CSCI3287 Database Systems

Homework Four – Case Study

Overview

This project is worth 150 points (out of 1000) toward your final grade. It is due on Thursday, May 1 at 11:59 p.m. As it is the end of the semester, no late work can be accepted. Your submission should be a document saved and submitted as a PDF file via the link found in the assignment section of the "Week 15" in Canvas.

This project will give you hands-on practice in designing, creating, loading and using database.

You may implement your design using the DBMS of your choice – either MySQL, MongoDB, or Cassandra (as covered in class.) If you wish to use another DBMS (either relational or NoSQL), you MUST obtain ***written*** approval from the professor to use an alternative DBMS (such as PostgreSQL, Amazon Dynamo, Redis, Elastisearch, etc.)

You may use a "pair programming" approach on this assignment. When you turn in the assignment, the document must contain the names of all students who worked on the project together. Each student must turn in a copy of the team's final document. You may create a student team of TWO or THREE students – no more than three.

Objectives

1. Familiarize yourself with an unfamiliar company via the Case Study
2. Gain an understanding of the unfamiliar company's data as presented in the Case Study
3. Determine the precise SCOPE of your proposed solution
4. Design a database to meet the needs of the client company
5. Create scripts (appropriate for the DBMS you have chosen) and then create the database you have designed and build the database
6. Create test data appropriate for the Case Study, and insert the data into the database you have created
7. Run some queries against your database

Deliverables

1. A document or drawing depicting your database design using the information in the case study as your input. Your design should include:

    - All entities (a person, place, thing or event about which you are keeping data) with proper keys defined

- All attributes, by entity, with data type, length, and constraints defined as appropriate
- If your design is relational, your database design (Data Model or ERD) must show all relationships between tables showing captions (1-way is OK), and proper optionality and cardinality.
- If your design is NOT relational, a drawing will suffice. You should show how the entities in your database are related to each other.

2. Text files or screenshots of the scripts/commands you used to create and populate your database
3. Documentation (screen shots) demonstrating the physical implementation of your database that matches your design.
4. The query code and the output of the queries against your database as described in detail requirement # 9 below.

Case Study Scenarios

For this assignment, you may CHOOSE to use ONE of TWO different case studies:

1. Eden Landscaping (in your Eden Landscaping Case Study document)
2. MyMobile telecom (contained in this document)

Eden Landscaping

You must study the Eden Landscaping Case Study. As you read the Case Study, you must pay close attention to every reference to the data that is collected and used by Eden Landscaping.

For this assignment, you must play the role of a consultant who has been hired by a client (Eden Landscaping) to design and create a database for them.

The **SCOPE** of this assignment includes your database design for ONLY the ***inventory*** kept by Eden for their **LIVE PLANT STOCK** and **LANDSCAPING MATERIALS**.

Your scope for this project excludes:

The scope of this assignment specifically **EXCLUDES** the tracking of any items kept in inventory for the purpose of retail sales through Eden's **retail store** (like shovels, rakes, seeds, bags of fertilizer, hoses, etc.)

The scope of the assignment **EXCLUDES** any inventory of tools and equipment used by Eden's crews as they go out to customers' locations and do landscaping jobs (like the backhoe, wheelbarrows, chain saws, shovels, etc.)

Your scope for this project ***includes***:

- **Plants** and **landscaping materials** that are sold to customers who come to the store, make a purchase, and pick up and carry out their purchased items

- Plants and landscaping materials that are sold to customers who come to the store, make a purchase, and have Eden deliver their purchased items to their home

- Plants and landscaping materials that are sold to customers as part of a landscaping service contract ("job"), where Eden loads up a truck and sends a crew to the customer's home to do a landscaping project

The case study includes in-depth descriptions of the business processes that center around the keeping of inventory, including business activities that **ADD** items into inventory (such as Orders and receiving Shipments) and the business activities that **SUBTRACT** items from inventory (such as sales, landscaping jobs, and deliveries of purchased items to customers.)

Your database design must support the following business processes at Eden

- The ordering of plants and landscaping materials from suppliers
- Taking physical inventory to see what's in stock
- Receiving incoming shipments of plants and landscaping materials from suppliers
- Fulfilling customer orders and purchases, including landscaping jobs

MyMobile – a Telecom Company

Background:

MyMobile provides mobile phone services to customers through various plans, such as prepaid, postpaid, and data-only plans. The company has a large customer base and provides services across different regions. Customers can choose from different plans and can make payments using various payment methods, including credit cards and electronic wallets. Customers may also choose to cancel their service at any time. The company also handles call traffic details for each customer.

Objectives

The goals of designing a database for the telecom company are:

To store and manage customer information, plan information, and transaction information efficiently.
To track plan activations, plan renewals, plan changes, and customer cancellations.
To provide a system that is scalable and flexible to accommodate changes in the business.
To track call traffic details made by the customers, including call ID, call date, call duration, call type (local, national, international), and call cost.

Requirements:

Based on the objectives, the following requirements need to be considered while designing the MyMobile database:

Customer Information: The database must store customer information, including name, address, phone number, email address, and date of birth.

Plan Information: The database must store plan information, including plan type, plan name, plan duration, plan cost, and plan features.

Transactions: The database must store transaction information, including plan activations, plan renewals, plan changes, payment information, and customer cancellations.

Call Traffic Details: The database must store call traffic details for each customer, including call duration, call type, call date, and call cost.

Database Design:

Based on the requirements, the following database design is proposed:

1. Customer Entity:
The customer table will store information about each customer, including customer ID, name, address, phone number, email address, and date of birth.

2. Plan Entity:
The plan table will store information about each plan, including plan ID, plan type, plan name, plan duration, plan cost, and plan features.

3. Transaction Entity:
The transaction table will store information about each transaction, including transaction ID, transaction type (plan activation, plan renewal, plan change, payment, or cancellation), transaction date, transaction amount, customer ID, and plan ID.

4. Call Traffic Entity:
The call traffic table will store information about each call made by the customers, including call ID, call date, call duration, call type (local, national, international), and call cost.

5. Customer_Plan Entity:
The customer_plan table will store information about the plans chosen by each customer. It will have two columns, customer ID and plan ID, to establish a many-to-many relationship between the customer and plan tables.

6. Cancellation Entity:
The cancellation table will store information about each customer cancellation, including cancellation ID, cancellation date, customer ID, and cancellation reason.

Step-By-Step Instructions

1. Read the overview of the business case you have chosen

2. As you read the case study, document the ENTITIES and ATTRIBUTES you observe as you learn about how the organization operates. (Suggestion: use a spreadsheet like HW # 1.)

3. As you read the case study, you must consider each ***business process*** that affects the in-scope business process (Inventory for Eden, *Customer Plans and Transactions* for MyMobile.)

4. As you finish identifying entities and attributes, then you can begin to design the Database that will become the foundation for application system that your consulting firm will build for the client in the next phase of this project.

5. Draw a design that includes all entities and attributes and the relationships among them. If designing a relational solution, all entities/attributes should be in third normal form.

6. Walk through the design and compare it to each business process to ensure that it contains all entities and attributes necessary to support the business processes described for your client.

7. Once the database design is complete, run necessary scripts to create the database.

8. Populate each entity in your database with several rows of test data of your own creation. Capture and turn in text files containing the scripts used to populate the database:

For Eden Landscaping

- Add some Plants in inventory (at least 8)
- Add some Landscaping Materials in inventory (at least 6)
- Add some Customers (at least 4)
- Add some Suppliers (at least 2)
- Add some Retail Sales Tickets and Details (at least 4 tickets with 4 items each)

For MyMobile

- Add some Customers (at least 4)

- Add some Plans (at least 4)
- Add some Transactions (several for each customer)
- Add some Calls (several for each customer)
- Add one cancellation of a plan for a customer

9. Create and run queries to show the following:

For Eden Landscaping

- A list of Customers showing name, address, city, state, zip, phone1 and phone2
- A list of plants in inventory showing category (trees, shrubs, perennials), SKU, plant description, and size (where known.) Be sure to include the quantity currently in inventory.
- A list of materials in inventory showing category (gravel, mulch, stone, etc.), SKU, and description. Be sure to include the quantity currently in inventory based on the Unit of Measure for each material. Gravel, mulch, topsoil and sand are measured in cubic yards. Stone and pavers are by pallet. Timbers are per each, sold by size.

For MyMobile

- Create a Customer Summary showing all plans for each customer, including any cancellations
- Create a Customer Call Log
- Create a Plan Revenue report showing revenue for each plan

Submission

Use the submission link in the **HOMEWORK 4** section of the Week 15 module in Canvas.

Your results for this project assignment can be captured in a document (such as a .txt file, MS Word or similar tool.) Please then save your final deliverable document as a **PDF** for submission. The final PDF deliverable document you submit for this project must consist of four sections:

- The first section is a picture of your complete database design
- The second section is text files that contain the scripts you used to create the database
- The third section is text containing the scripts you used to populate the data in your database.
- The fourth section contains your query code and the output of the queries against your database.