java API.....	7
Java Platform	7
Java Platform, Micro Edition Or Java ME.....	7
Java Platform, Standard Edition Or Java SE.....	8
Java Platform, Enterprise Edition Or Java EE	8
JAVA AVAILABILITY	8
WHAT CAN BE DONE WITH JAVA	9
2. INTRODUCTION TO JAVA ENTERPRISE EDITION 5.....	11
WHAT IS JAVA ENTERPRISE EDITION?	11
JAVA ENTERPRISE EDITION 5	13
Java EE 5 - Platform Overview	13
Features Of Java EE 5.....	14
Platform Support.....	14
New Persistence API	14
Java Server Faces 1.2 And Ajax Technologies.....	15
The Developer's Productivity.....	15
Supports Integrated Development Environment [IDE].....	15
Using Annotations Instead Of Deployment Descriptors.....	15
Packaging Applications	16
EJB Software Development Is Simplified	17
Dependency Injection To Access Resources	19
Web Application Design With Java Server Faces Technology	20
Java Server Pages Standard Tag Library	20
Java EE 5 Technologies.....	21
Java Servlet Technology	21
Enterprise Java Beans Technology	21
Java Server Pages Technology.....	22
Java Server Pages Standard Tag Library	22
Java Server Faces.....	22
SUN JAVA SYSTEM APPLICATION SERVER PLATFORM EDITION 9.0	23
Glassfish	23

3. INSTALLATION OF JAVA ENTERPRISE EDITION 5	25
DOWNLOADING JAVA ENTERPRISE EDITION 5 SDK	25
INSTALLING JAVA ENTERPRISE EDITION 5 SDK	27
Installing Java Enterprise Edition 5 On Linux	28
Installing Java Enterprise Edition 5 On Windows	33
UNINSTALLING JAVA ENTERPRISE EDITION 5	39
Uninstalling Java Enterprise Edition 5 On Linux	39
Uninstalling Java Enterprise Edition 5 On Windows.....	41
4. INTRODUCTION TO WEB APPLICATION.....	45
The Web Browser	47
The Web Server	48
WEB APPLICATION ARCHITECTURE	49
COLLECTING DATA	50
SENDING THE WEB SERVER A REQUEST	50
The GET Method	51
The POST Method	52
Which Method Should Be Used?	52
EXECUTING SERVER SIDE SCRIPTS / PROGRAMS	53
RETURNING THE RESULTS TO A BROWSER	53
DEVELOPING SERVER APPLICATIONS.....	53
SERVER-SIDE TECHNOLOGIES.....	54
Common Gateway Interface	54
Proprietary Web Server's APIs [ISAPI, NSAPI]	55
Active Server Pages	56
Java Servlets And Java Server Pages	56
WHY USE JAVA'S SERVER SIDE TECHNOLOGIES	58
Platform Independence	58
Efficiency	58
Access To Enterprise Java API's.....	58
Reusability	58
Modularity	59
 SECTION II: JAVA SERVLETS	
5. INTRODUCTION TO JAVA SERVLETS	61
WHAT IS A SERVLET.....	62
WHY SERVLETS	63
WHAT CAN SERVLETS DO.....	64
SERVLETS V/S CGI.....	65
How Are Servlets Created.....	65
Where Are Servlets Run	66
What Do Servlets Look Like	66

How Are Servlets Run	67
Standalone Servlet Engines.....	67
Add-On Servlet Engines	68
ARCHITECTURE OF A SERVLET.....	68
6. BASICS OF SERVLET APPLICATION PROGRAMMING INTERFACE	71
Servlet Application Programming Interface [Servlet API]	72
Class <code>java.lang.Object</code>	72
GenericServlet Class.....	75
HttpServlet Class	75
Methods Required For Creating A Functional Http Servlet.....	75
Common Servlet Methods	76
The Servlet Architecture.....	77
The Servlet Life Cycle.....	80
Initialization	80
Why Not Use A Constructor Instead Of The <code>init()</code> Method.....	81
The <code>init()</code> Method.....	81
Runtime.....	82
Destruction.....	82
A SIMPLE HELLO WORLD SERVLET	84
7. WORKING WITH SERVLETS.....	91
Getting Started	91
WHAT IS A WEB APPLICATION	92
ORGANIZATION OF A WEB APPLICATION	92
CREATING A SERVLET FILE	93
<code>SampleServlet.java</code>	93
COMPILING AND BUILDING THE APPLICATION.....	94
The ASANT Utility	95
<code>build.xml</code>	95
<code>web.xml</code>	99
Packaging Using The ASANT Utility	102
Deploying The Application.....	105
The Auto Deploy Method	106
How Is The war File Internally Deployed By The Application Server.....	109
Running The Deployed Web Application.....	110
The Application Server's Deploy Tool.....	111
The Application Server's Command Based Deploy Tool	117
Running The Deployed Web Application.....	118
Viewing Deployed Web Applications	118
MODIFYING THE PACKAGED WEB MODULE.....	119
Dynamic Reloading	119
UNDEPLOYING THE WEB MODULE	121
ADDING A USER INTERFACE TO THE WEB APPLICATION	122
HANDS ON EXERCISES.....	131

8. WORKING WITH DATABASES.....	133
JDBC.....	134
ADVANTAGES OF JDBC	135
JDBC ARCHITECTURE	135
TYPES OF JDBC DRIVERS	138
HOW TO ACCESS DATABASE	139
Configuring JDBC Driver.....	139
Creating A Database Connection.....	140
Executing Queries.....	141
Standard Statement	142
Prepared Statement	142
Callable Statement	143
Processing The Results	143
Closing The Database Connection.....	143
USING DATABASE.....	144
MySQL Connector/J 5.0	144
Downloading MySQL Connector/J.....	145
Installing And Configuring MySQL Connector/J JDBC Driver.....	147
With ClassPath.....	147
Without ClassPath.....	149
JDBC-ODBC Bridge Driver	150
Configuring JDBC-ODBC Bridge Driver.....	151
CONNECTING TO DATABASES.....	155
PERFORMING DATABASE OPERATIONS.....	161
Creating A Table.....	161
Inserting Data In A Table.....	164
Updating Data In A Table.....	167
Updating Data In MySQL Database	167
Deleting Data From A Table.....	170
A Servlet Example	171
HANDS ON EXERCISES.....	194
9. COOKIES.....	197
MARKING OF A BROWSER BY A WEB SERVER.....	198
THE CONTENTS OF A COOKIE.....	199
DIFFERENT TYPES OF COOKIES	199
Permanent / Persistent Cookies.....	199
Session / Transient Cookies.....	200
WHERE COOKIES ARE USED.....	200
Where Are Cookies Placed	201
ADVANTAGES OF COOKIES	201
CREATING COOKIES USING SERVLET	201
Working With Cookies	202
Creating A Cookie Constructor.....	202

Setting A Cookie.....	204
Sending A Cookie To The Client.....	204
Creating A Sample Cookie	204
Retrieving Cookies	206
Expiration Of A Cookie.....	210
Destroying A Cookie	211
Assigning Values To Cookie	212
AUTOMATIC LOGIN.....	221
HANDS ON EXERCISES.....	237
10. SESSIONS	239
SESSIONS	240
LIFECYCLE OF HTTP SESSION.....	243
Session Management Rules	244
SESSION TRACKING WITH SERVLET API.....	245
Methods Of Session Tracking.....	246
Cookies	246
URL Rewriting	247
Hidden Form Fields	249
Working With Session.....	250
Creating A Session.....	251
Destroying Session	254
Managing Sessions Lifetime.....	257
The getAttribute() Method.....	257
The getAttributeNames() Method.....	258
The setAttribute() Method	258
The removeAttribute() Method.....	258
The getId() Method.....	259
The isNew() Method.....	259
The getCreationTime() Method	260
The getLastAccessedTime() Method	260
The getMaxInactiveInterval() Method.....	261
The setMaxInactiveInterval() Method	261
A SHOPPING CART	264
The RunTime	274
The Working.....	279
HANDS ON EXERCISES.....	285
11. REQUEST DISPATCHING	289
The RequestDispatcher Interface	290
Obtaining An Object Implementing RequestDispatcher.....	290
The getRequestDispatcher() Method	290
The getNamedDispatcher() Method.....	292
Methods Of RequestDispatcher	292
The include() Method	292

The forward() Method.....	296
HANDS ON EXERCISES.....	302

SECTION III: JAVA SERVER PAGES

12. INTRODUCTION TO JAVA SERVER PAGES.....	307
WHY USE JAVA SERVER PAGES	308
Nobody Can Borrow The Code	308
Faster Loading Of Pages.....	309
No Browser Compatibility Issues	309
JSP Support.....	309
Compilation	309
JSP Elements In HTML / XML Pages.....	310
DISADVANTAGES OF JSP.....	310
Attractive Java Code	310
Java Code Required	310
Simple Tasks Are Hard To Code	311
Difficult Looping In JSP	311
Occupies A Lot Of Space.....	312
JSP V/S SERVLETS.....	312
Why JSP If Java Already Has An API For Answering HTTP Requests.....	312
JSP V/S ASP.....	313
Platform Independent.....	313
Components	313
Compilation	313
Extensible Tags.....	313
Platform Compatibility	313
LIFE CYCLE OF A JSP PAGE.....	314
HOW DOES A JSP FUNCTION.....	314
HOW DOES JSP EXECUTE	319
DEPLOYING AND EXECUTING JSP	320
Modifying JSP page.....	331
13. GETTING STARTED WITH JAVA SERVER PAGES.....	333
COMMENTS.....	334
TEMPLATE TEXT	335
JSP ELEMENTS.....	336
Directives	336
The page Directive	337
The include Directive.....	341
The taglib Directive	344
Scripting Elements	345
Declarations	345
Scriptlets	346

Expressions	348
A SAMPLE JSP PAGE	348
HANDS ON EXERCISES.....	356
14. JAVA SERVER PAGES DOCUMENT.....	359
Directives.....	362
The page Directive.....	362
The include Directive.....	364
The taglib Directive	365
Scripting Elements.....	366
Declarations	366
Scriptlets	366
Expressions	367
A SAMPLE JSP DOCUMENT	368
HANDS ON EXERCISES.....	384
15. ACTION ELEMENTS OF JAVA SERVER PAGES.....	385
INCLUDING OTHER FILES	386
FORWARDING JSP PAGE TO ANOTHER PAGE	391
PASSING PARAMETERS FOR OTHER ACTIONS	398
THE PLUG-INS	399
Parameters Passed To The Applet	401
Rendering Alternative Output For Browser Without Applet Support	408
LOADING A JAVA BEAN	411
Adding A Bean To A JSP Page	412
Setting The Properties Of The Bean	414
Accessing The Properties Of The Beans.....	416
A REGISTRATION FORM USING ACTION ELEMENTS	417
HANDS ON EXERCISES.....	437
16. IMPLICIT OBJECTS, SCOPE AND EL EXPRESSIONS	443
IMPLICIT OBJECTS	443
Request	444
Response.....	445
Out	447
Session	449
Application	450
Config	451
PageContext.....	452
Page	452
Exception	453
SCOPE.....	454
Application Scope.....	454
Session Scope	455
Request Scope.....	455

Page Scope	456
CHARACTER QUOTING CONVENTIONS	456
UNIFIED EXPRESSION LANGUAGE [UNIFIED EL]	457
Unified EL Evaluation Syntax	459
Immediate Evaluation	459
Deferred Evaluation	460
Types Of Expressions	461
Value Expressions	461
Method Expressions	462
Using EL Expressions	462
Literals	463
Operators	465
Arithmetic Operators	465
Logical Operators	466
Relational Operators	466
Conditional Operators	467
The . [A Dot] Operator	467
The [] Operator	468
The empty Operator	469
17. JSP STANDARD TAG LIBRARIES	471
WHAT IS WRONG IN USING JSP SCRIPTLET TAGS?	472
HOW JSTL FIXES JSP SCRIPTLET'S SHORTCOMINGS?	473
DISADVANTAGES OF JSTL	473
TAG LIBRARIES	474
The Core Tag Library	475
General-Purpose Actions	475
How Are Values Displayed	475
How Are Values Set	476
Exception Handling	477
How Are Values Removed	478
Conditional Actions Or Flow Control Statements	478
Iterator Actions	479
The <c:forEach> Element	479
The <c:forTokens> Element	481
URL-Related Actions	482
Importing The Contents Of A URL Based Resources	482
URL Encoding And Rewriting	483
Sending An HTTP Redirect To A Client	484
Specifying The Request Parameters	484
The Database / SQL Tag Library	485
Datasources	486
Queries And Updates	487
The Database Transactions	490
Functions Tag Library	491
The fn:contains Function	491

The fn:containsIgnoreCase Function	492
The fn:endsWith Function	492
The fn:escapeXml Function.....	492
The fn:indexOf Function	493
The fn:join Function	493
The fn:length Function.....	493
The fn:replace Function	494
The fn:split Function.....	494
The fn:startsWith Function	494
The fn:substring Function	495
The fn:substringAfter Function.....	495
The fn:substringBefore Function	495
The fn:toLowerCase Function	496
The fn:toUpperCase Function.....	496
The fn:trim Function.....	496
HANDS ON EXERCISES.....	516

SECTION IV: JAVA SERVER FACES

18. INTRODUCTION TO JAVA SERVER FACES.....	519
WHY MODEL VIEW CONTROLLER	520
WHAT IS JSF.....	520
Server Side.....	520
User Interface.....	520
Component Framework	520
COMPONENTS OF JSF	521
A JSF Application's Features	522
MODEL VIEW CONTROLLER DESIGN PATTERN	523
BENEFITS OF JAVA SERVER FACES	525
Based On Model View Controller Architecture.....	525
Ease-Of-Use.....	525
Standardization	525
Based On Reusable Components	525
Making UI Development Easier	526
Handling Data Transfer Mechanism.....	526
Easily Manageable Event Handling.....	526
Separating Behavior And Presentation Layer	526
Influence UI Component And Web Tier Concepts.....	527
Making Web Development Faster And Easier.....	527
DISADVANTAGES OF JAVA SERVER FACES	527
JAVA SERVER FACES APPLICATION	528
Java Server Faces Application Composition.....	529
Java Server Faces Application Lifecycle	530
Restore View	532

Apply Request Values.....	532
Process Validations	533
Update Model Values	534
Invoke Application.....	535
Render Response.....	535
CONFIGURING THE JAVA SEVER FACES	536
A SIMPLE LOGIN EXAMPLE	538
19. COMPONENTS AND RENDERERS.....	551
COMPONENTS	553
UIComponent.....	554
Standard JSF UI Components	555
UIViewRoot.....	557
UICommand.....	558
The <h:commandButton> Element.....	558
The <h:commandLink> Element.....	559
UIForm.....	560
UIGraphic	561
UIInput.....	562
The <h:inputText> Element.....	562
The <h:inputTextarea> Element	564
The <h:inputSecret> Element	565
The <h:inputHidden> Element.....	567
UIOutput	568
The <h:outputText> Element.....	568
The <h:outputLabel> Element	569
The <h:outputLink> Element.....	571
The <h:outputFormat> Element.....	572
UIPanel	574
The <h:panelGrid> Element.....	574
The <h:panelGroup> Element.....	577
UIParameter	578
UISelectBoolean	578
UISelectOne.....	580
The <h:selectOneRadio> Element	580
The <h:selectOneListbox> Element.....	582
The <h:selectOneMenu> Element.....	584
UISelectMany	586
The <h:selectManyCheckbox> Element	586
The <h:selectManyListbox> Element	588
The <h:selectManyMenu> Element.....	590
UISelectItem	591
UISelectItems.....	592
UIMessage	593
UIMessages.....	594

UIData.....	596
UIColumn.....	598
UINamingContainer.....	599
HTML Attributes	600
RENDERER	619
Render Kits	620
20. MANAGED BEANS AND NAVIGATION.....	639
MANAGED BEANS.....	639
Creating Bean	641
Registering Bean.....	642
Binding Bean	642
Managed Bean Property Initialization	642
NAVIGATION.....	643
Configuring Navigation Rule.....	644
Ways Of Navigating Between Pages	647
The Default Navigation Case.....	647
The Default Outcome Case.....	648
Using Wildcards Or Patterns	649
Using The <from-action> Element	649
Global Outcome.....	650
Redirect Rendering	651
Navigation Cases Split Over Multiple Rules	652
Overlapping Navigation Cases	653
Conflict Of Navigation Cases	653
Navigation Process	654
Types Of Navigation.....	657
Simple Or Static Navigation	657
Complex Or Dynamic Navigation	659
Actions And Navigation	661
Implementing Application Actions	661
21. CONVERTERS AND VALIDATORS.....	677
CONVERTERS	678
VALIDATORS.....	679
CONVERSION AND VALIDATION PROCESS	679
GETTING STARTED WITH CONVERTERS	681
DateTime Converter	683
Number Converter	686
GETTING STARTED WITH VALIDATORS	688
Length Validator	689
Long Range Validator.....	689
Double Range Validator	690
The required And The immediate Attributes	691
The required Attribute.....	691

xviii Java EE 5 For Beginners

The immediate Attribute	692
DISPLAYING ERROR MESSAGES	692
AN EXAMPLE OF CONVERTERS AND VALIDATORS.....	696
HANDS ON EXERCISES.....	710
SECTION III: JAVA SERVER PAGES	
22. INTRODUCTION TO ENTERPRISE JAVA BEANS.....	711
ENTERPRISE BEAN ARCHITECTURE.....	712
How Does The Communication Takes Place.....	713
Enterprise Bean Server	713
An Enterprise Bean	714
Enterprise Bean Containers.....	715
Enterprise Bean Clients.....	716
FEATURES / BENEFITS OF ENTERPRISE BEAN	717
Complete Focus Only On Business Logic	717
Reusable Components.....	718
Portable	718
Fast Building Of Applications	718
One Business Logic Having Many Presentation Logics	719
Distributed Deployment.....	719
Application Interoperability	719
Customized Deployment.....	720
Simplified EJB 3.0 API.....	720
TYPES OF ENTERPRISE BEAN.....	720
Session Beans	721
Stateless Session Bean	721
Life Cycle Of Stateless Session Bean	722
Stateful Session Bean.....	722
Life Cycle Of Stateful Session Bean.....	723
Entity Beans	723
Message Driven Beans.....	724
Life Cycle Of Message-Driven Bean	725
WRITING ENTERPRISE BEAN.....	726
Writing Business Interface.....	726
Writing Bean Class	727
Points To Be Remembered While Writing Bean Class.....	727
Writing Deployment Descriptor.....	728
Packaging Bean.....	729
Deployment of Bean	730
Writing the Client	730
23. BEGINNING WITH ENTERPRISE JAVA BEANS.....	733
CREATING A BUSINESS INTERFACE.....	734

CREATING AN ENTERPRISE BEAN	735
CREATING A WEB CLIENT USING JSP	737
COMPILATION AND PACKAGING	742
DEPLOYING THE WEB APPLICATION	758
RUNNING THE APPLICATION	759
24. WORKING WITH SESSION BEANS	763
STATELESS SESSION BEANS	764
Instance Pool Mechanism	765
STATEFUL SESSION BEANS	766
Passivation And Activation	766
AFTER BEAN INSTANTIATION	768
BEAN INSTANCES MANAGEMENT BY THE CONTAINER	769
REMOTE AND LOCAL INTERFACE	769
LIFECYCLE CALLBACK METHODS	770
Callbacks For Stateless Session Beans	771
@PostConstruct	771
@PreDestroy	771
Callbacks For Stateful Session Beans	771
@PostConstruct	772
@PreDestroy	772
@PrePassivate	772
@PostActivate	772
@Init	773
Bean Removal	773
@Remove	773
THE SHOPPING CART [STATEFUL SESSION BEAN]	773
Creating A Business Interface	776
Creating An Enterprise Bean	778
Lifecycle Callback Methods	785
Creating A Web Client Using JSP	785
Db Tables For The Enterprise Bean	792
Compilation And Packaging	792
Deploying The Web Application	794
Running The Application	794
THE VISITOR STATISTICS [STATELESS SESSION BEAN]	796
Creating A Business Interface	797
Creating An Enterprise Bean	798
Creating A Web Client Using JSP	803
Db Tables For The Enterprise Bean	805
Compilation And Packaging	805
Deploying The Web Application	807
Running The Application	807

25. WORKING WITH MESSAGE-DRIVEN BEANS	811
MESSAGE DRIVEN BEAN IN EJB 3.0	812
THE onMessage() METHOD	813
USES OF MESSAGE DRIVEN BEANS	814
A BASIC MESSAGE DRIVEN BEAN	814
Creating An Enterprise Bean	815
Creating A Web Client Using JSP	821
Compilation And Packaging	825
Creating The Administered Objects.....	829
Deploying The Web Application	830
Running The Application.....	830
REMOVING THE ADMINISTERED OBJECTS.....	832
26. WORKING WITH ENTITY BEANS	833
JAVA PERSISTENCE	834
The Java Persistence API [JPA].....	835
The Query Language.....	835
ENTITY CLASS.....	836
PERSISTENT FIELDS AND PROPERTIES.....	837
USER REGISTRATION AND LOGIN	837
Creating A Database Table	840
Creating An Enterprise Bean	844
Creating The Web Client	848
Compilation And Packaging	859
Deploying The Web Application	863
Running The Application.....	864
AUTHOR MASTER EXAMPLE.....	865
Creating A Database Table	866
Creating An Enterprise Bean	867
Creating A Web Client.....	870
Compilation And Packaging	881
Deploying The Web Application	883
Running The Application.....	883
HANDS ON EXERCISES.....	884