

## Advanced XML, XSLT, and Web Services (TT4350)

**Length:** 4 days

### Description

This course is an intensive, hands-on treatment of XML, XPath, and XSLT. The course is a balanced mixture of theory and practical labs designed to take students from the basics of XML through related advanced technologies. The students walk through the different standards in a structured manner to enable them to master the concepts and ideas, which are reinforced in the lab exercises. The course starts with a quick review of the fundamentals of XML before covering XML Schema in detail. It then moves on to the XPath and XSLT covering advanced topics in both. Finally, XML and Web Services security mechanisms and issues are addressed.

### Audience

This is an **advanced** level XML training course, designed for those needing in-depth knowledge and a working knowledge of XML, XML Schema, XSLT, and XML-related security.

### Prerequisite

A working knowledge of XML is required.

### Topics

#### XML CONTENT REVIEW

##### *XML Review*

- XML Document Structure
- Well-Formed and Valid XML Documents
- Structure, Content and Format

#### XML STRUCTURE

##### *Structure Using DTDs*

- Document Type Definition (DTD)
- DOCTYPE Statement
- Complex Content Models
- Useful DTD Constructs
- Designing and Modifying DTDs

##### *Namespaces*

- Namespaces Associate an Alias with a URI
- Declaring Namespaces
- Namespaces Best Practices

##### *Structure Using Schemas*

- XML Schemas: Objectives
- Schemas Data Types
- Complex Types
- Schema Components
- Global and Local Components
- Derived Complex Types
- Derivation by extension
- Associating Schemas with XML Instances
- Using Target Namespaces
- Using schema Location
- Reuse and Manageability of Schemas
- Schema Composition
- Reusable Groups
- Designing and Modifying Schemas
- Lifecycle Design Principles for Schemas

#### XML FORMATTING

##### *XSL Transformations Review*

## Advanced XML, XSLT, and Web Services (TT4350)

- XSL Version Issues
- XPath Describes Locations Within XML
- XSLT is Rule-Based Transformation Language
- XSL is Oriented Towards Formatting
- XPath Accesses Parts of Document
- XSLT Templates Specify Output Replacement
- XSLT Uses XPath Expressions Within Templates

### *XSLT and XPath*

- XPath Expressions
- Abbreviated Axis Forms
- Predicates As Optional Filters
- XPath Operators; Functions; Examples
- Working With XPath
- XSLT Stylesheet Structure
- Templates: Rules in a Stylesheet
- Apply-Templates Directs Processing
- value-of to Extract Values
- Built-in Templates
- Text Handling
- Calling Templates
- Passing Parameters
- Conditional Processing Constructs
- Looping With `<xsl:for-each>`
- Sorting
- Constructing A New Node
- Designing and Implementing XSLT Modifications

### **ADVANCED XML FORMATTING**

#### *XSL FO (Formatting Objects)*

- XSLT Designed to Support XSL-FO
- XSL Family Working Together
- XSL-FO Support for Paged Media
- XSL-FO Document Root Common Overall Structure

- Define A Page Type
- Page Types Can Be Conditional
- Content Flows Into Page Regions
- Flow Goes to Defined Regions
- Working With XSL-FO

#### *Advanced XSL Topics*

- Advanced Features
- Entities Used For Parameter Sets
- `<xsl:message>`
- `generate-id()` for Endpoints
- Create Unique Identifier for Each Node
- Grouping by Keys Used in Output
- `preceding-sibling:: axis`
- `<xsl:key>` and `key()` to Select Groups
- `<xsl:copy-of>`
- `<xsl:copy>`
- `name()`
- Whitespace and Why We Care
- Parser Can Perform Whitespace Actions
- Stripping Whitespace
- Whitespace in Stylesheet
- Whitespace Creep into Output
- Whitespace Coming From Source
- Whitespace Coming From Stylesheet
- Import or Include Statements
- Compose Stylesheets
- Generating linked TOC

### **APPLYING XML**

#### *XML Performance Improvements*

- Review of best practices

### **WEB SERVICES OVERVIEW**

#### *Introduction to Web Services*

- Infrastructure Supporting a Web App
- Constraints of Implementation Options

## Advanced XML, XSLT, and Web Services (TT4350)

- What are Web Services?
- XML in Web Services
- SOAP Specification Provides:
- SOAP Message Syntax
- A Simple Example...
- Remote Procedure Calls
- Example of SOAP RPC Call
- Example of Response
- WSDL: Description
- Example of WSDL Instance
- UDDI: Publication and Search
- Web Services Enables Decoupling
- Web Services Advantages
- Many Web Services Challenges
- Spec and Standard Evolution
- Web Services Interoperability Organization
- WS-I Has Many Deliverables
- Web Service Denial of Service Attacks
- OWASP Top Ten
- Picture is Evolving

### WRAP-UP

- W3C Activities
- Benefits of XML
- Drawbacks of XML
- XML Separates Structure, Content and Format
- Crossing Boundaries
- XML: Lightweight Databases
- From Tag to Architecture

### XML AND WEB SERVICES SECURITY

- XML Digital Signatures
- Standard For Digital Signature
- XML Encryption
- XML Encryption Protects Data
- Securing a Web service
- Web Service Security Exposures
- Transport-Level Security
- When to Use Transport-Level Security
- Message-Level Security
- Web Services Security Roadmap
- SOAP Message Security
- WS-Security Enables Interoperability
- XML Signature and Encryption
- XML Attacks Against Schemas
- XML Attacks Absent Parsers
- XML Injection
- XPath Injection
- CDATA Injection
- Known SOAP and Web Service Attacks