**Exercise 1: Configuring a Basic Spring Application**

**Scenario:**

**Your company is developing a web application for managing a library. You need to use the Spring Framework to handle the backend operations.**

**Steps:**

**1. Set Up a Spring Project:**

**o Create a Maven project named LibraryManagement.**

**o Add Spring Core dependencies in the pom.xml file.**

**2. Configure the Application Context:**

**o Create an XML configuration file named applicationContext.xml in the src/main/resources directory.**

**o Define beans for BookService and BookRepository in the XML file.**

**3. Define Service and Repository Classes:**

**o Create a package com.library.service and add a class BookService.**

**o Create a package com.library.repository and add a class BookRepository.**

**4. Run the Application:**

**o Create a main class to load the Spring context and test the configuration.**

**CODE :**

<project xmlns="http://maven.apache.org/POM/4.0.0"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xsi:schemaLocation="http://maven.apache.org/POM/4.0.0

http://maven.apache.org/xsd/maven-4.0.0.xsd">

<modelVersion>4.0.0</modelVersion>

<groupId>com.library</groupId>

<artifactId>LibraryManagement</artifactId>

<version>1.0-SNAPSHOT</version>

<dependencies>

<!-- Spring Core -->

<dependency>

<groupId>org.springframework</groupId>

<artifactId>spring-context</artifactId>

<version>5.3.32</version>

</dependency>

</dependencies>

</project>

<?xml version="1.0" encoding="UTF-8"?>

<beans xmlns="http://www.springframework.org/schema/beans"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xsi:schemaLocation="

http://www.springframework.org/schema/beans

http://www.springframework.org/schema/beans/spring-beans.xsd">

<!-- Define BookRepository Bean -->

<bean id="bookRepository" class="com.library.repository.BookRepository" />

<!-- Define BookService Bean and inject BookRepository -->

<bean id="bookService" class="com.library.service.BookService">

<property name="bookRepository" ref="bookRepository" />

</bean>

</beans>

package com.library.repository;

public class BookRepository {

public String getBookTitle() {

return "Effective Java";

}

}

package com.library.service;

import com.library.repository.BookRepository;

public class BookService {

private BookRepository bookRepository;

// Setter for Dependency Injection

public void setBookRepository(BookRepository bookRepository) {

this.bookRepository = bookRepository;

}

public void displayBook() {

System.out.println("Book: " + bookRepository.getBookTitle());

}

}

package com.library;

import org.springframework.context.ApplicationContext;

import org.springframework.context.support.ClassPathXmlApplicationContext;

import com.library.service.BookService;

public class LibraryMain {

public static void main(String[] args) {

ApplicationContext context = new ClassPathXmlApplicationContext("applicationContext.xml");

BookService bookService = context.getBean("bookService", BookService.class);

bookService.displayBook();

}

}

**OUTPUT:**

A black rectangular object with a black border

AI-generated content may be incorrect.

**Exercise 2: Implementing Dependency Injection**

**Scenario:**

In the library management application, you need to manage the dependencies between the BookService and BookRepository classes using Spring's IoC and DI.

**Steps:**

1. **Modify the XML Configuration:**
   * Update **applicationContext.xml** to wire **BookRepository** into **BookService**.
2. **Update the BookService Class:**
   * Ensure that **BookService** class has a setter method for **BookRepository**.
3. **Test the Configuration:**
   * Run the **LibraryManagementApplication** main class to verify the dependency injection.

**CODE:**

<!-- === pom.xml === -->

<project xmlns="http://maven.apache.org/POM/4.0.0"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xsi:schemaLocation="http://maven.apache.org/POM/4.0.0

http://maven.apache.org/xsd/maven-4.0.0.xsd">

<modelVersion>4.0.0</modelVersion>

<groupId>com.library</groupId>

<artifactId>LibraryManagement</artifactId>

<version>1.0-SNAPSHOT</version>

<dependencies>

<!-- Spring Core Dependency -->

<dependency>

<groupId>org.springframework</groupId>

<artifactId>spring-context</artifactId>

<version>5.3.32</version>

</dependency>

</dependencies>

</project>

<!-- === src/main/resources/applicationContext.xml === -->

<?xml version="1.0" encoding="UTF-8"?>

<beans xmlns="http://www.springframework.org/schema/beans"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xsi:schemaLocation="

http://www.springframework.org/schema/beans

http://www.springframework.org/schema/beans/spring-beans.xsd">

<!-- Repository Bean -->

<bean id="bookRepository" class="com.library.repository.BookRepository" />

<!-- Service Bean with dependency injection using setter -->

<bean id="bookService" class="com.library.service.BookService">

<property name="bookRepository" ref="bookRepository" />

</bean>

</beans>

// === src/main/java/com/library/repository/BookRepository.java ===

package com.library.repository;

public class BookRepository {

public String getBookTitle() {

return "Spring in Action";

}

}

// === src/main/java/com/library/service/BookService.java ===

package com.library.service;

import com.library.repository.BookRepository;

public class BookService {

private BookRepository bookRepository;

// Setter method for dependency injection

public void setBookRepository(BookRepository bookRepository) {

this.bookRepository = bookRepository;

}

public void displayBook() {

System.out.println("Book from repository: " + bookRepository.getBookTitle());

}

}

// === src/main/java/com/library/LibraryManagementApplication.java ===

package com.library;

import org.springframework.context.ApplicationContext;

import org.springframework.context.support.ClassPathXmlApplicationContext;

import com.library.service.BookService;

public class LibraryManagementApplication {

public static void main(String[] args) {

ApplicationContext context = new ClassPathXmlApplicationContext("applicationContext.xml");

BookService bookService = context.getBean("bookService", BookService.class);

bookService.displayBook();

}

}

**OUTPUT:**

**A black background with white text

AI-generated content may be incorrect.**

**Exercise 4: Creating and Configuring a Maven Project**

**Scenario:**

**You need to set up a new Maven project for the library management application and add Spring dependencies.**

**Steps:**

1. **Create a New Maven Project:**
   * **Create a new Maven project named LibraryManagement.**
2. **Add Spring Dependencies in pom.xml:**
   * **Include dependencies for Spring Context, Spring AOP, and Spring WebMVC.**
3. **Configure Maven Plugins:**
   * **Configure the Maven Compiler Plugin for Java version 1.8 in the pom.xml file.**

**CODE SETUP:**

<!-- === pom.xml for LibraryManagement === -->

<project xmlns="http://maven.apache.org/POM/4.0.0"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xsi:schemaLocation="http://maven.apache.org/POM/4.0.0

http://maven.apache.org/xsd/maven-4.0.0.xsd">

<modelVersion>4.0.0</modelVersion>

<groupId>com.library</groupId>

<artifactId>LibraryManagement</artifactId>

<version>1.0-SNAPSHOT</version>

<packaging>jar</packaging>

<properties>

<java.version>1.8</java.version>

</properties>

<dependencies>

<!-- Spring Context (for core DI and container support) -->

<dependency>

<groupId>org.springframework</groupId>

<artifactId>spring-context</artifactId>

<version>5.3.32</version>

</dependency>

<!-- Spring AOP (for aspect-oriented programming) -->

<dependency>

<groupId>org.springframework</groupId>

<artifactId>spring-aop</artifactId>

<version>5.3.32</version>

</dependency>

<!-- Spring Web MVC (for building web applications) -->

<dependency>

<groupId>org.springframework</groupId>

<artifactId>spring-webmvc</artifactId>

<version>5.3.32</version>

</dependency>

<!-- Servlet API (required for Spring WebMVC) -->

<dependency>

<groupId>javax.servlet</groupId>

<artifactId>javax.servlet-api</artifactId>

<version>4.0.1</version>

<scope>provided</scope>

</dependency>

</dependencies>

<build>

<plugins>

<!-- Maven Compiler Plugin -->

<plugin>

<artifactId>maven-compiler-plugin</artifactId>

<version>3.10.1</version>

<configuration>

<source>${java.version}</source>

<target>${java.version}</target>

</configuration>

</plugin>

</plugins>

</build>

</project>