



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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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:

```
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;  
    }
```

```
}
```

```
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);
} }

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()); } }

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: SAHIL
Course: Java, Duration: 4 months

...Program finished with exit code 0
Press ENTER to exit console.
```

Experiment -9.2

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;
    }
}

import org.hibernate.SessionFactory; import
org.hibernate.cfg.Configuration;
```



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```
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();

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

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

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

        tx = session.beginTransaction();
        session.delete(student); tx.commit();

        session.close();
    }
}
```

Output:

```
Saved: Student{id=1, name='SAHIL', age=21}
Fetched: Student{id=1, name='SAHIL', age=21}
Updated: Student{id=1, name='SAHIL', age=23}
Deleted student with ID 1
```

```
...Program finished with exit code 0
Press ENTER to exit console.[]
```

Experiment -9.3

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;
```

```
}
```

```
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();  
  
}  
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!

...Program finished with exit code 0
Press ENTER to exit console.
```

Learning Outcome:

- Learned how to define and manage **Spring beans** using `@Configuration`, `@Bean`, and dependency injection. I understood the working of a simple Java application wired using **Spring's ApplicationContext**, which improves modularity and decoupling.
- Explored **Hibernate ORM** to perform CRUD operations on a database using entity classes mapped via annotations. I learned how to configure `hibernate.cfg.xml`, establish a connection with MySQL, and use Hibernate's `SessionFactory`, `Session`, and `Transaction` objects to persist and manipulate data.



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- Learned to combine both Spring and Hibernate to simulate a **real-world banking transaction system**. I learned how to handle transactions using `@Transactional`, manage dependencies using Spring's `@Configuration` and `@Bean` annotations, and implement business logic for transferring money securely between accounts with rollback support in case of errors.