# BACKGROUND INFORMATION

The full details are included in the attached case synopsis file.

# PROJECT DESCRIPTION

Your task in this term project is to design and deploy a database that supports the objectives described in the attached case study. The case study provides a relatively detailed description of these. Consider the materials in the case study as a set of requirements you collected. These requirements must be translated into a logical database design (represented with an ER diagram) and subsequently into a physical database design deployed on our instance of MS SQL Server.

It is critical to remember that we are operating within specific time constraints tied to the academic calendar in this project. Hence, you may have to consider some trade-offs when designing your database. From this perspective, you will need to control the design’s complexity. You are welcome to extend your design further but keep in mind that it needs to be finalized within the term project’s time constraints.

# DELIVERABLES

To explicate the deliverables for your term project (and to facilitate the development), it is divided into milestones described below (refer to the course schedule in D2L to check the due dates for each milestone). Also, note that you are to follow the development lifecycle for database systems described in Chapter 1 of our textbook.

## Milestone 1

* Description of the business problem the proposed database should address, along with the expected benefits and projected risks associated with the system’s development.
* ER Diagram with all the requirements for the diagram written out.

*NOTE: People often get carried away when creating ER diagrams and developing sophisticated designs. Remember that the more complex your design is, the more difficult it will be to implement it at the database level. This does not mean you are to omit or eliminate any identified entities. The challenge is to carefully analyze the relationships between the entities and straightforwardly model them.*

### Milestone 1 Grading Rubric

| **Criteria (weight)** | **Exemplary (5)** | **Proficient (3)** | **Needs Improvement (1)** |
| --- | --- | --- | --- |
| **Problem Statement (x1)** | The business problem is correctly identified. Risks and benefits identified and discussed. | The problem is correctly identified. Risks and benefits are listed but not fully explained. | The problem is misidentified, no discussion of risks and benefits. |
| **Professionalism (x1)** | The diagram presents a professional appearance. It could be shared with a “real-world” customer without changes. | The diagram largely presents a professional tone. It could be shared with a “real-world” customer with minor revisions. | The diagram is unprofessional. Before sharing the document with a “real-world” customer, significant revisions would be necessary. |
| **Entity Sets (x2)** | The diagram captures all entity sets necessary for a database that meets the initial problem statement. | The diagram captures most entity sets necessary for a database that meet the initial problem statement. | The diagram captures few or none of the entity sets necessary for a database that meets the initial problem statement. |
| **Attributes and Keys (x1)** | The diagram captures all attributes and primary keys necessary for a database that satisfies the initial problem statement. | The diagram captures most attributes and primary keys necessary for a database that satisfies the initial problem statement. | The diagram captures none or a few of the attributes and primary keys necessary for a database that meets the initial problem statement. |
| **Relationships (x2)** | The diagram captures all relationships necessary for a database that meets the initial problem statement. | The diagram captures most relationships necessary for a database that meets the initial problem statement. | The diagram captures none or a few of the relationships necessary for a database that meet the initial problem statement. |
| **Constraints (x1)** | The diagram captures all cardinality and participation constraints necessary for a database that meets the initial problem statement. | The diagram captures most of the cardinality and participation constraints necessary for a database that meets the initial problem statement. | The diagram captures none or only a few of the cardinality and participation constraints necessary for a database that meets the initial problem statement. |
| **Complexity (x1)** | The diagram does not include more entities and relationships than the minimum number necessary to represent the database requirements. Regular entities and relationships are used whenever possible. | The diagram includes an excessive or insufficient number of entities and relationships needed to reflect the database requirements. Minor modifications may be required to bring it to the expected state. | The diagram includes an excessive or insufficient number of entities and relationships needed to reflect the database requirements. It is impossible to bring it to a form that would satisfy the project’s requirements without major modifications. |

## Milestone 2

* + Logical database model (i.e., a relational schema directly created by transforming your ER diagram in ERDPlus) normalized to the third normal form.
  + List of ALL functional dependencies.
  + Physical tables created in your SQL Server database. Create a separate schema to hold the tables first.
  + Tables populated with sample data. To simplify this step, you are welcome to use one of the free data generators available on the web. For instance, <https://www.generatedata.com/> is an open-source solution that is quite convenient and allows you to generate SQL statements that you can use to populate your tables.
  + You must create a database backup and attach it with your submission. Consult the attached document titled “How to Create Database Backup” for details on this task.
  + **IMPORTANT: Your Milestone 2 needs to reflect any changes requested/suggested by your instructor in the feedback you received with your grade for Milestone 1. It would be best if you did not start working on Milestone 2 items before you modified your ER diagram to reflect Milestone 1 feedback and submitted the modifications for approval to your instructor.**

### Milestone 2 Grading Rubric

| **Criteria (weight)** | **Exemplary (5)** | **Proficient (3)** | **Needs Improvement (1)** |
| --- | --- | --- | --- |
| **Relational Schema (x1)** | All entities and relationships are correctly mapped to the schema. | Most entities and relationships are correctly mapped to the schema. | Few entities and relationships are correctly mapped to the schema. |
| **Database Diagram (x1)** | All tables, primary keys, foreign keys, and relationships included in the diagram | Most tables, primary keys, foreign keys, and relationships included in the diagram | Some tables, primary keys, foreign keys, and relationships are included in the diagram. |
| **Functional Dependencies (x1)** | All relations are in 3NF. | Most relations are in 3NF. Minor modifications are needed. | Most relations are not in 3NF. Significant changes are required. |
| **Tables & Attributes (x2)** | All tables are created on the server, with columns reflecting all attributes and correct data types assigned to them. | Most tables are created on the server. Most columns are created with the correct data types assigned. | The majority of table attributes and data types are incorrectly specified. |
| **Primary Keys (x1)** | Appropriate PK defined. | Less than ideal PK defined. | Inappropriate or no PK defined. |
| **Foreign Keys (x1)** | All foreign keys are created. No modifications are necessary. | Most foreign keys are created, and the missing ones can be implemented with minor changes. | Most foreign keys are missing and are impossible to implement due to incorrect data types. |
| **Tables Populated with Data (x1)** | All tables are populated with data | Most tables are populated with data | Some tables are populated with data |

## Final Project Submission

* + Milestone 1
  + Milestone 2
  + Data dictionary for all tables created in Milestone 2.
  + Dimensional data warehouse model with at least one fact table and at least three dimension tables based on the relational design from Milestone 2.
  + Data warehouse model implemented in SQL Server (i.e., tables created, relationships established) with DW diagram created. NOTE that you will use the same database space for your relational database design. This would never be true in real life – DW would be deployed as a separate database. We are just reusing the space provided in our SQL Server instance for each user for class purposes. Use a separate schema to hold the data warehouse tables.
  + A discussion of potential ethical and privacy issues that could result from collecting data stored in the database you designed.
  + EXTRA CREDIT:

Populate DW tables with data from your relational database. This will require using nested SQL statements (i.e., build a SELECT statement, the output of which can then be used as values for an INSERT statement to populate the respective tables of your DW design). This may give you some taste of what goes on in the ETL process, though we will only devote a little time to them.

### Milestone 2 Grading Rubric

| **Criteria (pts)** | **Exemplary (5)** | **Proficient (3)** | **Needs Improvement (1)** |
| --- | --- | --- | --- |
| **Milestone 1** | All entities and relationships are correctly mapped to the schema. | Most entities and relationships are correctly mapped to the schema. | Few entities and relationships are correctly mapped to the schema. |
| **Milestone 2** | All relations are in 3NF. | Most relations are in 3NF. Minor modifications are needed. | Most relations are not in 3NF. Significant changes are required. |
| **Data Dictionary** | All tables are created on the server, with columns reflecting all attributes and correct data types assigned to them. | Most tables are created on the server. Most columns are created with the correct data types assigned. | The majority of table attributes and data types are incorrectly specified. |
| **Data Warehouse Diagram** | All tables, primary keys, foreign keys, and relationships included in the diagram | Most tables, primary keys, foreign keys, and relationships included in the diagram | Some tables, primary keys, foreign keys, and relationships are included in the diagram. |
| **Data Warehouse Tables** | All tables, PKs, and FKs are created. Proper data types are used. Proper table naming conventions help identify fact and dimension tables. | Most tables, PKs, and FKs are created. Proper data types are used. The table naming convention is not consistent. | Some tables, PKs, and FKs are created. Proper data types are used. The table naming convention is not followed. |
| **Privacy** | Identifies all privacy issues associated with the database’s implementation. Ethical issues are discussed. | Privacy and ethical issues are identified. The discussion provided is sketchy. | Privacy and ethical issues are identified but not explained. |

# Submission Guidelines (IMPORTANT):

For every milestone and final submission, you are to submit an MS Word document containing all figures, tables, and their descriptions and explanations. Use 12-point font with double line spacing. At each milestone, the report should document your work and include a title page, table of contents, list of figures and tables, etc. You will add more content to your report as you progress through each milestone. You must follow the above structure, as I will deduct points for not meeting the formatting requirements. Below are the essential instructions on how to format your documentation:

* + - 1. Margins – all margins = one inch (1")
      2. Format and Page Numbers: Every page except the title page contains a page number, and page numbers must not be placed in the margins. The text must be double-spaced. (See the appropriate pagination guidelines below for preliminary pages, text, and references.)
      3. Preliminary pages:
         1. Title Page: Include your name and the title of your report. Include the date of your final submission.
         2. Abstract: 350 words or less, single-spaced on one page.
         3. Table of Contents
         4. List of Tables
         5. List of Figures
      4. Text – Use Arabic numerals, center bottom OR upper right. Double-space your text; lengthy quotations, abstracts, footnotes, tables, and bibliographies may be single-spaced. Use a readable font size of 12 points.
      5. References – if necessary, use either of the following:
         1. APA
         2. MLA