CS 480: DATABASE SYSTEMS

Home Work 4

Submit Electronic version to the blackboard by July 24, by 10:30 AM

No late submissions accepted

Please read all instructions on the blackboard carefully before submitting your home work. In this homework you have to write a program that interfaces with a database using embedded SQL. The program should be implemented by Java. You can find the help on how to use Java. Your program should operate on the following database with two relations:

Consider the following schema:

Course (cid: integer, name:string, capacity: integer)
PrerequisiteCourse (cid: integer, pid:integer)

The key fields are underlined, and the domain of each field is listed after the field name.

The course relation gives information about a course. The prerequisite-Course relation gives prerequisite of a course. That is, if (100,200) is a tuple in prerequisiteCourse then this shows that the course with cid 200 is the prerequisite of the course with cid 100. First, your program should create the tables Course and PrerequisiteCourse. After setting up the tables, your program has to read an input file called transfile. Each line in transfile is a transaction. There are six types of transactions. The first character of each line gives the type of the transaction. We call this as transaction code.

- If the transaction code is 1, then you have to delete an existing course. The other field in this line is the id of the course (i.e., the cid) to be deleted. In this case, you need to delete the appropriate tuple from the Course table and tuples from the PrerequisiteCourse relation in which this course id appears as pid or cid.

- If the transaction code is 2, then you have to insert a new course. In this case, the other fields, in the line are cid, name, capacity followed by zero or more pids. Each of them is separated by one or more spaces. The first three fields in the line give the course attributes. The subsequent fields give the pids of the prerequisites for the course. Note cid, capacity and pids are integers while name is a string without spaces. For this transaction, you have to insert a tuple in course relation and insert zero or more tuples in prerequisiteCourse relation. The number of tuples inserted in prerequisiteCourse relation is as many as the number of distinct pids specified in the transaction. Note that the course may not have any prerequisite.

- If the transaction code is 3, then you have to output the average capacity of all the courses.
- If the transaction code is 4, then you have to output names of all courses that are prerequisites of a Course directly or indirectly. In this case, the course id is given in the line. For example, if the course id is 100, then you have to output names of courses that are prerequisites of 100, as well as names of courses of their prerequisites and so on.
- If the transaction code is 5, then you have to output the average capacity of courses that are direct prerequisites of a Course. If the average capacity is not an integer, round it up to an integer. Here also the course id is given in the input line.
- If the transaction code is 6, then you have to check if there is any course which has more than one direct prerequisite. In this case, you have to output the names of all such courses. If there is no such course then output the string "no courses with more than one prerequisite".

When you read a line from transfile, if the transaction code is 2, then you have to check that there are no duplicates in course relation. If the tuples for the new courses are created successfully, then output "done". If there is any problem then output "error". If the transaction code is 1 then you output "error" if no tuple for the course exists in the course relation. If the course is successfully deleted, then output "done". Note that , in this case, you have to delete all tuples in prerequisiteCourse relation in which this course id appears as cid or as pid. When you read a line whose transaction code is 3,4,5 or 6 then you output the results of the transactions. If any problem occurs, output "error".

After you have read all the transactions from transfile, your program should drop all tables that were created. **Note: Dont forget to drop all tables you created in the end of your program!!!**

We assume the input file is always valid, and you dont need to check if its correct. We also assume that each course name is a string of maximum 20 characters without any spaces.

A sample input file is as follows:

```
***transfile****
2 50 Software 55
2 60 AI 70
2 100 Database 40 50
2 101 Algorithm 53 100 60
4 101
4 50
5 101
6
```

****Your output should be:

```
done
done
done
done
Software, Database, AI
No prerequisite
55
Algorithm
```

Test your program using your own transfile. **Please use the default package for your file (do not define any package).** Please make sure that your code will compile and run on the command line. Upload your source code, YourNetID.java, on to the blackboard.