WEEK 3 – ASSIGNMENT

Superset ID: 6390124

Spring Core and Maven Exercises:-

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.

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">

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

    <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 void saveBook(String title) {
        System.out.println("Book saved: " + title);
    }
}
```

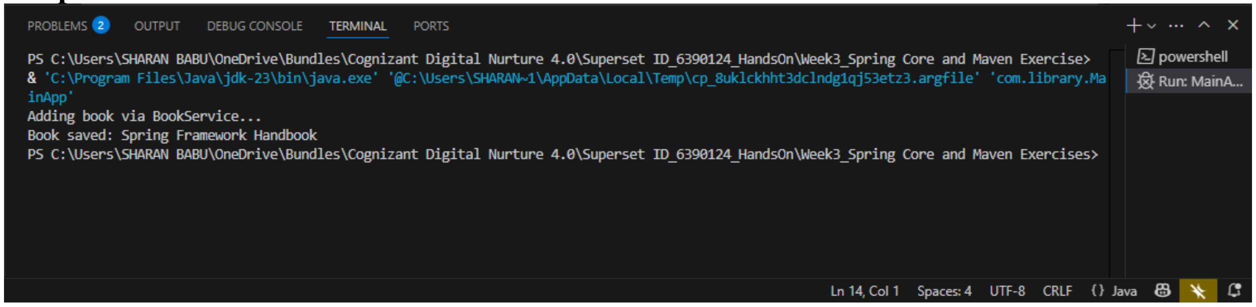
src/main/java/com/library/service/BookService.java

```java
package com.library.service;

import com.library.repository.BookRepository;

public class BookService {
    private BookRepository bookRepository;

    public void setBookRepository(BookRepository bookRepository) {
        this.bookRepository = bookRepository;
    }

    public void addBook(String title) {
        System.out.println("Adding book via BookService...");
        bookRepository.saveBook(title);
    }
}
```

src/main/java/com/library/MainApp.java

```java
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.addBook("Java Spring Fundamentals");
    }
}
```

Output:



```
PS C:\Users\SHARAN BABU\OneDrive\Bundles\Cognizant Digital Nurture 4.0\Superset ID_6390124_HandsOn\Week3_Spring Core and Maven Exercise>
& 'C:\Program Files\Java\jdk-23\bin\java.exe' '@C:\Users\SHARAN~1\AppData\Local\Temp\cp_8uklckhht3dclndg1qj53etz3.argfile' 'com.library.Ma
inApp'
Adding book via BookService...
Book saved: Spring Framework Handbook
PS C:\Users\SHARAN BABU\OneDrive\Bundles\Cognizant Digital Nurture 4.0\Superset ID_6390124_HandsOn\Week3_Spring Core and Maven Exercises>
```

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.

src/main/resources/applicationContext1.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">

    <!-- Bean for BookRepository -->
    <bean id="bookRepository"
class="com.library.repository.BookRepository1"/>

    <!-- Bean for BookService (inject BookRepository using setter) -->
    <bean id="bookService" class="com.library.service.BookService1">
        <property name="bookRepository" ref="bookRepository"/>
    </bean>

</beans>
```

src/main/java/com/library/service/BookService1.java

```
package com.library.service;

import com.library.repository.BookRepository1;

public class BookService1 {

    private BookRepository1 bookRepository;

    // Setter for Dependency Injection
    public void setBookRepository(BookRepository1 bookRepository) {
        this.bookRepository = bookRepository;
    }

    public void addBook(String title) {
        System.out.println("BookService: Adding book...");
        bookRepository.saveBook(title);
    }
}
```

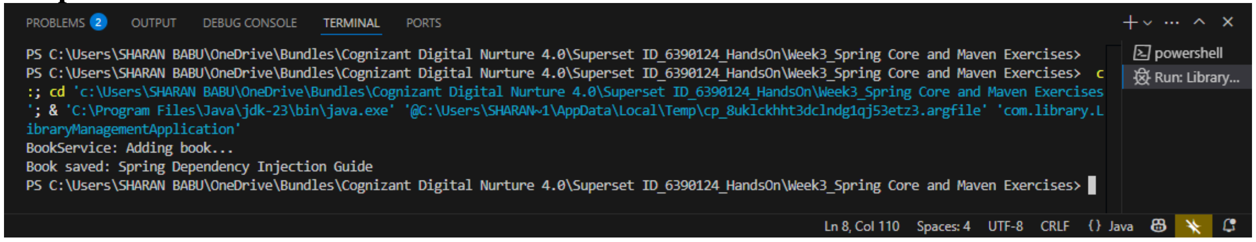
src/main/java/com/library/repository/BookRepository1.java

```
package com.library.repository;

public class BookRepository1 {
    public void saveBook(String title) {
        System.out.println("Book saved: " + title);
    }
}
```

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

```
package com.library;

import com.library.service.BookService1;
import org.springframework.context.support.ClassPathXmlApplicationContext;

public class LibraryManagementApplication {
    public static void main(String[] args) {
        try (ClassPathXmlApplicationContext context = new
ClassPathXmlApplicationContext("applicationContext.xml")) {
            BookService1 bookService = context.getBean("bookService",
BookService1.class);
            bookService.addBook("Spring Dependency Injection Guide");
        }
    }
}
```

Output:



```
PS C:\Users\SHARAN BABU\OneDrive\Bundles\Cognizant Digital Nurture 4.0\Superset ID_6390124_HandsOn\Week3_Spring Core and Maven Exercises>
PS C:\Users\SHARAN BABU\OneDrive\Bundles\Cognizant Digital Nurture 4.0\Superset ID_6390124_HandsOn\Week3_Spring Core and Maven Exercises>  c
:; cd 'c:\Users\SHARAN BABU\OneDrive\Bundles\Cognizant Digital Nurture 4.0\Superset ID_6390124_HandsOn\Week3_Spring Core and Maven Exercises
'; & 'C:\Program Files\Java\jdk-23\bin\java.exe' '@C:\Users\SHARAN~1\AppData\Local\Temp\cp_8uklckhht3dclndg1qj53etz3.argfile' 'com.library.L
ibraryManagementApplication'
BookService: Adding book...
Book saved: Spring Dependency Injection Guide
PS C:\Users\SHARAN BABU\OneDrive\Bundles\Cognizant Digital Nurture 4.0\Superset ID_6390124_HandsOn\Week3_Spring Core and Maven Exercises>
```

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.

Maven Command:

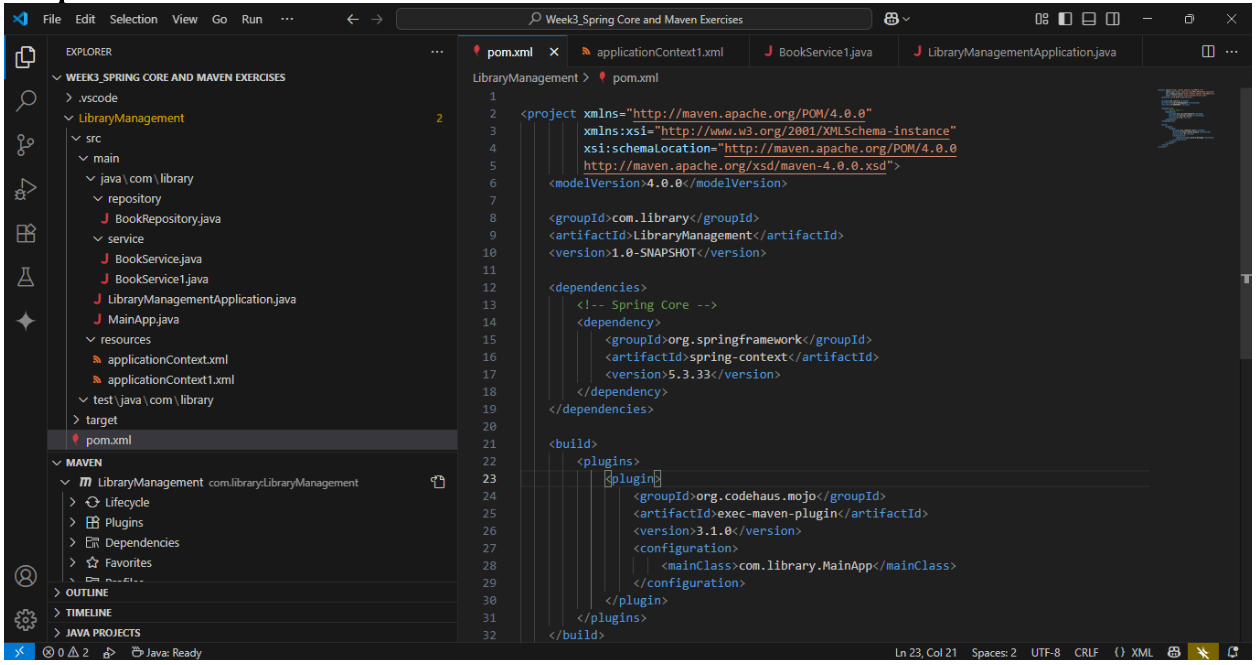
```
mvn archetype:generate -DgroupId=com.library -DartifactId=LibraryManagement -
DarchetypeArtifactId=maven-archetype-quickstart -DinteractiveMode=false
```

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 Context (Core container and DI) -->
        <dependency>
            <groupId>org.springframework</groupId>
            <artifactId>spring-context</artifactId>
            <version>5.3.33</version>
        </dependency>

        <!-- Spring AOP (for Aspect-Oriented Programming) -->
        <dependency>
            <groupId>org.springframework</groupId>
            <artifactId>spring-aop</artifactId>
            <version>5.3.33</version>
        </dependency>

        <!-- Spring Web MVC (for web applications using Spring MVC) -->
        <dependency>
            <groupId>org.springframework</groupId>
            <artifactId>spring-webmvc</artifactId>
            <version>5.3.33</version>
        </dependency>
    </dependencies>

    <build>
        <plugins>
            <!-- Compiler Plugin to set Java version -->
            <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>

            <!-- Exec Plugin to run the main class -->
            <plugin>
                <groupId>org.codehaus.mojo</groupId>
                <artifactId>exec-maven-plugin</artifactId>
                <version>3.1.0</version>
                <configuration>

<mainClass>com.library.LibraryManagementApplication</mainClass>
                </configuration>
            </plugin>
        </plugins>
    </build>
</project>
```

Output:



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

    <build>
        <plugins>
            <plugin>
                <groupId>org.codehaus.mojo</groupId>
                <artifactId>exec-maven-plugin</artifactId>
                <version>3.1.0</version>
                <configuration>
                    <mainClass>com.library.MainApp</mainClass>
                </configuration>
            </plugin>
        </plugins>
    </build>
```

Exercise 5: Configuring the Spring IoC Container

Scenario:

The library management application requires a central configuration for beans and dependencies.

Steps:

1. **Create Spring Configuration File:**
   - Create an XML configuration file named **applicationContext.xml** in the **src/main/resources** directory.
   - Define beans for **BookService** and **BookRepository** in the XML file.
2. **Update the BookService Class:**
   - Ensure that the **BookService** class has a setter method for **BookRepository**.
3. **Run the Application:**
   - Create a main class to load the Spring context and test the configuration.

src/main/resources/applicationContext2.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">

    <!-- Bean for BookRepository2 -->
    <bean id="bookRepository2" class="com.library.repository.BookRepository2"
/>

    <!-- Bean for BookService2 with DI -->
    <bean id="bookService2" class="com.library.service.BookService2">
        <property name="bookRepository2" ref="bookRepository2"/>
    </bean>

</beans>
```

src/main/java/com/library/service/BookService2.java

```
package com.library.service;

import com.library.repository.BookRepository2;

public class BookService2 {

    private BookRepository2 bookRepository2;

    // Setter for Dependency Injection
    public void setBookRepository2(BookRepository2 bookRepository2) {
        this.bookRepository2 = bookRepository2;
    }

    public void addBook(String title) {
        System.out.println("BookService2: Adding book...");
        bookRepository2.saveBook(title);
    }
}
```

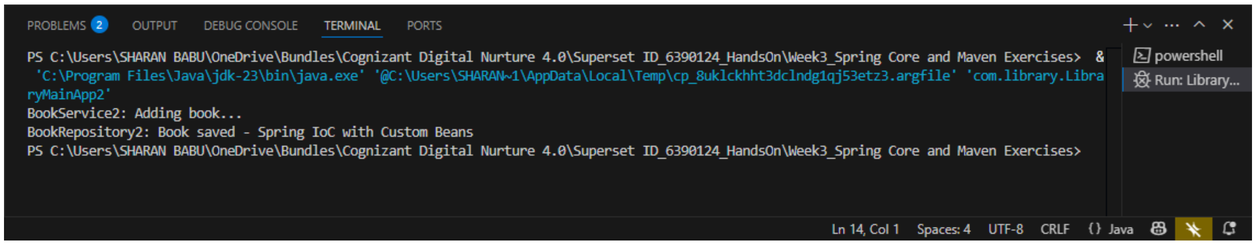
src/main/java/com/library/repository/BookRepository2.java

```
package com.library.repository;

public class BookRepository2 {
    public void saveBook(String title) {
        System.out.println("BookRepository2: Book saved - " + title);
    }
}
```

src/main/java/com/library/LibraryMainApp2.java

```
package com.library;

import com.library.service.BookService2;
import org.springframework.context.support.ClassPathXmlApplicationContext;

public class LibraryMainApp2 {
    public static void main(String[] args) {
        try (ClassPathXmlApplicationContext context = new
ClassPathXmlApplicationContext("applicationContext2.xml")) {
            BookService2 service = context.getBean("bookService2",
BookService2.class);
            service.addBook("Spring IoC with Custom Beans");
        }
    }
}
```

Output:



```
PS C:\Users\SHARAN BABU\OneDrive\Bundles\Cognizant Digital Nurture 4.0\Superset ID_6390124_HandsOn\Week3_Spring Core and Maven Exercises>  &
 'C:\Program Files\Java\jdk-23\bin\java.exe' '@C:\Users\SHARAN~1\AppData\Local\Temp\cp_8uklckhht3dclndg1qj53etz3.argfile' 'com.library.Libra
ryMainApp2'
BookService2: Adding book...
BookRepository2: Book saved - Spring IoC with Custom Beans
PS C:\Users\SHARAN BABU\OneDrive\Bundles\Cognizant Digital Nurture 4.0\Superset ID_6390124_HandsOn\Week3_Spring Core and Maven Exercises>
```

Exercise 7: Implementing Constructor and Setter Injection

Scenario:

The library management application requires both constructor and setter injection for better control over bean initialization.

Steps:

1. **Configure Constructor Injection:**
   - Update applicationContext.**xml** to configure constructor injection for **BookService**.
2. **Configure Setter Injection:**
   - Ensure that the **BookService** class has a setter method for **BookRepository** and configure it in **applicationContext.xml**.
3. **Test the Injection:**
   - Run the **LibraryManagementApplication** main class to verify both constructor and setter injection.

src/main/resources/applicationContext3.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">

    <!-- Constructor Injection for BookService3 -->
    <bean id="bookService3" class="com.library.service.BookService3">
        <constructor-arg value="Central Library"/>
        <property name="bookRepository3" ref="bookRepository3"/>
    </bean>

    <!-- BookRepository3 Bean -->
    <bean id="bookRepository3"
class="com.library.repository.BookRepository3"/>
</beans>
```

src/main/java/com/library/service/BookService3.java

```
package com.library.service;

import com.library.repository.BookRepository3;

public class BookService3 {
    private String libraryName;
    private BookRepository3 bookRepository3;
    // Constructor injection
    public BookService3(String libraryName) {
        this.libraryName = libraryName;
    }

    // Setter injection
    public void setBookRepository3(BookRepository3 bookRepository3) {
        this.bookRepository3 = bookRepository3;
    }

    public void addBook(String title) {
        System.out.println("[" + libraryName + "] BookService3: Adding
book...");
        bookRepository3.saveBook(title);
    }
}
```

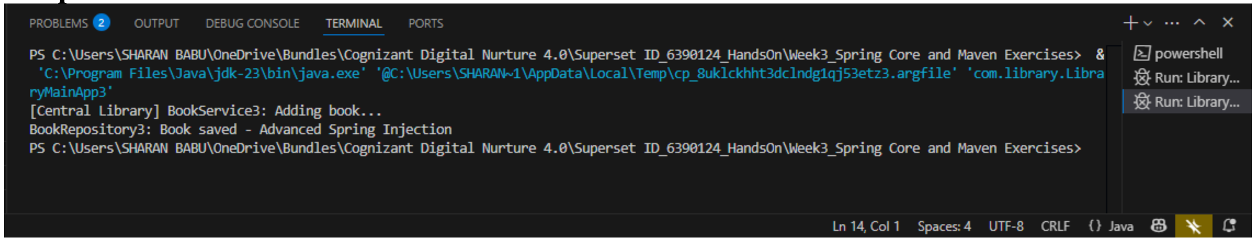
src/main/java/com/library/repository/BookRepository3.java

```
package com.library.repository;

public class BookRepository3 {
    public void saveBook(String title) {
        System.out.println("BookRepository3: Book saved - " + title);
    }
}
```

src/main/java/com/library/LibraryMainApp3.java

```
package com.library;

import com.library.service.BookService3;
import org.springframework.context.support.ClassPathXmlApplicationContext;

public class LibraryMainApp3 {
    public static void main(String[] args) {
        try (ClassPathXmlApplicationContext context = new
ClassPathXmlApplicationContext("applicationContext3.xml")) {
            BookService3 service = context.getBean("bookService3",
BookService3.class);
            service.addBook("Advanced Spring Injection");
        }
    }
}
```

Output:



```
PS C:\Users\SHARAN BABU\OneDrive\Bundles\Cognizant Digital Nurture 4.0\Superset ID_6390124_HandsOn\Week3_Spring Core and Maven Exercises>  &
 'C:\Program Files\Java\jdk-23\bin\java.exe' '@C:\Users\SHARAN~1\AppData\Local\Temp\cp_8uklckhht3dclndg1qj53etz3.argfile' 'com.library.Libra
ryMainApp3'
[Central Library] BookService3: Adding book...
BookRepository3: Book saved - Advanced Spring Injection
PS C:\Users\SHARAN BABU\OneDrive\Bundles\Cognizant Digital Nurture 4.0\Superset ID_6390124_HandsOn\Week3_Spring Core and Maven Exercises>
```

Exercise 9: Creating a Spring Boot Application

Scenario:

You need to create a Spring Boot application for the library management system to simplify configuration and deployment.

Steps:

1. **Create a Spring Boot Project:**
   - Use **Spring Initializr** to create a new Spring Boot project named **LibraryManagement**.
2. **Add Dependencies:**
   - Include dependencies for **Spring Web, Spring Data JPA, and H2 Database**.
3. **Create Application Properties:**
   - Configure database connection properties in **application.properties**.
4. **Define Entities and Repositories:**
   - Create **Book** entity and **BookRepository** interface.
5. **Create a REST Controller:**
   - Create a **BookController** class to handle CRUD operations.
6. **Run the Application:**
   - Run the Spring Boot application and test the REST endpoints.

src/main/resources/application.properties

```
# H2 DB Config
spring.datasource.url=jdbc:h2:mem:librarydb
spring.datasource.driverClassName=org.h2.Driver
spring.datasource.username=sa
spring.datasource.password=

# JPA Config
spring.jpa.database-platform=org.hibernate.dialect.H2Dialect
spring.jpa.hibernate.ddl-auto=update
spring.jpa.show-sql=true

# H2 Console
spring.h2.console.enabled=true
spring.h2.console.path=/h2-console
```

src/main/java/com/library/entity/Book.java

```
package com.library.entity;

import jakarta.persistence.*;

@Entity
public class Book {

    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;
```

```java
    private String title;
    private String author;

    // Getters and Setters
    public Long getId() {
        return id;
    }

    public void setId(Long id) {
        this.id = id;
    }

    public String getTitle() {
        return title;
    }

    public void setTitle(String title) {
        this.title = title;
    }

    public String getAuthor() {
        return author;
    }

    public void setAuthor(String author) {
        this.author = author;
    }
}
```

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

```java
package com.library.repository;

import com.library.entity.Book;
import org.springframework.data.jpa.repository.JpaRepository;

public interface BookRepository extends JpaRepository<Book, Long> {
}
```

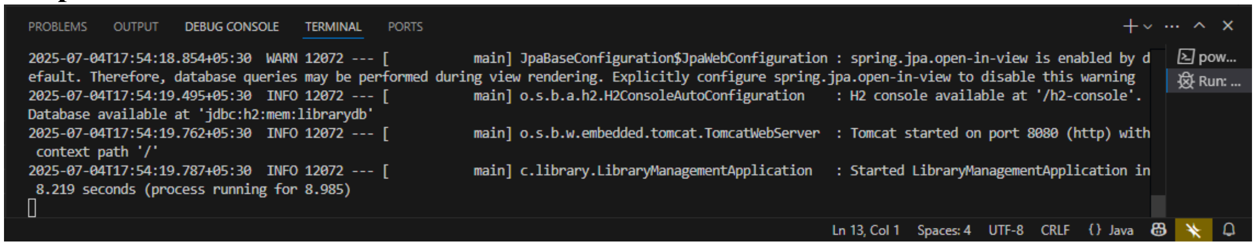
src/main/java/com/library/controller/BookController.java

```java
package com.library.controller;

import com.library.entity.Book;
import com.library.repository.BookRepository;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.web.bind.annotation.*;

import java.util.List;

@RestController
@RequestMapping("/api/books")
public class BookController {
    @Autowired
    private BookRepository bookRepository;

    @GetMapping
    public List<Book> getAllBooks() {
        return bookRepository.findAll();
    }

    @PostMapping
    public Book addBook(@RequestBody Book book) {
        return bookRepository.save(book);
    }

    @GetMapping("/{id}")
    public Book getBook(@PathVariable Long id) {
        return bookRepository.findById(id).orElse(null);
    }

    @PutMapping("/{id}")
    public Book updateBook(@PathVariable Long id, @RequestBody Book book) {
        book.setId(id);
        return bookRepository.save(book);
    }

    @DeleteMapping("/{id}")
    public void deleteBook(@PathVariable Long id) {
        bookRepository.deleteById(id);
    }
}
```

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

```java
package com.library;

import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;

@SpringBootApplication
public class LibraryManagementApplication {

    public static void main(String[] args) {
        SpringApplication.run(LibraryManagementApplication.class, args);
    }
}
```

Output:



```
2025-07-04T17:54:18.854+05:30  WARN 12072 --- [           main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by d
efault. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-07-04T17:54:19.495+05:30  INFO 12072 --- [           main] o.s.b.a.h2.H2ConsoleAutoConfiguration    : H2 console available at '/h2-console'.
Database available at 'jdbc:h2:mem:librarydb'
2025-07-04T17:54:19.762+05:30  INFO 12072 --- [           main] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on port 8080 (http) with
 context path '/'
2025-07-04T17:54:19.787+05:30  INFO 12072 --- [           main] c.library.LibraryManagementApplication   : Started LibraryManagementApplication in
 8.219 seconds (process running for 8.985)
```