



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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Experiment-9

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Semester: 6th

Date of Performance: 17/04/2025

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:

// 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;
```



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```
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;
    }
}
```



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```
// 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);
    }
}
```



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```
tx.commit();  
  
session.close();  
}  
}
```

9.2.3 Output:

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



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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;
```



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```
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");
    }
}
```



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```
        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());  
        }  
    }  
}
```




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

OUTPUT

```
Transaction Successful!
```

```
OR
```

```
Transaction Failed: Insufficient Balance
```