"Larry's Groceries" Project Final Report

Benjamin Reyes
Michael Shahtout

Table of Contents

1. Acknowledgements

We would like to thank professor Jahan Ghofraniha for the knowledge to complete a project like this. We'd also like to thank all members of the CS157A class that assisted us in solving issues challenges we had during the creation of this project

2. Executive Summary

Database Solutions seeks to design well formatted and robust databases for small businesses within the greater Santa Clara County area, as well as remotely when possible. For this project we were tasked with designing a database to interact with a pickup and browsing service for "Larry's Groceries" in Santa Clara County. The goal of this document is to outline the history and needs of this business within the background section. From there, this document will describe the design process from problem statement to physical design. From there this document will seek to outline the finalized structure of the database including views, as well as, describe the testing process to ensure stability in the database.

3. Background

This section will go over some of the background of why we chose to take on this project as well as research needed to understand how to design a database to fit the clients needs.

3.1   History

With the modernization of online shopping; grocery stores are having to move into this online space. Smaller, traditional brick and mortar stores are now having to add the online shopping service to their local communities in order to stay competitive. For Larry's Grocery store the time to move into the online shopping space has come. There have been more and more requests (especially for the current pandemic) for a service that allows a contact free pickup. To implement this our company has been signed on to develop a database software to start itemizing and interacting digitally with their physical inventory and customers.

3.2   Requirements

Larry's Groceries has request the following services
- Customer accounts and information
    - A cart service that records items per customer account for employees to collect for the customer
- Employee records and information
- Editable MasterList of items for sale
    - Active Quantity Changing
- Management tools to see who is working and where

3.3 Solution

Due to the lack of a current online web store front. We're going to design the backend database with some sample views for the management team to work with until a point in which they are ready to move forward with a front end. This database will be designed in MySQL and utilizes the views service to interact with the database. These views will include a management view that allows to see existing employees, check availability of an item, and

4. Problem Statement

The grocery store "Larry's" is looking to modernize their online presence. This includes the creation of an online shopping cart allowing customers to select the items they wish to purchase and pick up in store. They would also like a database that allows for employees and management to interact with the online storefront and monitor items on shelves. In order to do this, Database Solutions will be implementing 3 preliminary views for the team at Larry's Groceries to test prior to a front end web application. Furthermore these views will interact with the back end MySQL database that will be long term storage for the previously described tables.

5. Motivation

To assist your local community and it's small businesses is one of the most important undertakings any business can do. Using technology to assist the companies that directly service your community is necessary for the technological industry. Instead of perpetually moving forward into a more corporate side detracts from the important people who are directly affected by the technology we create.

6. Methodology

This will describe the technologies utilized to implement the entire database software

6.1 Business Rules

The following rules have been given by the Larry's Groceries Management for how we should setup the database
1. Employee and Customer ID's are going to be formatted by a business consulting firm. At current we do not know the formatting of these ID's and should use Auto Incrementing Integers to represent them
2. Credit Card data should be in a separate table referenced by the CustomerID in order to isolate it from other attacks

3. Employees must be able to be associated with a CustomerID in order to access the shopping cart to build.

6.2   MySQL

This is the main DBMS (Database Management Software) used to create the relational tables and the views that interact with them. The database file itself was modified and experimented using the main MySQL Shell.

6.3   GitHub

Utilized to communicate and collaborate between each member of the team on the database structure and code. Furthermore please see the link in appendix below for the source code.
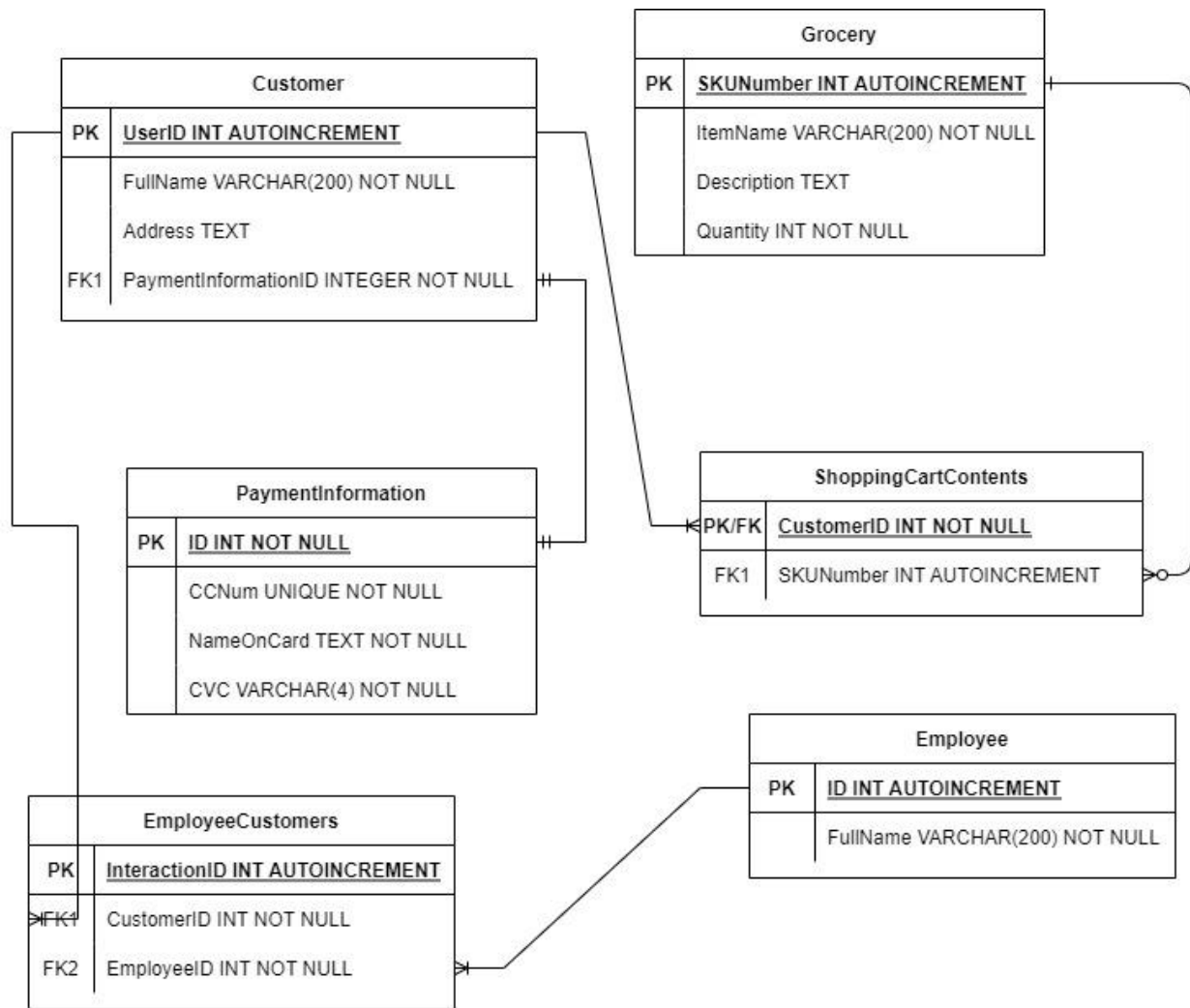
7. Implementation

7.1   Logical Diagram
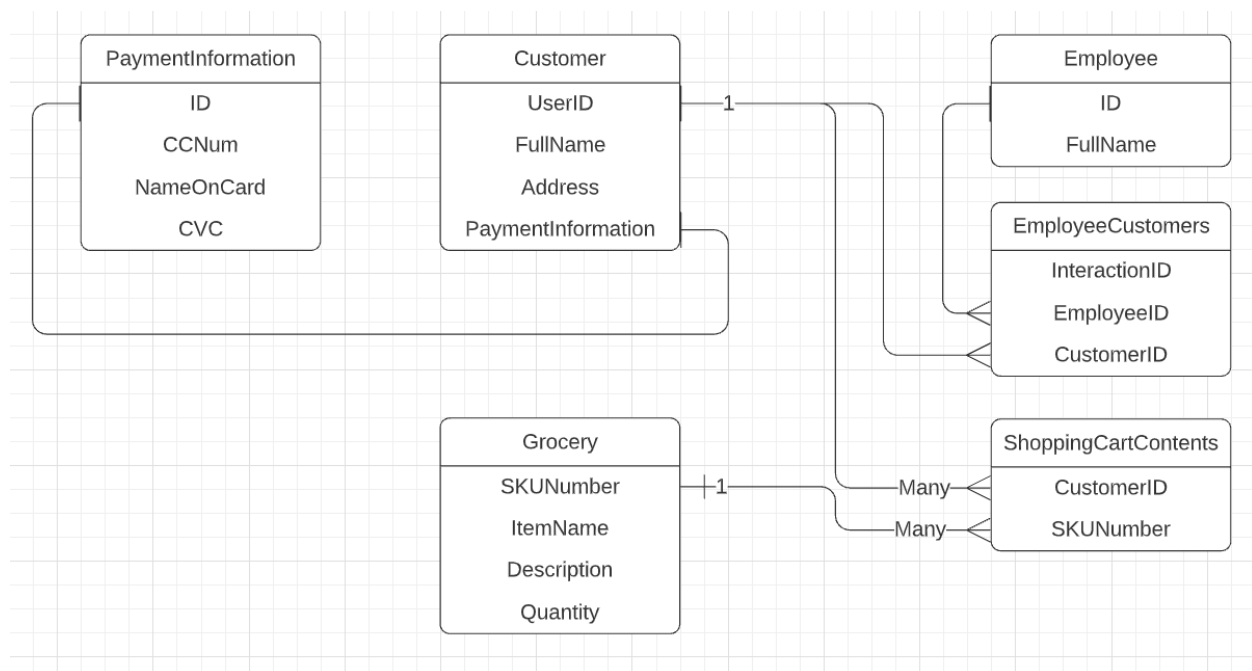
The logical diagram is built around a simple ecosystem of customer information, customer shopping carts, employees, available groceries, and customer's payment information. Customers are associated with their payment information to allow isolation and security of that information. Shopping carts are associated with the CustomerID and an Employee can be assigned with that CustomerID to be put on a job. This would in turn allow the employee to view all items associated with the customer's order and collect them for pickup.

7.2   Physical Diagram

For the physical design implementation, Larry's Groceries does not have the means to acquire a large server or memory bank to store large amounts of data. For this purpose we chose to limit VARCHAR entries to 200 total possible characters in the hope that we can reduce some issues. Furthermore formatting of the ID's still hasn't been established as Larry's Groceries is moving in the new online space so as a part of the Business Rules we must keep business information separated and hopefully Larry's Groceries will use a secure, proven, payment system to hold this information.

7.3   Views

AvailableItems will collect all grocery items that are not at a quantity of 0

```
-- View: AvailableItems
CREATE VIEW AvailableItems AS
    SELECT ItemName,
            Quantity
      FROM Grocery
     WHERE Grocery.Quantity > 0;
```

ExistingEmployees returns the information about all employees for managerial use

```
-- View: ExistingEmployees
CREATE VIEW ExistingEmployees AS
    SELECT FullName
       FROM Employee;
```
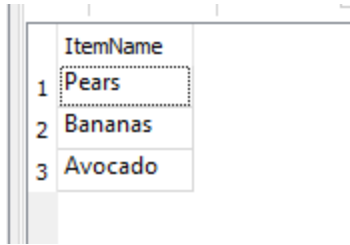
EmployeeBaggedItems shows all the items that employees have bagged. The view can be modified in a way that only shows bagged items for a specific employee with a provided ID/name.

```
CREATE VIEW EmployeeBaggedItems AS
    SELECT ItemName
      FROM Grocery
     WHERE Grocery.SKUNumber IN (
                SELECT SKUNumber
                  FROM ShoppingCartContents
                 WHERE CustomerID IN (
                            SELECT CustomerID
                              FROM EmployeeCustomers
                             WHERE EmployeeID IN (
                                        SELECT ID
                                          FROM Employee
                             )
                 )
        );
```

7.4   Database

See github for the entire Database Source Code. Below we will exhibit some of the testing undergone to insure stable CRUD interactions with the database.

Usage of the EmployeeBaggedItems with dummy data resulted in

	ItemName
1	Pears
2	Bananas
3	Avocado

Showing that the data is being selected appropriately for items bagged by employees under their relationship between a EmployeesCustomer table

8. Conclusion

In total, Larry's Groceries was an enjoyable project for the whole team. We undertook a new challenge of creating something simple and effective for a local business. This work is worthwhile to us and we are happy to do it.

8.1　Results

After testing, we found the database to be stable and capable of accepting queries. Furthermore the Views we had created worked to give the staff at Larry's Groceries examples of how the database can be used to find out information they need to know. There is still much to implement, especially with the front end, but for now we are pleased with the design.

8.2　Post Discussion

As a team we decided to do a post mortem of the project to see how we can improve in the future. We determined that establishing more business rules with the client before moving into the logical phase can help streamline the database creation process. Without well defined and specific rules it can be difficult to know exactly what route to take. Overall we are happy with the product we have made and are hopeful moving forward we can continue to help Larry's Groceries modernize their systems.

9. Appendix

GitHub Source:　https://github.com/misterturkes/CS157A