Mandatory hands-on

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:**
    - Create a Maven project named **LibraryManagement**.
    - Add Spring Core dependencies in the **pom.xml** file.
2. **Configure the Application Context:**
    - Create an XML configuration file named applicationContext.xml in the **src/main/resources** directory.
    - Define beans for **BookService** and **BookRepository** in the XML file.
3. **Define Service and Repository Classes:**
    - Create a package **com.library.service** and add a class **BookService.**
    - Create a package **com.library.repository** and add a class **BookRepository.**
4. **Run the Application:**
    - Create a main class to load the Spring context and test the configuration.

Steps:

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

   Create a Maven project named LibraryManagement: project name is LibraryManagement.

   Add spring core dependencies in the pom.xml file: Go to pom.xml and add the following dependencies in that file.

   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
                 https://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>
  <dependencies>
```

```
        <!-- Spring Core -->
        <dependency>
            <groupId>org.springframework</groupId>
            <artifactId>spring-context</artifactId>
            <version>5.3.33</version>
        </dependency>
    </dependencies>
</project>
```

2. Configure the Application Context:

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

Creating a file in src/main/resources as applicationContext.xml

application.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 -->
 <bean id="bookService" class="com.library.service.BookService">
  <property name="bookRepository" ref="bookRepository"/>
</bean>
</beans>
```

3. Define Service and Repository Classes:

In src/main/java create a new package named as com.library.service, in that create a class named as Bookservice:

```
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(int id) {
        String book = bookRepository.findBookById(id);
        System.out.println(book);
    }
  }
```

In src/main/java create another package named as com.library,repository, in that create one class name it as Bookreository:

```
package com.library.repository;
 public class Bookrepository {
public String findBookById(int id) {
 return "Book with ID: " + id;
    }
    }
```

4. Run the Application:

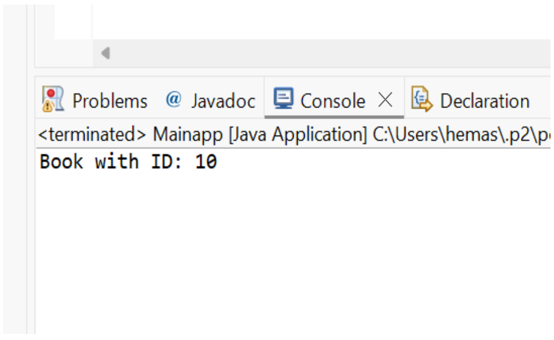
Create a main class to load the Spring context and test the configuration.

Creating a class in the package name com.library, class name Mainjava

```
package com.library;
import com.library.service.Bookservice;
import org.springframework.context.ApplicationContext;
import org.springframework.context.support.ClassPathXmlApplicationContext;
public class Mainapp {
 public static void main(String[] args) {
 ApplicationContext context = new ClassPathXmlApplicationContext("applicationContext.xml");
 Bookservice bookService = (Bookservice) context.getBean("bookService");
 bookService.displayBook(10);
 }
}
```

Right click Mainjava the Run as Java application.

Output:



```
<terminated> Mainapp [Java Application] C:\Users\hemas\.p2\p
Book with ID: 10
```

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.

Step:

1. **Modify the XML Configuration:**

Update applicationContext.xml to wire BookRepository into Bookservice:

```
<?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
      https://www.springframework.org/schema/beans/spring-beans.xsd">
  <!-- BookRepository Bean -->
  <bean id="bookRepository" class="com.library.repository.Bookrepository" />
  <!-- BookService Bean with Dependency Injection -->
  <bean id="bookService" class="com.library.service.Bookservice">
```

```
        <property name="bookRepository" ref="bookRepository" />
    </bean>
</beans>
```

2. **Update the BookService Class:**

Ensure there's a setter method named setBookRepository(...) for Spring to inject the dependency.

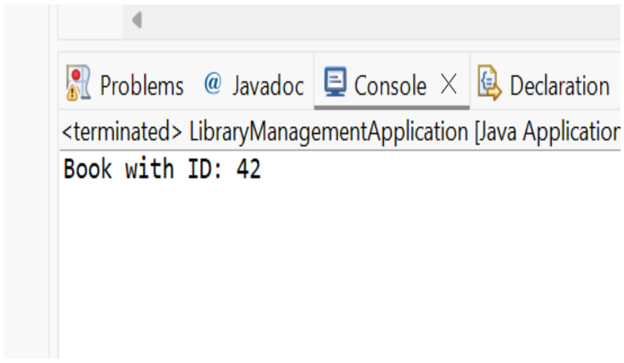
```
package com.library.service;
import com.library.repository.Bookrepository;
public class Bookservice {
    private Bookrepository bookRepository;
    // Setter for Dependency Injection
    public void setBookRepository(Bookrepository bookRepository) {
        this.bookRepository = bookRepository;
    }
    public void displayBook(int id) {
        String book = bookRepository.findBookById(id);
        System.out.println(book);
    }
}
```

3. **Test the Configuration:**

Run a simple main class to test whether Spring's IoC container performs the injection.

```
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 = (Bookservice) context.getBean("bookService");
        bookService.displayBook(42);
    }
}
```

Output:



```
<terminated> LibraryManagementApplication [Java Applicatior
Book with ID: 42
```

- This confirms that Bookrepository is successfully injected into Bookservice.
- That means, Spring’s IoC and DI are working properly.

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.

Steps:

1. **Create a new maven project:**
   File > New > Maven Project
   Check "Create a simple project (skip archetype selection)" → Click Next
   Fill in:
    - Group Id: com.library
    - Artifact Id: LibraryManagement
    - Version: leave as default 0.0.1-SNAPSHOT

   Click Finish

2. **Add Spring Dependencies in 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">
```

```xml
    <modelVersion>4.0.0</modelVersion>
    <groupId>com.library</groupId>
    <artifactId>LibraryManagement</artifactId>
    <version>0.0.1-SNAPSHOT</version>
    <properties>
      <maven.compiler.source>1.8</maven.compiler.source>
      <maven.compiler.target>1.8</maven.compiler.target>
    </properties>
    <dependencies>
      <!-- Spring Context (Core DI) -->
      <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-context</artifactId>
        <version>5.3.33</version>
      </dependency>
      <!-- Spring AOP -->
      <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-aop</artifactId>
        <version>5.3.33</version>
      </dependency>
      <!--  Spring Web MVC -->
      <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-webmvc</artifactId>
        <version>5.3.33</version>
      </dependency>
    </dependencies>
    <build>
      <plugins>
        <!--  Maven Compiler Plugin for Java 1.8 -->
        <plugin>
          <groupId>org.apache.maven.plugins</groupId>
          <artifactId>maven-compiler-plugin</artifactId>
          <version>3.8.1</version>
          <configuration>
            <source>1.8</source>
            <target>1.8</target>
          </configuration>
        </plugin>
      </plugins>
    </build>
  </project>
```

3. **Configure Maven Plugins:**
   After saving pom.xml:

1. Right-click your project → Maven > Update Project
2. Check "Force Update of Snapshots/Releases" → Click OK

This will download all Spring dependencies to your local .m2 Maven repository.