CS3700: Aug-Nov-2021: Assignment Descriptions

Assignment-1: Database Design
This assignment is a group assignment.
Part-1:
Pick a domain of your choice and write down its description in plain English and the broad purpose for which you are building the database. Do not use the technical terms of the ER model (entity, relationship, attribute, multi-valued etc) in your description of the domain. Draw an ER diagram based on the description. Briefly explain the various entities involved in the model, the relationships and attributes. You are required to upload a PDF file containing the domain description and ER Diagram with explanation. Please ensure that your chosen domain gives you the opportunity to use the various features of the ER model.
--------- Deadline 30/8/2019 23:55 ------
Part-2:
Consider the feedback from TAs and update the ER model incorporating the suggestions. Using the standard method, convert the ER diagram into a relational database scheme. You are required to upload a PDF file containing the updated domain description, ER diagram and relational schema diagram with keys and RICs. In the subsequent assignments, you will be asked to populate data and write SQL queries on the DB designed at this stage. It is expected that your relational schema has at least around 10 relations. If you are adopting a relational schema that has variations from the one derived from the ER model, please justify the adopted changes.
--------- Deadline 9/9/2019 23:55 ------

Assignment-2: SQL on Academic DB
This assignment is an individual assignment. You have to create 8 queries of your choice on the academic_insti database (details given below) and write the SQL queries for the same. Of the 8, 4 queries are required to use aggregate functions, group by and having clauses. Do not use queries given in the class/tutorials/Quizzes. You have to upload the SQL queries along with the plain English description of the query and ensure that they produce correct results. The assignment will be evaluated based on the hardness/interesting-ness of the queries and the diversity of the SQL features used. There will be an individual viva session in the days following the deadline where you may be asked to write SQL queries on the spot.

Please install MySQL in your laptops to load the Academic Institute database. You can find the SQL dump file for the database in the course moodle page. You can load it to MySQL through the following steps:
Create a new database named "academic_insti" using MySQL.
Open Terminal and go to the folder where you have saved the SQL dump file.
Execute the command: mysql -u<yourusername> -p academic_insti < academic_insti.sql
------- Deadline: 24/09/2019 23:55 --------

Assignment-3: SQL on Group DB

Using MySQL, create the database that your group has designed in the previous assignment and populate it with data. Each student needs to create at least 6 queries of his/her choice on the database and write the SQL queries for the same. Of these, 2 queries need to involve aggregate functions. You have to upload the SQL queries along with the English description. The assignment will be evaluated based on the hardness of the queries and the diversity of the SQL features used. There will be an individual viva session in the days following the deadline where you may be asked to write SQL queries on the spot on your group's database.

Note: Populating data can be a group task, but queries need to be individual.

------ Deadline: 08/Oct/2019 --------

Assignment-4A: Application Development.

This part of the assignment is a group task. You need to create an application in any programming language of your choice and access the academic_insti database from it. The application should have the following simple functionalities. GUI is optional.

1. Addition of courses: The application should allow to update the course details of the even semester of 2006 for a particular department. More precisely, it should take department id, course id, teacher id and class room from the user as input, perform validations on course id and teacher id and make necessary changes to the database.
2. Student enrollment: The application should facilitate enrollment of students into the courses for the same semester and same department used above. It should take roll No and course Ids from the user as input. Verify if the student has passed in the prerequisites of the course that he/she wants to enroll. If the student had passed in all the prerequisites, make necessary changes to enroll him/her in the course. It should display appropriate messages.

Submission: Application code written by the group and a readme file that describes the steps to execute the code. You can choose C/C++/Java/Python for implementation.

------- Deadline for submitting the code is Nov 1st 23:55 hrs.

Assignment-4B: Index Effect Study.

This part of the assignment is an individual task. Choose a SQL query on the academic_insti database and see the query plan generated by MySQL engine (use EXPLAIN command). Create one or more appropriate indices to improve the performance of the query. Observe the generated plan on the same query after the indices creation. Write a description on the SQL query used for the assignment, the indices and the improvement shown by the query plan in terms of the number of rows accessed as reported by the query engine. The hardness of the query used for the assignment will also be considered for evaluation.

Submission: PDF Report with appropriate screen-shots to be submitted by individuals.

------- Deadline for submitting the code is Nov 1st 23:55 hrs.