TT5100: J2EE Fundamentals: J2EE Web Development using Servlets/JSPs, JDBC & More (5 days)

Essential J2EE - JEE5 PROGRAMMING SERIES

Created in collaboration with several leading J2EE authors and industry experts, Trivera Technologies ***J2EE Fundamentals using Servlets/JSP, JDBC and More*** is a five-day in-depth course geared for software developers who need to understand what J2EE is, what it means in terms of today's systems and architectures, and how to apply basic Servlets and JSPs in implementing and deploying robust, flexible web applications.

Course Overview

Java 2, Enterprise Edition (J2EE) is a powerful platform for building web applications. The J2EE platform offers all the advantages of developing in Java plus a comprehensive suite of server-side technologies. This course tells you what you need to know to design and build your own web applications. You'll learn the details of the key J2EE technologies and how to leverage the strengths of each, with special focus on Servlets and JSPs. At the same time, you'll be learning about the big picture of J2EE and how to design web applications that are robust, efficient, secure, and maintainable. If you want to deliver an application on the web, you'll find this course essential.

COURSE SNAPSHOT

Duration: 5 days
Skill Level: Introductory
Focus: Basic Servlet/JSP & JDBC, web application development with EJB overview
Audience: Experienced Java developers
Format: Extensive hands-on programming labs, expert lecture combined with open discussions and high-Level demonstrations and dynamic group exercises.
Language / Tools: Java-focused, available for most IDEs and application servers.
Delivery Format: Available for onsite private classroom presentation, or live online / virtual presentation
Customizable: Yes

Course Objectives: What You'll Learn

Students who attend **Building J2EE Web Applications using Servlets/JSPs & JDBC** will leave the course armed with the required skills to build basic web applications.

The course begins with a discussion of web application architecture. A major part of the course is spent on Servlets and JavaServer Pages (JSP). It then covers interacting databases using JDBC, Java's database access technology. The course includes an introduction to the newest J2EE web component - Web Services. The course concludes with an examination of J2EE and web application security providing students with an understanding of the importance of defensive coding practices. Throughout the course, students will create code for an online store. Students will learn not only specific topics and APIs but also how to fit the pieces together into a complete application.

Throughout the course, students will create code for an online store. Students will learn not only specific topics and APIs but also how to fit the pieces together into a complete application.

Topics covered include:

- J2EE Application Architecture
- JDBC (Java Database Connectivity)
- Servlets
- Java Server Pages (JSP)
- JSP 2.0 and JSTL
- EJBs
- Web Services
- J2EE Security
- Web Application Security
- Other APIS: JNDI, XML, JavaMail, JMS (Optional)

Working in a dynamic, interactive discussion and hands-on programming environment, developers will:

- Design and build robust, secure, and maintainable web applications
- Access databases with JDBC
- Create dynamic HTML content with Servlets and Java Server Pages
- Make Servlets and JSP work together cleanly
- Use JSP 2.0, EL, and JSTL to separate Java and HTML code
- Expose web components as web services
- Recognize basic web security vulnerabilities and implement effective defenses

The course provides a solid foundation in basic terminology and concepts, extended and built upon throughout the engagement. Processes and best practices are discussed and illustrated through both discussions and group activities.

Attending students will be led through a series of advanced topics comprised of integrated lectures, extensive hands-on lab exercises, group discussions and comprehensive demonstrations. Please see below for additional information about the hands-on lab work.

Audience & Pre-requisites: Who Should Attend

This is an introductory level training course, designed for experienced Java developers that need to extend their skills in web development and understand the architecture of a J2EE web application and/or implement a web application, taking advantage of what J2EE brings to the table. Attendees should have practical experience developing basic Java applications.

Related Courses – Suggested Learning Path

Take Before: Students should have basic development skills and a working knowledge in the following topics, or attend these courses as a pre-requisite:

- TT4000 Understanding Internet Architectures
- TT2100 Java Programming Fundamentals

Take Instead: We offer other courses that provide different levels of knowledge or focus:

- If you need high level J2EE training, you might consider: **TT5000 Understanding J2EE**
- Students without prior Java programming background should consider **TT5140 Java Programming Fundamentals for J2EE Developers** (combines Intro to Java with Intro to J2EE)
- If you need additional coverage of Struts, consider **TT6260 Developing J2EE Web Apps using Servlets, JSPS, Tags and Struts**

Take After: We offer a variety of introductory through advanced security, development, project management, engineering, architecture and design courses. Students may want to consider the following topics as a follow-on to this course.

- Additional essentials or advanced Java EE / J2EE topics
- Java or J2EE Security topics
- Service-Oriented Analysis and Design
- Web Services – Intro through Advanced
- AJAX, XML or other Web Development topics
- Java EE topics: EJB3.0; Spring; Hibernate; Design Patterns & more.
- Architecture & Analysis courses

Please note all development courses may also be offered in other programming languages or tailored to suit your unique requirements. Please contact us for recommended next steps tailored to your longer term education, project or development objectives.

Experiential Learning: Hands-On Labs

This class is "technology-centric", designed to train attendees in essential J2EE development skills, coupling the most current, effective techniques with the soundest industry practices.

This workshop is about **50% dynamic lab exercises** and **50% lecture**. Throughout the course students will be led through a series of progressively advanced topics, where each topic consists of lecture, group discussion, comprehensive hands-on lab exercises, and lab review. Multiple detailed lab exercises are laced throughout the course, designed to reinforce fundamental skills and concepts learned in the lessons. At the end of each lesson, developers will be tested with a set of review questions to ensure that he/she has fully understands that topic.

Student Materials: What You'll Receive

Our robust course materials include much more than a simple slideshow presentation handout. Trivera Technologies Student materials include a comprehensive hard-copy course manual, complete with detailed course notes, code samples, diagrams and current reference materials, all directly related to the course at hand, indexed for ease of use. Step-by-step lab instructions and project descriptions are clearly illustrated and commented for maximum learning and ease of use. Our course kits are designed to serve as an excellent and useful reference set, long after we leave your classroom.

Delivery Environment & *LoadNGo*™ Classroom Set Up

Although this training is skills-centric, this course may run using a variety of IDEs and application server combinations, including but not limited to: JBoss 4.x; BEA WebLogic Server 8.1/9; IBM Rational Application Developer (6.0 or 7.0); Oracle JDeveloper 10g; JBuilder; Apache TomCat; Eclipse Web Tools Project, MyEclipse; and others.

Our lab guides are complete with software-specific instructions, screen shots and detailed tutorials for using the software you select. In most cases we can easily port our classes to run in the environment of your choosing.

For course deliveries or virtual presentation using open-source tools, we'll provide our unique ***LoadNGo Instant Classroom Kit***, which enables students to run the entire course off of a DVD that hosts the entire course set up software, labs, and other pertinent useful educational resources, whitepapers and more. You only need to provide the hardware and appropriate O/S, and we'll do the rest. No installation needed. **Great for secure environments.** Minimum set up burden for your team or firm, with maximum results for your students.

No matter which set up option or software your firm requires, we're pleased to provide a detailed set up guide for all private or on-site courses, and as much assistance as you require to prepare your students or classroom for the course. Our support personnel and instructors can be contacted for any advice you may require to prepare your classroom and/or students for attendance.

Optional Pre-Testing & Assessment

We work with you to ensure that your resources are well spent. Through our basic pre-testing, we ensure your team is up to the challenges that this course offers. We will work with you to come up with the best solution to ensure your needs are met, whether

we customize the material, or devise a different educational path to prepare for this course.

Please contact us for details about our online pre and post test assessment services, custom managed training plans for one student or your entire organization, and our custom online training program management system for monitoring the courses or progress while skilling your students of all experience levels.

Workshop Topics Covered

Need more info? *Please note that a more detailed outline of the course table of contents, lists of lab exercises and project descriptions is available. Please contact us at Training@triveratech.com for info.*

Need courseware? *This course is fully customizable, and also available for license with complete support for qualified organizations. Please contact Courseware@triveratech.com for details.*

Session J2EE Application Architecture

Lesson Technical Overview of J2EE

- What is J2EE?
- Common Themes In J2EE Framework
- J2EE Containers and Components
- Servlets
- Java Server Pages (JSP)
- EJBs and Web Services
- J2EE Containers
- J2EE Application Modules
- The J2EE 1.4 Specification
- J2EE Platform Roles

Lesson J2EE Application Architectures (web based)

- J2EE and the Web
- J2EE 1st Generation DB-centric Web Application
- Adding JSPs to Separate Presentation
- Eliminating Java code from view
- The Model 2 Architecture
- Using EJBs
- J2EE Infrastructure Supporting Web Applications Lesson Review

Session Web Applications

Lesson Understanding Web Applications

- J2EE Application Modules
- The Truth about Archives
- Enterprise Application Archive (EAR)
- Enterprise JavaBean Archive (JAR)
- J2EE Application Client (JAR)
- Resource Adapter Archive (RAR)
- Web Application Archive (WAR)
- Directory Structure

Lesson Configuring Web Applications

- Mapping an HTTP Request to a Resource
- The web.xml File
- Structure
- Declaring Servlets and JSPs
- Servlet Mapping
- Servlet Init Parameters
- Web Application init Parameters
- Welcome Page
- Error Page

Session Developing Servlets

Lesson Introduction to Servlets

- Servlet Overview
- Life Cycle of Servlets
- Servlet Lifecycle is Handled by Web Container
- HttpServlet
- Writing the init Method
- HttpServlet doXXX Methods
- Writing a Simple HTTP Servlet
- HttpServletRequest Methods
- ServletResponse
- HttpServletResponse
- Servlet I/O Classes
- Return a Status Code
- Building the Output Document
- Sending Binary Content

Lesson Processing Input Data

- Form Processing with Servlets
- HTML Form
- LoginServlet doPost

Lesson Sever-Side Control

- Request Dispatcher
- Forward the processing
- Passing Processing on and Getting it Back
- Servlet Runs Within Web Container Environment
- Several Options for Receiving Data
- Init Parameters and Attributes
- ServletConfig; ServletContext
- Servlet Variables are Scoped
- HTTP Request Information
- Several Options for Sharing Data
- configuration and Context
- Servlet Variables
- HttpServlet Request
- Threading and Data
- Threading and Data 2

Lesson Client Side Control

- Output Buffering
- Setting Status Codes; Setting Headers
- sendRedirect
- Disabling Client Caching
- Supporting Persistent Connections
- Setting Content Length
- Dynamic Content Pushing

Lesson Maintaining Client State – Sessions

- Session Management
- Tracking Problem – Stateless HTTP
- Data Problem – Session Data
- Solving the Tracking Problem
- Cookies
- Cookie Behavior; Retrieving Cookies
- servlet to set Cookies
- Servlet to Show Cookies
- URL Rewriting
- Solving the Data Problem
- Web Container Manages Session Instances
- Sessions with Cookies
- Cookie-Based Sessions
- Basic Session Implementation
- Cookie Detection is not Standardized
- Getting Rid of Http Sessions
- Session with URL Rewriting

Lesson Application and Session Events

- Event Listener Model
- Life Cycle Events in a Web-Application
- Declare the Listener
- Type of Events
- Context Listeners; Session Listeners
- Session Listeners for Session-Objects

Session Filters

Lesson Overview of Filters
- What is a Filter
- Single Filter
- Filter Objects
- doFilter Method
- init Method
- Filter Life Cycle
- Cascading Filters

Lesson Filtering Requests and Responses
- Request Wrapper
- Process the Request
- Examples of Request Filters
- Filter the Response
- Response Wrapper

Session Developing JavaServer Pages

Lesson Introduction to JavaServer Pages
- Separating Presentation from Model
- Java Server Page (JSP): An Extension of Servlet
- Lifecycle of a JSP
- Example JSP
- JSP Syntax Consists of Three Types
- JSP Scripting: Declarations; Expressions; Scriptlets & Directives
- The session Attribute
- The errorPage/isErrorPage Attribute
- JSP Actions
- JSP Actions: Include/Forward
- Typical JSP Access Model
- JSP Action: useBean
- Implicit Objects
- JSPs or Servlets?

Lesson JSP Implicit Objects
- Implicit Objects
- Page Object; Config Object
- Request Object; Response Object
- Out Object
- Output Buffer
- Session Object
- Application Object
- PageContext Object
- Attributes
- Session Attributes
- Exception Handling

Lesson Actions, Java Beans,™ and Custom Tags
- Standard Actions
- Forwarding; Including
- Using JavaBeans™ and JSP
- Declaring to use a Bean
- Using a Bean, Example
- Setting and Getting Properties
- What are Custom Tags?
- Create and Use a Custom TagLib

Session JSP 2.0

Lesson Introduction to JSP 2.0
- JSP 2.0 Specification
- The web.xml in J2EE 1.4
- <jsp-config>
- JSP Format Rules
- JSP Error Pages

Lesson The Expression Language
- The Expression Language
- The Expression Language (JSP 2.0)
- Enable/Disable EL
- Variables
- Literals and Operators in the JSP EL
- Implicit Objects in JSP EL
- Reserved Words
- EL Functions
- Developing the Function
- Declaring the Function in the TLD
- Using the Function
- Pre-Built EL Functions

Session JSTL 1.1

Lesson JSTL Introduction and Core Library
- Introduction to JSTL
- Expression Language (EL) in JSTL
- Review of JSP Bean Tags
- Tag Collaboration
- JSTL Core
- <c:choose> <c:when> <c:otherwise>
- <c:if>; <c:import>; <c:forEach>; <c:forTokens>; <c:out>; <c:param> ; c:catch>; <c:redirect>; <c:remove>; <c:set>;
- Using c:set to pass HTML
- <c:url>

Lesson JSTL Format Library
- JSTL Format
- <fmt:requestEncoding>; <fmt:setLocale>; <fmt:timeZone>
- <fmt:setTimeZone>; <fmt:bundle> <fmt:setbundle>; <fmt:message>
- <fmt:formatNumber>; <fmt:parseNumber>
- <fmt:formatDate>; <fmt:parseDate>

Lesson JSTL SQL Library
- JSTL SQL
- <sql:query>; <sql:update>; <sql:transaction>; <sql:param> <sql:dateParam>

Lesson JSTL XML
- JSTL XML
- <x:choose> <x:when> <x:otherwise>
- <x:out>; <x:if>; <x:forEach>; <x:parse>; <x:set>; <x:transform>; <x:param>

Lesson Simple Tag Handlers
- Tag Files
- Simple Tag Handlers
- Tag File Location
- Tag-Files Outside of a Library
- Tag Library Descriptors
- The TLD File
- The <tag-file> Element
- Tag File with Attributes
- jsp:attribute Element
- Using Attributes
- jsp:doBody
- jsp:invoke

Session Database Integration: JDBC and J2EE

Lesson JDBC and Its Position in J2EE
- JDBC Versions
- The JDBC API
- JDBC in J2EE
- Programming with DataSources
- JNDI names
- DataSource Programming Best Practices

Lesson JDBC Data Access API

- Structured Query Language (SQL)
- Statements & Statement
- PreparedStatements
- PreparedStatement
- ResultSet
- Executing Inserts, Updates, and Deletes
- Mapping SQL Types to Java Types
- CallableStatement

Lesson The DAO Pattern

- Data Access Object (DAO)
- DAO Structure
- DAO Example: ProductDAO
- The DAOFactory
- Complete UML Diagram
- Using the ProductDAO

Session Additional J2EE Components

Lesson Working With Enterprise JavaBeans™

- Defining Enterprise JavaBeans
- JavaBeans™ vs EJBs
- EJB Architecture Overview
- EJB Container & Types of EJBs
- Enterprise Bean; Session Beans
- Entity Beans
- Message-Driven Bean
- EJBObject/EJBLocalObject
- Home Object (EJB Factory)
- Deployment Descriptor
- EJB-Jar File

Lesson Web Services in J2EE – WSEE

- What are Web Services?
- Web Services Architecturally
- XML and Web Service APIs
- Web Services for J2EE - WSEE
- Servlets as Web Services
- EJBs as Web Services
- Routing SOAP requests to an EJB
- WSDD

Session Security

Lesson J2EE Security

- Typical J2EE App Server Security Services
- Java 2 Platform Security Model
- Java 2 Security in J2EE
- JAAS Authentication: Who are you?
- J2EE Security Overview
- Authorization: Are you allowed access?
- High-Level Trace of J2EE Authorization
- Deployment Descriptors Play a Large Role
- Declaring Secure Resources
- Declaring the security roles
- Typical J2EE App Server Security Services
- Security on the Web; Secure Web Traffic
- SSL In Action
- Responsibilities For Security
- CMS: Declaring HTTPS
- Authentication Challenge Mechanisms

Lesson Web Application Security Overview

- Attacks are Constant and Changing
- Open Web Application Security Project
- Assets are the Targets
- The Context for Defensive Coding
- Attackers Not Hackers
- Cross-Site Scripting (XSS): Description
- Defending Against XSS Attacks
- SQL Injection: Description; Example & Drill Down
- Defending Against SQL Injection Attacks

Lesson Handling Untrusted Input

- Unvalidated Input: Description
- Protecting a Web Resource
- Defending a Web Application
- Defending a Web Application/Resource
- Responding to Error State
- Best Practices for Untrusted Data
- Additional Types of Attacks

Session Additional J2EE Topics

Lesson Transactions

- Transaction Definitions
- The ACID Transaction Properties
- Transaction Lifecycle
- Overview of a Transactional System
- J2EE Transaction Support

Lesson Other J2EE APIs

- Java Message Service (JMS)
- When is Messaging Used?
- Two Messaging Models
- More On Publish/Subscribe
- Logical View of Publish/Subscribe
- More On Point-to-Point (P2P)
- Logical View of Point-To-Point
- Message Servers
- JavaMail; JavaMail Architecture
- XML
- An XML Document
- J2EE and XML

Lesson The J2EE Blueprints

- Overview
- Key Resources

Appendix: Custom Tags

Lesson Introduction to Custom Tags

- Components that Make up a Custom Tag
- Example of a TagHandler
- Tag Library Descriptor (TLD)
- The Tag Element
- Attribute Element; Variable Element
- Example Tag Library JAR
- Example WAR
- Example Using the Tag in a JSP
- Viewing the Result

Lesson Developing Custom Tags

- Package overview
- Developing the TagHandler
- TagSupport Sequence
- Iterations Without Generating bodycontent
- The doStartTag
- Programming the doEndTag
- Adding Support for Attributes
- Using Introspection and Reflection
- The User Bean
- The IfTag TagHandler
- The Introspection Method
- The doStartTag Method
- Implementing the Release Method
- The TLD

Why Work With Trivera Technologies?

- **We provide a solid J2EE development foundation**. Students will learn how to develop (and reuse!) essential J2EE web design skills and concepts properly, using best design practices, grounding them for advanced curriculum. Students will be prepared for designing and implementing real solutions, right after the class ends. Students will learn the importance of developing well-designed J2EE applications.
- **Our courses are focused - no "fluff" included.** We offer more than a "laundry list" approach to teaching. All lessons have clear objectives, are fundamental to core J2EE or JavaEE development and design practices, and are reinforced by hands-on labs and solid practical examples. Each lesson has performance driven objectives that ensure students will learn technologies and skills core to fundamental J2EE application design – nothing more, nothing less.
- **Our materials are comprehensive, and current.** Our comprehensive manuals include not only a hard copy of the course presentation, but also detailed reference notes, pertinent diagrams and charts, current lists of suggested online resources and articles, and often technical tutorials or white papers geared to the topics at hand.
- **We set you up!** Hands-on courses also include our unique materials for each student, complete with our ***LoadNGo Instant Classroom*** course set up DVD, software, and a multitude of learning resources that complement the course. Run the course right off the DVD – minimal set up for your company – maximum results for your students.
- **We foster "Learning by Doing".** Progressive labs are designed in such a way that students get a firm grasp on fundamental skills while they work toward defending a complete application. All labs are take-home, and all solution code is presented in an easy to use self-study format for future use and review.
- **True content ownership gives us flexibility & quality above the rest.** These course materials are wholly-owned by our company and fully customizable - at little or no cost - to help you best meet your learning objectives. We have many dedicated experts available worldwide to instruct your team, and can provide services around the globe, either locally or virtually. We work closely with you to produce the most effective events and materials for your team, within your desired timeframe and budget.
- **We have to adhere to higher standards.** As a courseware provider, our content and hands-on lab materials are licensed internationally by dozens of firms, and are therefore subject to very stringent quality requirements. Not only will your organization benefit from our own technical team's technical expertise, but also the feedback of hundreds of students and trainers using these materials, worldwide, on a regular basis. This unique fact guarantees that our materials are not only robust and interesting, but also technically correct, current and of the highest quality and usability.
- **We bring years of practical, current experience into the classroom and content.** Our instructors and course authors are also skilled mentors, Java, J2EE, .Net, SOA, and web services developers, architects and security-oriented professionals. We believe that learning, using and maintaining solid software execution and delivery methods are as important as gaining sharp coding skills. Best Practices for software development and execution, beyond technical coding skills, are enforced throughout all of our courses and discussions. Our team brings this extensive experience into every classroom and engagement.
- **We're skills-centric.** Although our team has extensive experience using a variety of tools and solutions, our core content is "technology-centric". Our aim is to teach you the best skills and solutions out there – not to sell you software from any particular vendor.
- **We're Java & J2EE authors and industry speakers.** Our team was selected to write the online *J2EE, EJB, EJB CMP-CMR a*nd *Web Services Tutorial Series for IBM developerWorks®* (www.ibm.com) These are the same instructors who train our classes and author the courseware. Most of our trainers/consultants have also authored additional articles on web services, EJB< Struts, J2EE and advanced Java topics, and are recognized speakers and presenters on the industry technical seminar circuit. Our team is comprised on several successful published authors. Members of our team have written or contributed to: *Eclipse Kick Start, Mastering Eclipse; Professional Jakarta Struts; Using Java Tools for Extreme Programming; Mastering Resin; Mastering TomCat and others.*
- ***Our services are guaranteed.*** Whether you're a stakeholder organizing your firm's educational services, a student in our live or virtual classroom or a trainer using our materials to educate your own client or team – **Our core mission is to make YOU a success in the classroom**.

Trivera Technologies is a 100% Female-Owned Small Business Concern
GSA Schedule # GS-35F-0188T
Please contact us for details & pricing.

For Additional Information

Need dedicated training? All courses can be brought onsite for a **private presentation**, customized to suit your unique requirements or goals. Please contact Training@triveratech.com for course details, Public Schedule dates and locations, and Special Discount Offers. **Need courseware?** Let us take the risk out of your classroom delivery! All materials are also available for corporate license with complete instructor support and free corporate branding. We guarantee our pricing and service. Samples of our course materials, as well as live client references for all of our services are available upon request. Please contact Courseware@triveratech.com for details. **For more information** about our training, mentoring or courseware licensing options, or to see our complete list of course offerings and services, please visit us at **www.triveratech.com**, email Training@triveratech.com or call 609.953.1515.