Training: Capstone Courseware
563 Developing RESTful Services Using Java

FORM OF TRAINING	MATERIALS	PRICE	DURATION
Traditional	Hardcopy	1150 EUR	5 days
Traditional	CTAB Tablet	1250 EUR	5 days
Distance learning	Hardcopy	1150 EUR	5 days
Distance learning	CTAB Tablet	1150 EUR	5 days

LOCATIONS

Krakow - 5 Tatarska Street, II floor, hours: 9:00 am - 4:00 pm
Warsaw - 17 Bielska Street, hours: 9:00 am - 4:00 pm

TRAINING GOALS:

Version 2.0.1

This course shows experienced Java programmers how to build RESTful web services using the **Java API for RESTful Web Services**, or **JAX-RS**. We first overview the key concepts of REST -- ultimately the thorough and thoughtful use of URLs, HTTP methods, and media types to design and implement scalable and maintainable enterprise services. Then we dive into the elegant JAX-RS standard for building RESTful services, learning how to manage URLs and URL patterns and methods, how to bind input and control response production, and how to manage HTTP entities in popular content types such as XML and JSON.

From here students investigate intermediate features including dependency injection, error handling, and JSR-303 validation, and use Java generics to implement patterns for common operations over an application's domain classes. We explore sub-resources, the JAX-RS client API, filters and interceptors, and testing techniques, before closing with a summary chapter on REST security that includes implementations of HTTP BASIC security and HMAC signatures.

Learning Objectives

- Understand the advantages of the REST architecture for web services.
- Use JAX-RS to develop simple RESTful services.
- Control dispatching to service methods based on URL patterns and HTTP methods.
- Bind request values to method parameters when expressed as HTTP query parameters, form values, headers, cookies, and more.
- Manage XML and JSON content using XML Schema and JAXB -- or without JAXB using leading JAX-RS providers and Reflection-driven entity providers such as MOXy and Jackson.

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ul. Tatarska 5, 30-103 Kraków, tel.: (12) 298 47 77
ul. Bielska 17, 02-394 Warszawa, tel.: (22) 417 41 70

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- Handle error conditions by producing appropriate HTTP responses.
- Use JSR-303 validation for request parameters, headers, and entities.
- Use Java generics to implement REST API patterns for various domain classes.
- Take advantage of lifecycle and context services available to JAX-RS services.
- Organize request-handling methods into sub-resource classes to make REST APIs extensible and maintainable.
- Implement REST clients using the JAX-RS standard API.
- Build filters and interceptors to adapt service endpoint behavior.
- Develop unit tests for JAX-RS services that cover both method code and JAX-RS annotations, using the Jersey test framework.
- Be aware of security concerns for RESTful services and secure services appropriately.

CONSPECT:

- Overview of REST and JAX-RS
  - The REST Vision
  - Use of HTTP
  - Use of URIs
  - Use of Content Types
  - CRUD Operations and Business Operations
  - HATEOAS and the Richardson Maturity Model
  - JAX-RS
  - Applications, Resources, and Providers
- Configuration and Lifecycle
  - The JAX-RS Application
  - XML Configuration
  - Annotation-Driven Configuration
  - Applications
  - Root Resource Classes
  - Per-Request vs. Singleton Lifecycle
  - Providers
- Handling Requests
  - The Application Path
  - The @Path Annotation
  - The HTTP Method Annotations
  - Sub-Resource Locators
  - Annotation Inheritance and overriding

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- @XXXParam Annotations
- The @DefaultValue Annotation
- Parameter Types
- Parameter Converters

- Producing Responses
  - Supported Return Types
  - The Response Class
  - Response Entities
  - Binary Content
  - Delivering a File
- Entity Translation
  - Entity Parameter and Return Type
  - Entity Providers
  - @Consumes and @Produces Annotations
  - Built-In Entity Providers
  - Custom Entity Providers
- Working with XML and JSON
  - The JAXB Entity Provider
  - Driving XML Representations from Schema
  - Driving JSON Representations with JAXB
  - JSON Without JAXB: Jackson, MOXy, etc.
  - CRUD Patterns
  - Error Handling
  - Sub-Resources
- Dependency Injection
  - The @Context Annotation
  - Injectable Types
  - The Application Subclass
  - Servlet Configuration and Context
  - Impact of Lifecycle Policies
  - Context Providers
  - Using CDI
- Validation and Error Handling
  - Using Response
  - Throwing WebApplicationException
  - Exception Mapping Providers

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- Selection of Exception Mappers
- Java EE Bean Validation
- Constraint Annotations
- Support for JSR-303
- Annotating Method Parameters
- Annotating Entity Classes
- Error Reporting

- Generic Services
  - Generic Entities
  - Generic Entity Providers
  - ParameterizedType
  - Reflection-Driven Entity Providers
  - Annotation Inheritance
  - CRUD Patterns, II
  - Serialization, Recursion, and Scope
  - Dynamic Sub-Resources
- Working with Databases
  - Persistence Services
  - The Java Persistence API
  - JPA Support for JSR-303
  - Handling IDs and Keys
  - Cascading
  - Caching
  - Error Handling
  - Hypermedia Challenges
- Sub-Resources
  - Significance of Sub-Resources
  - Exposing Sub-Objects
  - Exposing Collections
  - Multiple Paths to Resources
  - Exposing Actions
  - Using Sub-Resource Locators
  - Collection vs. Instance Services
- The Client API
  - The Builder Pattern
  - Client

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- WebTarget
- Invocation
- Basic Usage
- Managing Content Types and Entities
- Error Handling
- Registering Providers
- The Service Locator Pattern
- Generic Clients

- Filters and Interceptors
  - The Filter Interfaces
  - Processing Pattern
  - The Request and Response Context Interfaces
  - Aborting a Request
  - The Interceptor Interfaces
  - Adaptive Streams
  - Filters on the Client Side
  - Interceptor Strategy for Hypermedia
- Testing
  - Testing JAX-RS Services
  - Unit Testing and Integration Testing
  - Mocking the Container
  - The Jersey Test Framework
  - Test Configuration
  - Mocking Dependencies
  - Testing JAX-RS Clients
  - Mocking Services
- Security
  - Concerns for RESTful Services
  - Authentication and Authorization
  - HTTP BASIC and DIGEST
  - HTTPS
  - Programmatic Security
  - SQL Injection
  - Cross-Site Request Forgery
  - Message-Level Security
  - HMACs

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REQUIREMENTS:

- Strong Java programming skills are essential -- Course 103 is excellent preparation.
- Experience with other Java EE standards, especially servlets and JSP, will be very helpful in class, but is not strictly required.

Difficulty level

CERTIFICATE:

The participants will obtain certificates signed by Capstone Courseware.

TRAINER:

Authorized Capstone Courseware Trainer.

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