Database Management Systems

Final Report

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1. Introduction

1.1 Brief Introduction

The business we decided to get into is the clothing sector.

With the advent of e-commerce, millions of people are choosing to buy clothes online (a trend that has been growing since the outbreak of the Covid-19 pandemic), without knowing whether the size is right or whether the product they buy actually reflects their wishes.

1.2 Project

Our project involves creating a website for three physical clothing stores.

The main difference from the online stores we are used to seeing nowadays is that the customer can choose and book online the clothes he/she wants to try on or buy, and then go to the corresponding physical shop, try on the chosen clothes and eventually buy them.

In order to make a preliminary analysis of the data, we are going to create a database that will allow us to store and process the historical sales data of the fashion industry in a better way.

1.3 Problems we want to solve

- The pandemic has led to a decline in sales in the fashion industry: according to a study by McKinsey & Company ("The state of fashion 2021"), the decline of global fashion companies is about 90% (compared to a 4% increase in 2019), a consequence of reduced sales, changing consumer behaviour and disruptions in supply chains.
- Unable to track consumer preferences: nowaday, the fashion industry is one of the industries that is most moving towards an all-encompassing digital transformation. However, in the majority of situations, although clothes are sold to customers, online websites do not track customer preferences. An appropriate digital tool can

help bridge the gap between customer expectations and the service and experience they receive.

- No data analysis about our customers and stores: We do not have a data analysis that allows us to understand our customers, their preferences and stores in a deeper way.

1.4 Competitive advantages

- Service differentiation: Choosing clothes online, then trying and buying the selected goods in the physical store is a service offered by few companies in the clothing sector.
- Better tracking of consumer preferences: Such a system would allow us to learn more about our customers, providing them with an innovative and satisfying shopping experience.

Issue → Bank transfers, Paypal, credit or debit cards: The convenience of easily completing online payments in a few seconds may be the main obstacle for our system.

2. Requirement Analysis

2.1 Statement of project scope

Why → Buying clothes online does not always meet customer's requirements and wishes, because they might receive the final products which are not their sizes or not their expectation.

Key Objectives → Giving the customer what they really want; ensuring the availability of the desired sizes when customers go to the physical store; improving the customer experience continuously; keeping track of their preferences in order to make the service as complete as possible.

Target → The products offered on our system have a slightly above average cost, qualifying as expensive products. A specific target group could be represented by economically independent women between the ages of 30 to 40.

Major deliverables →

User point of view: A platform that allows customers to register their account, choose the products they want to buy or try, order them and then go to the preferred store to complete their purchase process.

Manager point of view: Ensuring an efficient and innovative service; keeping track of information of individual consumer preferences.

Deadline → 11:59:59 pm on June 30, 2021

2.2 Need Analysis

Our development process involves the collection of data through interviews. We interviewed our group member's father who operates a clothes company. He said his company is facing transformation because of the growth of e-commerce. He wants a customized system to have a market segmentation between their high-end products and others.

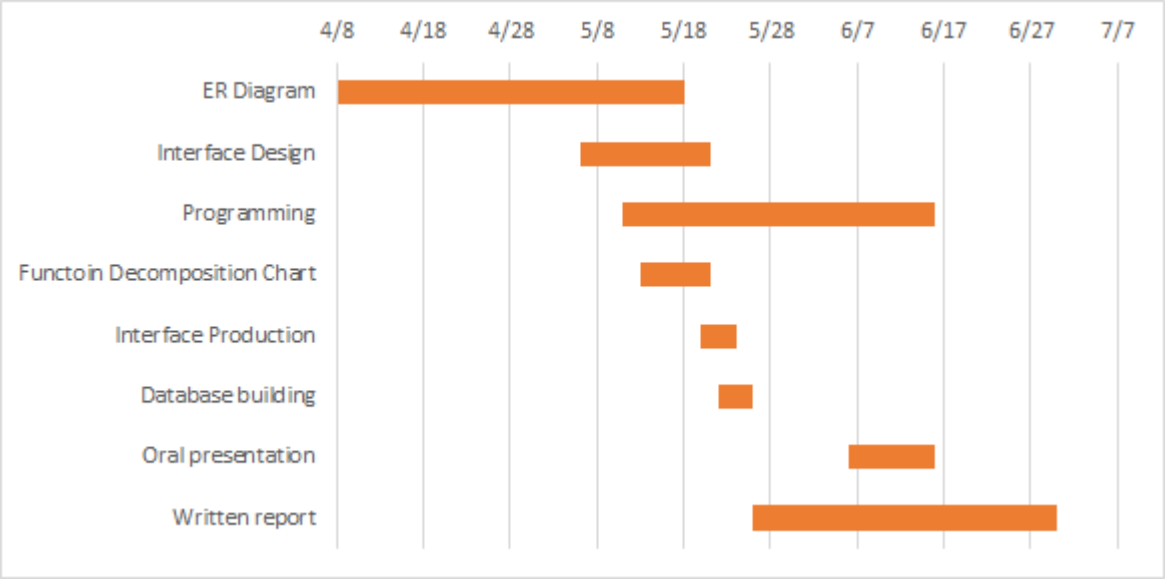
2.3 Economic feasibility analysis

Actually, the cost of developing a management-type software very similar to the one we designed is variable.

A possible price range could be identified in the following figures: a basic software could cost around 500-600€ per module. On the other hand, it can easily reach 5000€ and more. It depends very much on factors such as the size of the company or the fulfillment of different needs.
In addition, there are the costs of maintaining the software itself, such as preventive, corrective or emergency maintenance.
The average cost of maintaining such software could be around 20% of the initial development cost.

Regarding income, riding the unstoppable wave generated by e-commerce in the world in general, but especially in relation to the clothing sector, we foresee very positive results. For example, global digital commerce is expected to increase by 58% in 2021, up from 17% last year. In particular, clothing items with a high average price have increased by more than 90% globally.
The aim is to join this context of virtuous growth.

2.4 Gantt Chart



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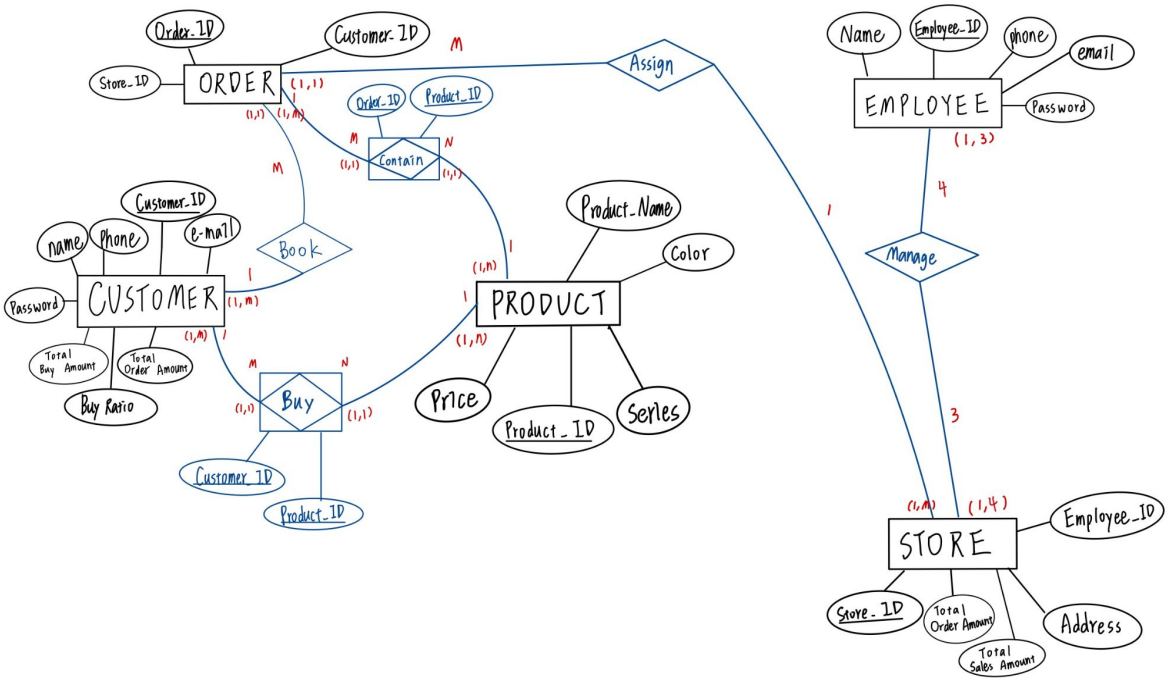
3. Logical Design of the Business Transaction

3.1 Conceptual Schema Design



1. EMPLOYEE table has five attributes: employee_ID, name, phone, email, password and the primary key is employee_ID.
2. CUSTOMER table has eight attributes including customer_ID, email, phone, name, password, total_buy_amount, total_order_amount, buy_ratio and the primary key is customer_ID. Total_buy_amount records how many clothes a customer bought in the store, total_order_amount records how many clothes a customer ordered in the system, and buy_ratio represents total_buy_amount divided by total_order_amount.
3. PRODUCT table has five attributes including product_ID, product_name, color, series, price and the primary key is product_ID.
4. STORE table has five attributes including the primary key store_ID, employee_ID, address, total_order_amount and total_sales_amount. Total_order_amount records how many clothes are ordered in the system and assigned to the store.Total_sales_amount records how many clothes were sold in the store.
5. ORDER table has three attributes including order_ID, customer_ID, store_ID and the primary key is order_ID.

6. BUY table has two attributes including customer_ID, product_ID and the primary key is customer_ID and product_ID.
7. CONTAIN table has two attributes including product_ID, order_ID and the primary key is product_ID and order_ID.

Constrains

- Each employee may manage at least one store but at most three stores, and each store should be managed by at least one but at most four employees.
- Each customer may book many orders, but each order should be booked by only one customer.
- Each customer may buy multiple products.
- Each order should contain at least one product.
- Each order should be assigned to only one store, but each store may have many orders.

3.2 Interaction with the Database

In the transactions, we identify the entities as read or updated as below:

• Read: Employee, Product, Store

⟶Employee, Product, and Store three entities are fixed data which are already set up at first, and they will not change.

• Updated: Customer, Order

⟶When customers register in our system, the Customer database will be updated. In addition, when customers send an order, the Order database will also be updated.

3.3 Constraints and functionality

1. Consumers need to be mentioned about the repeatability of the registered account while they are trying to create a new account.
2. Make sure the amount of the order is correct, that is to say using the proper update on the order_id in the order table (auto_increment property did not consider at the time we were building up the code)
3. The related actions should be accomplished when customers press the checking button in the CheckingCart page.
4. After choosing the store to try on the ordered clothes, the information about that customer's choice should be included in the related table.
5. Immagine paying scenario for the customer, the clerk enters the product's id for the establishment of the product sales. Second, the clerk uses this product_id to see the customer_id of the buyer. With product_id and customer_id, the clerk finalizes the buying procedures for Gerbar Clothing.

3.4 Conversion to a Relational Model

The relations below result from mapping the entity and relationship shown in section 3.1.

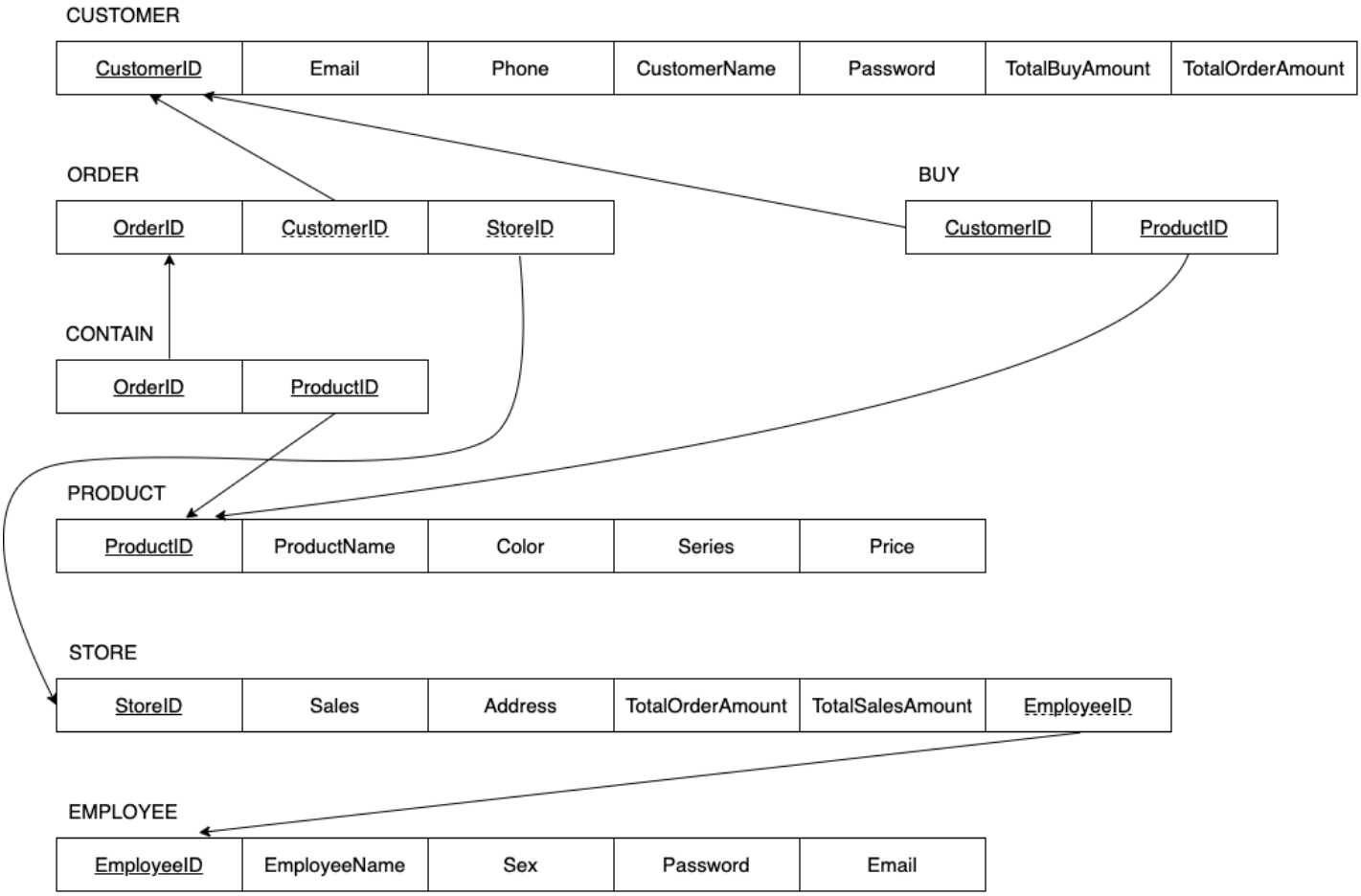
First, the primary key attributes CustomerID and StoreID become foreign keys in ORDER. Since that each customer may book many orders, but each order should be booked by only one customer. And also, each order should be assigned to only one store, but each store may have many orders.

Second, the primary key attribute EmployeeID becomes foreign key in STORE, as each employee may manage at least one store but at most three stores, and each store should be managed by at least one but at most four employees.

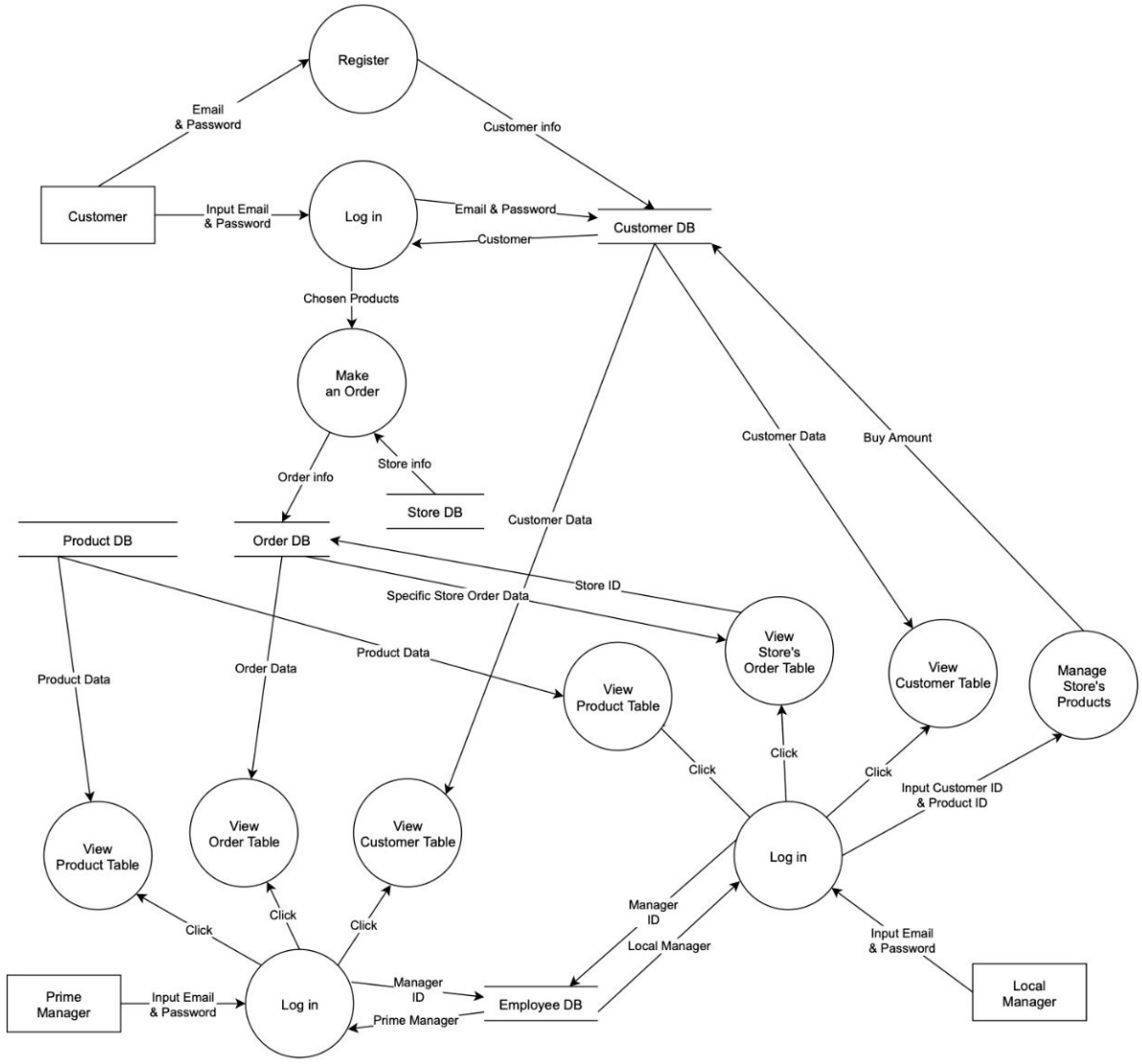
Third, the primary key attributes CustomerID and ProductID become foreign keys in BUY. These two attributes are components of the primary key of BUY. However, CustomerID can not uniquely identify a given transaction because a customer may buy the same product on more than one occasion. In addition, in order to clearly distinguish the customer's order on the Internet and the customer's purchase in the physical store, we

must make the customer's purchase in store into an additional relation, so that we can make it easier to do database query and update.

Fourth, the primary key attributes OrderID and ProductID become foreign keys in CONTAIN, which are components of the primary key of CONTAIN. However, OrderID can not uniquely identify a given order because each order may contain at least one product to many products. This relation is created to clearly and completely list the items in each order.



4. Implementation Plan



Customers:

1. To use the system, they should enter email and password to register so that their information can be recorded in the customer table. Each customer's buy amount recorded in the Management of Store's Products (see the second point in local managers) will flow to the customer database.
2. After logging in the system, customers choose the products they want to make an order and choose the store they want to go to. The order information will flow to the order table.

Local managers (clerks):

1. There are already local managers' accounts in the employee table.

2. They log in and click the button to see the tables relating to sales information, including product table, order table, and customer table. Local employees can only see their stores' order information in the order table. Besides, they can enter customer ID and product ID to record the finished order in "Management of Store's Products" page.

Prime manager:

1. There are already prime manager's account in the employee table.
2. They log in and click the button to see the tables relating to sales information, including product table, order table, and customer table.