Course: CS345: Database Lab
Type of database: Relational
Implementation: MYSQL

Stage 4: Trigger, View, Index and Alter

Note: A set of practice queries is given. It is expected that you get familiar with the practice queries before coming to Lab. Otherwise, TAs will also be helping you to formulate these queries in the Lab. Once you are able to formulate SQL queries for those practice queries, you will be given another five queries similar to the ones given in practice set. You should complete those five queries on your own. You can attempt the new set of queries, only if you complete the practice queries.

You have to use the database created in the Stage – 2 and 3.

A university consists of a number of departments. A student belongs to only one department. A lecturer belongs to only one department. Each department offers several courses. Students enrol in a particular course. A course may be taught by more than one lecturer from the appropriate department, and a lecturer may teach more than one course. A student can enrol courses offered in any department. However, a lecture can teach the courses that are offered only in his department.

Focus: The objective of this Lab is to learn (i) INDEX creation, (ii) VIEW creation, (iii) Trigger, and (iv) Alter Table

What is INDEX? Indexing is a way to optimize performance of a database by minimizing the number of disk accesses required when a query is processed. An index or database index is a data structure which is used to quickly locate and access the data in a database table. Indexes are created using some database columns.
Reference:

- **http://www.mysqltutorial.org/mysql-index/**
- **https://dev.mysql.com/doc/refman/8.0/en/create-index.html**
- **https://www.w3schools.com/sql/sql_create_index.asp**

What is View? A database view is a searchable object in a database that is defined by a query. Though a view doesn't store data, some refer to a views as "virtual tables," you can query a view like you can a table.
Reference:

- **https://www.essentialsql.com/what-is-a-relational-database-view/**
- **https://www.w3schools.com/sql/sql_view.asp**

What is Trigger? a trigger or database trigger is a stored program executed automatically to respond to a specific event e.g., insert, update or delete occurred in a table.
Reference:

- **http://www.mysqltutorial.org/mysql-triggers.aspx**
- **https://dev.mysql.com/doc/refman/5.7/en/triggers.html**

ALTER TABLE: Reference:

- https://dev.mysql.com/doc/refman/8.0/en/alter-table.html
- https://dev.mysql.com/doc/refman/5.7/en/alter-table-examples.html

Marks:

(i) 4 for practice queries.
(ii) 6 for additional queries.
(iii) Total: 10.

Tutorial queries (These queries can be formed using different Clauses and commands. You are advised to explored different possible formulations):

1. Create an appropriate index on appropriate attribute(s) of over the relevant table for enhancing retrieval performance for the query **"Find the name of the students of a course who have score higher than the average of another course**"
2. Create appropriate view for performing the following query "Given a student's id, find the name of the courses that the student enrolled".
3. Create a Trigger on appropriate table to perform the following. "Whenever an invalid score (mark of a student against a course) i.e., score<0 or score>100, set a trigger to correct the value to 0 or 100 respectively".
4. Alter an appropriate table to add a new attribute to store "attendance of a student against a course" and set new values by updating only the attendance field.

5. Create an appropriate index on appropriate attribute(s) over relevant table(s) for enhancing retrieval performance for the query "Given a student's id, find the list of students who have enrolled the courses (all) that the student has enrolled."
6. Modify/add the indexes to the above solution to support "Given a student's id, find the list of students with same fname (prefix of size 5 char, if you do not have explicit fname) who have enrolled the courses (all) that the student has enrolled"
7. Create a view for performing following task "Assume that student scoring (i) lesser than 40 has F grade, (ii) greater than or equal to 40, but lesser than 70 has B grade, and (iii) greater than or equal to 70 has A grade. Highest possible mark is 100. Given a student id, find the grade of students." Note: the grade should be part of the view.
8. Is the above view that you have created INSERT upgradable? If yes, show by inserting a new student record. If no, create an appropriate view to support insert operation.
9. Create a table to store student id and his/her grade on a course <sid, cid, grade>. Create a trigger on INSERT to determine grade of a student based on their mark. student scoring (i) lesser than 40 has F grade, (ii) greater than or equal to 40, but lesser than 70 has B grade, and (iii) greater than or equal to 70 has A grade. Highest possible mark is 100. [Mark 2, no partial]