DEPARTMENT OF
COMPUTER SCIENCE & ENGINEERING

Experiment -9

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Semester:6th	Date of Performance:17/03/2025
Subject Name: Project-Based Learning in Java with Lab	Subject Code: 22CSH-359

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

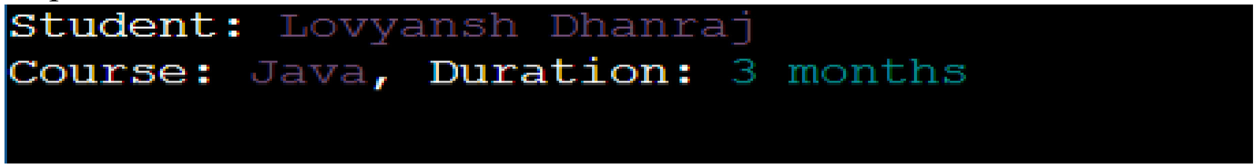
Objective:

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

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("Lovyansh Dhanraj",
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: Lovyansh Dhanraj
Course: Java, Duration: 3 months
```

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

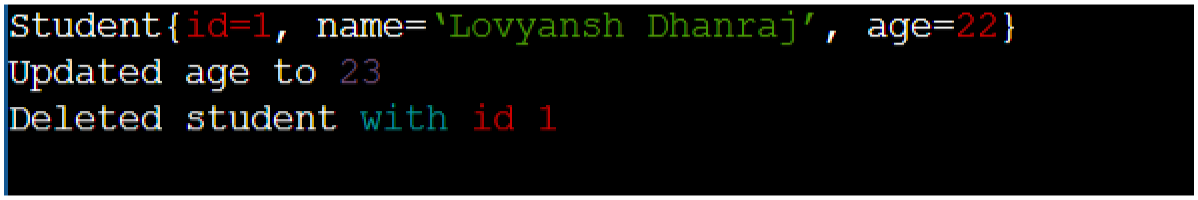
Objective:

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

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();
      }
  }
```

Output:



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

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

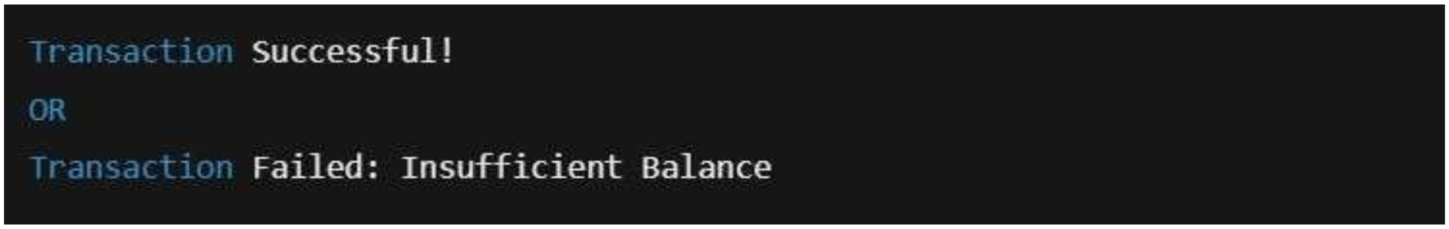
Objective:

- 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();
       }
}
```

OUTPUT



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