Project 1.B

I. Project Description

Figure 1 shows the ER diagram for University database we implemented in project 1.A.

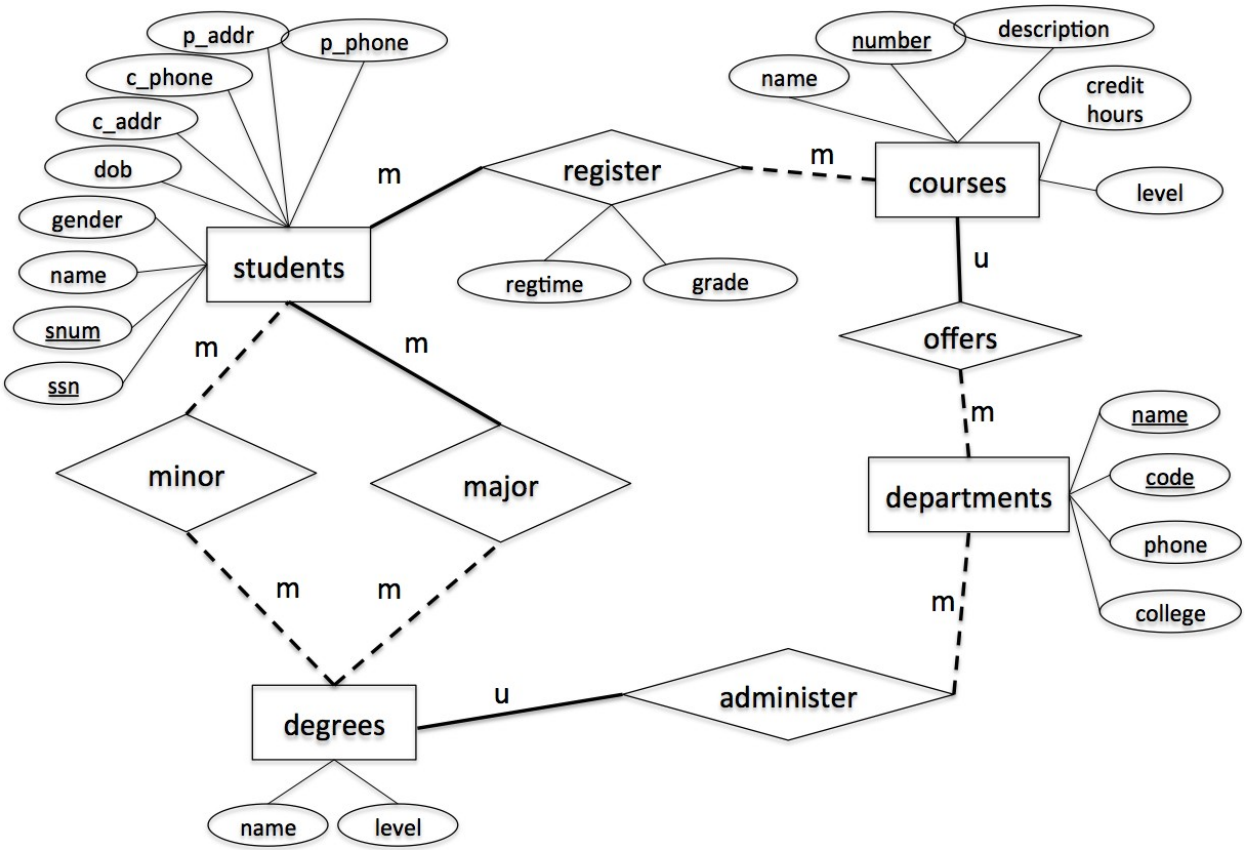

Figure 1. ER-diagram

This project is to implement the above design using a relational data model. Specifically, you are asked to write the following Java programs using JDBC connection to connect MySQL database to Java programs.

1. CreateTables.java [Points: 10]

After execution, your program must create tables in MySQL, which are the same with project 1A. You can find your MySQL code from Gradescope.

2. InsertRecords.java [Points: 10]

After execution, your program must insert records to all tables created by CreateTables.java. Use the same records as Project 1A.

3. **Query.java [Points: 30]**

After execution, your program must print out the following information (note that these are new queries different from project 1A)

1) **The numbers and names of courses and their corresponding average grades from students registered in the past semesters.**
2) **The count of female students who major or minor in a degree managed by LAS departments**
3) **The names and levels of degrees that have more male students than female students (major or minor)**

4. **Index.java [Points: 20]**

1) **Insert an additional 5000 meaningful records in the students table. All new students must also have degrees (major, minor, or both), but not courses. You are encouraged to use the Java Faker library to generate meaningful data**
   https://mvnrepository.com/artifact/com.github.javafaker/javafaker/1.0.2
   Example Java Faker project using maven:
   https://iowastate-my.sharepoint.com/:u:/g/personal/kopper_iastate_edu/EVzpSgz1V2hLuQ4PtHwV4sABS--Mx-TXQvPqglc8-EzeVA?e=dd8SEw
2) **Execute the query 3) from above (names and levels of degrees that have more male than female students) and take a screenshot of the query execution time**
3) **Create an index on gender and execute the query again. Take a screenshot of the query execution time. Observe how the new execution time is dramatically faster than before.**

5. **ModifyRecords.java [25]**

After execution, your program must modify the following information and print out the new tables where the modifications are conducted

1) Change the name of the student with ssn = 144673371 to Scott
2) Change the major of the student with ssn = 144673371 to Computer Science, Master.
3) Delete all registration records that were in “Summer2024”
4) **If a group of courses have the same level and department_code, only keep the one with the smallest course number and delete the rest. If a course is deleted, the corresponding record in register relation should also be deleted. (Hint: You cannot delete from a table and select from the same table in a subquery in MySQL. Check this link for multi-table deletes)**

6. **DropTables.java [5]**

After execution, your program must delete all tables.

Submission Instruction

Submit all your java programs (.java) to Canvas. Be sure to*

1) *Name your files as required, i.e., CreateTables.java, InsertRecords.java, Query.java, Index.java, ModifyRecords.java, DropTables.java;*
2) *Make each of these java files independently executable, i.e., each having its main() method;*
3) *Set user name to be "coms363" and password to be "password" in database authentication.*

Submit your screenshots from the query execution. Be sure to

1) *Add the screenshots to a single pdf file*
2) *Name your file Index.pdf*

Set up working environment using Eclipse (See instruction posted on Canvas)

Note:
For testing your code, we will use username= 'coms363' and password= 'password'. To set up this user account, run the following code as root user.

```
CREATE USER 'coms363'@'localhost' IDENTIFIED BY 'password';
GRANT ALL PRIVILEGES ON *.* TO 'coms363'@'localhost';
```

Once you run your Java code, you should see updates on MySQL (remember to refresh SCHEMAS)

Special submission instruction for each file name below. Make sure the file names match:

CreateTables.java
InsertRecords.java

Query.java
ModifyRecords.java
Index.java

* Connection String Config while submission:

```
String userName = "coms363";
String password = "password";
String dbServer = " jdbc:mysql://localhost:3306/project1";
```

** Package and import libraries (beginning of file like below one example for CreateTables) in submission file:

```
package coms363;
import java.sql.*;

public class CreateTables {
```

DropTables.java

```
String userName = "test";
String password = "password";
String dbServer = "
```

jdbc:mysql://localhost:3306/project1_del_data";

** Package and import libraries

```
1  package coms363;
2  import java.sql.*;
3
4  public class DropTables {
```