FPT Education
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Java

Hibernate Application Development & CRUD Operations

Objectives

- Data Management
  - Implement CRUD (Create, Read, Update, Delete) operations to manage data effectively.
  - Utilize Hibernate to map Java objects to database tables, simplifying data persistence and retrieval.
- User Interface Development
  - Design and develop a user-friendly interface using JavaFX, enabling seamless interaction with the application.
  - Implement features such as form input validation, error handling, and feedback mechanisms to enhance user experience.

Student Management System

Build Simple Student Management System

- Step 1. Setup JavaFX in Eclipse
- Step 2. Setup Scene Builder
- Step 3. Build CRUD Application with Repository Pattern
- Step 4. Design GUI Application with JavaFX

Setup JavaFX in Eclipse IDE

1. Open Eclipse, Help | Eclipse Market | e(fx)clipse

2. Open openfx.io page, download JavaFX

3. Download JavaFX

4. Open Eclipse, Window | Preferences | Java | Build Path | User Library

5. Extract JavaFX SDK, Add External JARs | Browser to JavaFX SDK lib

Setup Scene Builder

1. Open Eclipse, File | New | Maven Project

Scene Builder - Gluon

gluonhq.com/products/scene-builder/#download

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Download Scene Builder

Scene Builder **21.0.0** was released on **Oct 5, 2023**.

*You can use this Scene Builder version together with **Java 17 and higher**.*

Product	Platform	Download
Scene Builder	Windows Installer	Download
Scene Builder	Mac OS X dmg (Intel)	Download
Scene Builder	Mac OS X dmg (Apple Silicon)	Download
Scene Builder	Linux RPM	Download
Scene Builder	Linux Deb	Download
Scene Builder Kit info	Jar File	Download

License: Scene Builder 21 is licensed under the BSD license.

Download Scene Builder for Java 8

2. Open Gluon Scene Builder

3. Open JavaFX File

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Java

Build CRUD Application with Repository Pattern

1. Open Eclipse, File | New | Maven Project

2. Check Create a simple project -> Browse Project -> Next

3. Fill the information Project -> Click Finish

4. Structure of Maven Project

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/pom.xml - Eclipse IDE

File Edit Source Navigate Search Project Run Design Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToOne [HSF301 main]
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
    - hsf301.fe.repository
    - hsf301.fe.service
  - src/main/resources
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

StudentDAO.java | HSF301_Chapter_01_Ex_02_ManyToOne/pom.xml

```
https://maven.apache.org/xsd/maven-4.0.0.xsd (xsi:schemaLocation)
1  <project xmlns="http://maven.apache.org/POM/4.0.0"
2      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
3      xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 https://maven.apache.org/xsd/maven-4.0.0.xsd">
4      <modelVersion>4.0.0</modelVersion>
5      <groupId>fe.edu.vn</groupId>
6      <artifactId>HSF301_Chapter_01_Ex_02_ManyToOne</artifactId>
7      <version>0.0.1-SNAPSHOT</version>
8      <dependencies>
9
10         <dependency>
11             <groupId>org.hibernate</groupId>
12             <artifactId>hibernate-entitymanager</artifactId>
13             <version>5.6.9.Final</version>
14         </dependency>
15         <dependency>
16             <groupId>com.microsoft.sqlserver</groupId>
17             <artifactId>mssql-jdbc</artifactId>
18             <version>11.2.3.jre17</version>
19         </dependency>
20     </dependencies>
21 </project>
```

Overview | Dependencies | Dependency Hierarchy | Effective POM | pom.xml

Console | Problems | Debug Shell

```
<terminated> D:\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v20240120-1143\jre\bin\javaw.exe (Apr 7, 2024, 11:27:10 PM) [pid: 12940]
[INFO] Installing E:\Teaching\FPT\JAVA\HSF301\HSF301_Chapter_01_Ex_02_ManyToOne\pom.xml to C:\Users\84767\.m2\repository\fe\edu\vn
[INFO] Installing E:\Teaching\FPT\JAVA\HSF301\HSF301_Chapter_01_Ex_02_ManyToOne\target\HSF301_Chapter_01_Ex_02_ManyToOne-0.0.1-SNA
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  11.072 s
[INFO] Finished at: 2024-04-07T23:27:24+07:00
[INFO] ------------------------------------------------------------------------
```

Writable | Insert | 15 : 21 : 569

5. Create hibernate.cfg.xml

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/resources/hibernate.cfg.xml - Eclipse IDE

File Edit Source Source Navigate Search Project Run Window Help

Project Explorer × Servers

- HSF301_Chapter_01_Ex_02_ManyToO
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
    - hsf301.fe.repository
    - hsf301.fe.service
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml ×

```
http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd (doctype)
<?xml version = "1.0" encoding = "utf-8"?>
<!DOCTYPE hibernate-configuration SYSTEM
"http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <property name="hbm2ddl.auto">update</property>
        <property name="dialect">org.hibernate.dialect.SQLServerDialect</property>
        <property name="connection.url">jdbc:sqlserver://localhost:1433;DatabaseName=tutorial;encrypt=true;trustServerCertificate=true</p
        <property name="connection.username">sa</property>
        <property name="connection.password">Aesx5099@@</property>
        <property name="connection.driver_class">com.microsoft.sqlserver.jdbc.SQLServerDriver</property>

        <mapping class="hsf301.fe.pojo.Student" />
        <mapping class="hsf301.fe.pojo.Book" />

    </session-factory>

</hibernate-configuration>
```

Design | Source

Console × Problems Debug Shell

```
<terminated> D:\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v20240120-1143\jre\bin\javaw.exe (Apr 7, 2024, 11:27:10 PM) [pid: 12940]
[INFO] Installing E:\Teaching\FPT\JAVA\HSF301\HSF301_Chapter_01_Ex_02_ManyToOne\pom.xml to C:\Users\84767\.m2\repository\fe\edu\vn\HSF301_Chap
[INFO] Installing E:\Teaching\FPT\JAVA\HSF301\HSF301_Chapter_01_Ex_02_ManyToOne\target\HSF301_Chapter_01_Ex_02_ManyToOne-0.0.1-SNAPSHOT.jar to
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  11.072 s
[INFO] Finished at: 2024-04-07T23:27:24+07:00
[INFO] ------------------------------------------------------------------------
```

xml | Writable | Smart Insert | 1 : 1 : 0

6. Create Books in Pojo

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/pojo/Book.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToOne
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
    - hsf301.fe.service
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java

```java
package hsf301.fe.pojo;

import javax.persistence.CascadeType;

@Entity
@Table(name = "BOOKS")
public class Book {

    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private Long id;

    @Column(name = "title", length = 30)
    private String title;

    private String author;

    private String isbn;

    @ManyToOne(cascade = CascadeType.ALL)
    @JoinColumn(name = "student_id")
    private Student student;

    public Book() {
        super();
    }
```

Console | Problems | Debug Shell

```
<terminated> D:\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v20240120-1143\jre\bin\javaw.exe (Apr 7, 2024, 11:27:10 PM) [pid: 12940]
[INFO] Installing E:\Teaching\FPT\JAVA\HSF301\HSF301_Chapter_01_Ex_02_ManyToOne\pom.xml to C:\Users\84767\.m2\repository\fe\edu\vn\HSF301_Chap
[INFO] Installing E:\Teaching\FPT\JAVA\HSF301\HSF301_Chapter_01_Ex_02_ManyToOne\target\HSF301_Chapter_01_Ex_02_ManyToOne-0.0.1-SNAPSHOT.jar to
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  11.072 s
[INFO] Finished at: 2024-04-07T23:27:24+07:00
[INFO] ------------------------------------------------------------------------
```

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7. Create Students in Pojo

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/pojo/Student.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToO
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
    - hsf301.fe.service
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java | Student.java

```java
package hsf301.fe.pojo;

import java.util.HashSet;

@Entity
@Table(name = "STUDENTS")
public class Student {

    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    @Column(name = "id")
    private int id;

    @Column(name = "fistName", nullable = false, unique = true)
    private String firstName;

    @Column(name = "lastName")
    private String lastName;

    @Column(name = "marks")
    private int marks;

    @OneToMany(cascade = CascadeType.ALL)
    @JoinColumn(name = "student_id")
    private Set<Book> books ;
```

Console | Problems | Debug Shell

```
<terminated> D:\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v20240120-1143\jre\bin\javaw.exe (Apr 7, 2024, 11:27:10 PM) [pid: 12940]
[INFO] Installing E:\Teaching\FPT\JAVA\HSF301\HSF301_Chapter_01_Ex_02_ManyToOne\pom.xml to C:\Users\84767\.m2\repository\fe\edu\vn\HSF301_Chap
[INFO] Installing E:\Teaching\FPT\JAVA\HSF301\HSF301_Chapter_01_Ex_02_ManyToOne\target\HSF301_Chapter_01_Ex_02_ManyToOne-0.0.1-SNAPSHOT.jar to
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  11.072 s
[INFO] Finished at: 2024-04-07T23:27:24+07:00
[INFO] ------------------------------------------------------------------------
```

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8. Create StudentDAO

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/dao/StudentDAO.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToOn
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
    - hsf301.fe.service
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java | Student.java | StudentDAO.java

```java
package hsf301.fe.dao;

import java.util.List;

public class StudentDAO {

    private SessionFactory sessionFactory = null;
    private Configuration cf = null;

    public StudentDAO(String persistanceName) {
        cf = new Configuration();
        cf = cf.configure(persistanceName);
        sessionFactory = cf.buildSessionFactory();
    }

    public void save(Student student) {

    public List<Student> getStudents() {

    public void delete(Long studentID) {

    public Student findById(Long studentID) {

    public void update(Student student) {
}
```

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9. Save Student in StudentDAO

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/dao/StudentDAO.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToOne
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
    - hsf301.fe.service
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java | Student.java | StudentDAO.java

```java
public class StudentDAO {

    private SessionFactory sessionFactory = null;
    private Configuration cf = null;

    public StudentDAO(String persistanceName) {
        cf = new Configuration();
        cf = cf.configure(persistanceName);
        sessionFactory = cf.buildSessionFactory();
    }

    public void save(Student student) {

        Session session = sessionFactory.openSession();
        Transaction t = session.beginTransaction();
        try {
            session.save(student);
            t.commit();
            System.out.println("successfully saved");
        } catch (Exception ex) {
            t.rollback();
            System.out.println("Error " + ex.getMessage());
        } finally {
            sessionFactory.close();
            session.close();
        }

    }

    public List<Student> getStudents() {

    public void delete(Long studentID) {

    public Student findById(Long studentID) {

    public void update(Student student) {
}
```

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10. Get All Student in StudentDAO

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/dao/StudentDAO.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToOn
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
    - hsf301.fe.service
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java | Student.java | StudentDAO.java

```java
12
13 public class StudentDAO {
14
15     private SessionFactory sessionFactory = null;
16     private Configuration cf = null;
17
18     public StudentDAO(String persistanceName) {
19         cf = new Configuration();
20         cf = cf.configure(persistanceName);
21         sessionFactory = cf.buildSessionFactory();
22     }
23
24     public void save(Student student) {
41
42     public List<Student> getStudents() {
57
58     public void delete(Long studentID) {
59         Session session = sessionFactory.openSession();
60         Transaction tx = session.getTransaction();
61         try {
62             tx.begin();
63             Student student = (Student) session.get(Student.class, studentID);
64             session.delete(student);
65             tx.commit();
66         } catch (RuntimeException e) {
67             tx.rollback();
68             throw e;
69         } finally {
70             session.close();
71         }
72     }
73
74     public Student findById(Long studentID) {
85
86     public void update(Student student) {
103 }
104
105
```

Writable | Smart Insert | 42 : 1 : 959

11. Delete Student in StudentDAO

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/dao/StudentDAO.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToO
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
    - hsf301.fe.service
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java | Student.java | StudentDAO.java

```java
public class StudentDAO {

    private SessionFactory sessionFactory = null;
    private Configuration cf = null;

    public StudentDAO(String persistanceName) {
        cf = new Configuration();
        cf = cf.configure(persistanceName);
        sessionFactory = cf.buildSessionFactory();
    }

    public void save(Student student) {

    public List<Student> getStudents() {

    public void delete(Long studentID) {
        Session session = sessionFactory.openSession();
        Transaction tx = session.getTransaction();
        try {
            tx.begin();
            Student student = (Student) session.get(Student.class, studentID);
            session.delete(student);
            tx.commit();
        } catch (RuntimeException e) {
            tx.rollback();
            throw e;
        } finally {
            session.close();
        }
    }

    public Student findById(Long studentID) {

    public void update(Student student) {
}
```

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12. Find A Student in StudentDAO

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/dao/StudentDAO.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToOn
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
    - hsf301.fe.service
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java | Student.java | StudentDAO.java

```java
package hsf301.fe.dao;

import java.util.List;

public class StudentDAO {

    private SessionFactory sessionFactory = null;
    private Configuration cf = null;

    public StudentDAO(String persistanceName) {
        cf = new Configuration();
        cf = cf.configure(persistanceName);
        sessionFactory = cf.buildSessionFactory();
    }

    public void save(Student student) {

    public List<Student> getStudents() {

    public void delete(Long studentID) {

    public Student findById(Long studentID) {
        Session session = sessionFactory.openSession();
        try {
            return (Student) session.get(Student.class, studentID);
        } catch (RuntimeException e) {
            throw e;
        } finally {
            session.close();

        }
    }

    public void update(Student student) {
}
```

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13. Update a Student in StudentDAO

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/dao/StudentDAO.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToOn
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
    - hsf301.fe.service
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java | Student.java | StudentDAO.java

```java
public class StudentDAO {

    private SessionFactory sessionFactory = null;
    private Configuration cf = null;

    public StudentDAO(String persistanceName) {
        cf = new Configuration();
        cf = cf.configure(persistanceName);
        sessionFactory = cf.buildSessionFactory();
    }

    public void save(Student student) {

    public List<Student> getStudents() {

    public void delete(Long studentID) {

    public Student findById(Long studentID) {

    public void update(Student student) {

        Session session = sessionFactory.openSession();
        Transaction t = session.beginTransaction();
        try {
            session.update(student);
            t.commit();
            System.out.println("update saved");
        } catch (Exception ex) {
            t.rollback();
            System.out.println("Error " + ex.getMessage());
        } finally {
            sessionFactory.close();
            session.close();
        }

    }
}
```

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14. Create IStudentRepository

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/repository/IStudentRepository.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToOn
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
      - IStudentRepository.java
      - StudentRepository.java
    - hsf301.fe.service
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java | Student.java | StudentDAO.java | IStudentRepository.java | StudentRepository.java

```java
package hsf301.fe.repository;

import java.util.List;

public interface IStudentRepository {
    public List<Student> findAll();

    public void save(Student student);

    public void delete(Long studentID);

    public Student findById(Long studentID);

    public void update(Student student);
}
```

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15. Create StudentRepository

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/repository/StudentRepository.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToOi
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
      - IStudentRepository.java
      - StudentRepository.java
    - hsf301.fe.service
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java | Student.java | StudentDAO.java | IStudentRepository.java | StudentRepository.java

```java
package hsf301.fe.repository;

import java.util.List;

public class StudentRepository implements IStudentRepository {
    private StudentDAO studentDAO = null;

    public StudentRepository(String fileConfig) {
        studentDAO = new StudentDAO(fileConfig);
    }
    @Override
    public void save(Student student) {
        // TODO Auto-generated method stub
        studentDAO.save(student);
    }
    @Override
    public List<Student> findAll() {
        // TODO Auto-generated method stub
        return studentDAO.getStudents();
    }
    @Override
    public void delete(Long studentID) {
        studentDAO.delete(studentID);
    }
    @Override
    public Student findById(Long studentID) {
        // TODO Auto-generated method stub
        return studentDAO.findById(studentID);
    }
    @Override
    public void update(Student student) {
        studentDAO.update(student);

    }

}
```

Writable | Smart Insert | 1 : 1 : 0

16. Create IStudentService

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/service/IStudentService.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToOn
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
      - IStudentRepository.java
      - StudentRepository.java
    - hsf301.fe.service
      - IStudentService.java
      - StudentService.java
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java | Student.java | StudentDAO.java | IStudentRepository.java | StudentRepository.java | IStudentService.java

```java
package hsf301.fe.service;

import java.util.List;

public interface IStudentService {
    public List<Student> findAll();

    public void save(Student student);

    public void delete(Long studentID);

    public Student findById(Long studentID);

    public void update(Student student);

}
```

Writable | Smart Insert | 17 : 1 : 325

17. Create StudentService

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/service/StudentService.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToOne
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
      - IStudentRepository.java
      - StudentRepository.java
    - hsf301.fe.service
      - IStudentService.java
      - StudentService.java
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java | Student.java | StudentDAO.java | IStudentRepository.java | StudentRepository.java | IStudentService.java | StudentService.java

```java
package hsf301.fe.service;

import java.util.List;

public class StudentService implements IStudentService{
    private IStudentRepository iStudentRepo = null;

    public StudentService(String fileName) {
        iStudentRepo = new StudentRepository(fileName);
    }
    @Override
    public void save(Student student) {
        // TODO Auto-generated method stub
        iStudentRepo.save(student);
    }
    @Override
    public List<Student> findAll() {
        // TODO Auto-generated method stub
        return iStudentRepo.findAll();
    }
    @Override
    public void delete(Long studentID) {
        iStudentRepo.delete(studentID);

    }
    @Override
    public Student findById(Long studentID) {
        // TODO Auto-generated method stub
        return iStudentRepo.findById(studentID);
    }
    @Override
    public void update(Student student) {
        // TODO Auto-generated method stub
        iStudentRepo.update(student);
    }

}
```

Writable | Smart Insert | 1 : 1 : 0

18. Create Main Function

eclipse-workspace - HSF301_Chapter_01_Ex_02_ManyToOne/src/main/java/hsf301/fe/gui/ManyToOne.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_02_ManyToOne
  - JPA Content
  - src/main/java
    - hsf301.fe.dao
      - StudentDAO.java
    - hsf301.fe.gui
      - ManyToOne.java
    - hsf301.fe.pojo
      - Book.java
      - Student.java
    - hsf301.fe.repository
      - IStudentRepository.java
      - StudentRepository.java
    - hsf301.fe.service
      - IStudentService.java
      - StudentService.java
  - src/main/resources
    - hibernate.cfg.xml
  - JRE System Library [JavaSE-17]
  - Maven Dependencies
  - src
  - target
  - pom.xml

hibernate.cfg.xml | Book.java | Student.java | StudentDAO.java | IStudentRepository.java | StudentRepository.java | IStudentService.java | StudentService.java | ManyToOne.java

```java
package hsf301.fe.gui;

import java.util.List;

public class ManyToOne {

    public static void main(String[] args) {
        // TODO  Auto-generated method stub

        //Many To One
        String fileName = "hibernate.cfg.xml";
        IStudentService studentService = new StudentService(fileName);
        Student student = new Student("Lam","Nguyen",9);
        Book book = new Book("Java Persistence with Spring","Catalin Tudose","9781617299186");
        student.getBooks().add(book);
        studentService.save(student);

    }

}
```

Writable | Smart Insert | 21 : 28 : 635

19. Result

lamnhungoc\LOCALHOST.tutorial - Diagram_0* - Microsoft SQL Server Management Studio
Quick Launch (Ctrl+Q)
File Edit View Project Table Designer Tools Window Help
New Query
Equipments2024DB
Execute
Object Explorer
Connect
localhost (SQL Server 16.0.1000.6 - sa)
Databases
System Databases
Database Snapshots
Equipments2024DB
tutorial
Database Diagrams
Tables
System Tables
FileTables
External Tables
Graph Tables
dbo.BOOKS
dbo.hibernate_sequence
dbo.STUDENTS
Dropped Ledger Tables
Views
External Resources
Synonyms
Programmability
Query Store
Service Broker
Storage
Security
Security
Server Objects
Replication
Always On High Availability
Management
Integration Services Catalogs
lamnhungoc\LOCAL...orial - Diagram_0*
SQLQuery1.sql - loc...nts2024DB (sa (61))*
Properties
STUDENTS
id
fistName
lastName
marks
BOOKS
id
author
isbn
title
student_id
Ready

20. Result

SQLQuery1.sql - localhost.tutorial (sa (53)) - Microsoft SQL Server Management Studio
File Edit View Query Project Tools Window Help
New Query
tutorial
Execute
Object Explorer
Connect
localhost (SQL Server 16.0.1000.6 - sa)
Databases
System Databases
Database Snapshots
Equipments2024DB
tutorial
Database Diagrams
Tables
System Tables
FileTables
External Tables
Graph Tables
dbo.BOOKS
dbo.hibernate_sequence
dbo.STUDENTS
Dropped Ledger Tables
Views
External Resources
Synonyms
Programmability
Query Store
Service Broker
Storage
Security
Security
Server Objects
Replication
Always On High Availability
Management
Integration Services Catalogs
SQLQuery1.sql - loca...st.tutorial (sa (53))
SELECT TOP (1000) [id]
,[author]
,[isbn]
,[title]
,[student_id]
FROM [tutorial].[dbo].[BOOKS]
100 %
Results
Messages
id author isbn title student_id
1 2 Catalin Tudose 9781617299186 Java Persistence with Spring 1
Query executed successfully.

SQLQuery2.sql - localhost.tutorial (sa (62)) - Microsoft SQL Server Management Studio
Quick Launch (Ctrl+Q)
File Edit View Query Project Tools Window Help
New Query
tutorial
Execute
Object Explorer
Connect
localhost (SQL Server 16.0.1000.6 - sa)
Databases
System Databases
Database Snapshots
Equipments2024DB
tutorial
Database Diagrams
Tables
System Tables
FileTables
External Tables
Graph Tables
dbo.BOOKS
dbo.hibernate_sequence
dbo.STUDENTS
Dropped Ledger Tables
Views
External Resources
Synonyms
Programmability
Query Store
Service Broker
Storage
Security
Security
Server Objects
Replication
Always On High Availability
Management
Integration Services Catalogs
SQLQuery2.sql - loca...st.tutorial (sa (62))
SQLQuery1.sql - loca...st.tutorial (sa (53))
SELECT TOP (1000) [id]
,[fistName]
,[lastName]
,[marks]
FROM [tutorial].[dbo].[STUDENTS]
100 %
Results
Messages
id fistName lastName marks
1 1 Lam Nguyen 9
Query executed successfully.
localhost (16.0 RTM) sa (62) tutorial 00:00:00 1 rows
Ready
Ln 1 Col 1 Ch 1 INS
Properties

FPT Education
FPT UNIVERSITY

Java

Design GUI Application with JavaFX

1. Open Eclipse, File | New | JavaFX Project

2. Fill the Project Name

3. Add JavaFX to Project

5. Add JavaFX SDK to Project

6. Choose the application type

7. Build the Architecture

eclipse-workspace - HSF301_Demo_JavaFX_GUI/src/hsf301/fe/view/AccountGUI.fxml - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Package Explorer

- HSF301_Demo_JavaFX_GUI [HSF301 main]
  - src
    - hsf301.fe.controller
      - AccountController.java
    - hsf301.fe.main
      - Main.java
    - hsf301.fe.view
      - AccountGUI.fxml
      - application.css
  - JRE System Library [JavaSE-17]
  - JavaFX
  - JavaFX SDK
  - build.fxbuild
- HSF301_Demo_JavaFX_ManyToOne [HSF301 main]

Main.java | AccountGUI.fxml

```
1 <?xml version="1.0" encoding="UTF-8"?>
2
3 <?import javafx.scene.layout.GridPane?>
4
  Bind to grammar/schema...
5 <GridPane xmlns:fx="http://javafx.com/fxml/1" fx:controller="hsf301.fe.controller.AccountController">
6     <!-- TODO Add Nodes -->
7 </GridPane>
8
```

Problems | Javadoc | Declaration | Console

<terminated> Main (2) [Java Application] D:\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v20240120-1143\jre\bin\javaw.exe (Apr 9, 2024, 10:24:50 AM – 10:24

hsf301.fe.controller - HSF301_Demo_JavaFX_GUI/src

8. Open the page | copy VM arguments

Getting Started with JavaFX

openjfx.io/openjfx-docs/

HOME English WORKS DIVI NCS TECH CP HR MICROBIT STEM FPT All Bookmarks

JavaFX

- Introduction
- Install Java
- Run HelloWorld using JavaFX
- Run HelloWorld via Maven
- Run HelloWorld via Gradle
- Runtime images
- JavaFX and IntelliJ
- JavaFX and NetBeans
- JavaFX and Eclipse
  - Non-modular from IDE
  - Non-modular with Maven
  - Non-modular with Gradle
  - Modular from IDE
  - Modular with Maven
  - Modular with Gradle
- JavaFX and Visual Studio Code
- Next Steps

Warning: If you now run the project it will compile but you will get this error:

```
Error: JavaFX runtime components are missing, and are required to run this application
```

This error is shown since the Java 21 launcher checks if the main class extends `javafx.application.Application`. If that is the case, it is required to have the `javafx.graphics` module on the module-path.

3. Add VM arguments

To solve the issue, click on `Run -> Run Configurations... -> Java Application`, create a new launch configuration for your project named `hellofx` and add these VM arguments:

Linux/Mac | Windows

```
--module-path "\path\to\javafx-sdk-22\lib" --add-modules javafx.controls,javafx.fxml
```

Warning: Make sure the checkbox **"Use the -XstartOnFirstThread argument when launching with SWT"** is not checked.

Click apply and close the dialog

9. Right Click | Run Configurations…

10. Edit Main File

eclipse-workspace - HSF301_Demo_JavaFX_GUI/src/hsf301/fe/main/Main.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_01_ManyToOne [HSF3
  - JPA Content
  - src/main/java
  - src/main/resources
  - JRE System Library [JavaSE-1.8]
  - Maven Dependencies
  - src
  - target
  - pom.xml
- HSF301_Demo_JavaFX_GUI [HSF301 main]
  - src
    - hsf301.fe.controller
      - AccountController.java
    - hsf301.fe.main
      - Main.java
    - hsf301.fe.view
      - AccountGUI.fxml
      - application.css
  - JRE System Library [JavaSE-17]
  - JavaFX SDK
  - JavaFX
  - build.fxbuild

AccountController.java | AccountGUI.fxml | application.css | Main.java

```java
package hsf301.fe.main;

import javafx.application.Application;


public class Main extends Application {
    @Override
    public void start(Stage primaryStage) {
        try {
            Parent  root =FXMLLoader.load(getClass().getResource("../view/AccountGUI.fxml"));
            Scene scene = new Scene(root,400,400);
            scene.getStylesheets().add(getClass().getResource("../view/application.css").toExternalForm());
            primaryStage.setScene(scene);
            primaryStage.setTitle("Demo JavaFX");
            primaryStage.setHeight(600);
            primaryStage.setWidth(700);
            primaryStage.show();
        } catch(Exception e) {
            e.printStackTrace();
        }
    }

    public static void main(String[] args) {
        launch(args);
    }
}
```

HSF301_Demo_JavaFX_GUI

11. Run JavaFX Project

12. Add Reference Another Project

13. Open AccountGUI.fxml in SceneBuilder

14. Edit Account.fxml

eclipse-workspace - HSF301_Demo_JavaFX_GUI/src/hsf301/fe/view/AccountGUI.fxml - Eclipse IDE

File Edit Source Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_01_ManyToOne [HSF30
  - JPA Content
  - src/main/java
  - src/main/resources
  - JRE System Library [JavaSE-1.8]
  - Maven Dependencies
  - src
  - target
  - pom.xml
- HSF301_Demo_JavaFX_GUI [HSF301 main]
  - src
    - hsf301.fe.controller
      - AccountController.java
    - hsf301.fe.main
      - Main.java
    - hsf301.fe.view
      - AccountGUI.fxml
      - application.css
  - JRE System Library [JavaSE-17]
  - JavaFX SDK
  - JavaFX
  - build.fxbuild

AccountController.java | AccountGUI.fxml

```
1  <?xml version="1.0" encoding="UTF-8"?>
2
3  <?import javafx.geometry.Insets?>
4  <?import javafx.scene.control.Button?>
5  <?import javafx.scene.control.Label?>
6  <?import javafx.scene.control.TableColumn?>
7  <?import javafx.scene.control.TableView?>
8  <?import javafx.scene.control.TextField?>
9  <?import javafx.scene.layout.AnchorPane?>
10 <?import javafx.scene.layout.ColumnConstraints?>
11 <?import javafx.scene.layout.GridPane?>
12 <?import javafx.scene.layout.HBox?>
13 <?import javafx.scene.layout.Pane?>
14 <?import javafx.scene.layout.RowConstraints?>
15 <?import javafx.scene.text.Font?>
16
   Bind to grammar/schema...
17 <AnchorPane maxHeight="-Infinity" maxWidth="-Infinity"
18     minHeight="-Infinity" minWidth="-Infinity" prefHeight="563.0"
19     prefWidth="600.0" xmlns="http://javafx.com/javafx/21"
20     xmlns:fx="http://javafx.com/fxml/1"
21     fx:controller="hsf301.fe.controller.AccountController">
22     <children>
23         <Pane prefHeight="83.0" prefWidth="500"
24             style="-fx-background-color: #2D75E8;" AnchorPane.leftAnchor="0.0"
25             AnchorPane.rightAnchor="0.0" AnchorPane.topAnchor="0.0">
26             <children>
27                 <Label layoutX="176.0" layoutY="7.0" text="Manage Student"
28                     textFill="WHITE">
29                     <font>
30                         <Font size="36.0" />
```

#text | Writable | Smart Insert | 13 : 36 : 481

15. Edit Account.fxml

eclipse-workspace - HSF301_Demo_JavaFX_GUI/src/hsf301/fe/view/AccountGUI.fxml - Eclipse IDE

File Edit Source Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_01_ManyToOne [HSF30
  - JPA Content
  - src/main/java
  - src/main/resources
  - JRE System Library [JavaSE-1.8]
  - Maven Dependencies
  - src
  - target
  - pom.xml
- HSF301_Demo_JavaFX_GUI [HSF301 main]
  - src
    - hsf301.fe.controller
      - AccountController.java
    - hsf301.fe.main
      - Main.java
    - hsf301.fe.view
      - AccountGUI.fxml
      - application.css
  - JRE System Library [JavaSE-17]
  - JavaFX SDK
  - JavaFX
  - build.fxbuild

AccountController.java | AccountGUI.fxml

```
30                          <Font size="36.0" />
31                      </font>
32                  </Label>
33              </children>
34          </Pane>
35          <TableView fx:id="tbData" layoutX="20.0" layoutY="328.0"
36              prefHeight="213.0" prefWidth="624.0" AnchorPane.bottomAnchor="22.0"
37              AnchorPane.leftAnchor="20.0" AnchorPane.rightAnchor="16.0"
38              AnchorPane.topAnchor="328.0">
39              <columns>
40                  <TableColumn fx:id="studentId" prefWidth="75.0"
41                      text="StudentId" />
42                  <TableColumn fx:id="firstName" prefWidth="75.0"
43                      text="First Name" />
44                  <TableColumn fx:id="lastName" prefWidth="75.0"
45                      text="Last Name" />
46                  <TableColumn fx:id="totalMark" prefWidth="75.0"
47                      text="Total Mark" />
48              </columns>
49              <columnResizePolicy>
50                  <TableView fx:constant="CONSTRAINED_RESIZE_POLICY" />
51              </columnResizePolicy>
52          </TableView>
53          <GridPane layoutX="20.0" layoutY="100.0" prefHeight="232.0"
54              prefWidth="575.0">
55              <columnConstraints>
56                  <ColumnConstraints hgrow="SOMETIMES"
57                      maxWidth="429.0" minWidth="10.0" prefWidth="427.0" />
58                  <ColumnConstraints hgrow="SOMETIMES"
59                      maxWidth="281.0" minWidth="10.0" prefWidth="148.0" />
60              </columnConstraints>
```

#text | Writable | Smart Insert | 13 : 36 : 481

16. Edit Account.fxml

eclipse-workspace - HSF301_Demo_JavaFX_GUI/src/hsf301/fe/view/AccountGUI.fxml - Eclipse IDE

File Edit Source Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_01_ManyToOne [HSF30
  - JPA Content
  - src/main/java
  - src/main/resources
  - JRE System Library [JavaSE-1.8]
  - Maven Dependencies
  - src
  - target
  - pom.xml
- HSF301_Demo_JavaFX_GUI [HSF301 main]
  - src
    - hsf301.fe.controller
      - AccountController.java
    - hsf301.fe.main
      - Main.java
    - hsf301.fe.view
      - AccountGUI.fxml
      - application.css
  - JRE System Library [JavaSE-17]
  - JavaFX SDK
  - JavaFX
  - build.fxbuild

AccountController.java | AccountGUI.fxml

```
60              </columnConstraints>
61              <rowConstraints>
62                  <RowConstraints minHeight="10.0" prefHeight="30.0"
63                      vgrow="SOMETIMES" />
64                  <RowConstraints minHeight="10.0" prefHeight="30.0"
65                      vgrow="SOMETIMES" />
66                  <RowConstraints minHeight="10.0" prefHeight="30.0"
67                      vgrow="SOMETIMES" />
68              </rowConstraints>
69              <children>
70                  <HBox prefHeight="61.0" prefWidth="362.0">
71                      <children>
72                          <Label text="First Name :" />
73                          <TextField fx:id="txtFirstName" prefHeight="26.0"
74                              prefWidth="254.0">
75                              <HBox.margin>
76                                  <Insets left="10.0" />
77                              </HBox.margin>
78                          </TextField>
79                      </children>
80                  </HBox>
81                  <HBox maxWidth="-Infinity" minHeight="-Infinity"
82                      minWidth="-Infinity" prefHeight="100.0" prefWidth="200.0"
83                      GridPane.columnIndex="1">
84                      <children>
85                          <Button fx:id="btnAdd" onAction="#addStudent"
86                              mnemonicParsing="false" prefHeight="43.0" prefWidth="124.0"
87                              text="Add Student" />
88                      </children>
89                  </HBox>
90                  <HBox prefHeight="100.0" prefWidth="200.0"
```

#text | Writable | Smart Insert | 13 : 36 : 481

17. Edit Account.fxml

eclipse-workspace - HSF301_Demo_JavaFX_GUI/src/hsf301/fe/view/AccountGUI.fxml - Eclipse IDE

File Edit Source Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_01_ManyToOne [HSF30
  - JPA Content
  - src/main/java
  - src/main/resources
  - JRE System Library [JavaSE-1.8]
  - Maven Dependencies
  - src
  - target
  - pom.xml
- HSF301_Demo_JavaFX_GUI [HSF301 main]
  - src
    - hsf301.fe.controller
      - AccountController.java
    - hsf301.fe.main
      - Main.java
    - hsf301.fe.view
      - AccountGUI.fxml
      - application.css
  - JRE System Library [JavaSE-17]
  - JavaFX SDK
  - JavaFX
  - build.fxbuild

AccountController.java | AccountGUI.fxml

```
90          <HBox prefHeight="100.0" prefWidth="200.0"
91              GridPane.rowIndex="1">
92              <children>
93                  <Label text="Last Name :" />
94                  <TextField fx:id="txtLastName" prefHeight="26.0"
95                      prefWidth="254.0">
96                      <HBox.margin>
97                          <Insets left="10.0" />
98                      </HBox.margin>
99                  </TextField>
100             </children>
101         </HBox>
102         <HBox maxWidth="-Infinity" prefHeight="77.0" prefWidth="210.0"
103             GridPane.columnIndex="1" GridPane.rowIndex="1">
104             <children>
105                 <Button fx:id="btnUpdate" onAction="#updateStudent"
106                     mnemonicParsing="false" prefHeight="42.0" prefWidth="124.0"
107                     text="Update Student" />
108             </children>
109         </HBox>
110         <HBox prefHeight="100.0" prefWidth="200.0"
111             GridPane.rowIndex="2">
112             <children>
113                 <Label text="Total Mark :" />
114                 <TextField fx:id="txtTotalMark" prefHeight="26.0"
115                     prefWidth="254.0">
116                     <HBox.margin>
117                         <Insets left="10.0" />
118                     </HBox.margin>
119                 </TextField>
120             </children>
```

#text | Writable | Smart Insert | 13 : 36 : 481

18. Edit Account.fxml

eclipse-workspace - HSF301_Demo_JavaFX_GUI/src/hsf301/fe/view/AccountGUI.fxml - Eclipse IDE

File Edit Source Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_01_ManyToOne [HSF30
  - JPA Content
  - src/main/java
  - src/main/resources
  - JRE System Library [JavaSE-1.8]
  - Maven Dependencies
  - src
  - target
  - pom.xml
- HSF301_Demo_JavaFX_GUI [HSF301 main]
  - src
    - hsf301.fe.controller
      - AccountController.java
    - hsf301.fe.main
      - Main.java
    - hsf301.fe.view
      - AccountGUI.fxml
      - application.css
  - JRE System Library [JavaSE-17]
  - JavaFX SDK
  - JavaFX
  - build.fxbuild

AccountController.java | AccountGUI.fxml

```
108                 </children>
109             </HBox>
110             <HBox prefHeight="100.0" prefWidth="200.0"
111                 GridPane.rowIndex="2">
112                 <children>
113                     <Label text="Total Mark :" />
114                     <TextField fx:id="txtTotalMark" prefHeight="26.0"
115                         prefWidth="254.0">
116                         <HBox.margin>
117                             <Insets left="10.0" />
118                         </HBox.margin>
119                     </TextField>
120                 </children>
121             </HBox>
122             <HBox maxWidth="-Infinity" prefHeight="60.0" prefWidth="200.0"
123                 GridPane.columnIndex="1" GridPane.rowIndex="2">
124                 <children>
125                     <Button fx:id="btnDelete" onAction="#deleteStudent"
126                         mnemonicParsing="false" prefHeight="43.0" prefWidth="125.0"
127                         text="Delete Student">
128                         <HBox.margin>
129                             <Insets top="10.0" />
130                         </HBox.margin>
131                     </Button>
132                 </children>
133             </HBox>
134         </children>
135     </GridPane>
136 </children>
137 </AnchorPane>
138
```

#text | Writable | Smart Insert | 13 : 36 : 481

19. Edit the AccountController.java

eclipse-workspace - HSF301_Demo_JavaFX_GUI/src/hsf301/fe/controller/AccountController.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_01_ManyToOne [HSF3
  - JPA Content
  - src/main/java
  - src/main/resources
  - JRE System Library [JavaSE-1.8]
  - Maven Dependencies
  - src
  - target
  - pom.xml
- HSF301_Demo_JavaFX_GUI [HSF301 main]
  - src
    - hsf301.fe.controller
      - AccountController.java
    - hsf301.fe.main
      - Main.java
    - hsf301.fe.view
      - AccountGUI.fxml
      - application.css
  - JRE System Library [JavaSE-17]
  - JavaFX SDK
  - JavaFX
  - build.fxbuild

AccountController.java | AccountGUI.fxml | application.css | Main.java

```
1  package hsf301.fe.controller;
2
3  import java.net.URL;
22
23 public class AccountController implements Initializable {
24     @FXML
25     private TableView<Student> tbData;
26     @FXML
27     public TableColumn<Student, Integer> studentId;
28
29     @FXML
30     public TableColumn<Student, String> firstName;
31
32     @FXML
33     public TableColumn<Student, String> lastName;
34
35     @FXML
36     public TableColumn<Student, Integer> totalMark;
37
38     @FXML
39     private TextField txtLastName;
40
41     @FXML
42     private TextField txtFirstName;
43
44     @FXML
45     private TextField txtTotalMark;
46
47     private int idStudent;
48
49     private IStudentService iStudentService;
```

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20. Edit the AccountController.java

eclipse-workspace - HSF301_Demo_JavaFX_GUI/src/hsf301/fe/controller/AccountController.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_01_ManyToOne [HSF3
  - JPA Content
  - src/main/java
  - src/main/resources
  - JRE System Library [JavaSE-1.8]
  - Maven Dependencies
  - src
  - target
  - pom.xml
- HSF301_Demo_JavaFX_GUI [HSF301 main]
  - src
    - hsf301.fe.controller
      - AccountController.java
    - hsf301.fe.main
      - Main.java
    - hsf301.fe.view
      - AccountGUI.fxml
      - application.css
  - JRE System Library [JavaSE-17]
  - JavaFX SDK
  - JavaFX
  - build.fxbuild

AccountController.java | AccountGUI.fxml | application.css | Main.java

```
49      private IStudentService iStudentService;
50
51      private ObservableList<Student> studentsModels;
52
53      public AccountController() {
54          iStudentService = new StudentService("JPAs");
55          studentsModels = FXCollections.observableArrayList(iStudentService.findAll());
56      }
57
58      public void showAlert(String header, String content) {
59          Alert alert = new Alert(Alert.AlertType.INFORMATION);
60          alert.setHeaderText(header);
61          alert.setContentText(content);
62          alert.showAndWait();
63      }
64
65      private void showStudent(Student student) {
66          this.setIdStudent(student.getId());
67          this.txtFirstName.setText(student.getFirstName());
68          this.txtLastName.setText(student.getLastName());
69          this.txtTotalMark.setText(String.valueOf(student.getMarks()));
70      }
71
72      private void refreshDataTable() {
73          this.setIdStudent(0);
74          this.txtFirstName.setText("");
75          this.txtLastName.setText("");
76          this.txtTotalMark.setText("");
77          studentsModels = FXCollections.observableArrayList(iStudentService.findAll());
78          tbData.setItems(studentsModels);
79      }
```

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21. Show all student and get StudentID when click first cell

eclipse-workspace - HSF301_Demo_JavaFX_GUI/src/hsf301/fe/controller/AccountController.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_01_ManyToOne [HSF3
  - JPA Content
  - src/main/java
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    - hsf301.fe.controller
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      - AccountGUI.fxml
      - application.css
  - JRE System Library [JavaSE-17]
  - JavaFX SDK
  - JavaFX
  - build.fxbuild

AccountController.java | AccountGUI.fxml | application.css | Main.java

```
80
81      @SuppressWarnings({ "unchecked", "rawtypes" })
82      @Override
83      public void initialize(URL location, ResourceBundle resources) {
84          studentId.setCellValueFactory(new PropertyValueFactory<>("Id"));
85          firstName.setCellValueFactory(new PropertyValueFactory<>("FirstName"));
86          lastName.setCellValueFactory(new PropertyValueFactory<>("LastName"));
87          totalMark.setCellValueFactory(new PropertyValueFactory<>("Marks"));
88          tbData.setItems(studentsModels);
89
90          tbData.getSelectionModel().selectedItemProperty().addListener(new ChangeListener() {
91              @Override
92              public void changed(ObservableValue observableValue, Object oldValue, Object index) {
93                  if (tbData.getSelectionModel().getSelectedItem() != null) {
94                      TableViewSelectionModel selectionModel = tbData.getSelectionModel();
95                      ObservableList selectedCells = selectionModel.getSelectedCells();
96                      TablePosition tablePosition = (TablePosition) selectedCells.get(0);
97
98                      Object studentID = tablePosition.getTableColumn().getCellData(index);
99
100                     try {
101                         Student student = iStudentService.findById(Integer.valueOf(studentID.toString()));
102                         showStudent(student);
103                     } catch (Exception ex) {
104                         showAlert("Infomation Board !", "Please choose the First Cell !");
105                     }
106                 }
107             }
108         });
109     }
110
```

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22. CRUD for Students

eclipse-workspace - HSF301_Demo_JavaFX_GUI/src/hsf301/fe/controller/AccountController.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer | Servers

- HSF301_Chapter_01_Ex_01_ManyToOne [HSF3
  - JPA Content
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    - hsf301.fe.view
      - AccountGUI.fxml
      - application.css
  - JRE System Library [JavaSE-17]
  - JavaFX SDK
  - JavaFX
  - build.fxbuild

AccountController.java | AccountGUI.fxml | application.css | Main.java

```
110
111     @FXML
112     public void addStudent() {
113         Student student = new Student(this.txtFirstName.getText(), this.txtLastName.getText(),
114                 Integer.parseInt(txtTotalMark.getText()));
115         iStudentService.save(student);
116         refreshDataTable();
117     }
118
119     @FXML
120     public void deleteStudent() {
121         iStudentService.delete(this.getIdStudent());
122         refreshDataTable();
123     }
124
125     @FXML
126     public void updateStudent() {
127         Student student = new Student(this.idStudent,
128                 this.txtFirstName.getText(),
129                 this.txtLastName.getText(),
130                 Integer.parseInt(txtTotalMark.getText()));
131         iStudentService.update(student);
132         refreshDataTable();
133     }
134
135     public int getIdStudent() {
138
139     public void setIdStudent(int idStudent) {
140         this.idStudent = idStudent;
141     }
142
```

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23. Run Project

Summary

Concepts were introduced:

- Implement CRUD (Create, Read, Update, Delete) operations to manage data effectively.
- Utilize Hibernate to map Java objects to database tables, simplifying data persistence and retrieval.
- Design and develop a user-friendly interface using JavaFX, enabling seamless interaction with the application.
- Implement features such as form input validation, error handling, and feedback mechanisms to enhance user experience.