

TT8120: Secure Web Application Development Seminar (Language Neutral Edition) (2 days)

According to research by the National Institute of Standards, 92% of all security vulnerabilities are now considered application vulnerabilities and not network vulnerabilities

Trivera Technologies' *Best Defense™ Security Training Series* is a suite of developer-oriented, application security courses that provide complete coverage of the recently released CWE/SANS *Top 25 Most Dangerous Programming Errors* (<http://cwe.mitre.org/top25/>). These errors, as determined by a consortium of cyber security organizations, enable cyber espionage and crime. Our comprehensive application security and secure coding classes address each of these critical issues head-on, as our courses, seminars and workshops explicitly:

- Teach programmers what these errors are
- Demonstrate, in real terms, the potential impact of each of these errors
- Provide experience in how to recognize and properly address these errors
- Teach stakeholders how to defend against the potential consequences of security breaches in other parts of their IT infrastructure.

COURSE SNAPSHOT

Course: TT8120: Secure Web Application Development Seminar (Language Neutral)

Duration: 2 days

Skill Level: Intermediate

Focus: Lecture and demonstrations of why and how to integrate security into the entire software development lifecycle for web applications

Audience: Web Developers

Format: Seminar / Lecture / Demo: Expert lecture combined with open discussions and high-level demonstrations. This is not a hands-on course.

Language / Tools: This edition is Language Neutral, this course is also offered for Java (TT8120-J), .Net (TT8120-N) or other programming language formats.

Delivery Format: Available for onsite private classroom presentation, or live online / virtual presentation

Customizable: Yes

The *Secure Web Application Development Seminar* is an intense web application security training workshop/seminar essential for web developers who need to produce secure web applications, integrating security measures into the development process from requirements to deployment and maintenance. This course explores well beyond basic programming skills, teaching developers sound processes and practices to apply to the entire software development lifecycle. Perhaps just as significantly, students learn about current, real examples that illustrate the potential consequences of not following these best practices. This course is short on theory and long on application, providing students with in-depth, code-level demonstrations and walkthroughs. This course is taught in a language-neutral fashion, with demonstrations from several languages to illustrate patterns and techniques.

In this course, students are shown best practices for defensively coding web applications, including XML processing and web services. Demonstrations repeatedly attack and then defend various assets associated with a fully-functional web application. This approach illustrates the mechanics of how to secure web applications in the most practical of terms.

Security experts agree that the least effective approach to security is "penetrate and patch". It is far more effective to "bake" security into an application throughout its lifecycle. After spending significant time examining a poorly designed (from a security perspective) web application, developers are ready to learn how to build secure web applications starting at project inception. The final portion of this course builds on the previously learned mechanics for building defenses by exploring how design and analysis can be used to build stronger applications from the beginning of the software lifecycle.

A key component to our *Best Defense IT Security Training Series*, this workshop is a companion course with several developer-oriented courses and seminars. Although this edition of the course is language-agnostic, it may also be presented using Java, .Net or other programming languages or environments

▶ **Course Objectives: What You'll Learn**

Students who attend **Secure Web Application Development** will leave the course armed with the skills required to recognize actual and potential software vulnerabilities, implement defenses for those vulnerabilities, and test those defenses for sufficiency. This course quickly introduces developers to the most common security vulnerabilities faced by web applications today. Each vulnerability is examined from a coding perspective through a process of describing the threat and attack mechanisms, recognizing associated vulnerabilities, and, finally, designing, implementing, and testing effective defenses. In many cases, there are labs that reinforce these concepts with real vulnerabilities and attacks. Students are then challenged to design and implement the layered defenses they will need in defending their own applications.

Working in an interactive learning environment, guided by our application security expert, attendees will learn to:

- Understand potential sources for untrusted data
- Understand the consequences for not properly handling untrusted data such as denial of service, cross-site scripting, and injections
- Be able to test web applications with various attack techniques to determine the existence of and effectiveness of layered defenses
- Prevent and defend the many potential vulnerabilities associated with untrusted data
- Understand the vulnerabilities of associated with authentication and authorization
- Be able to detect, attack, and implement defenses for authentication and authorization functionality and services
- Understand the dangers and mechanisms behind Cross-Site Scripting (XSS) and Injection attacks
- Be able to detect, attack, and implement defenses against XSS and Injection attacks
- Understand the concepts and terminology behind defensive, secure, coding
- Understand the use of Threat Modeling as a tool in identifying software vulnerabilities based on realistic threats against meaningful assets
- Perform both static code reviews and dynamic application testing to uncover vulnerabilities in web applications
- Design and develop strong, robust authentication and authorization implementations
- Understand the fundamentals of XML Digital Signature and XML Encryption as well as how they are used within the web services arena
- Be able to detect, attack, and implement defenses for XML-based services and functionality
- Understand techniques and measures that can be used to harden web and application servers as well as other components in your infrastructure
- Understand and implement the processes and measures associated with the Secure Software Development (SSD)
- Acquire the skills, tools, and best practices for design and

- code reviews as well as testing initiatives
- Understand the basics of security testing and planning
- Work through a comprehensive testing plan for recognized vulnerabilities and weaknesses

▶ **Experiential Learning – Course Structure**

Attending students will be led through a series of advanced topics comprised of integrated lectures, group discussions and comprehensive demonstrations. The course provides a solid foundation in basic terminology and concepts, extended and built upon throughout the engagement. Students will examine various recognized attacks against web applications. Processes and best practices are discussed and illustrated through both discussions and group activities.

The second portion of the course steps through a series of vulnerabilities illustrating in very real terms the right way to implement secure web applications. The last portion of the course examines several design patterns that can be used to facilitate better application architecture, design, implementation, and deployment.

▶ **Audience & Pre-requisites: Who Should Attend**

This is an **intermediate-level** course designed for application project stakeholders who wish to get up and running on developing well defended web applications. Familiarity with a programming language (such as Java, .Net or C++) is required, and real world programming experience is highly recommended.

▶ **Related Courses – Suggested Learning Path**

Take Before: Students should have an understanding and a working knowledge in basic programming in either .Net or Java. Depending on the language of choice, students should have experience similar to:

- **TT4000 Understanding Internet Architectures**
- **TT2100 Core Java Programming for OO Developers (C++, etc)** or a **.Net Fundamentals** courses

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

- We offer this course for both Java (**TT8120-J**) and .Net (**TT8120-N**) flavors.
- For team members that need a higher level view of security and related issues, please consider **TT8020 Understanding Web Application Security**
- If you are looking for hands-on labs, you might consider: **TT8325 Securing Web Applications – Lifecycle** (for Java or .Net)
- If you need less of a web application orientation, you might consider: **TT8200 Secure Coding** (for Java or .Net)

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 follow-on to this course.

- **TT8500 Secure Web Services** (for Java or .Net)
- **TT8150 Mastering Secure SOA**
- **TT8600 Secure Software Design**
- Additional advanced Security or Secure Programming topics
- Service-Oriented Analysis and Design
- Web Services – Intro through Advanced
- Software Engineering, Design or Project Management tracks

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

► **Student Materials: What You'll Receive**

Our robust course materials include much more than a simple slideshow presentation handout. 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.

For course deliveries, demonstrations 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 or demonstrations, 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 course kits are designed to serve as an excellent and useful reference set, long after we leave your classroom.

► **Optional Pre / Post-Testing & Skills Assessment**

We work with you to ensure that your resources are well spent. Through our basic course pre-testing and/or post-course assessments, we ensure your team is up to the challenges that this course offers. Our goal is to structure 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, or our custom online training program management system for monitoring the courses or progress while skilling your students of all experience levels.

► **Bridging the Gap: Collaborative Mentoring Services**

Our team of technical experts is also available for various project assistance services to help your team apply their newly-learned classroom skills to their real-world project in a meaningful, practical way, right after the training ends.

Our custom **collaborative mentoring programs** integrate with or extend your team's classroom training experience, to help bring these skills into existing (or inherited) legacy projects, into new projects, or to simply keep your students sharp them in between projects. Our programs can be highly involved and closely integrated with your project timelines or group development efforts, or can be less involved, serving simply as an overarching educational framework or 'spot check' to keep your group skills moving forward in between projects or waiting for projects to begin. Please contact us for details about this exciting custom service.

Workshop Topics Covered

Session: Foundation

- Misconceptions
 - Thriving Industry of Identify Theft
 - Dishonor Roll of Data Breaches
 - TJX: Anatomy of a Disaster
 - Heartland: What? Again?
- Security Concepts
 - Terminology and Players
 - Assets, Threats, and Attacks
 - OWASP
 - CWE/SANS Top 25 Programming Errors
 - Categories
 - What they mean to your

web applications

- Defensive Coding Principles
- Reality
 - Recent, Relevant Incidents
 - Find Security Defects In Web Application

Session: Top Security Vulnerabilities

- Unvalidated Input
 - Description With Working Example
 - Defenses
 - Identifying Trust Boundaries
 - Qualifying Untrusted Data
 - Implementing An Effect, Layered Defense

- Designing An Appropriate Response
- Testing Defenses And Responses
- Overview Of Regular Expressions
 - Description With Working Example
- Broken Access Control
 - Description With Working Example
 - Defenses
 - Authorization Security Overview
 - Defending Special Privileges Such As Administrative Functions

- Application Authorization Best Practices
 - Broken Authentication And Session Management
 - Description With Working Example
 - Defenses
 - Multi-Layered Defenses Of Authentication Services
 - Password Management Strategies
 - Password Handling With Hashing
 - Mitigating Password Caching
 - Testing Defenses And Responses For Weaknesses
 - Alternative Authentication Mechanisms
 - Best Practices For Session Management
 - Defending Session Hijacking Attacks
 - Best Practices For Single Sign-On (SSO)
 - Cross Site Scripting (XSS) Flaws
 - Description With Working Example
 - Defenses
 - Character Encoding Complications
 - Blacklisting
 - Whitelisting
 - HTML/XML Entity Encoding
 - Trust Boundary Definition
 - Implementing An Effective Layered Defense
 - Designing An Appropriate Response
 - Cross-Site Request Forgeries (CSRF)
 - Understanding CSRF
 - Defending Against CSRF
 - Output Encoding – Why
 - Output Encoding – How
 - Output Encoding – Best Practices
 - Injection Flaws
 - Description With Working Example
 - Defenses
 - Qualifying Untrusted Data
 - Hibernate Best Practices
 - XML Best Practices
 - Third Party API's
 - Implementing An Effective Layered Defense
 - Designing An Appropriate Response
 - Error Handling And Information Leakage
 - Description With Working Example
 - Defenses
 - Web Application Exception Handling Framework
 - Error Response Best Practices
 - Error, Auditing, And Logging Content Management
 - Error, Auditing, And Logging Service Management
 - Best Practices For Supporting Web Attack Forensics
 - Insecure Storage
 - Description With Working Example
 - Defenses
 - Data Leakage
 - Risk Minimization
 - Cryptography Overview
 - Data Encryption
 - Partial/Complete
 - Property/Deployment/Configuration Files
 - Insecure Management Of Configuration
 - Description With Working Example
 - Defenses
 - System Hardening
 - Server Configuration “Gotchas!”
 - Hardening Software Installation
 - Direct Object Access
 - Description With Working Example
 - Defenses
 - XML/DTD/Schema/XSLT Best Practices
 - Spoofing
 - Description With Working Example
 - Defenses
 - Protecting Your Clients
 - Defending Against Cross Site Request Forgeries
 - Phishing Defenses
- Session: Best Practices**
- Best Practices and Principles
 - Security Is A Lifecycle Issue
 - Minimize Attack Surface
 - Manage Resources
 - Application States
 - Compartmentalize
 - Defense In Depth - Layered Defense
 - Consider All Application States
- Not Trusting The Untrusted
 - Security Defect Mitigation
 - Leverage Experience
- Session: Defending XML Processing**
- Defending XML
 - Understanding Common Attacks And How To Defend
 - Operating In Safe Mode
 - Using Standards-Based Security
 - XML-Aware Security Infrastructure
 - Defending Web Services
 - Security Exposures
 - Transport-Level Security
 - Message-Level Security
 - WS-Security
 - Attacks And Defenses
 - Defending Ajax
 - Ajax Security Exposures
 - Attack Surface Changes
 - Injection Threats And Concerns
 - Effective Defenses And Practices
- Session: Secure Software Development (SSD)**
- SSD Process Overview
 - CLASP Defined
 - CLASP Applied
 - Asset, Boundary, and Vulnerability Identification
 - Vulnerability Response
 - Design and Code Reviews
 - Applying Processes and Practices
 - Risk Analysis
- Session: Security Testing**
- Testing as Lifecycle Process
 - Testing Planning and Documentation
 - Testing Tools And Processes
 - Principles
 - Reviews
 - Testing
 - Tools
 - Static and Dynamic Code Analysis
 - Testing Practices
 - Authentication Testing
 - Session Management Testing
 - Data Validation Testing
 - Denial Of Service Testing
 - Web Services Testing
 - Ajax Testing

Session: Appendix: Security Design Patterns

- Design Patterns Introduction
- Web Application Security Design Patterns
 - Authentication Enforcer
 - Authorization Enforcer
 - Intercepting Validator
 - Secure Base Action

- Secure Logger
- Secure Pipe
- Secure Service Proxy
- Intercepting Web Agent

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.

► Why Work With Trivera Technologies?

Whether you are a project leader choosing a training provider or course to bring to your team, or an organization or an instructor looking to potentially license or use course materials to train your own team, or a student looking for an exciting, targeted training class to attend or to recommend to your colleagues - **Our single focus is to make YOUR training event or experience a success.** Here's why choosing Trivera Technologies as your education resource takes the risk right out of your decision making process...

- **We provide a solid secure, design, coding and implementation foundation.** Students will learn how to code, use (and reuse!) essential secure programming and design skills and concepts properly, using best coding practices, grounding them for advanced curriculum, and will be prepared for designing and implementing solutions. **Students will learn the importance of developing well-defended 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 secure application 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 server-side 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. Our dedicated course development team keeps everything as current as possible with both industry trends and software editions to ensure your team is getting the most current information available.
- **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 designing 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.
- **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 have to adhere to higher standards.** As a courseware provider to other organizations, training firms and/or independent instructors, 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 benefit from 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, JEE/JavaEE, J2EE, .Net, Agile, 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. Our team has trained thousands of students.
- **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 & JEE / J2EE authors and industry speakers.** Our team was selected to write the online *J2EE, EJB, EJB CMP-CMR and 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 / JEE 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.**

► **For Additional Information**

Need dedicated training? All courses can be brought onsite or run virtually for a **private presentation, anywhere around the world**, 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 on a worldwide basis for corporate license with complete instructor support and free corporate branding. Our LoadNGo Set up is available to partners as well! 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 development or 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.



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