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A DBMS Mini Project Report

on

" Convenience Store Database "

Submitted in partial fulfillment of the requirements for the V semester

and award of the degree of Bachelor of Engineering in Computer Science

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CERTIFICATE

Certified that the DBMS mini project work entitled **"Convenience Store Management"**has been successfully carried out by **"Vishwanath B Hiremath** bearing USN **"1RN20CS181"** and **"Vishwas Gowda** bearing USN **"1RN20CS182"**, bonafide students of **"RNS Institute of Technology"** in partial fulfillment of the requirements for the 5th semester of **"Bachelor of Engineering in Computer Science and Engineering of Visvesvaraya Technological University"**, Belagavi, during academic year 2021-2022. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the DBMS laboratory requirements of 5th semester BE, CSE.

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ACKNOWLEDGEMENT

ABSTRACT

This project deals with 'Convenience Store Database'. In order to keep track of all the information regarding a convenience store, we have created a database that will help in storing data and integrate all three processes of managing sales, inventory and employees. This project makes the job of convenience store staff easier and brings transparency in the operation of the store.

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Chapter 1

INTRODUCTION

1.1 DATABASE TECHNOLOGIES

The essential feature of database technology is that it provides an internal representation (model) of the external world of interest. Examples are, the representation of a particular date/time/flight/aircraft in an airline reservation or of the item code/item description/quantity on hand/reorder level/reorder quantity in a stock control system. The technology involved is concerned primarily with maintaining the internal representation consistent with external reality; this involves the results of extensive RD over the past 30 years in areas such as user requirements analysis, data modelling, process modelling, data integrity, concurrency, transactions, file organisation, indexing, rollback and recovery, persistent programming, object-orientation, logic programming, deductive database systems, active database systems... and in all these (and other) areas there remains much more to be done. The essential point is that database technology is a CORE TECHNOLOGY which has links to

- Information management / processing

- Data analysis / statistics

- Data visualization / presentation

- Multimedia and hypermedia

- Multimedia and hypermedia

- Office and document systems

- Business processes, workflow, CSCW (computer-supported cooperative work)

Relational DBMS is the modern base technology for many business applications. It offers flexibility and easy-to-use tools at the expense of ultimate performance. More recently relational systems have started extending their facilities in directions like information retrieval, objectorientation and deductive/active systems which lead to the so-called 'Extended Relational Systems'.

Information Retrieval Systems began with handling library catalogues and then extended to full free-text by utilizing inverted index technology with a lexicon or thesaurus. Modern systems utilize some KBS (knowledge-based systems) techniques to improve the retrieval.

Object-Oriented DBMS started for engineering applications in which objects are complex, have versions and need to be treated as a complete entity. OODBMSs share many of the OOPL features such as identity, inheritance, late binding, overloading and overriding. OODBMSs have found favours in engineering and office systems but haven't been successful yet in traditional application areas.

Deductive / Active DBMS has evolved over the last 20 years and combines logic programming technology with database technology. This allows the database itself to react to the external events and also to maintain its integrity dynamically with respect to the real world.

1.2   CHARACTERISTICS OF DATABASE APPROACH

Traditional form included organising the data in file format. DBMS was a new concept then, and all kinds of research was done to make it overcome the deficiencies in traditional style of data management. A modern DBMS has the following characteristics

- Real-world entity A modern DBMS is more realistic and uses real-world entities to design its architecture. It uses behaviour and attribute too. For example, a school database may use students as an entity and their age as an attribute.

- Relation-based tables DBMS allows entities and relations to form tables. A user can understand the architecture of a database by just looking at the table names.

- Isolation of data and application A database system is entirely different than its data. A database is an active entity, whereas data is said to be passive, on which the database works and organizes. DBMS also stores metadata, which is data about data, to ease its own process.

- Less redundancy DBMS follows the rules of normalization, which splits a relation when any of its attributes has redundancy in its values. Normalization is a mathematically rich and scientific process that will reduces the data redundancy.

- Consistency Consistency is a state where every relation in a database remains consistent. There exists methods and techniques, that can detect an attempt of leaving database in an inconsistent state. DBMS can provide greater consistency as compared to earlier forms of data storing applications like file-processing systems.

- Query Language DBMS is equipped with query language, which makes it more efficient to retrieve and manipulate data. A user can apply as many and the filtering options as required to retrieve a set of data. Traditionally it was not possible where file-processing system was used

- ACID Properties DBMS follows the concepts of Atomicity, Consistency, Isolation, and Durability (normally shortened as ACID). These concepts are applied on transactions, which manipulate data in a database. ACID properties help the database to stay healthy in multi-transactional environments and also in case of failure.

- ultiuser and Concurrent Access DBMS supports multi-user environment and allows them to access and manipulate data in parallel. Though there are restrictions on transactions when users attempt to handle the same data item, but users are always unaware of them

- Multiple views DBMS offers multiple views for different users. A user in the Sales department will have a different view of the database from the person working in the Production department. This feature enables the users to have a concentrate view of the database according to their requirements.

- Security Features like multiple views offer security to certain extent when users are unable to access the data of other users and departments. DBMS offers methods to impose constraints while entering data into the database and retrieving the same at a later stage. DBMS offers many different levels of security features, which enables multiple users to have different views with different features. For example, a user in the Sales department cannot see the data that belongs to the Purchase department. It can also be helpful in deciding how much data of the Sales department should be displayed to the user. Since a DBMS is not saved on the disk as traditional file systems, it is very hard for miscreants to break the code.

1.3 APPLICATIONS OF DBMS

The applications of database management system are :

- **Telecom:** There is a database to keeps track of the information regarding the calls made, network usage, customer details etc. Without the database system it is hard to maintain such huge amounts of data which gets updated every millisecond.

- **Industry:** Whether it is a manufacturing unit, a warehouse or a distribution centre, each one needs a database to keep the records of the ins and outs. For example, a distribution centre should keep a track of the product units that were supplied to the centre as well as the products that got delivered from the distribution centre on each day; this is where DBMS comes into picture

- **Banking System:** For storing information regarding a customer, keeping a track of his/her day to day credit and debit transactions, generating bank statements etc is done with through Database management systems

- **Education Sector:** Database systems are frequently used in schools and colleges to store and retrieve the data regarding the student , staff details, course details, exam details, payroll data, attendance details, fees details etc. There is lots of inter-related data that needs to be stored and retrieved in an efficient manner

- **Online shopping:** You must be aware of the online shopping websites such as Amazon, Flip kart etc. These sites store the product information, your addresses and preferences, credit details and provide you the relevant list of products based on your query. All this involves a Database management system.

Chapter 2

REQUIREMENT ANALYSIS

2.1 HARDWARE REQUIREMENTS

- Processor :i5 8250U

- Processor speed :1.8GHz

- RAM :1GB

- Storage Space :40GB

- Monitor Resolution :1024*768 or 1336*768 or 1280*1024

2.2 SOFTWARE REQUIREMENTS

- Operating System used : Windows 11

- Technologies used :
  Database-MySQL and workbench
  Back end:MySQL connector
  Front end:Streamlit,Pandas

- IDE used:Visual Studio Code

2.3 TECHNOLOGIES USED

- **Streamlit:**Streamlit is a software company offering an open-source platform for machine
  learning and data science teams to create data applications with python. We have used streamlit

library from python as a major part of our front end.

- **Pandas:**pandas is a software library written for the Python programming language for data manipulation and analysis. In particular, it offers data structures and operations for manipulating numerical tables and time series. It is free software released under the three-clause BSD license. The usage of pandas library has helped us represent the data fetched from MySQL workbench in an efficient manner.

- **MySQL Connector:**MySQL Connector/Python enables Python programs to access MySQL databases, using an API that is compliant with the Python Database API Specification v2.0 (PEP 249). It is written in pure Python and does not have any dependencies except for the Python Standard Library.

- **MySQL:**MySQL is an open-source relational database management system (RDBMS).It's name is a combination of "My", the name of co-founder Michael Widenius's daughter My,and "SQL", the acronym for Structured Query Language. A relational database organizes data into one or more data tables in which data may be related to each other; these relations help structure the data. SQL is a language programmers use to create, modify and extract data from the relational database, as well as control user access to the database. In addition to relational databases and SQL, an RDBMS like MySQL works with an operating system to implement a relational database in a computer's storage system, manages users, allows for network access and facilitates testing database integrity and creation of backups.

Chapter 3

DATABASE DESIGN

3.1 FUNCTIONAL REQUIREMENTS

3.1.1 Major Entities:

Customer: Contains details about the customer like customer name,customer id,phone,gender,address,points etc.

Supplier: Contains details regarding the supplier of various products like supplier's name and supplier id.

Employee: Contains details like employee name,dob,gender,phone,employee id,address etc.

User:describes employee who has access to the database. Includes details like username and password.

Category: Contains category name and category id

Product: Contains details about the category to which product belongs to,product name,product id,price and stock.

Sales: Contains information regarding the transactions that have taken place so far. Attributes include bill id,quantity,sales date and total amount.

Bill: Contains details like bill id,customer id,billing amount and billing date.

Job: Describes the job role of a particular employee along with the salary for that particular job role.

3.1.2 Relationships:

product supplier:special relation that exists between product and supplier. Attributes include product id and supplier id.

bill product:joins bill and product entities.
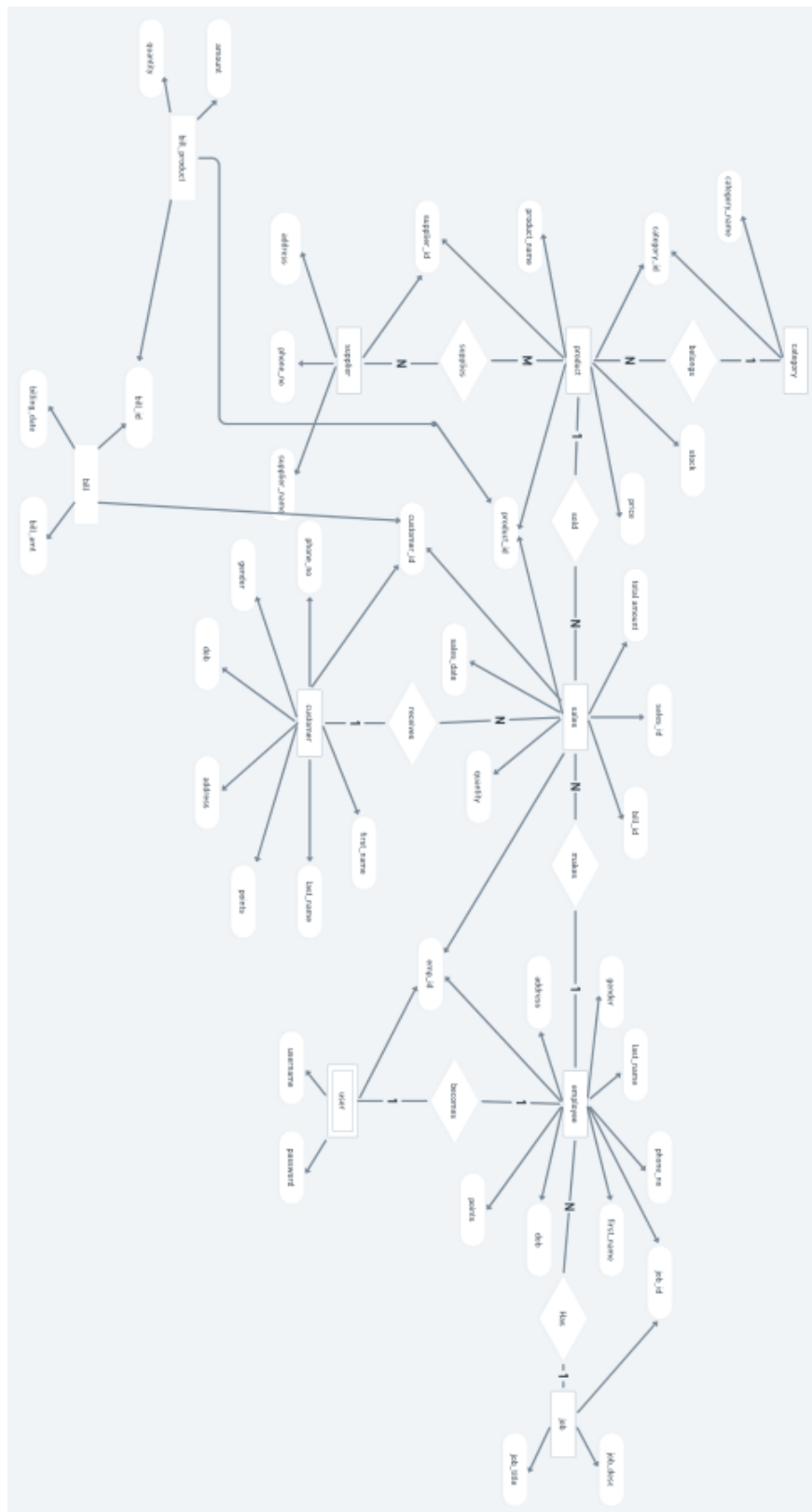
3.1.3 ENTITY RELATIONSHIP DIAGRAM

Figure 3.1: ER Diagram

3.2 RELATIONAL SCHEMA DIAGRAM

Figure 3.2: Schema Diagram

Chapter 4

IMPLEMENTATION

4.0.1 FUNCTIONALITIES

To start with the execution part,we first need to run the main page in the terminal using the command streamlit run name of the main page.This will redirect us to the local browser wherein the main page appears first.

The Main Page: The main page allows the user to login and logout.Once the user has logged in,a brief introduction about the project. Also the user has the option to view customer,employee,product and the sales page.

Customer Page: The customer page has a age range that can sort the customers based on their age and display their details . We also have a name filter to sort the customers by their name.

Employee Page: This page displays the details of the employee who is part of the database. We can sort the employees with the help of age range,salary range,gender filter and name filter.

Product Page: This page displays the details of various products that are present in the store. The products can be grouped based on the category to which they belong. The products can also be sorted according to their price,available stock and their name by using respective filters.

Sales Page: This page contains details about the sales that have occured so far. We can sort the sales by specifying the start and last date. This tabulates the sales in the specified range. The use of filters provides the luxury to extract any specific data that the store management can use to improve their services based on customer interests.

Chapter 5

TESTING

In unit testing, the program modules that make up the system are tested individually. Unit testing focuses to locate errors in the working modules that are independent to each other. This enables to detect errors in coding and the logic within the module alone. This testing is also used to ensure the integrity of the data stored. The various routines were checked by passing the inputs and the corresponding output is tested.Table 5.1 gives details of validation. Test cases used in the project as follows:

Table 5.1: Test Case Validation:

Test Case No.	Metric	Description	Observation
1.	Bill counter Function	This function provides bill for a particular transaction by linking together customer and product details .	Results obtained as expected
2	Sales Function	This function provides details of every transaction,every product that has been sold.	Results obtain ed as expected
3	Product	This function provides options to choose particular product from particular category and additional slider feature to sort products as per request..	Results obtained as expected

Chapter 6

RESULTS & SNAPSHOTS

Login Page: This page takes username and password to verify if the user is authenticated.
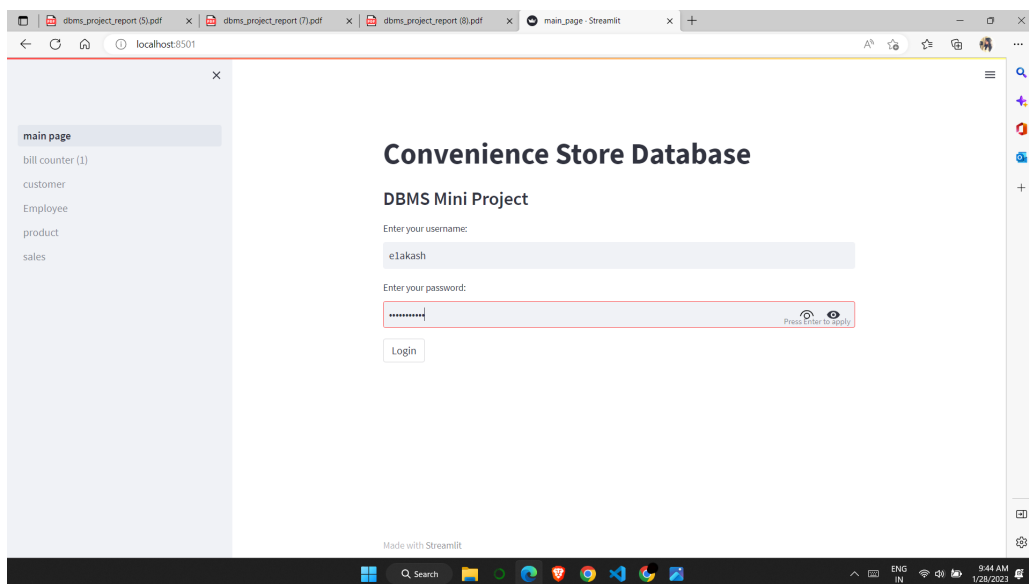

Figure 6.1: Login Page

Main Page: This page marks the introduction to the project. It tells if the user is verified or not.
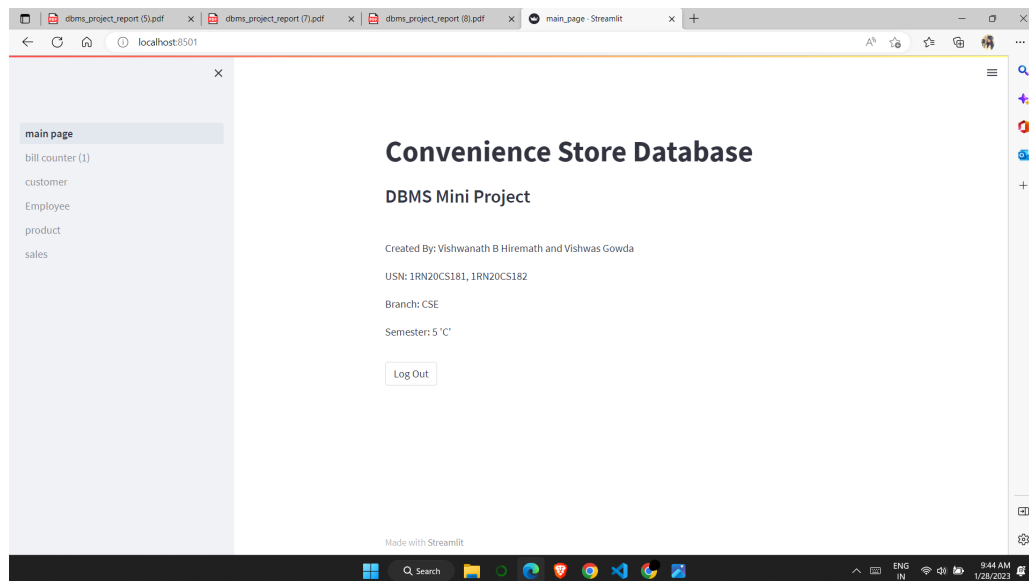

Figure 6.2: Main Page

Bill Counter Page: This page provides the option to generate a bill for a customer on a particular transaction.
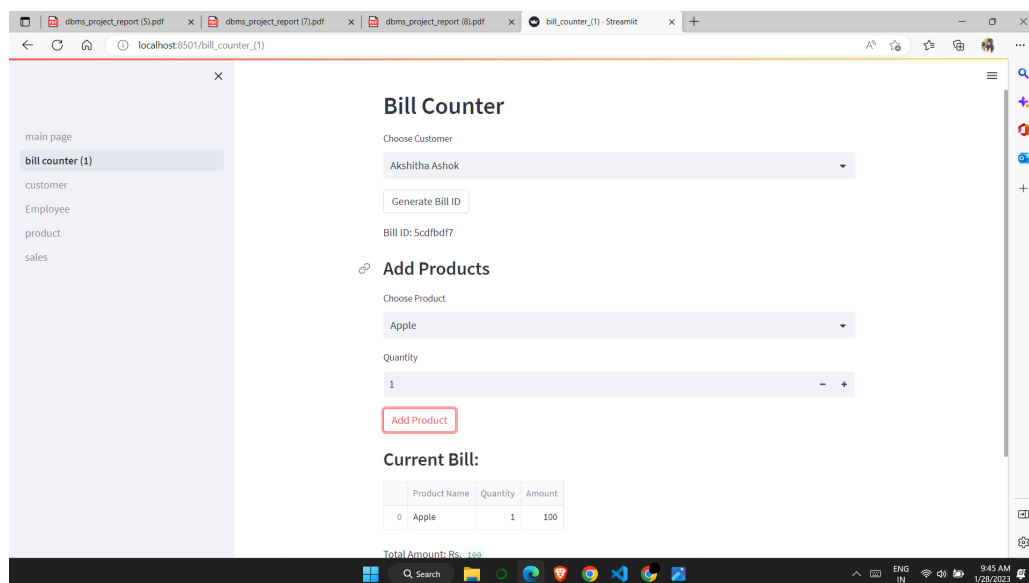

Figure 6.3: Bill Counter Page

Customer Page: This page displays the details of all the customers who have visited the store before. It also provides filters to sort customers by their age and name.
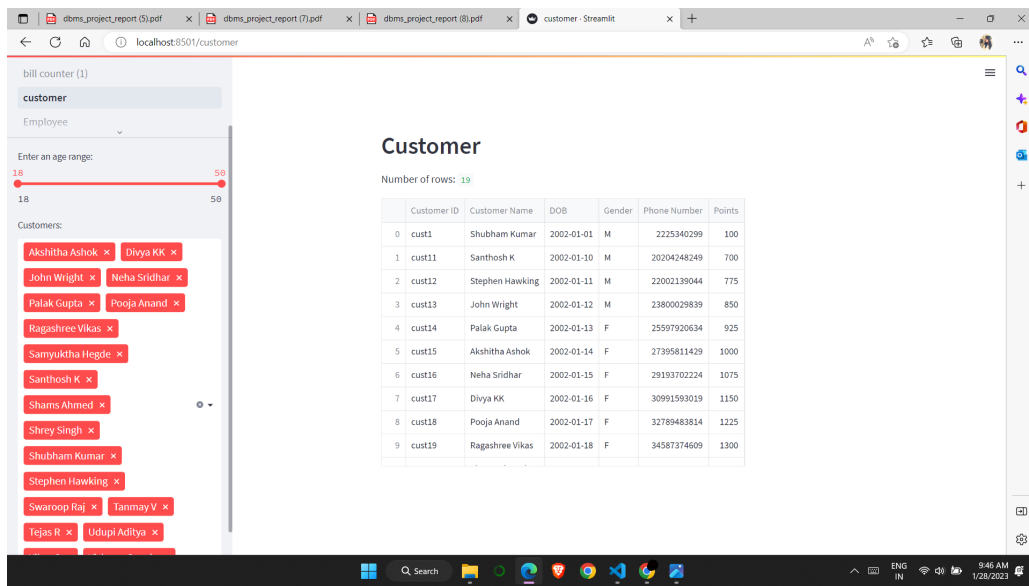

Figure 6.4: Customer Page

Employee Page: This page displays the details of all the employees who are part of the store. It also provides filters to sort employees by their age,salary,gender and name.
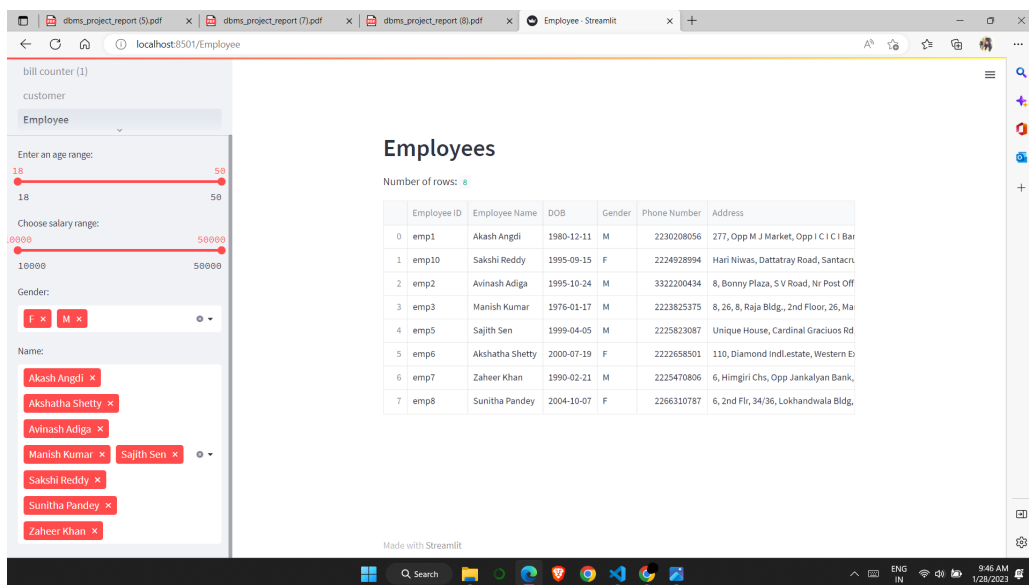

Figure 6.5: Employee Page

Product Page: This page displays the details of all the products that are available in the store. It also provides filters to sort products by their price,stock available,name and category to which they belong.
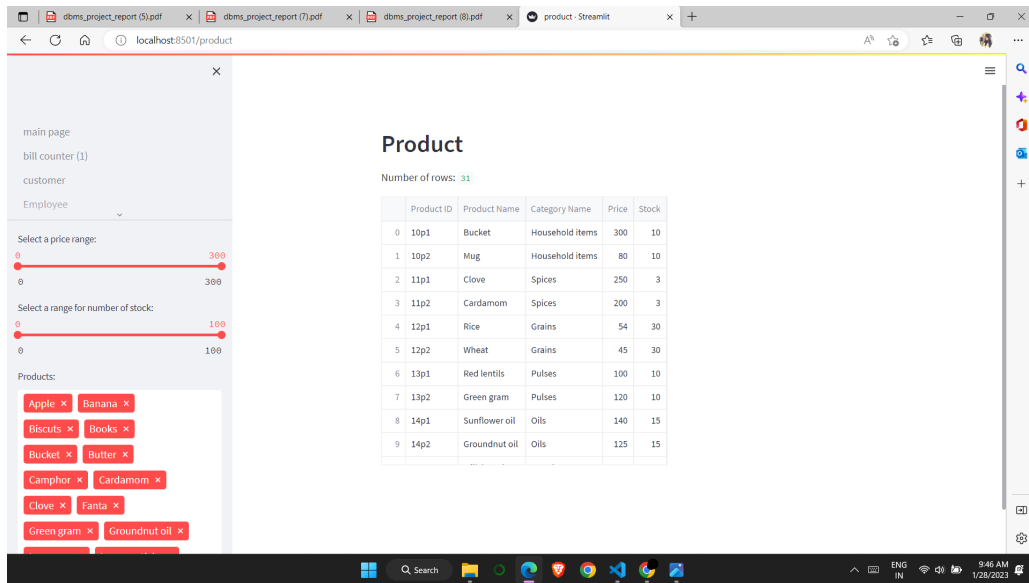

Figure 6.6: Product Page

Sales Page: This page displays the details of all the sales that have occur so far in the store. It also provides filters to sort sales by their starting-ending date,products and customers.
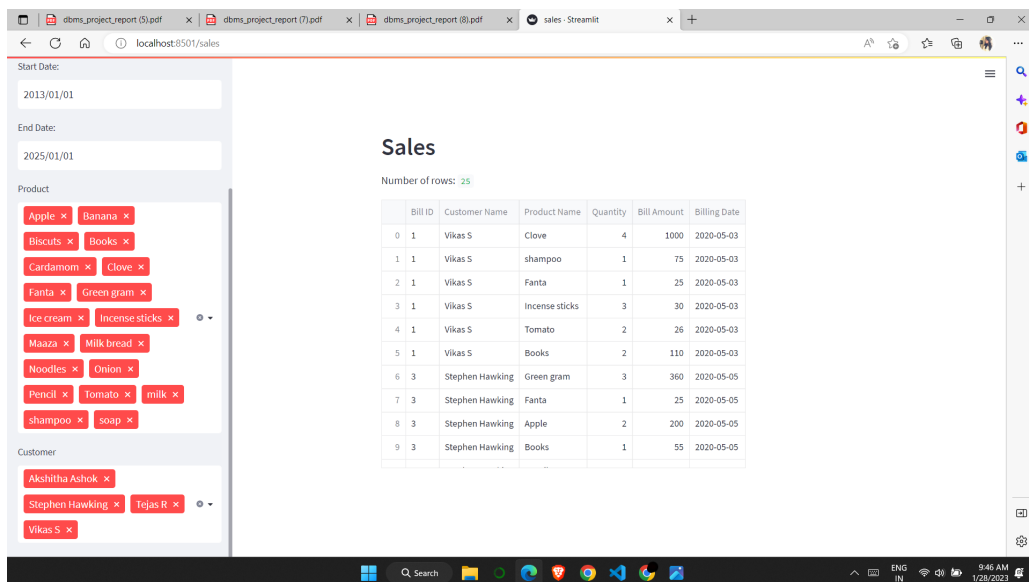

Figure 6.7: Sales Page

Chapter 7

CONCLUSION & FUTURE ENHANCEMENTS

7.1 CONCLUSION

This project helps in improving the day-to-day operations of convenience store.It brings transparency in the transactions of the store. With this system, it is now easy to keep track of various records of the convenience store. It gives an idea of products in demand whose availability can be increased and thereby meeting the needs of customers. Business analysis can be done with more accuracy.This system induces more efficiency and reflects the current status of the business. In a store with plenty of products to manage,by monitoring things from billing counter any theft can be detected easily. There is always room for improvement in any application, however good and efficient it may be. But the improvement thing is that the system should be flexible enough for further modifications. Considering this important factor, the system is designed in such a way that provisions can be given for further enhancement without affecting the system presently developed.

7.2 FUTURE ENHANCEMENTS

We can implement different levels of accessibility among various users of the system which brings in additional security. This project can be implemented on a bigger scale where data of multiple branches of a particular convenience store can be maintained under one roof.