



Experiment -9

Student Name: Nikita Kumari

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**Subject Name: Project-Based Learning in
Java with Lab**

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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

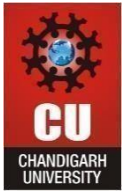
```
public class Course {  
    private String courseName;  
    private String duration;
```

```
        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
```



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```
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:



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```
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;
```



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```
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);
    }
}
```



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// 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);  
}
```



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



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```
ctx.close();  
}
```

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

```
}
```

OUTPUT