**Exercise 3: Implementing Logging with Spring AOP**

1. pom.xml

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

<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>0.0.1-SNAPSHOT</version>

<name>LibraryManagement</name>

<url>http://www.example.com</url>

<properties>

<project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>

<maven.compiler.release>17</maven.compiler.release>

</properties>

<dependencies>

<!-- Spring AOP -->

<dependency>

<groupId>org.springframework</groupId>

<artifactId>spring-aop</artifactId>

<version>5.3.32</version>

</dependency>

<!-- AspectJ (required for annotations like @Aspect, @Around) -->

<dependency>

<groupId>org.aspectj</groupId>

<artifactId>aspectjweaver</artifactId>

<version>1.9.21</version>

</dependency>

<!-- Spring Core and Context -->

<dependency>

<groupId>org.springframework</groupId>

<artifactId>spring-context</artifactId>

<version>5.3.32</version>

</dependency>

<!-- JUnit 5 Testing Dependencies -->

<dependency>

<groupId>org.junit.jupiter</groupId>

<artifactId>junit-jupiter-api</artifactId>

<version>5.11.0</version>

<scope>test</scope>

</dependency>

<dependency>

<groupId>org.junit.jupiter</groupId>

<artifactId>junit-jupiter-params</artifactId>

<version>5.11.0</version>

<scope>test</scope>

</dependency>

<dependency>

<groupId>org.junit.jupiter</groupId>

<artifactId>junit-jupiter-engine</artifactId>

<version>5.11.0</version>

<scope>test</scope>

</dependency>

</dependencies>

<build>

<plugins>

<plugin>

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

<version>3.11.0</version>

<configuration>

<release>17</release>

</configuration>

</plugin>

<!-- For running tests -->

<plugin>

<groupId>org.apache.maven.plugins</groupId>

<artifactId>maven-surefire-plugin</artifactId>

<version>3.3.0</version>

</plugin>

</plugins>

</build>

</project>

1. BookService.java

package com.library.service;

import com.library.repository.BookRepository;

public class BookService {

private BookRepository bookRepository;

public void performAction() {

bookRepository.saveBook();

}

public void setBookRepository(BookRepository bookRepository) {

this.bookRepository = bookRepository;

}

}

1. BookRepository.java

package com.library.repository;

public class BookRepository {

public void saveBook() {

System.***out***.println("Exercise 3: Book saved to repository.");

}

}

1. 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"

xmlns:aop="http://www.springframework.org/schema/aop"

xsi:schemaLocation="

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

https://www.springframework.org/schema/beans/spring-beans.xsd

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

https://www.springframework.org/schema/aop/spring-aop.xsd">

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

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

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

</bean>

<bean id="loggingAspect" class="com.library.aspect.LoggingAspect" />

<aop:aspectj-autoproxy />

</beans>

1. LibraryManagementApplication.java

package com.library;

import com.library.service.BookService;

import org.springframework.context.ApplicationContext;

import org.springframework.context.support.ClassPathXmlApplicationContext;

public class LibraryManagementApplication {

public static void main(String[] args) {

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

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

bookService.performAction();

}

}

1. LoggingAspect.java

package com.library.aspect;

import org.aspectj.lang.ProceedingJoinPoint;

import org.aspectj.lang.annotation.Around;

import org.aspectj.lang.annotation.Aspect;

*@Aspect*

public class LoggingAspect {

*@Around*("execution(\* com.library.service.\*.\*(..))")

public Object logExecutionTime(ProceedingJoinPoint joinPoint) throws Throwable {

long start = System.*currentTimeMillis*();

Object result = joinPoint.proceed();

long end = System.*currentTimeMillis*();

System.***out***.println("Method " + joinPoint.getSignature() + " executed in " + (end - start) + "ms");

return result;

}

}

1. Output:

