SDSU | San Diego State University

MIS686: Term Project

Enterprise Database Management

San Diego State University

Introduction

The purpose of the term project is for students to gain a thorough understanding of the materials covered in the course and to apply that knowledge to real-world settings. Students will be responsible for an end-to-end design, beginning with the selection of a specific application and developing the rest of the project from there. Throughout the semester, students will work collaboratively on one practical team project. Groups will be made up of four students, and each group will determine the project's objective with the instructor's agreement. This project involves designing and implementing a real-world database utilizing techniques acquired in class.

The term project consists of five main steps: (1) Topic/Domain Selection, (2) Conceptual Data Modeling and Database Design, (3) Database Implementation, (4) Deploying the Database, and (5) Developing Analytical Questions and Creating a Dashboard. Each step is designed to build upon the previous one, providing a structured pathway from conceptualization to deployment and data analysis, ensuring a comprehensive learning experience.

When selecting a topic or completing this project, consider how it will enhance your resume and demonstrate your skills during job interviews. Choose a project that reflects an industry or field of interest, and think about how the final product can be used to showcase your technical skills, problem-solving abilities, and knowledge in data-driven solutions. This way, your term project can be more than just an academic requirement—it can be a valuable portfolio piece that highlights your readiness for real-world challenges.

Project Outline

Each group will design and implement a comprehensive database management solution that encompasses end-to-end project development, beginning with a topic selection and ending with a fully functional database and analytical dashboard.

◆ **Notice:**

- All group members must participate in all stages of the project. All members will be assessed at the end and need to be able to answer any related questions.

- Each group must present their project at the end of the semester to the instructor (not the whole class).

- The project deliverables (report and produced codes, files, etc.) should be submitted to CANVAS by the deadline.

- Students peer assess their group members and rate their contribution. For example, if your contribution is 80% based on other group members you will get $(0.8 \times TermProjectGroupGrade)$. Therefore, if you get full group grade (300 pts) but your contribution is 80% you will get 240 pts.

This project is divided into the following steps:

1 STEP 1: Topic/Domain Selection

Task: Select a topic or business domain. It could be a realistic business scenario, a startup idea, or even a fun concept meant purely for learning.

Deliverables:

- A detailed explanation of the selected topic.

- List of **business rules** (key principles governing the data structure and operations) for the chosen domain.

- **Use Cases**: Identify possible industries or areas where the system might be used.

2 Step 2: Conceptual Data Modeling and Database Design

Task: Create an ERD (Entity-Relationship Diagram) to represent entities, relationships, cardinalities, supertypes, subtypes, etc. This design can either be built from scratch or use a universal data model as a starting point.

Deliverables:

- Detailed **ERD**, incorporating supertypes/subtypes, cardinalities, associative entities, and attributes.

- **Relational Model Transformation**: Transform the ER/EER into a relational model. Be sure to include primary keys, foreign keys, and entity relationships.

ⓘ **Case Study:**

For reference, please check Case Study chapter (Chapter 12) of your textbook which provides a case study of a DMV system in California with a step-by-step guide.

◆ **Notice:** The ERD should be sufficiently complex to accurately represent a real-world scenario, including at least 10 entities with diverse relationships and attributes.

3 Step 3: Database Implementation

Task: Implement the logical design using SQL. This includes creating tables, views, indexes, and other essential database components.

Deliverables:

- **DDL SQL Statements**: Use DDL (Data Definition Language) statements to create entities (tables), relationships, and attributes.

- **Dummy Data Generation**: Generate dummy/fake data using language models such as ChatGPT for testing and populate the tables.

4 Step 4: Deploy the Database

Task: Create and deploy the database on **AWS** (Amazon Web Services) using **RDS** or another cloud database service (e.g., free tier would be enough).

Deliverables:

- **Database Deployment**: Implement the physical design in AWS.

- **User Access Management**: Assign different access rights to users based on roles (e.g., Read-Only, Data Entry, Admin).

- **Indexes, Views, Triggers, and Stored Procedures**: Develop at least one **index**, one **view**, one **trigger**, and one **stored procedure** based on the requirements of the selected topic.

    - Example indexes: Index on customer ID for faster lookup.
    - Example views: Showing top-selling products or customer information.
    - Example trigger: Trigger to log any data updates in critical tables.
    - Example stored procedure: Procedure for processing a customer's order.

- Create at least two user levels with different permissions.

5 Step 5: Analytical Questions and Dashboard Creation

Task: Develop and answer both simple and complex analytical questions. Use these queries to create a dashboard.

Deliverables:

- **Analytical Questions**: A list of at least 8 analytical questions that provide meaningful insights into the data (e.g., top-selling products, average order value, customer segmentation).

- **Python-SQL Dashboard**: Create a **dashboard using Python** and SQL. You should use the developed SQL codes within Python code to execute queries, and use Python for creating charts and dashboards. A template of code is provided, which you can use as a starting point and edit accordingly. The dashboard should visualize critical insights using charts and tables based on the analytical questions. Students can use Python libraries like **Matplotlib**, **Pandas**, or **Plotly** to build this. Feel free to use any other libraries if you have proficiency in Python. You also have the freedom to use any other programming languages, but we do not provide any template code for that.

◆ **Notice:** Step-by-step instruction for this step will be updated and posted on CANVAS.

Final Presentation and Deliverables

Project Presentation: Each group must present their project to the instructor. Each member will be evaluated on their understanding of all parts of the project.

Final Report: Submit the final report, which includes: (You don't need to spend too much time explaining. Your report is mainly the documentation of your work.)

- **ERD and Relational Models**
- **SQL Code (DDL, DML, views, triggers, stored procedures)**
- **Database deployment documentation**
- **Dashboard with explanations for the analytical insights**

Peer Evaluation: Group members will evaluate each other's contributions to ensure fairness in grading.

Conclusion

This project encourages students to work through the entire database design process, from initial conceptualization to implementation, testing, deployment, and analytics, thereby providing a complete hands-on experience with real-world database management scenarios.

APPENDIX: Additional Sample Topics

Below is a list of sample topics (an additional set of sample topics is provided at the end of this document):

ℹ **Example:**

- **Property Management System Database Project Idea:** A property management system that helps people with the right property is the need of the hour. A property management system needs a database that has relative properties that simplifies addition and searching. One can make use of related keywords like address or street no. In order to locate a property hence it is one of those unique ideas with huge potential. Any student undertaking this project as the final project will be able to fetch good marks.

- **Water Supply Management System Database Project Idea:** Managing data for every connection manually is impossible. A well-developed system with an eloquently integrated database will do wonders for people. Along with people, the supplier will also be able to enjoy hassle-free business management. This is one database project that solves the most difficult problem of the modern world and will help institutions save millions of Dollars.

- **Library book management database:** The Issue and Return of books at a library is the most difficult task to manage. An automated system with a powerful database will make things easier for an institution as well as for users. Students will be able to return books through varied kiosks and will be able to save themselves from the applied fines.

- **Hostel seat booking system database:** Universities with thousands of students can rely on a database that simplifies management procedures. One can always use a related database for ensuring that no same room is allotted to one or more kids. This project is the need of the hour and will solve really important issues.

- **Generation System Database:** Governments can use a similar platform for managing records better. This one platform will allow governments to keep a tab on the growing population. This unique database project can also be used to identify people from varied creed. Such projects are going to be really beneficial to government offices.

- **Club Membership Database System:** A database is required everywhere more than one person is involved. It is probably the most unique and simple database project students can undertake. This project will help students fetch good marks.

- **Flower Bouquet Management System Database:** A unique and simple database that allows flower merchants to manage their business really well. It is true that simple database project ideas can put the growth of businesses on automatic mode. Entrepreneurs can enjoy such unique facilities for easier business development. Hence there lies huge potential in this final year database project.

- **Insurance Management System Database:** A simple system with a powerful database that allows insurance merchants to simplify their business. One such database will make money dispense easier and more fun. Enterprises can depend on such unique database project ideas and can save millions of dollars.

- **I-card generation system database:** Universities and offices yet again can use this simple system with a strong database for setting things straight. A well-developed database will leverage enterprises with the power to pass on messages with just one click.

- **Certificate Management System Database:** Not just the government, private institutions can also use this system for managing data better. Keeping a record of all your employees in a sorted way will help the enterprises move in the right direction.

- **Tax Calculation System Database:** Be it for an enterprise for government usage. This tax calculation system database has the power to do amazing things. It is one of the most ambitious oracle database project ideas for the final year. One can surely impress faculty with this as their final year project.

- **Stadium seat booking system:** A database that avoids allocation of one seat to one or more people is surely the need of the hour. A smartly developed database for the stadium seat management system will prevent errors. One such database will make things smoother.

- **Social Networking database:** A very complex and related database is required for social networking sites. One needs to be really smart while creating one. One of the most difficult oracle database project ideas to work upon.

- Hotel Management System Databass

- Course selection system database

- Fruit selling management system database

- Token booking management system database

- Student housing system database

- Service request system database

- Home renting system database

- Marriage Hall booking system database

- Complaint management system database

- Event management system database

- Luggage import export system database
- University health care database
- Learning management system
- Restaurant Order system database
- Restaurant management system database
- Employee referral system database
- Employee Performance review system database
- Employee vacation system database
- Time management system database
- Document Management System database
- Employee track and report system database
- Task management database
- Employee attendance system database
- Library management system database
- Online voting system database
- Online bookstore database
- Online job portal database
- Online Art Gallery Database
- Airline reservation system database
- Video streaming database
- Cinema booking system Project