Experiment -9

Student Name: Manpreet Singh **UID:22BCS50009**
Branch: BE-CSE **Section/Group:DL-901A**
Semester:6th **Date of Performance:17/03/2025**
Subject Name: Project-Based Learning in Java **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();
     }
  }
```

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.

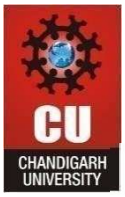
Objective:

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

Code:

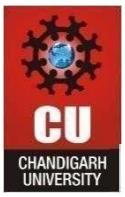
```
import javax.persistence.*;

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();
  }
}
```

OUTPUT

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