Working with XML in Java Using JAXB

INTRODUCTION TO JAXB

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Overview

XML – eXtensible Markup Language

Java Architecture for XML Binding
- One of the Java XML APIs

Learning Path

Course Overview

XML and XML Schema in a Nutshell

What is JAXB?

JAXB

Java Architecture for XML Binding

Java Architecture for XML Binding

Convert between Java objects and XML

```java
public class Item {
    private String productName;
    private int quantity;
    private BigDecimal price;
    private String comment;

    // ...
}
```

```xml
<item>
    <productName>Ballpoint Pen</productName>
    <quantity>20</quantity>
    <price>8.95</price>
    <comment>Blue ink</comment>
</item>
```

Java APIs for Processing XML

DOM – Document Object Model

SAX – Simple API for XML

StAX – Streaming API for XML

JAXB – Java Architecture for XML Binding

DOM – Document Object Model

In-memory tree of nodes
- Nodes correspond to items in XML

Package org.w3c.dom
- Document, Element, Attr, ...

Easy to use but does not scale well to large documents

SAX – Simple API for XML

Event-Based

- Callback methods

Package org.xml.sax

- Interface ContentHandler

Cumbersome but can handle documents of any size

StAX – Streaming API for XML

Event-Based

- Pull parsing

Package javax.xml.stream

- XMLStreamReader, XMLStreamWriter, …

More convenient than SAX but still low-level

JAXB – Java Architecture for XML Binding

Higher-level API
- Less code to write and maintain

XML Schema

Two Approaches
- Code-first: Java ➜ XSD
- Schema-first: XSD ➜ Java

JAXB – Java Architecture for XML Binding

Advantages

- Less code to write and maintain
- XML Schema to specify domain model

Disadvantages

- Harder to have precise control
- May not scale well

Learning Path

Prerequisites

- Java Development Kit
- Any IDE that supports Maven and Gradle
- Basics of XML and XML Schema

Courses About XML

- XML Fundamentals by Dan Sullivan
- XML Syntax Fundamentals by Ken Holman

After This Course

- Building JAX-WS Web Services with Apache CXF by Michael Hoffman

Course Overview

Reading and Writing XML with JAXB

JAXB Annotations

The Code-First Approach

The Schema-First Approach

Customizing Bindings
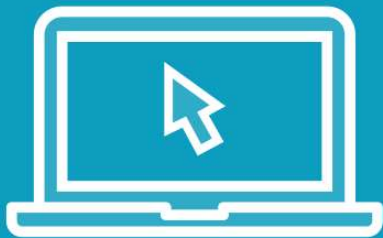
Integration with Maven and Gradle

JAXB and Web Services

XML and Namespaces in a Nutshell

Demo

XML – Extensible Markup Language

XML Schema in a Nutshell

XML Schema

Describes a data model for XML
- Specifies what a valid XML document looks like

Used by tools
- For example to check if an XML document is valid

XML Schema Languages

Document Type Definition (DTD)

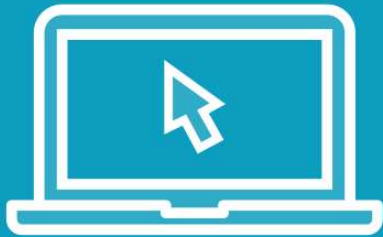- Does not support namespaces and data types

XML Schema (XSD)

- Is an XML document itself

XML Schema Primer (W3C)

- https://www.w3.org/TR/xmlschema-0/

Demo

XSD – XML Schema Definition

Summary

Java APIs for Working with XML
- Lower-level: DOM, SAX, StAX
- Higher-level: JAXB

JAXB: Two Approaches
- Code-first: Java ➜ XSD
- Schema-first: XSD ➜ Java

XML and XML Schema