WEEK 3

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Spring core and maven

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.

MainApp.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("The Harry Potter");


            ((ClassPathXmlApplicationContext) context).close();

        }

}
```

BookRepository.java

```
package com.library.repository;

public class BookRepository {

        public void saveBook(String bookName) {

            System.out.println("Book '" + bookName + "' saved to the database.");
```

```
        }
}
```

BookService.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 bookName) {
            System.out.println("Processing the book: " + bookName);
            bookRepository.saveBook(bookName);
          }
}
```

Output:

LibraryApp.java Share Run Output Clear

```
public class LibraryApp {

    // Repository class
    static class BookRepository {
        public void saveBook(String bookName) {
            System.out.println("Book '" + bookName + "' saved to the database.");
        }
    }

    // Service class
    static class BookService {
        private BookRepository bookRepository;

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

        public void addBook(String bookName) {
            System.out.println("Processing the book: " + bookName);
            bookRepository.saveBook(bookName);
        }
```

```
Processing the book: The Harry Potter
Book 'The Harry Potter' saved to the database.

=== Code Execution Successful ===
```

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.

MainApp.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 bookName) {

        System.out.println("Processing the book: " + bookName);

        bookRepository.saveBook(bookName);

    }

}
```

BookRespository.java

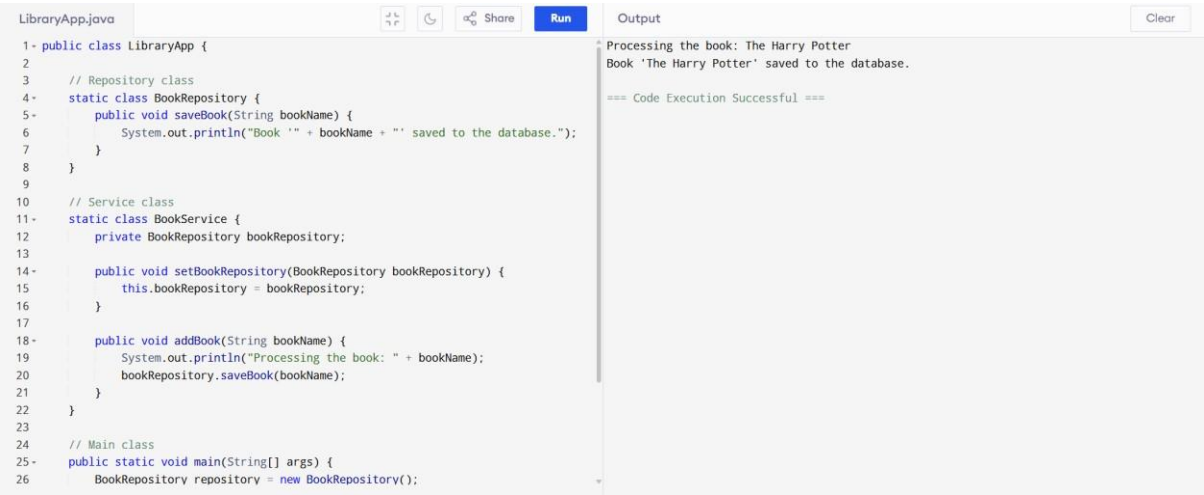
```
package com.library.repository;

public class BookRepository {

            public void saveBook(String bookName) {

                System.out.println("Book '" + bookName + "' saved to the database.");

            }

}
```

BookService.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 bookName) {
        System.out.println("Processing the book: " + bookName);
        bookRepository.saveBook(bookName);
    }
}
```

Output:



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.

Code:

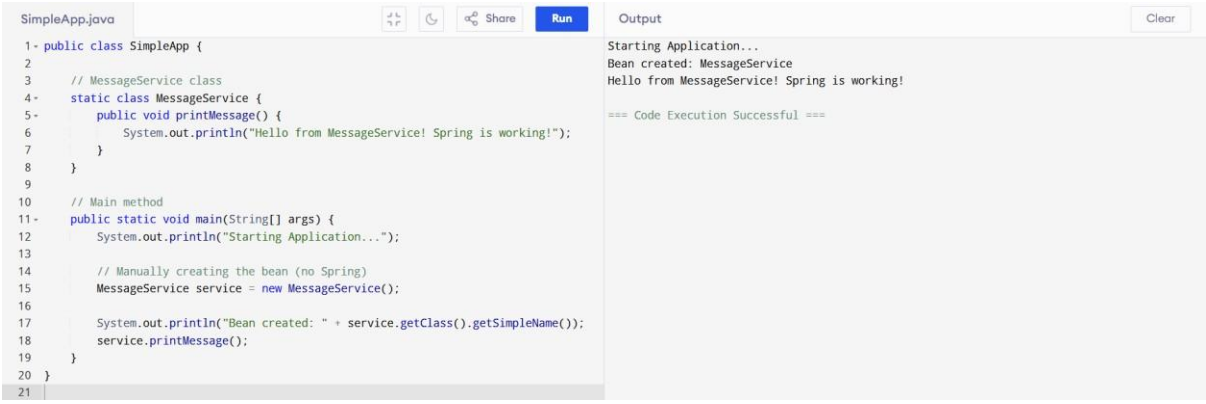
MainApp.java

```
package com.example;
import org.springframework.context.ApplicationContext;
import org.springframework.context.support.ClassPathXmlApplicationContext;
public class MainApp {
        public static void main(String[] args) {
            System.out.println("Starting Spring Application...");
            ApplicationContext context = new
ClassPathXmlApplicationContext("applicationContext.xml");
            System.out.println("Spring context loaded successfully!");
            MessageService service = (MessageService) context.getBean("messageService");
            System.out.println("Retrieved bean: " + service.getClass().getSimpleName());
            service.printMessage();
        }
}
```

MessageService.java

```
package com.example;
public class MessageService {
        public void printMessage() {
            System.out.println("Hello from MessageService! Spring is working!");
        }
}
```

Output:



Difference between JPA, Hibernate and Spring Data JPA

1.JPA (Java Persistence API)

- It is a specification (interface) provided by Java for ORM (Object-Relational Mapping).
- JPA provides standard APIs for managing relational data in Java applications.
- It does not provide implementation, only guidelines.
- Needs a provider (like Hibernate, EclipseLink) to work.
- Focuses on entity mapping, query language (JPQL), and transactions.
- Example annotation: @Entity, @Id, @GeneratedValue.

2. Hibernate

- It is a JPA implementation and a powerful ORM framework.
- It provides all features required by JPA plus extra features like:
    - o Caching
    - o Lazy loading
    - o Batch processing
- Supports native Hibernate APIs (like Session) in addition to JPA.
- Can be used with or without Spring.
- Has its own query language called HQL (Hibernate Query Language).

3. Spring Data JPA

- It is a Spring project that simplifies the use of JPA in Spring apps.
- It builds on top of JPA and Hibernate.
- Reduces boilerplate by providing pre-built repositories like JpaRepository.
- Supports query method names, custom JPQL, and @Query annotations.
- Automatically implements CRUD operations and supports pagination and sorting.
- Great for rapid development of data access layers.