Due Date: Monday, Oct 09, 2023 (11:59PM)

Important Dates:

- **Phase I due Oct 09**
- Phase II due Nov 08
- Phase III due Dec 08
  - [*group submission, one per group*] Presentations Dec 08 (11:59PM)
  - [*group submission, one per group*] Complete Project Documentation
  - [*individual*] Self-Reflection Document (10 marks)
  - [*individual*] Individual Contribution Form for Group Project (5 marks)*
  - [*individual*] Evaluating Group Presentations (10 marks)** Dec 11 (11:59PM)

An Overview of the TCSS 445 Project

A major portion of your grade in TCSS445 consists of a team project. This project is meant to be a substantial independent effort for developing a database application that reflects the material studied in class. Students will apply the (technical) knowledge acquired in the course throughout this group project.

The deliverables for this project are divided into multiple phases. This document serves as **Phase I** of the project. Each phase reflects a subset of the list of the database topics covered in class.

Throughout the quarter, you will work on developing a working database application. The database applications reflects a typical real-world project on databases involving: (a) database design (conceptual schema), (b) defining a database (relational schema), (c) configuring and deploying a database on a DBMS (physical schema), (d) optimizing the database and (e) building a web-based user interface for interacting with the database, among others. Each week, you will learn new topics about databases through the lecture material and assignments. The lecture notes will help you gain the theoretical foundations of these topics whereas the assignments will help gain the practical experience for building the database application. For the web programming part, we plan to integrate the Google Cloud Platform (GCP) and backend/frontend technology (e.g., PHP or Node.js) in the course assignments, however, you may use any programming language and/or DBMS to develop your database application components. Here is an overview of the expectations of this course project (*more details will be provided for each phase*).

- **(Phase I)** Choose an application idea that requires the use of a database which is feasible and doable. At this stage, you may not know the scope of the database or how large the database would look like. Hence, Phase I is primarily concerned with proposing an application idea that requires the use of a database for storing and maintaining data.
- **(Phase II)** You will:
  - Create the relational model for your database including all non-trivial relational schemas
  - Create a sample data for your database
  - Create, execute and maintain non-trivial SQL statements required for your database
- **(Phase III)** You will:
  - Create a conceptual model for your database
  - Normalize (or proof that) your database design is in Boyce-Codd Normal Form (BCNF)
  - Create a front-end web interface that interacts with your database

- **(Project Presentations/Demonstrations and Final Reports)** At the end of the quarter, each group will demonstrate the database application (including a graphical user interface). This typically occurs at the end of the quarter. Each group will provide a presentation video that will be made accessible to all other groups (or students) for peer evaluation.

Phase I *(15 marks)*

Phase I is the first opportunity for team members to start meeting, introduce each other and learn about the skills-set of each team member. So far, you know that there is a course project that requires the use of databases in this project. Discuss ideas of interests among the group members and determine an application area that requires the use of a database. All team members may have great ideas, however, it is imperative that each member gives a chance to learn about other ideas from other team members. Then, collectively agree (or vote) on the best idea you believe would be suitable for the project.

Nearly all software applications today require the use of a database in the backend for storing and manipulating data. Whether it is a small local resturant keeping track of their menus and customer data or a government tracking patterns across an entire country, databases have become instrumental for data manipulation. There are few examples posted on the Canvas website from previous quarters that will help you identify relevant ideas.

This project will help you gain the skills from both the (a) backend and the (b) frontend of an application. What we mean by the backend is the applications, tools, services or programs required for handling backend tasks such as retrieving data, storing data, processing data, among others. What is meant by the frontend is building powerful user interfaces for allowing endusers to interact with the database such as drop down menus, form handling, among others. While discussing the idea of your database application, consider also how you wish your interface may look like. This might help you identify the elements you need to have in your database application.

As part of Phase I, you are required to submit a project proposal. The proposal serves as the initial step into the development of your database application. That is, you will identify the goals and motivation for building the database application. As part of the proposal, you can identify, for example, some of the initial requirements, planned activities and envisioned interfaces. As you may have learned in previous courses (e.g. TCSS 360), requirements elicitation is a critical part of the software development process (SDLC). Phase I allows you begin the preparation for developing the database application. Hence, the proposal should discuss a number of activities including, but not limited to, the objectives and goals, main requirements of the database application, the types of users who will use the application, what data you expect to store within the database, the importance or motivation for building your proposed database application, among other activities. While there is no specific theme for the database you can build, you may explore topics related to your current work/internship where you identify an area that would be improved through utilizing a database or exploring the the use of databases for solving data processing tasks, among many other ideas.

A sample list of topics is provided on page 5. However, groups are free to propose any idea of their own choice.

What should we include in this Phase I project proposal?

Write a project proposal consisting of 1-2 pages (10 pt font or larger, one column, 1 inch margins, single or double spaced) describing the problem that you plan to solve throughout your project. Your proposal should explicitly identify the following elements with appropriate section heading using a paragraph format. A template is provided on Canvas which you can easily follow to populate the necessary proposal element.

- Group Name (name should reflect the idea of your project) 1 marks
- Logo (should be appealing and well designed)* 1 marks
- An **overview** or the general description of the problem you are planning to solve 6 marks
- Does your idea **already exists**? How yours will be different? Who will use you idea? 3 marks
- What **data** you plan to store? What is the **planned functionality** of your applications? 3 marks
- What skill set team members have and how do you plan to distribute the workload? 1 marks

* You may wish to use online tools to create a logo for your project. Below are some helpful resources for creating free online logos:

- https://www.freelogodesign.org/
- https://www.canva.com/
- https://www.logomaker.com/

Tips for Making Successful Groups for TCSS 445 Project

Members of each group should communicate with other members as soon as possible. Below are some useful guidelines that will help you collaborate and communicate effectively on your group project.

- **Effective Communication**: Creating a forum for all team members to communicate and participate in the project is crucial for the success of the project. Team collaboration tools for task management, file sharing and document collaboration all enhance the productivity of the entire team.
  - Use **Google Docs** for sharing and collaborating on project deliverables
  - Use **Zoom** for online meetings and project-related discussions:
    - https://itconnect.uw.edu/connect/phones/conferencing/zoom-video-conferencing/
  - Use other collaboration apps that can make your team more productive such as Discord, Flock or Slack (there many other tools)
  - Meet on campus as a group to discuss the project
- **Team Effort:** Divide **Roles** and **Responsibilities**:
  - identify individual strengths for each member or experiences (e.g. programming languages, web technologies, etc.)
  - align roles and responsibilities with strengths and interests
- Availability **Schedule**: Create a time schedule for the availability of each member. You may wish to use a tool such as **Google Calendar** to identify each member's schedule.
- **Weekly Meeting**: Identify a suitable or best time for all members to meet and conduct a weekly meeting to discuss project plans/status. You may wish to use a tool such as **Google Calendar** to schedule events.
- Be **proactive** and start on creating the groundwork for project elements as early as possible.
- Identify and prioritize project **activities** that require completion. For each activity/task identify the following:
  - ***what***? what is the required activity?
  - ***who***? who will complete the activity?
  - ***when***? when the activity would be completed?
  - ***where***? where can members find the results of the activity (e.g. Google docs)?

- Choose a **group leader or coordinator** that can identify goals, organizing team initiatives, track progress, etc.
- **Using an existing dataset**: you may use an existing dataset as your data source for the project. You can also revise or customize the dataset for usage for your project.
- **Having trouble** working in group?
    - individual accountability is important when working in groups
    - equal participation: peer evaluations will be available at the end of the quarter
    - be considerate and respectful to other team members
    - mediate any concerns early: don't be afraid to talk to your instructor
        - provide regular updates or status reports
        - **do not wait and start early**: meet with the instructor to discuss the project

The project is a group-based activity that must be divided **evenly** and **fairly** among the group members. Each group member will have an opportunity to evaluate their partners at the end of the term. Such evaluations will reflect member's participation and contribution in the completion of the project and can affect student's final mark. This can also apply to any grades assigned for Phases I and II and III.

Thank you for your understanding and cooperation.

Please do not hesitate to send me an email if you have any questions, doubts or concerns.

Sample Application Areas/Project Ideas

The following is a list of potential application areas or project ideas. You are not required to choose from this list and you are encouraged to solve a problem of your own choosing. Utilizing or integrating Web APIs to enhance the features of your applications are strongly encouraged. The project ideas below only serve as suggestions of the areas that you can explore. A project team is encouraged to research the project ideas over the Web and examine any current database applications that might be similar.

- disaster preparedness
- early warning system
- telehealth & remote patient monitoring
- Radio Frequency Identification (RFID) Tracking
    - automotive
    - animal and livestock
    - manufacturing
    - medical and pharmaceutical
    - supply chain and Logistics
- Internet of Things (IoT)
    - smart home systems (e.g. sensor data collection and processing)
    - autonomous cars (e.g. artificial intelligence, machine learning, data processing, etc.)
- Other examples:
    - Bookstore
    - Car Rental Reservation
    - Restaurants Finder
    - Railway System
    - Online Planner
    - (Mobile Device) Application Store
    - Auto Insurance
    - Electronic Prescription EHR
    - Inventory Control
    - Art Gallery
    - Online Games
    - Blood Donation
    - Help Desk and Ticket Management
    - Solid Waste Management
    - Library Management
    - Payroll Management
    - Restaurant Management
    - Asset Management
    - Payroll Management
    - Hotel Management
    - Job Management
    - Real Estate Management