# Chapter 1

# An introduction to web programming with Java

# Contact information of Lecturer

Nguyễn Đình Quân
Email: quannd@ptit.edu.vn
Phone number: 0902905335

# Course syllabus

- Introduction to Web programming
- HTML/CSS/Javascript
- MVC Model
- Java Servlets
- Java Server Pages (JSP)
- Session and Cookies
- Java Beans/JSP Expression Language
- JSP Standard Tag Library
- JDBC
- Spring Framework
- Spring Data JPA/Hibernate
- Java Web Services/Spring Rest API

# Objectives

**Knowledge**

1. Name the software component that runs on the client of a typical web application.

2. Name the two software components that run on the server of a typical web application.

3. Distinguish between HTML and HTTP.

4. Distinguish between static web pages and dynamic web pages.

5. Name three approaches for developing Java web applications.

6. Describe the software components that are required for developing servlet and JSP applications.

7. List and describe the three layers of a typical Java web application.

8. In general terms, describe the use of these directories as defined by the J2EE specification: webapps, document root, WEB-INF, and WEB-INF\classes.

## Objectives (continued)

9.  Name two IDEs that can be used for developing Java web applications.

10. Name two web servers that can be used for developing Java web applications.

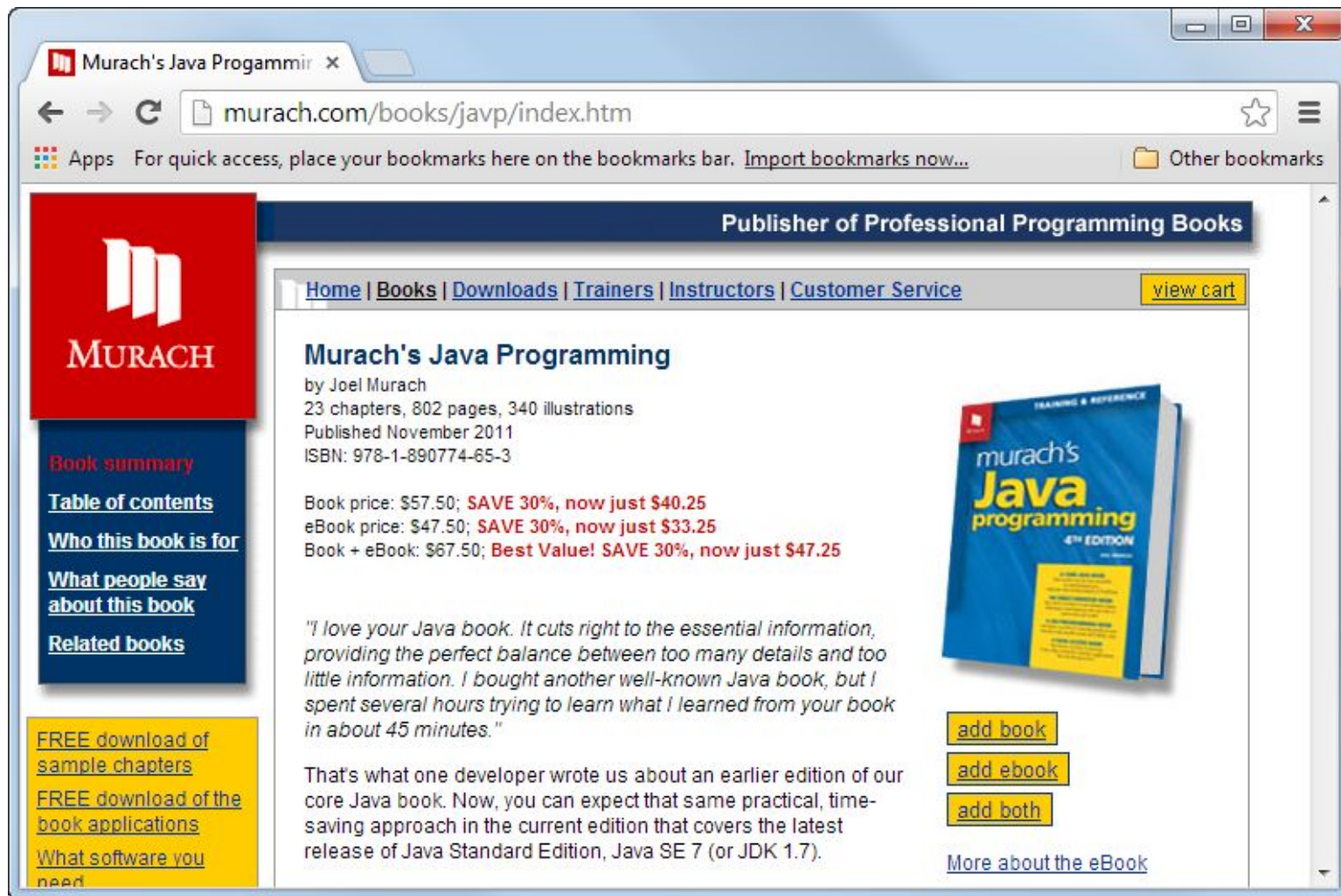11. Name a popular database server that can be used for developing Java web applications.

# Course materials

- J. Murach, M. Urban. Murach's Java Servlet and JSP. 3rd Edition", 2014.
- Spring in Action, 5th Edition
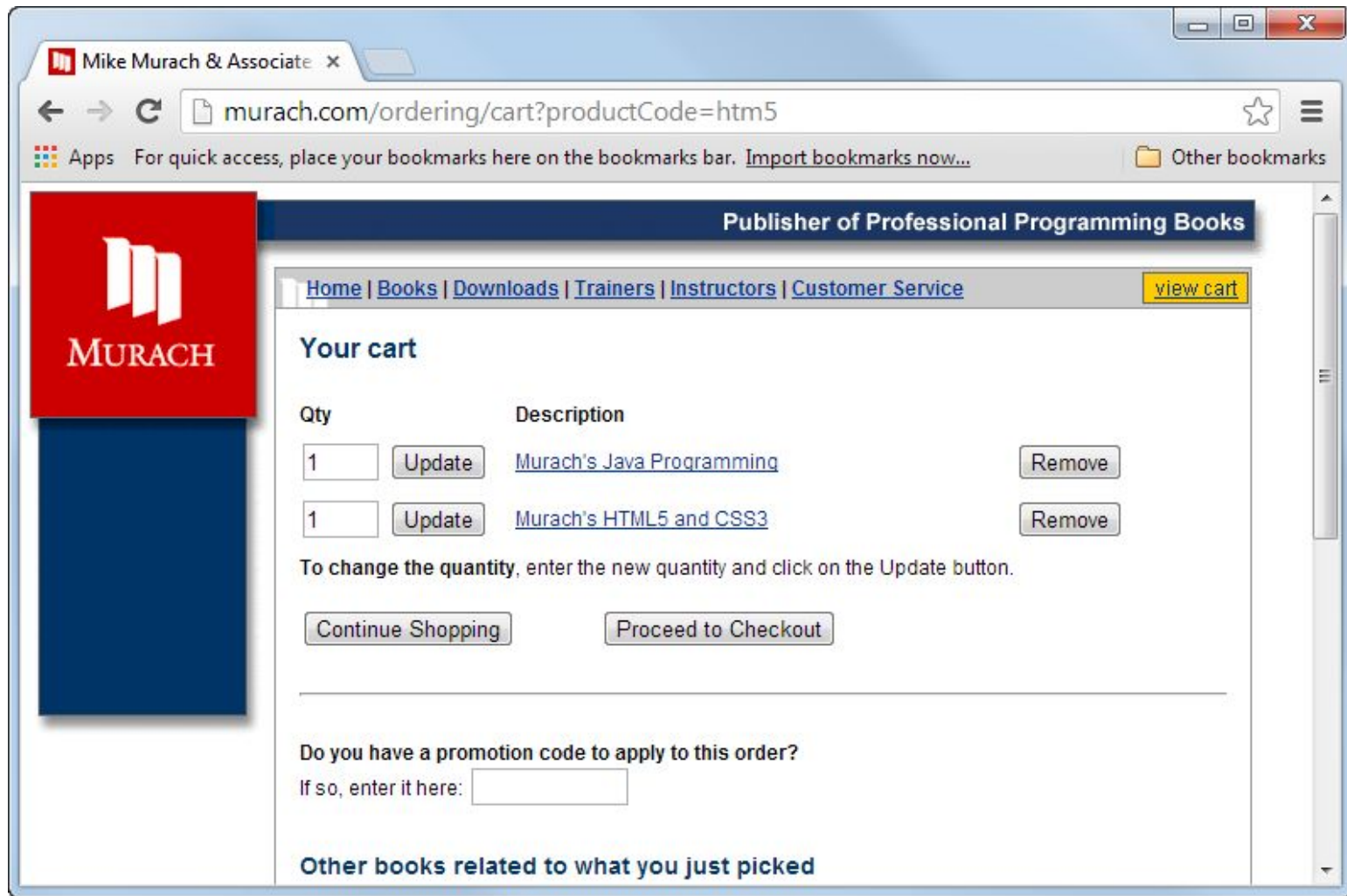- Bài giảng Lập trình Web, Học viện Công nghệ Bưu chính Viễn thông.
- Slides
- Google Classroom

# How to grade?

| Chuyên cần | 10% | Slink |
|---|---|---|
| Lab | 20% | 6 buổi |
| Project | 20% | Nhóm |
| Final exam | 50% | Thi phòng máy |

# The first page of a shopping cart application
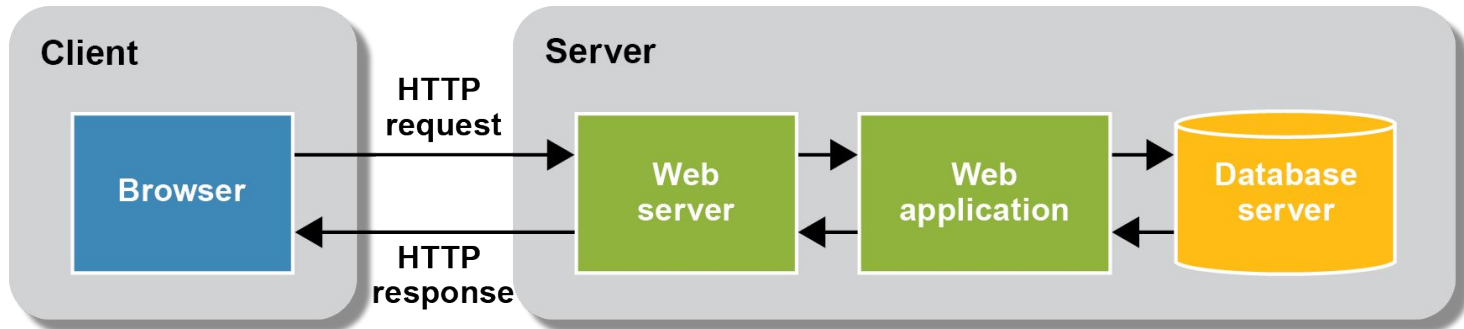
# The second page of a shopping cart application

# Components of a web application

**Client computer**

**Server computer**

**Internet connection**

**Web browser**

**Web server
Database server**
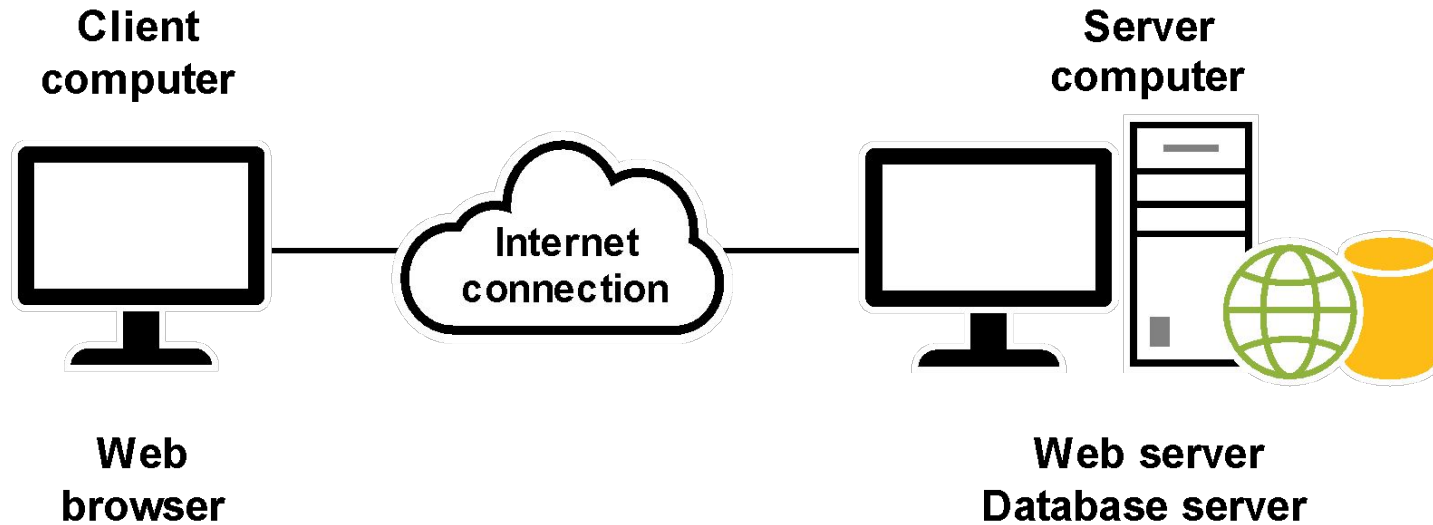
# How a web server processes static web pages
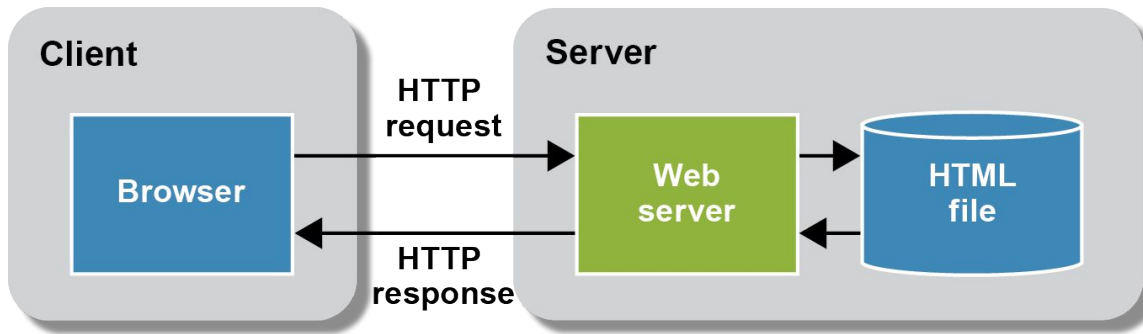


# How a web server processes dynamic web pages

# Three approaches for developing Java web apps

**Servlet/JSP**

- Is a lower-level API that does less work for the programmer.

- Provides a high degree of control over the HTML/CSS/JavaScript that's returned to the browser.

**JSF**

- Is a higher-level API that does more work for the programmer.

- Makes it more difficult to control the HTML/CSS/JavaScript that's returned to the browser.

**Spring Framework**

- Is a higher-level API that does more work for the programmer.

- Provides a high degree of control over the HTML/CSS/JavaScript that's returned to the browser.

# Terminology

- The *Java Standard Edition* (*Java SE*) includes the *Java Development Kit* (*JDK*) and the *Java Runtime Environment* (*JRE*).

- The *Java Enterprise Edition* (*Java EE*) specification describes how web servers can interact with all Java web technologies.

- *Servlets* store the Java code that does the server-side processing.

- *JavaServer Pages* (*JSPs*) store the HTML that defines the user interface.

- *JavaServer Faces* (*JSF*) provides a higher-level API that replaces both servlets and JSPs.

- *Java Persistence API* (*JPA*) is an API for working with databases.

# The components of a servlet/JSP application
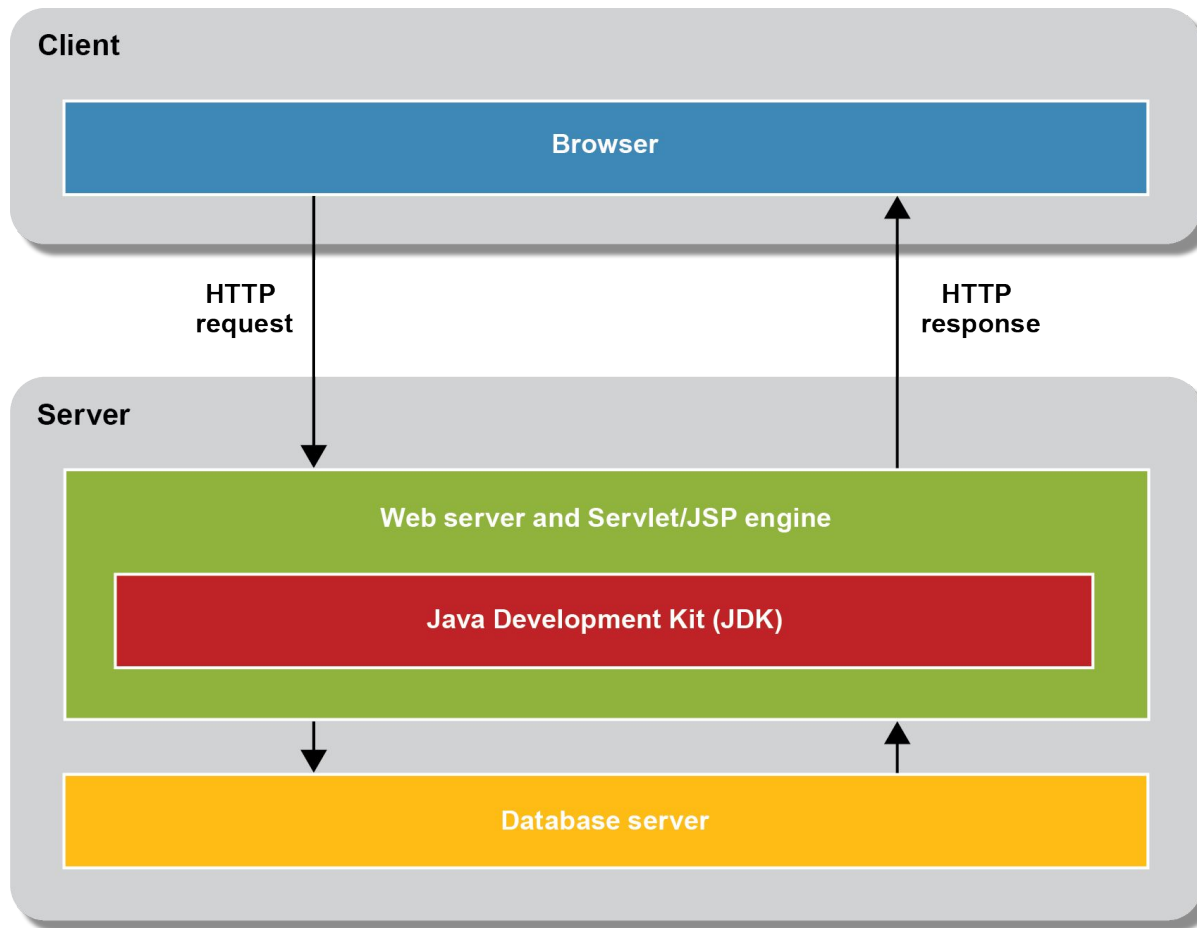
# The architecture for a servlet/JSP application

**Presentation layer**

| HTML files | JSP files |
|------------|-----------|

**Business rules layer**

| Servlets | JavaBeans | Other Java classes |
|----------|-----------|--------------------|

**Data access layer**

| Data access classes |
|---------------------|

Database    Text files    Binary files    XML files
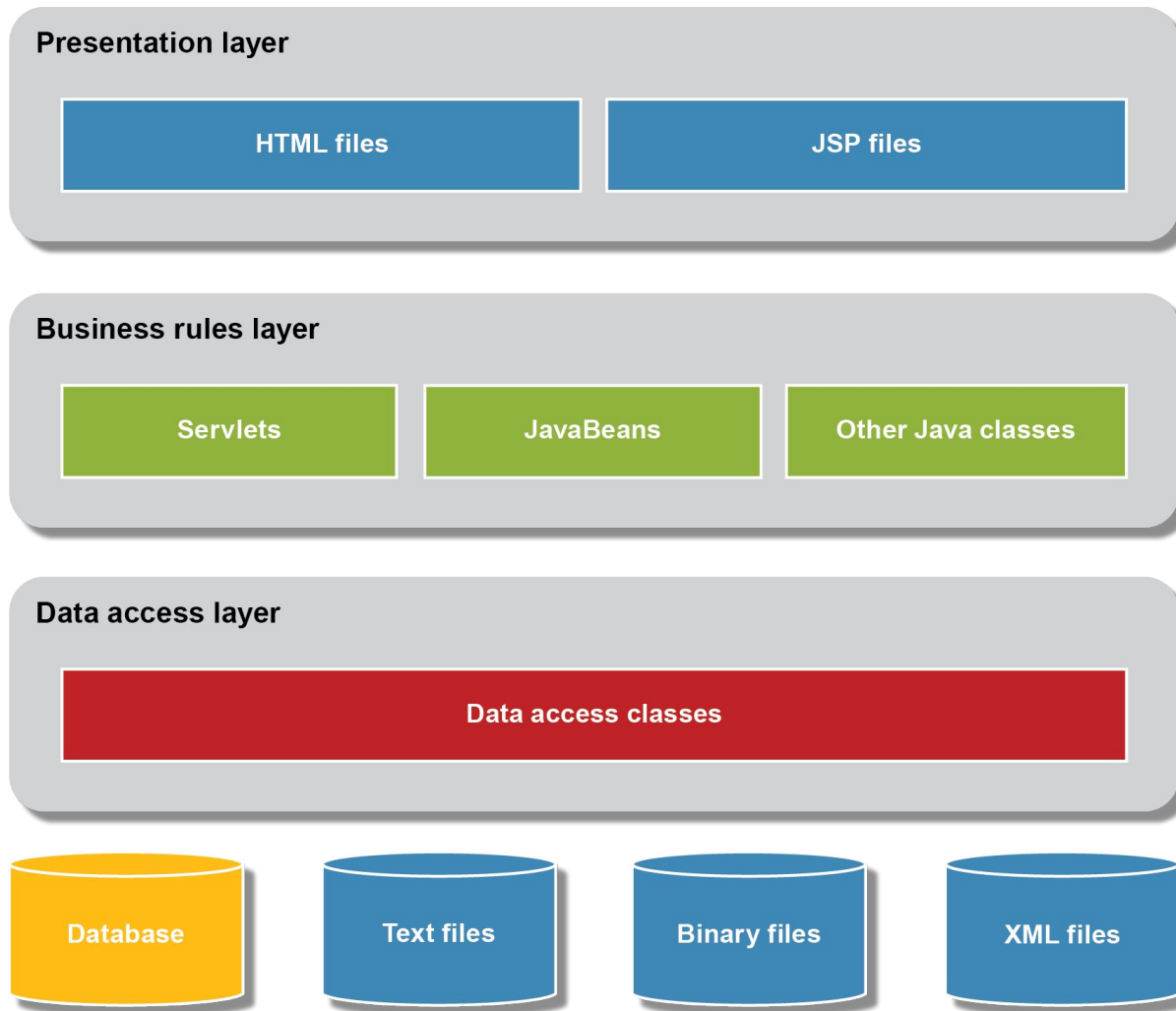
# The directory structure for a web application



tomcat
  webapps
    musicStore (the root directory for HTML and JSP files)
      admin
      cart
      catalog
      META-INF (content.xml file)
      WEB-INF (the web.xml file)
        classes (the root directory for Java classes)
          music
            business
            controllers
            data
            util
        lib (JAR files for Java class libraries)
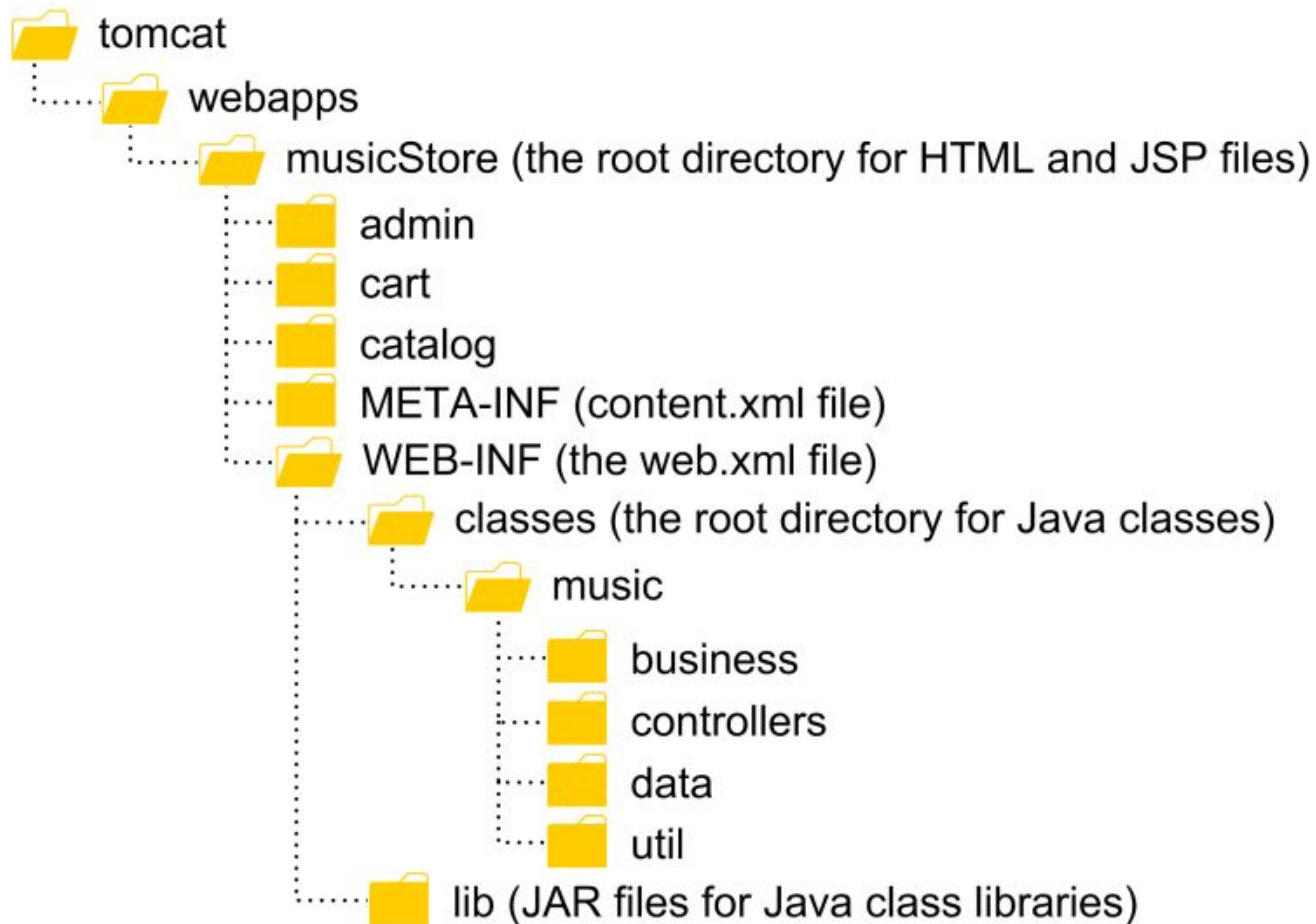
# The directories and files for a web application

| Directory | Description |
|---|---|
| (root) | Contains the HTML and JSP files. |
| \WEB-INF | Contains the web.xml file and is not directly accessible from the web. |
| \WEB-INF\classes | Contains the servlets and other Java classes for your application. Each subdirectory corresponds with the package for the Java class. |
| \WEB-INF\lib | Contains any JAR files that contain Java class libraries that are used by the web application. |
| \META-INF | Contains the context.xml file that configures the web application context. |

# The NetBeans IDE
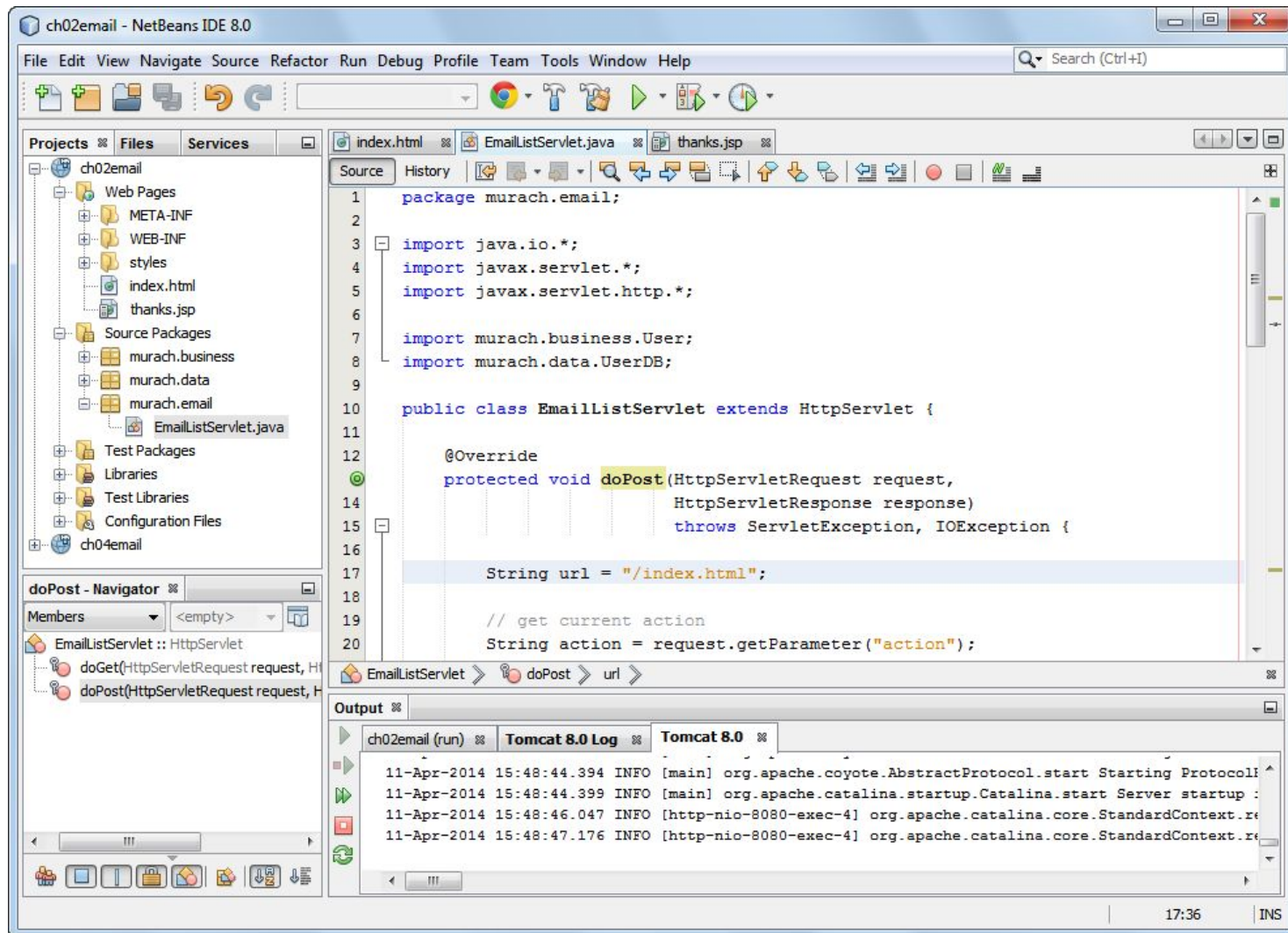
# Popular IDEs for Java web development

- NetBeans

- Eclipse

- IntelliJ IDEA

# Two popular web servers

## Tomcat

- Is a servlet/JSP engine that includes a web server.

- Is free, open-source, and runs on all modern operating systems.

- Is a popular web server for Java web applications.

## GlassFish

- Is a complete Java EE application server.

- Is free, open-source, and runs on all modern operating systems.

- Provides more features than Tomcat.

- Requires more system resources than Tomcat.

# Other popular web servers

- WildFly (formerly JBoss)

- Jetty

- Oracle WebLogic

- IBM WebSphere

# A popular database server

## MySQL

- Is a relational database server that implements most of the SQL standard.

- Is free, open-source, and runs on all modern operating systems.

- Is the most popular database server for Java web applications.

## Other popular database servers

- PostgreSQL
- Oracle

# An ISP that provides servlet/JSP web hosting

# The FileZilla program

# WinSCP

# WinSCP – Synchronize