5200 Database Management Systems
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Project Title: Recycle.io a Smart Disposal System

Project Overview:

The proposal for this project is smart disposal system, that takes the concept of waste management and elevates it by providing customers the opportunity to avail rewards in exchange for disposing waste correctly. We have taken a case study for Dunkin' as an example in our project. The idea here is that customers are able to buy a product from Dunkin' and deposit it in a smart bin that scans the barcode on it, and gifts the customer some points. For the scope of this DBMS project we will have an employee register the deposit instead. The store offers some vouchers worth a specific number of points that the customer can redeem when they have sufficient points. They can then use this voucher on future purchases from Dunkin'.

This product presents an efficient choice for large companies in the food and beverage industry with substantial carbon footprints and significant volumes of plastic waste. The product, its associated services, and network have the potential to reduce the environmental impact of these businesses and establish a viable business model.

1. README

Steps to install and run the project:

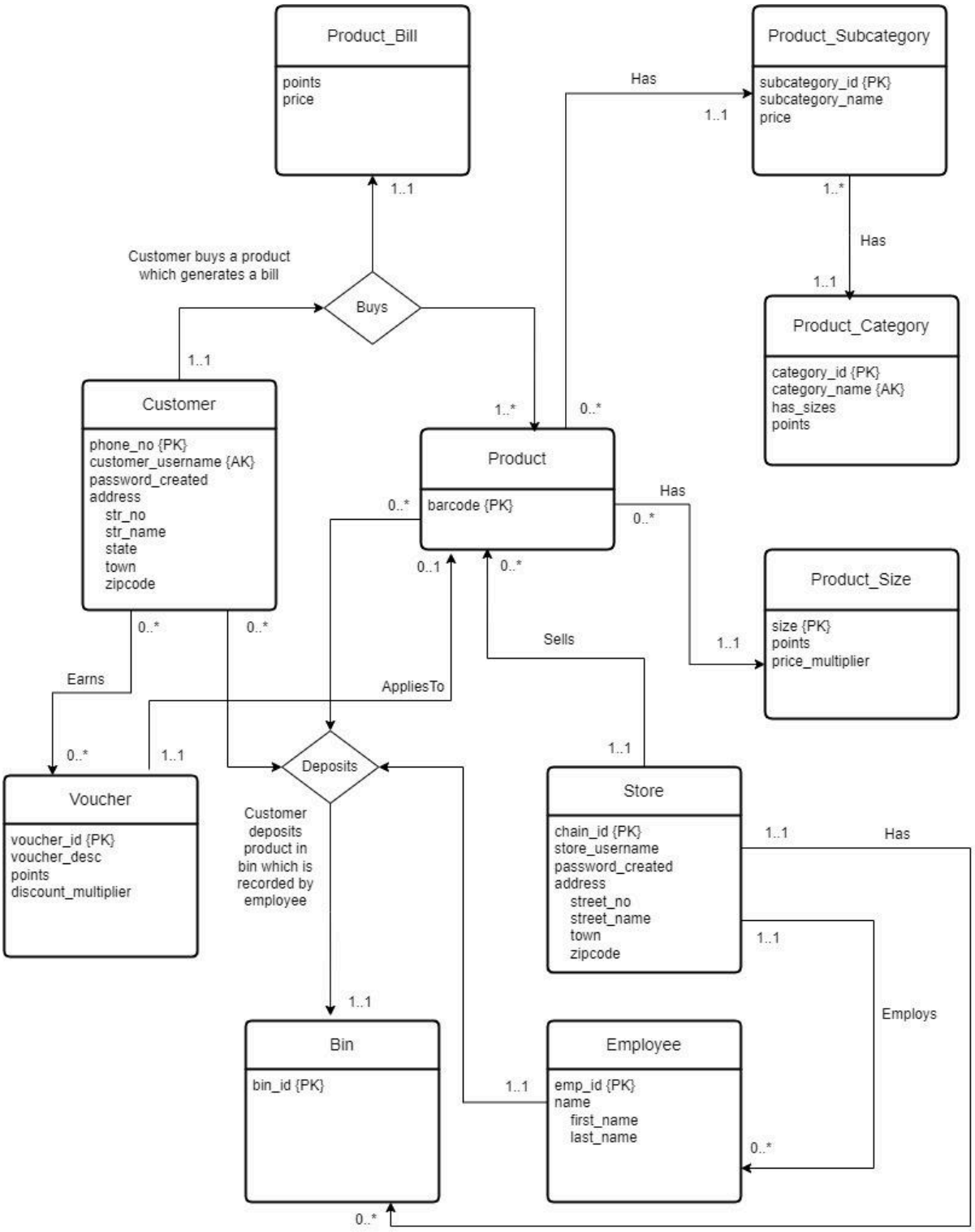
1. Download the provided zip file and extract the folder
2. To set up the database, import the dump in MySQL Workbench using the project_dump.sql file.
3. To allow the project to connect to the database, open the project folder (db-proj) in a code development IDE. We have used Visual Studio Code. This is the link to download and install Visual Studio- https://visualstudio.microsoft.com/downloads/
4. Once you have opened the project directory in Visual Studio Code, you should open the server.js file in the root folder and on line 12 replace the password with your mysql password and in case the user name is not root replace that on line 11.
5. You need to have node installed on your device. This is the link to download and install node - https://nodejs.org/en/download/. Alternatively, you can follow the steps mentioned in this link :
   https://radixweb.com/blog/installing-npm-and-nodejs-on-windows-and-mac#mac
6. Got to the project directory via command prompt / terminal (inside the db-proj folder in your machine) and run the following commands:
   npm install express
   npm install mysql2
   npm install cors
7. To start the project run the following command:
   node server.js
   You should see a message: Server is running at http://localhost:3000
8. Open the link to where the web application is running: http://localhost:3000
9. Click on get involved to get started with the login. Section 5.2 gives more details on how to test the functionalities and CRUD operations for this application.

2. Technical Specifications for the project

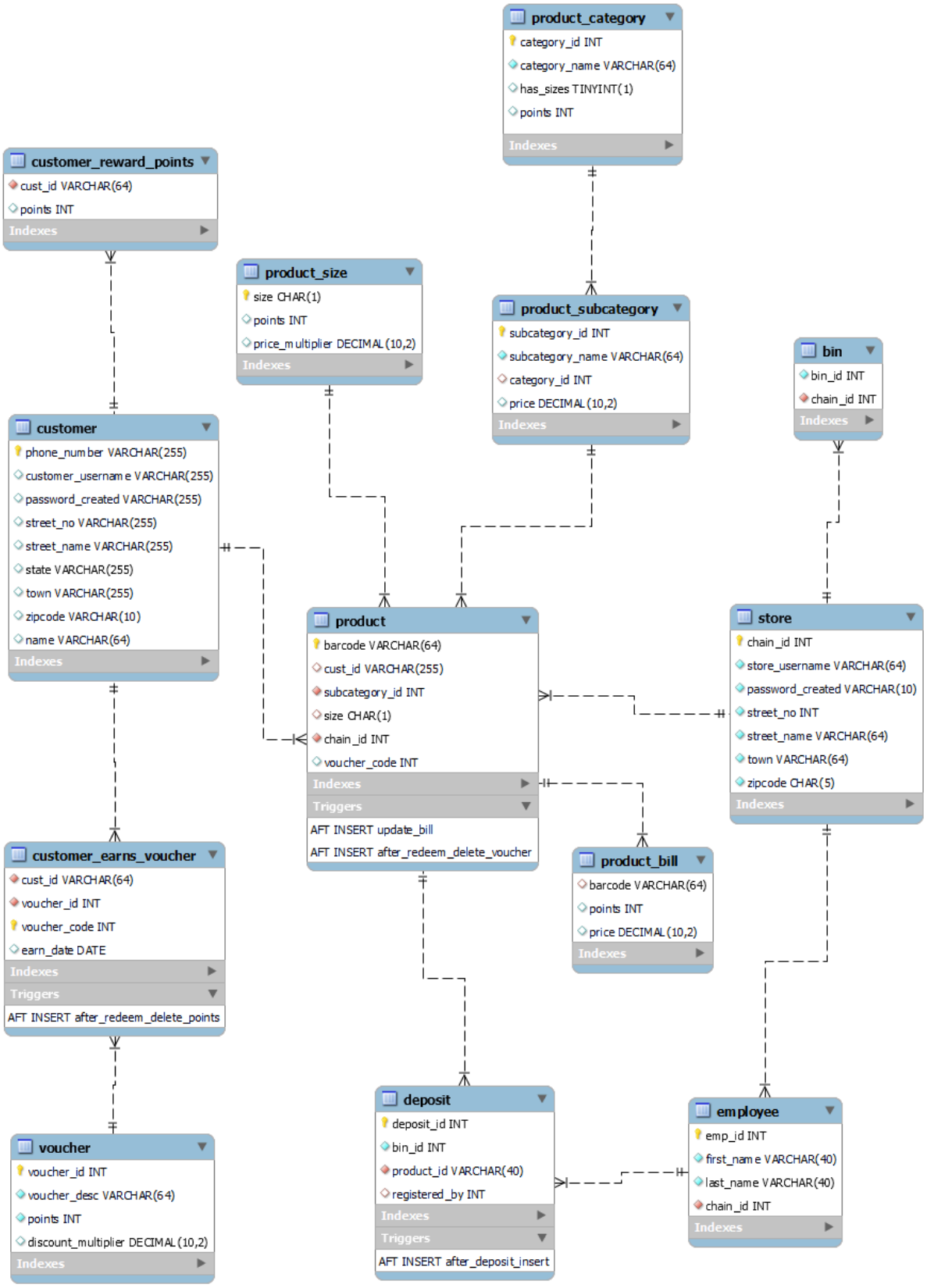
Programming Languages, Software, Apps, Libraries, and Hardware:

- **Code Development Tools:** Visual Studio Code
- **Front-End Technologies:** HTML, CSS
- **Database Management:** MySQL Workbench
- **Programming Language:** Node.js (Javascript)
- **Web Technologies:** The project is compatible with web browsers like Google Chrome, Mozilla Firefox, and Microsoft Edge.

3. Conceptual design

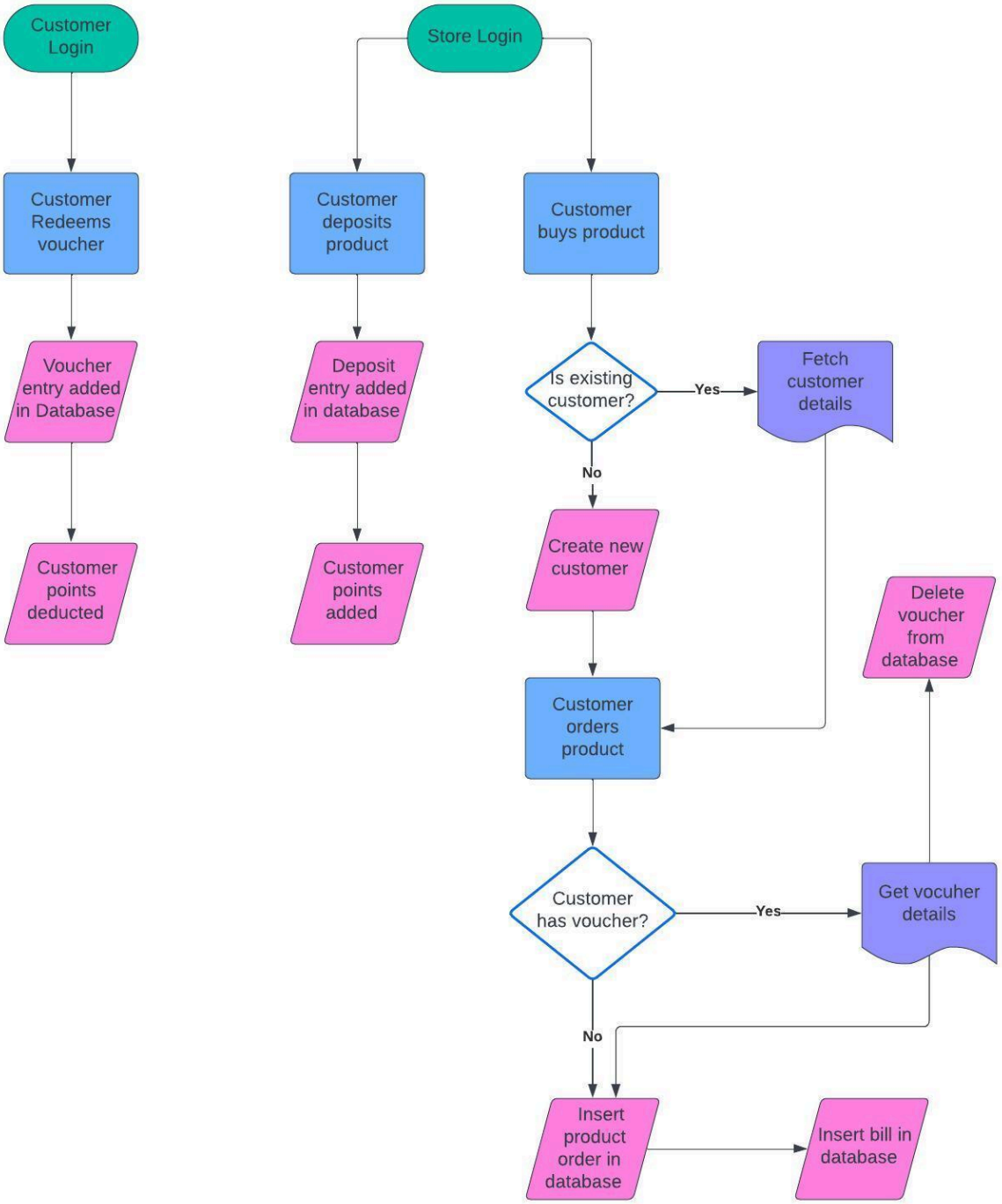


4. Logical design of schema



5. User flow of the system

5.1. Flow chart for the system



5.2 Steps to use the application

1. On the very first page: http://localhost:3000/ click on “Get Involved” to get started with the login
2. Next you have two options, either login as a customer or store. A customer is someone who has purchased a product from Dunkin while store depicts one of the Dunkin stores
3. A customer can create their own account as well. A store signup would be one of the Dunkin outlets signing up as a new store.
4. You can create a new store and login using the same.
5. Alternatively you can use an existing store from our database dump like username: store1 and password: 123
6. You will now see two options, clicking on Place an Order allows you to place an order for a customer (new or existing).
7. If the customer has a voucher you can use that voucher code.
8. Clicking on Register a Deposit will allow an employee to record a product being deposited in a store bin using the barcode of the product. For example use the same barcode of the ordered product and use the bin id: 1
9. You can login using the existing credentials we have provided in our database dump. Click on “Login as a Customer”. Use the username “gargi” and password “1234”.
10. Here you can redeem a voucher using the voucher ID. In case the customer does not have enough points then we will get an error while redeeming the voucher.
11. The voucher code that appears if redeemed can be used on next product purchase. A redeemed voucher is deleted

6. Lessons Learned

6.1 Technical expertise gained

The project we have built uses three main technologies. The front end UI design is made using HTML and CSS, the backend database is created using MySQL and the logical design that communicates between the two is written in JavaScript. The database creation using MySQL was a part of the course curriculum that we implemented in the project. When it comes to our project, the functionalities are mostly relevant to users depositing trash, earning reward points and redeeming rewards for the same. This made us realize that the menu items could be pre-populated for this project. This is why we performed web scraping on the online Dunkin' menu to populate the product_category and product_subcategory tables. We used python and selenium webdrivers to obtain the data, wrote it to a csv file, and imported it into our database tables using MySQL Workbench. These were some of the new techniques we learned during the process of this project. We were able to incorporate our knowledge of HTML, CSS and JavaScript with the understanding of databases we had from this course to come up with the final result.

6.2 Insights

The development of this project took place over a few weeks which helped us polish upon our time management skills. We were able to modularize the expectations and features by coming up with smaller goals to achieve as part of a larger project. It also helped us understand the concept of task allocation and distribution. The approach we followed was

6.3. Contemplated alternative design approaches

Our initial approach was more focused on the engineering aspect of things which we modified into a user interactive software based system that focused on the database management aspect of the smart disposal. The new approach we came up with focused more on the

7. Future Work

Our project is a smart disposal system that implements the database management and user interactive part of the project. For the scope of our project we keep the deposit entry recorded by the employee. In a real world scenario, we would like to expand upon this idea by actually placing smart bins in the store with sensors that auto-scan the barcode of the object while it is being disposed of. This is a real world practical scenario that would actually complete the implementation of the project as an environmentally conservative initiative as it encourages users to perform good waste management and disposal while also rewarding their efforts.

Additionally as this project is a waste management initiative, many other companies that produce waste can use this approach. We have chosen Dunkin' for the scope of our project however the idea can be expanded to others as well. The basic conceptual idea would be the same, however we can add a company entity that maps to the store entity, as this would simply build upon this existing idea.