Group Project - Building a simple database and its management system

Title: 5408DB
Team Size: 3

Project Objective:

By completing this project, a student will be able to describe concepts in modelling notation (e.g., Entity-Relation Diagrams or UML) and how they would be used. A student will be able to describe the most common designs for core database system components including the query optimizer, query executor, storage manager, access methods, and transaction processor. By completing this task, a student will be able to explain the techniques used for data fragmentation, replication, and allocation during the distributed database design process

In this project, each group is required to simulate a database management system (e.g. data storing, retrieval, building database and logs, analysis, report writing, and presentation)

Plagiarism Policy:

- This project is a group task. Collaboration of any type (outside the assigned group) amounts to a violation of the academic integrity policy and will be reported to the AIO.
- Content cannot be copied verbatim from any source(s). Please understand the concept and write in your own words. In addition, cite the actual source. Failing to do so will be considered as plagiarism and/or cheating.
- The Dalhousie Academic Integrity policy applies to all material submitted as part of this course. Please understand the policy, which is available at: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Timeline and Deliverables:

Phase 1: (5%)

- Each group will work on the problem and identify a solution.
- Each group will perform a feasibility study and submit a short-recorded group presentation with their meeting Logs.
- Each group will submit their tentative design, and implementation plan

Phase 2: (15%)

- Each group will complete the task incorporating the changes suggested in Phase 1
- Each group will submit a report (10 to 15 pages) and a short-recorded group presentation.

- There will be a synchronous Q&A session with each group at the end of the course

Phase 1		**Phase 2 – Due Nov 29, 2020**		**Date: TBD**
Recorded video (30 min) – Due Oct 14	Initial Report (2 page) – Due Oct 20	Recorded video (maximum 45 min)	Final Report	Q & A

Project Rubric:

Based on the discussion board rubric (McKinney, 2018)

	Excellent (20%)	Proficient (15%)	Marginal (10%)	Unacceptable (0%)
Completeness including Citation	All required tasks are completed	Submission highlights tasks completion. However, missed some tasks in between, which created a disconnection	Some tasks are completed, which are disjoint in nature.	Incorrect and irrelevant
Correctness	All parts of the given tasks are correct	Most of the given tasks are correct However, some portions need minor modifications	Most of the given tasks are incorrect. The submission requires major modifications.	Incorrect and unacceptable
Novelty	The submission contains novel contribution in key segments, which is a clear indication of application knowledge	The submission lacks novel contributions. There are some evidences of novelty, however, it is not significant	The submission does not contain novel contributions. However, there is an evidence of some effort	There is no novelty
Clarity	The written or graphical materials, and developed applications provide a clear picture of the concept, and highlights the clarity	The written or graphical materials, and developed applications do not show clear picture of the concept. There is room for improvement	The written or graphical materials, and developed applications fail to prove the clarity. Background knowledge is needed	Failed to prove the clarity. Need proper background knowledge to perform the tasks
Group Work	Evidence of group work, meeting logs, Coordination	Evidence of group work. However, missed meeting logs, room for improvement in Coordination	Missed meeting logs, failed to display group coordination	No group work done. Project is unacceptable

Initial Requirements

In this project, you need to build a database, and database management system (DBMS). Your team should explore data structure concepts for creating the database. In addition, your team should create a programming framework that can work as a DBMS application layer. Your database should handle multi-user (2 users) requests. The DBMS layer should provide a command-line or standard I/O based user interface (Graphical User Interface is not required), and perform various functionalities of DBMS.

Expected functionalities of 5408DB (version 1.0):

- Create, manage database users (2 users), passwords
- Accepts user input in standard SQL format
- Process the queries and converts those into instructions that can update/alter/configure the data structure which is used as database
- Creation of various dynamic logs such as,
    - **General Logs**: query execution time, state of the database (e.g. how many tables are there with number of records at a given time)
    - **Event Logs:** capture user queries, changes in database, concurrent transactions, crash reports, etc.
- Depending on the design - creation of Data dictionary, metadata, and lower limit/upper limit
- Option to create SQL Dump (only the table structure)
- The DBMS should follow ACID properties
- The DBMS should create simple ERD from existing database (data structure). The concept of ERD generation is identical to reverse engineering that is available on standard commercial DBMSs. However, the ERD does not have to be completely graphical. Information such as cardinality, entity names, relationships can be captured on text files

Initial Tasks:

- Meet your team (using Teams, Brightspace discussion area) and discuss the strategy
- Select a programming framework and related technologies
- Create a Data Structure that is suitable for your database
- Document your plan
    - – create flowchart highlighting the operations of the DBMS (**5408DB**)
    - Write the assumptions
    - Add your initial algorithms or pseudocodes
    - Write initial Test cases for performing the unit tests
- The database should handle integer, real numbers, and text data
- Your team needs to work on the feasibility study, and maintain the team meeting logs
- Short recorded video of the initial tasks