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.

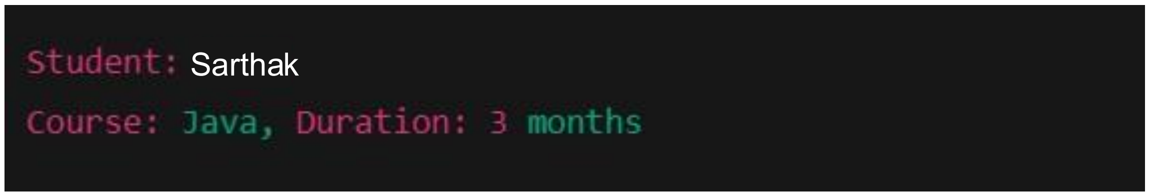
9.1.2 Objective:

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.

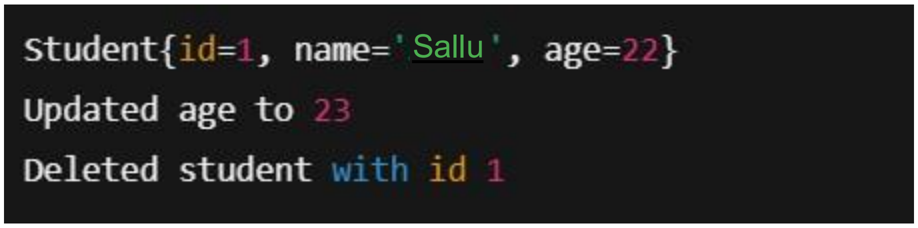
9.2.2 Code:

```
        <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:

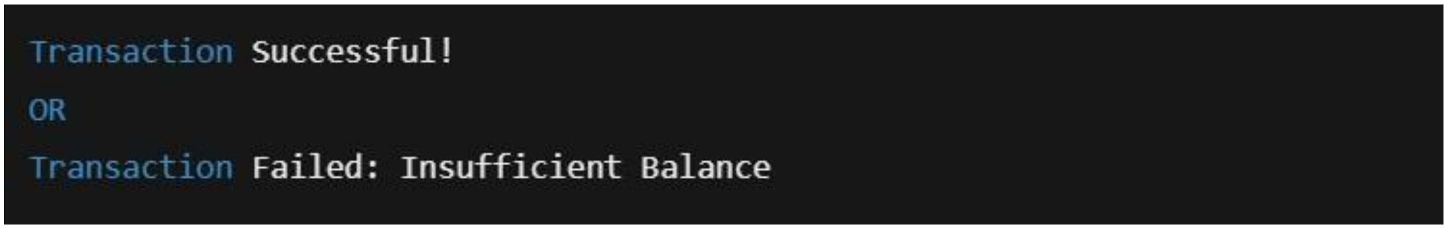
Integrate Spring + Hibernate.

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