Experiment -9

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Subject Name: Project-Based Learning in Java with Lab **Subject Code: 22CSH-359**

9.1.1.Aim: To demonstrate dependency injection using Spring Framework with Java-based configuration.

9.1.2 Objective:

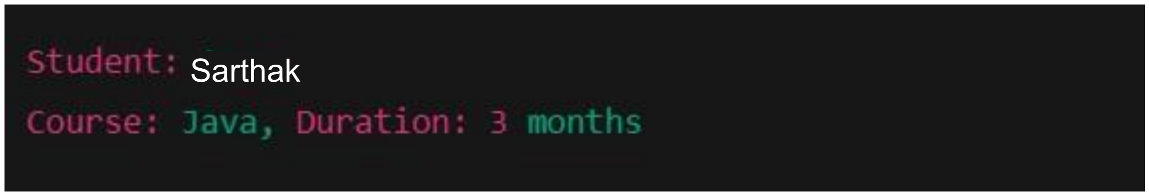
Define Course and Student classes.
Use Configuration and Bean annotations to inject dependencies. Load Spring context and print student details.

9.1.3 Code: // Course.java

```
public class Course {
private String courseName;
private String duration;

   public Course(String courseName, String duration) {
this.courseName = courseName;        this.duration =
duration;
   }

   public String getCourseName() { return courseName; }
public String getDuration() { return duration; }

   @Override
   public String toString() {
      return "Course: " + courseName + ", Duration: " + duration;
   }
}
```

```
// Student.java public
class Student {     private
String name;     private
Course course;     public
Student(String name,
Course course) {
        this.name = name;
this.course = course;
    }

    public void showDetails() {
        System.out.println("Student: " + name);
        System.out.println(course);
    }
}// AppConfig.java
import org.springframework.context.annotation.*;

@Configuration public
class AppConfig {
    @Bean
    public Course course() {
        return new Course("Java", "3 months");
    }

    @Bean
    public Student student() {
        return new Student("Aman", course());
    }
}// MainApp.java
import org.springframework.context.ApplicationContext;
import org.springframework.context.annotation.AnnotationConfigApplicationContext;

public class MainApp {
    public static void main(String[] args) {
        ApplicationContext context = new
AnnotationConfigApplicationContext(AppConfig.class);
Student student = context.getBean(Student.class);
student.showDetails();
    } }
```

Output:



```
Student: Sarthak
Course: Java, Duration: 3 months
```

9.2.1 Aim: To perform CRUD operations on a Student entity using Hibernate ORM with MySQL.

Objective: Define Course and Student classes.

Use Configuration and Bean annotations to inject dependencies.

Load Spring context and print student details.

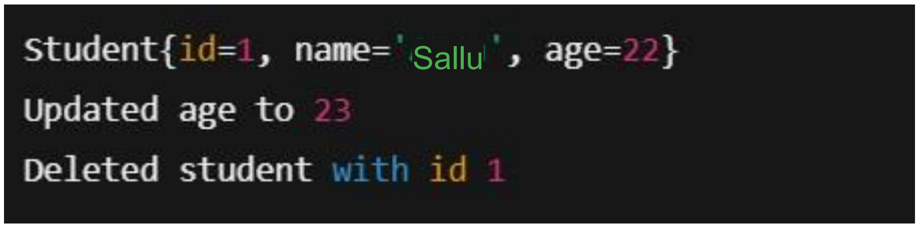
9.2.2 Code:

```
        <hibernate-configuration>
            <session-factory>
                <property
name="hibernate.connection.driver_class">com.mysql.cj.jdbc.Driver</property>
                <property
name="hibernate.connection.url">jdbc:mysql://localhost:3306/testdb</property>
                <property name="hibernate.connection.username">root</property>
                <property name="hibernate.connection.password">password</property>
                <property
name="hibernate.dialect">org.hibernate.dialect.MySQL8Dialect</property>
                <property name="hibernate.hbm2ddl.auto">update</property>
                <mapping class="Student"/>
            </session-factory>
        </hibernate-configuration>

import javax.persistence.*;

Entity
public class Student {
    Id
    GeneratedValue(strategy = GenerationType.IDENTITY)
private int id;     private String name;
```

```
    private int age;

    public Student() {}
    public Student(String name, int age) {
this.name = name;         this.age = age;
    }

    // Getters, setters, toString
} import
org.hibernate.SessionFactory;
import org.hibernate.cfg.Configuration;

public class HibernateUtil {
    private static final SessionFactory sessionFactory;
     static
{
        sessionFactory = new Configuration().configure().buildSessionFactory();
    }

    public static SessionFactory getSessionFactory() {
        return sessionFactory;
    }
}

import org.hibernate.*;

public class MainCRUD {
    public static void main(String[] args) {
        Session session = HibernateUtil.getSessionFactory().openSession();

        // Create
        Transaction tx = session.beginTransaction();
Student s1 = new Student("Aman", 22);
        session.save(s1);
        tx.commit();

        // Read
        Student student = session.get(Student.class, 1);
        System.out.println(student);

        // Update
        tx = session.beginTransaction();
student.setAge(23);
session.update(student);        tx.commit();

        // Delete
        tx = session.beginTransaction();
session.delete(student);
```

```
        tx.commit();

        session.close();
    }
}
```

9.2.3 Output:



```
Student{id=1, name='Sallu', age=22}
Updated age to 23
Deleted student with id 1
```

9.3.1 Aim: To implement a banking system using Spring and Hibernate that ensures transaction consistency during fund transfers.

Objective:

Integrate Spring + Hibernate.
Handle transactions atomically (rollback on failure).
Demonstrate success and failure cases.

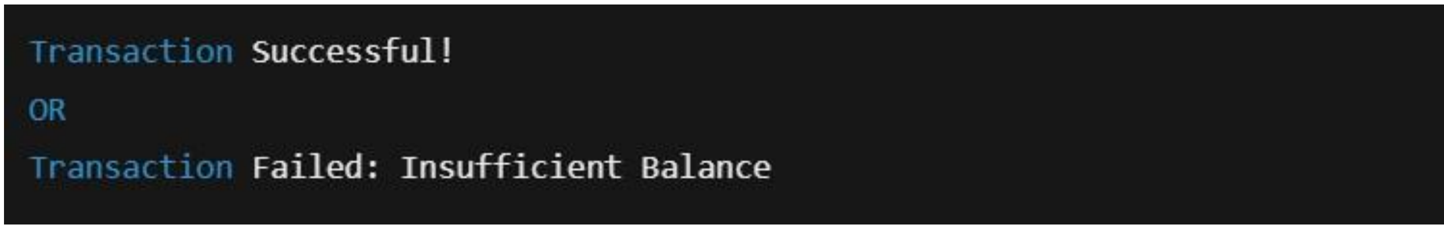
Code:

```
import javax.persistence.*;

Entity
public class Account {
   @Id     private int
accountId;     private String
holderName;
   private double balance;

   // Constructors, getters, setters
}

import javax.persistence.*;
import java.util.Date;

@Entity
public class BankTransaction {
   @Id
   @GeneratedValue(strategy = GenerationType.IDENTITY)
private int txnId;     private int fromAcc;     private int toAcc;
private double amount;
   private Date txnDate = new Date();

   // Constructors, getters, setters
}
import org.hibernate.*;
import org.springframework.transaction.annotation.Transactional;
```

```
public class BankService {
   private SessionFactory sessionFactory;

   public BankService(SessionFactory sessionFactory) {
      this.sessionFactory = sessionFactory;
   }

   @Transactional
   public void transferMoney(int fromId, int toId, double amount) {
      Session session = sessionFactory.getCurrentSession();

      Account from = session.get(Account.class, fromId);
      Account to = session.get(Account.class, toId);

      if (from.getBalance() < amount) {
         throw new RuntimeException("Insufficient Balance");
      }

      from.setBalance(from.getBalance() - amount);
to.setBalance(to.getBalance() + amount);

      session.update(from);
      session.update(to);

      BankTransaction txn = new BankTransaction(fromId, toId, amount);
session.save(txn);
   }
}
@Configuration
@EnableTransactionManagement public
class AppConfig {
   @Bean
   public DataSource dataSource() {
      DriverManagerDataSource ds = new DriverManagerDataSource();
```

```
        ds.setDriverClassName("com.mysql.cj.jdbc.Driver");
ds.setUrl("jdbc:mysql://localhost:3306/testdb");
ds.setUsername("root");        ds.setPassword("password");
        return ds;
    }

    @Bean
    public LocalSessionFactoryBean sessionFactory() {
        LocalSessionFactoryBean lsf = new LocalSessionFactoryBean();
lsf.setDataSource(dataSource());
lsf.setPackagesToScan("your.package");        Properties props =
new Properties();
        props.put("hibernate.dialect", "org.hibernate.dialect.MySQL8Dialect");
props.put("hibernate.hbm2ddl.auto", "update");
        lsf.setHibernateProperties(props);
return lsf;
    }

    @Bean
    public HibernateTransactionManager transactionManager(SessionFactory sf) {
return new HibernateTransactionManager(sf);
    }

    @Bean
    public BankService bankService(SessionFactory sf) {
return new BankService(sf);
    }
}

public class MainApp {
    public static void main(String[] args) {
        AnnotationConfigApplicationContext ctx = new
AnnotationConfigApplicationContext(AppConfig.class);
        BankService service = ctx.getBean(BankService.class);
         try
{
            service.transferMoney(101, 102, 500);
    System.out.println("Transaction Successful!");
} catch (Exception e) {
    System.out.println("Transaction Failed: " + e.getMessage());
}
```

```
        ctx.close();
    }
```



```
Transaction Successful!
OR
Transaction Failed: Insufficient Balance
```

```
}
```

OUTPUT