Spring JDBC

Spring Java Database Connectivity

Introduction to Spring JDBC

What is Spring JDBC?

- Spring JDBC is a part of the Spring Framework that simplifies the use of JDBC (Java Database Connectivity) to interact with relational databases.
- It provides a consistent way to access databases and helps to avoid common errors and boilerplate code associated with traditional JDBC.

Why use Spring JDBC?

- **Reduces Boilerplate Code:** Spring JDBC eliminates the need for repetitive code, such as opening and closing connections, handling exceptions, and managing transactions.
- **Enhances Productivity:** Developers can focus on writing business logic rather than dealing with low-level database operations.
- **Improves Maintainability:** The code is cleaner and easier to maintain.

Key Components of Spring JDBC

- JdbcTemplate
  - Core class for database operations.
  - Simplifies the use of JDBC and helps to avoid common errors.
- DataSource
  - Interface for getting database connections.
  - Supports connection pooling.
- RowMapper
  - Interface for mapping rows of a ResultSet to Java objects.
- NamedParameterJdbcTemplate
  - Extension of JdbcTemplate.
  - Supports named parameters for queries.

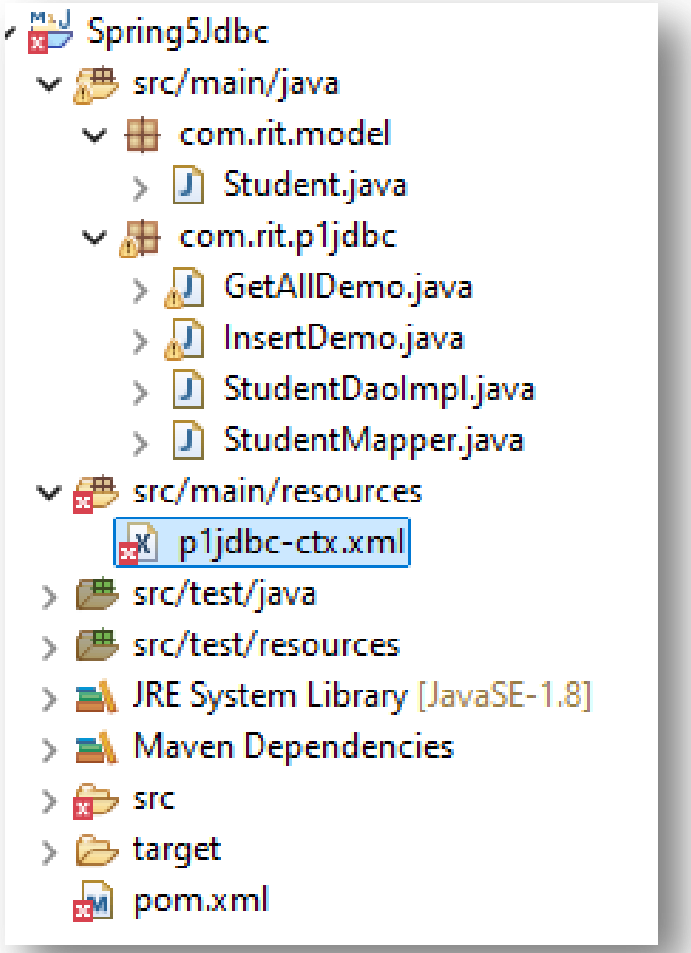
Setting Up Spring JDBC

- Dependencies
  - Maven/Gradle dependencies for Spring JDBC.
- Configuration
  - XML-based configuration.
  - Java-based configuration using @Configuration and @Bean.

Basic CRUD Operations

- Create
  - Using JdbcTemplate.update() for insert operations.
- Read
  - Using JdbcTemplate.query() and RowMapper for select operations.
- Update
  - Using JdbcTemplate.update() for update operations.
- Delete
  - Using JdbcTemplate.update() for delete operations.

Step by step



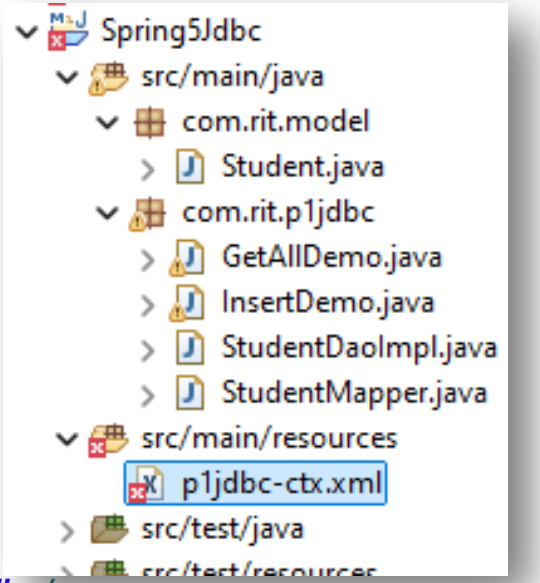
- Create a maven project
- Include dependencies
- Create DB Configuration in XML
- Create a Model (Student) Class
- Create a StudentMapper Class
- Create a StudentDaoImpl Class
  - Implement CRUD
- Create a main class

Include Dependencies

```
<dependency>
<groupId>org.springframework</groupId>
<artifactId>spring-jdbc</artifactId>
<version>5.3.31</version>
</dependency>
<dependency>
<groupId>org.springframework</groupId>
<artifactId>spring-
context</artifactId>
<version>5.3.31</version>
</dependency>
<dependency>
<groupId>org.springframework</groupId>
<artifactId>spring-core</artifactId>
<version>5.3.31</version>
</dependency>
```

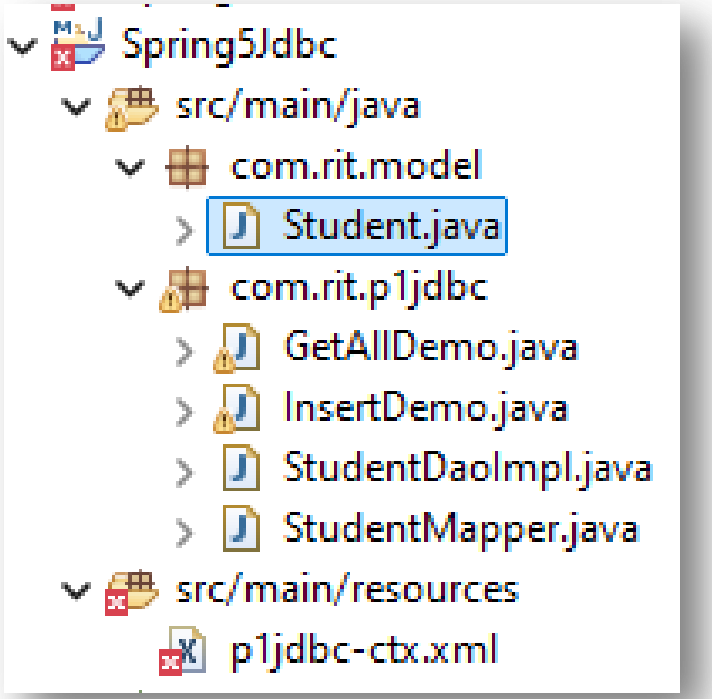
```
<dependency>
<groupId>org.springframework</groupId>
<artifactId>spring-beans</artifactId>
<version>5.3.31</version>
</dependency>
<dependency>
<groupId>org.springframework</groupId>
<artifactId>spring-tx</artifactId>
<version>5.3.31</version>
</dependency>
<dependency>
<groupId>mysql</groupId>
<artifactId>mysql-connector-java</artifactId>
<version>8.0.33</version>
<scope>runtime</scope>
</dependency>
```

DB Configuration in XML




```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
xmlns:p="http://www.springframework.org/schema/p"
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-3.0.xsd">
    <bean id="dataSource"
    class="org.springframework.jdbc.datasource.DriverManagerDataSource">
        <property name="url" value="jdbc:mysql://localhost:3306/spring_db" />
        <property name="username" value="root" />
        <property name="password" value="root" />
    </bean>
    <bean id="jdbcTemplate" class="org.springframework.jdbc.core.JdbcTemplate">
        <property name="dataSource" ref="dataSource" />
    </bean>
    <bean id="studentDao" class="com.rit.p1jdbc.StudentDaoImpl">
        <property name="jdbcTemplate" ref="jdbcTemplate" />
    </bean>
</beans>
```

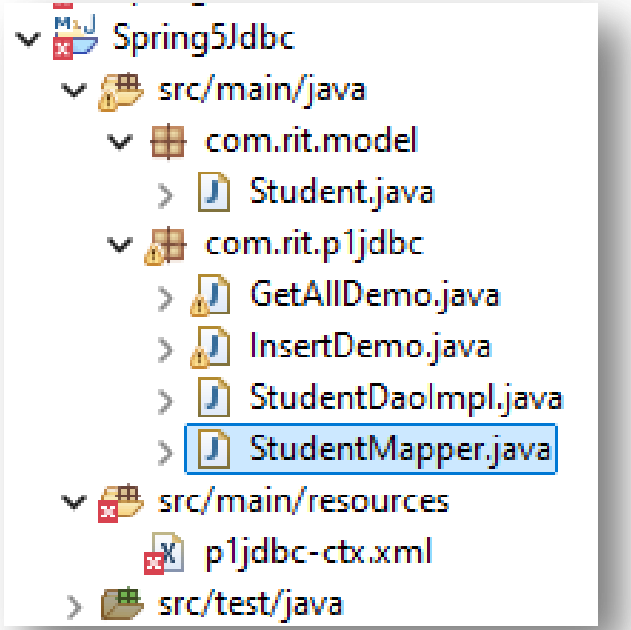
Create a Model (Student) Class



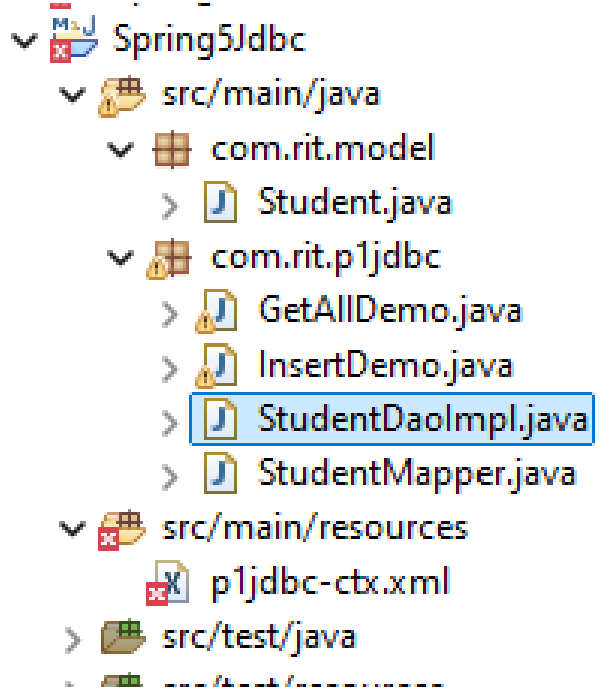

```java
public class Student {

    // Member variables
    private int id;
    private String name;
    private String department;

    //constructors, Getters, Setters and toString() method
```

Create a StudentMapper Class

```
public class StudentMapper implements RowMapper<Student> {
    @Override
    public Student mapRow(ResultSet rs, int rowNum)
    throws SQLException {
        Student student = new Student();
        student.setId(rs.getInt("id"));
        student.setName(rs.getString("name"));
        student.setDepartment(rs.getString("department"));
        return student;
    }
}
```



Create a StudentDoaImpl Class




```
public class StudentDaoImpl {

private JdbcTemplate jdbcTemplate;

public JdbcTemplate getJdbcTemplate() {
    return jdbcTemplate;
}
public void setJdbcTemplate(JdbcTemplate jdbcTemplate) {
        this.jdbcTemplate = jdbcTemplate;
}

//Insert a Student Object
public int saveStudent(Student student) {
    String sql = "INSERT INTO student (id, name, department) VALUES (?, ?, ?)";
    return jdbcTemplate.update(sql, student.getId(), student.getName(),
    student.getDepartment());
}
```

```
    public List<Student> getAllStudents() {
        String sql = "SELECT * FROM student";
        List<Student> list = jdbcTemplate.query(sql, new StudentMapper());
        return list;
    }
    public int updateStudent(Student student) {
        String sql = "UPDATE student SET name = ?, department = ? WHERE id = ?";
        return jdbcTemplate.update(sql, student.getName(), student.getDepartment(),
        student.getId());
    }
    public int deleteStudent(int id) {
        String sql = "DELETE FROM student WHERE id = ?";
        return jdbcTemplate.update(sql, id);
    }
    public Student getStudentById(int id) {
        NamedParameterJdbcTemplate namedParam = new
        NamedParameterJdbcTemplate(jdbcTemplate);
        String sql = "SELECT * FROM student WHERE id = :id";
        Map<String, Object> params = new HashMap<>();
        params.put("id", id);
        Student student = namedParam.queryForObject(sql, params, new
        StudentMapper());
        return student;
    }
}
```

Main class

```
public class GetAllDemo {
    public static void main(String[] args) {
        AbstractApplicationContext context = new
        ClassPathXmlApplicationContext("p1jdbc-ctx.xml");

        StudentDaoImpl studentDaoImpl =
        (StudentDaoImpl)context.getBean("studentDao");


        List<Student> studentList = studentDaoImpl.getAllStudents();
        for(Student student : studentList) {
                System.out.println(student);
        }
    }
}
```

Main class (Insert, Update, Delete & GetById)

```
public class InsertDemo {
    public static void main(String[] args) {

        AbstractApplicationContext context = new
        ClassPathXmlApplicationContext("p1jdbc-ctx.xml");

        StudentDaoImpl studentDaoImpl =
        (StudentDaoImpl)context.getBean("studentDao");

        Student student = new Student(202."Anand"."Computers");
        int res = studentDaoImpl.saveStudent(student);
        if(res == 0)
            System.out.println("Error Saving Student");
        else
        {
            System.out.println(studentDaoImpl.getStudentById(202));
            student.setDepartment("Science");
            studentDaoImpl.updateStudent(student);
            System.out.println(studentDaoImpl.getStudentById(202));
            studentDaoImpl.deleteStudent(202);
            System.out.println("Record Deleted");
        }
    }
}
```

Thank you