Experiment-9

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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: Aman
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='     ', 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!");
```

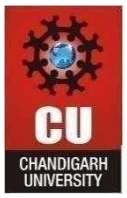
```
        } catch (Exception e) {
            System.out.println("Transaction Failed: " + e.getMessage());
        }
        ctx.close();
    }
}
```

OUTPUT

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

Learning Outcomes

- Demonstrated Dependency Injection using Spring with Java-based configuration via @Bean and @Configuration.
- Performed CRUD operations on Student entity using Hibernate ORM with MySQL database.
- Integrated Spring + Hibernate for seamless object-relational mapping and dependency management.
- Implemented transaction management using @Transactional to ensure atomicity in fund transfers.
- Handled transaction failures and rollbacks (e.g., insufficient balance) to maintain data consistency.



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