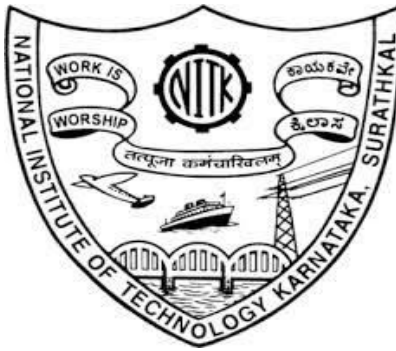


CO303 DATABASE MANAGEMENT SYSTEMS LAB

A REPORT ON THE PROJECT ENTITLED SUPERMARKET MANAGEMENT SYSTEM



SUBMITTED BY

K RAHUL REDDY - 171CO119

SUSHRUTH V - 171CO148

V SEMESTER B-TECH

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL**

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1. ABSTRACT

Databases are the treasure chests of the information age and Database Management Systems are the keys to the chests that give access to the invaluable treasures inside that is Data. Every single service provided in the 21st century runs on the data it collects and manipulates to provide the best possible version of its service to each individual separately. This means data, and lots of it. The huge amount of data needs to be stored in an intuitive and efficient way that makes working and building systems on the data effortless. This is where Database Management Systems come in.

A Database Management System is a software package that is used to create, maintain, manipulate and protect a Database and the data in it. The concept of DBMS has gone through many iterations and with the advent of the Web, Relational Databases Systems have taken over the industry.

The Service industry exists for the purpose of serving its customers and nothing else. Without customers any service sector industry is as good as closed. Thus, it is a no-brainer that players in the service industry will leave no stone unturned to attract new customers and retain existing ones. This means learning anything and everything about each customer, which means eventually to data, and its manipulation and usage.

But to run a firm smoothly, the firm needs to take care of its business operations and the people who carry out these operations. Thus there exists an inherent need to record all the operations and data about the employees of the firm. An Enterprise Resource Planning System is the solution to this problem.

An Enterprise Resource Management System or an ERP system is a business process management software that allows an organization to use a system of integrated applications to manage the business and automate many back office functions related to technology, services and human resources.

A Supermarket chain is a textbook example of a Service sector industry. While collecting customer information and providing a billing system is the front face of a supermarket, the management of the work behind the scenes is equally crucial. The acquisition, storage and transportation, and display of goods is carried out without the customer's know-how. The management of Human Resource, such as the Outlet-personnel, the godown manager, the supplier and the district-area manager are equally important. This project tries to implement an efficient Enterprise Resource Planning System for a Supermarket Chain.

2. INTRODUCTION

This project is an implementation of an efficient and intuitive, offline enterprise resource planning system for a Supermarket chain. The supermarket modeled in this project is a multi-outlet chain that has multiple merchandise storage godowns and suppliers servicing the chain.

A high level working of the supermarket chain is as follows. A supplier supplies a particular merchandise to one or more godowns owned by the chain. The supplier for a certain product is chosen by the management at each godown independently and this power lies only in the hands of the Manager of the godown. A chain outlet can request a restocking of products from one of the multiple godowns that stock the required products. The authority to approve a restocking request lies in the hands of the godown manager. The supermarket chain records the details of the various customers that shop with them by recording necessary details about them. Employee details are also recorded in the database of this system.

All the above mentioned operations are recorded in the database of the ERP system and are displayed to the employees through a portal. Details of the suppliers such as the name, contact information and the affiliated godowns are displayed in tabular format. An option to add new suppliers to the system is also provided to employees with sufficient credentials.

Details of the products available in the godown is also displayed. The restock requests made to the particular godown with details regarding the outlet that made the request and the date of request are present along with the option to approve the restocking request. This again is available to employees with sufficient credentials.

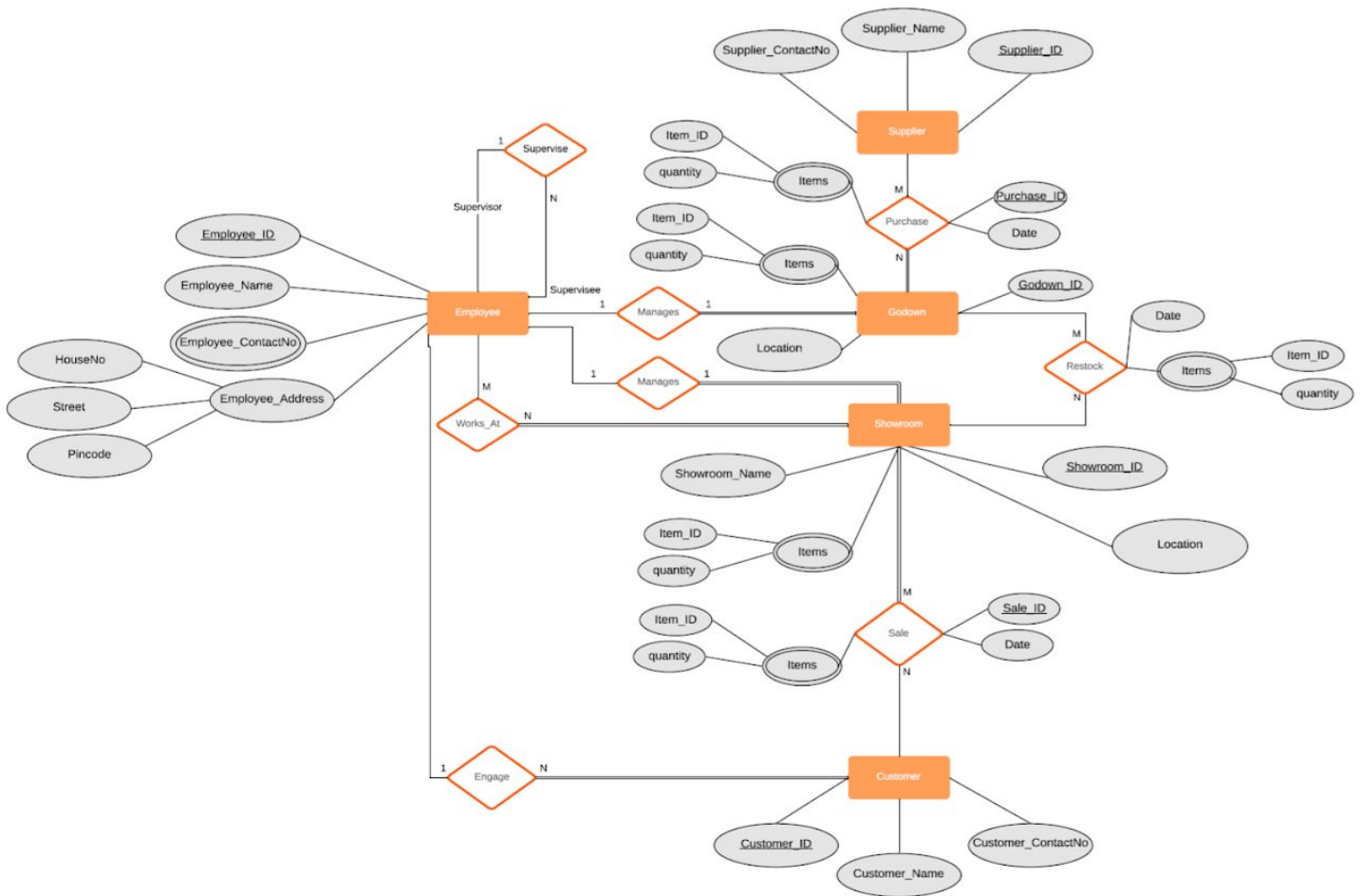
The outlet details along with the products on display is made available in the form of tables. An option to request for restock is present in the system.

Employee details are recorded when an employee registers into the system. Details such as name, address, contact information, branch, superior etc are recorded.

Each employee can access the system via login portal by providing their unique Employee ID and their password. An employee is registered into the system by providing their basic information and setting up a password to facilitate the login process. On providing the information, the system cross-checks it for any possible discrepancies and redirects the employee on a successful login activity to the home page which provides navigation to the various modules as discussed above. Based on the clearance available to the specific employee certain information and actions will be withheld to safeguard the system and the data present in the database.

3. DATABASE DESIGN

3.A ER DIAGRAM



3.B RELATIONAL SCHEMA

The Supermarket Management System consists of a single database that contains all the data pertaining to the supermarket chain modeled in the project. The database contains 15 tables in the 3rd Normalized Form.

1. **Employee Details:** The basic details of an employee such as employee ID, name, address, contact information, supervision under whom the employee works under etc, are stored in a total of two tables.
2. **Supplier Details:** The details of a supplier to the godown is stored in one table. This table contains attributes such as the unique supplier ID, name of the supplier and their contact information.
3. **Godown Details:** The supermarket chain owns a number of godowns and the details of each are stored in a total of two tables. The first table contains the information about the godowns such as the unique godown ID, the location of the godown, the godown manager's ID. The second table on the other hand contains the details of the merchandise that has been stocked in each godown.
4. **Outlet Details:** Similar to the Godowns, the chain owns multiple Outlets which sell the products for the Supermarket Chain. The details are stored in the three tables which contain the basic details of each of the outlets, the employees working in each of the outlets and the items on-display at each of the outlets.
5. **Purchase Details:** Each godown purchases a stipulated amount of merchandise from various suppliers. All the details related to such purchases are stored in two tables in the database. The first contains the details of the transaction such as the godown ID, supplier ID, product ID of the purchased product and the date of purchase. The second table contains details of the product purchased and the amount of product purchased.
6. **Restock Details:** Products are restocked from the godowns to the outlets and the details of these transactions are stored in the two tables. The tables contain details similar to purchase details such as the details of the transaction and the product details.
7. **Sale Details:** Products on-display in the outlets are sold to various customers. These transactions are recorded similar to the purchase details in two tables in the database.
8. **Customer Details:** The system stores information of new customers on their first visit to any of the multiple outlets of the chain. The records include a unique customer ID, customer name, their contact details and the employee with whom they interacted with.

3.C NORMALIZED TABLES

Database normalization is a database schema design technique, by which an existing schema is modified to minimize redundancy and dependency of data. Normalization split a large table into smaller tables and defining relationships between them to increases the clarity in organizing data.

Tables in 3rd Normalized form:

Employee table [Attributes: Employee_ID(Key), Employee_Name, Supervisor_ID, Home_Number, Street, Pin_Code]

<u>Employee_ID</u>	Employee_Name	Supervisor_ID	Home_Number	Street	Pin_Code
--------------------	---------------	---------------	-------------	--------	----------

Employee Contact Details table [Attributes: Employee_ID(Key), Employee_Contacts(Key)]

<u>Employee_ID</u>	<u>Employee_Contacts</u>
--------------------	--------------------------

Supplier table [Attributes: Supplier_ID(Key), Supplier_Name, Supplier_Contact]

<u>Supplier_ID</u>	Supplier_Name	Supplier_Contact
--------------------	---------------	------------------

Godown table [Attributes: Godown_ID(Key), Godown_Location, Manager_ID]

<u>Godown_ID</u>	Godown_Location	Manager_ID
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Godown Item Details table [Attributes: Godown_ID(Key), Item_ID(Key), Quantity]

<u>Godown_ID</u>	<u>Item_ID</u>	Quantity
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Showroom table [Attributes: Showroom_ID(Key), Showroom_Name, Showroom_Location, Manager_ID]

<u>Showroom_ID</u>	Showroom_Name	Showroom_Location	Manager_ID
--------------------	---------------	-------------------	------------

Showroom Item Details table [Attributes: Showroom_ID(Key), Item_ID(Key), Quantity]

<u>Showroom_ID</u>	<u>Item_ID</u>	Quantity
--------------------	----------------	----------

Showroom Employee Details table [Attributes: Showroom_ID(Key), Employee_ID(Key)]

<u>Showroom_ID</u>	<u>Employee_ID</u>
--------------------	--------------------

Purchase table [Attributes: Purchase_ID(Key), Supplier_ID, Godown_ID, Date_of_Purchase]

<u>Purchase_ID</u>	Supplier_ID	Godown_ID	Date_of_Purchase
--------------------	-------------	-----------	------------------

Purchased Item Details table [Attributes: Purchase_ID(Key), Item_ID(Key), Quantity]

<u>Purchase_ID</u>	<u>Item_ID</u>	Quantity
--------------------	----------------	----------

Restock table [Attributes: Restock_ID(Key), Godown_ID, Showroom_ID, Date_of_Restock]

<u>Restock_ID</u>	Godown_ID	Showroom_ID	Date_of_Restock
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Restocked Item Details table [Attributes: Restock_ID(Key), Item_ID(Key), Quantity]

<u>Restock_ID</u>	<u>Item_ID</u>	Quantity
-------------------	----------------	----------

Customer table [Attributes: Customer_ID(Key), Customer_Name, Sales_Exec_ID, Contact_Number]

<u>Customer_ID</u>	Customer_Name	Sales_Exec_ID	Contact_Number
--------------------	---------------	---------------	----------------

Sales table [Attributes: Sale_ID(Key), Showroom_ID, Customer_ID, Date_of_Sale]

<u>Sale_ID</u>	Showroom_ID	Customer_ID	Date_of_Sale
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Sold Item Details table [Attributes: Sale_ID(Key), Item_ID(Key), Quantity]

<u>Sale_ID</u>	<u>Item_ID</u>	Quantity
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4. MODULES

Describe all the modules present in your project with screenshot.

Supermarket System



LoginRegister

Login


Employee-ID

Password

Submit

This is a Supermarket Database management System. This can be used to track items bought from Suppliers, stored in Godowns, restocked to showrooms, available in showrooms, and Sold to customers. Prices of items can also be monitored and changed.

Supermarket System



LoginRegister

Registration

Name

Supervisor_ID

House Number

Street

This is a Supermarket Database management System. This can be used to track items bought from Suppliers, stored in Godowns, restocked to showrooms, available in showrooms, and Sold to customers. Prices of items can also be monitored and changed.

Registration and Login Page: Form validation is done for registration. Password must be at least 6 characters long. Password is not directly stored in the DB. We encrypt passwords using SHA-1 encryption to provide security.

Supermarket

Suppliers

Purchase

Godowns

Restock

Showrooms

Sale

Customers

Items

Details

LOGOUT

Supplier ID	Supplier Name	Supplier Contact
1	Ramesh	9999998887
3	asd	1321654123
4	Supplier 1	1234567891
5	Supplier 2	9494949494

Add Suppliers :

Name

Contact

Add

Suppliers: We have a module where supplier details can be viewed and new suppliers can be added to the DB.

Add
Purchases :

Supplier ID

I(Ramesh)

Godown ID

I(Malpe)

Date of Purchase

mm/dd/yyyy

Add

[Back](#)

Items already added:

Item ID	Item Name	Quantity	Price per unit	Total price
1	Good day	2000	Rs.6 per piece	12000
2	Good day cashew	300	Rs.10 per piece	3000
6	Bread	30	Rs.30 per Loaf	900

All items

Item ID	Item Name	Item Units	Item Unit Price
1	Good day	piece	6
2	Good day cashew	piece	10
3	Good day golden	piece	12
4	Tomato	kg	20
5	Potato	kg	15
6	Bread	Loaf	30

Supermarket

Suppliers

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Items

Details

LOGOUT

7	Mango	kg	50
8	Banana	dozen	35
9	Cashew	kg	1000
10	Oranges	kg	50
11	Apples	kg	100
12	asd	piece	15

Add Items :

Item_ID

Quantity

Add

Purchase: We have a module to add purchase details to the DB. Only Godown Manager can authorize purchase for a Godown. Once a purchase is initiated, items can be added for this transaction from a list of all available items from the suppliers.

Supermarket
Suppliers
Purchase
Godowns
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Customers
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Details
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All Godowns

Godown ID	Godown Location	Manager Name
1	Malpe	K Rahul Reddy
2	Mangalore	Rahul
14	asd	Rahul
22	gdl	Sush
23	gd2	Sush

Add Godowns :

Location

Manager-ID

Supermarket
Suppliers
Purchase
Godowns
Restock
Showrooms
Sale
Customers
Items
Details
LOGOUT

Items in Godown

Item ID	Item Name	Quantity	Price per unit	Total price
1	Good day	100	Rs.6 per piece	600
2	Good day cashew	300	Rs.10 per piece	3000
3	Good day golden	80	Rs.12 per piece	960
5	Potato	480	Rs.15 per kg	6900
6	Bread	16	Rs.30 per Loaf	480
10	Oranges	100	Rs.50 per kg	5000

Purchase history

Date	Item ID	Item Name	Supplier ID	Supplier Name	Quantity	Price per unit	Total price
1970-01-01	10	Oranges	1	Ramesh	100	Rs.50 per kg	5000
1970-01-01	1	Good day	1	Ramesh	2000	Rs.6 per piece	12000

Godown: We have a Godown Module to manage and view Godown summary. Only one user(owner) is permitted to add Godowns and assign manager. We display all available godowns here. On clicking any of the Godowns, we can view all the details of all the items currently available in the Godown, Purchase history for the godown and restock history from the godown.

Supermarket

SuppliersPurchaseGodownsRestockShowroomsSaleCustomersItemsDetailsLOGOUT

Restock :

Showroom ID

1(Showroom 1)

Godown ID

1(Malpe)

Date of Restock

mm/dd/yyyy

Add

[Back](#)

Supermarket

SuppliersPurchaseGodownsRestockShowroomsSaleCustomersItemsDetailsLOGOUT

Items already added:

Item ID	Item Name	Quantity	Price per unit	Total price
1	Good day	1500	Rs.6 per piece	9000
5	Potato	20	Rs.15 per kg	300
6	Bread	10	Rs.30 per Loaf	300

All items

Item ID	Item Name	Item Units	Item Unit Price
1	Good day	100	600
2	Good day cashew	300	3000
3	Good day golden	80	960
5	Potato	480	6900
6	Bread	16	480
10	Oranges	100	5000

Restock: We have a module to add restock details to the DB. Godown Manager or Showroom Manager can authorize restock from a Godown to a Showroom. Once a restock is initiated, items can be added for this transaction from a list of all available items at the Godown.

All Showrooms

Showroom ID		Showroom Name	Showroom Location	Manager ID
1	⊕	Showroom 1	Surathkal	K Rahul Reddy
2	⊕	Showroom 2	Malpe	K Rahul Reddy
3	⊕	Showroom 3	Malore	Rahul
4	⊕	Sh3	NITK	Sush
5	⊕	sh4	Surat	K Rahul Reddy

Add Showrooms :

Name

Location

Manager-ID

Items in Showroom

Item ID	Item Name	Quantity	Price per unit	Total price
1	Good day	480	Rs.6 per piece	2880
5	Potato	18	Rs.15 per kg	270
6	Bread	10	Rs.30 per Loaf	300

Sale history

Item ID	Item Name	Customer ID	Customer Name	Quantity	Price per unit	Total price
1	Good day	1	Suresh	20	Rs.6 per piece	120
5	Potato	1	Suresh	2	Rs.15 per kg	30

Restock history

Item ID	Item Name	Godown ID	Quantity	Price per unit	Total price
1	Good day	2	1500	Rs.6 per piece	9000

6	Bread	2	10	Rs.30 per Loaf	300
6	Bread	14	14	Rs.30 per Loaf	420
1	Good day	2	400	Rs.6 per piece	2400
5	Potato	2	20	Rs.15 per kg	300
6	Bread	2	4	Rs.30 per Loaf	120

Employee details

Employee ID	Employee Name
1	Rahul
2	K Rahul Reddy
3	Sush

Add Employees :

Employee- ID

1(Rahul)

Add

Showroom: We have a Showroom Module to manage and view Showroom summary. Only one user(owner) is permitted to add Showrooms and assign manager. We display all available showrooms here. On clicking any of the Showrooms, we can view all the details of all the items currently available in the Showroom, Restock history from various godowns to the showroom and sale history from the showroom to customers. Also, Manager can add Employees working in a Showroom.

Supermarket
Suppliers
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Sales :

Customer ID
1(Suresh)

Showroom ID
1(Surathkal)

Date of Sale
mm/dd/yyyy

Add

Back

Supermarket
Suppliers
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Godowns
Restock
Showrooms
Sale
Customers
Items
Details
LOGOUT

Items already added:

Item ID	Item Name	Quantity	Price per unit	Total price
1	Good day	20	Rs.6 per piece	120
5	Potato	2	Rs.15 per kg	30

All items

Item ID	Item Name	Item Units	Item Unit Price
1	Good day	480	2880
5	Potato	18	270
6	Bread	10	300

Add Items :

Item_ID

Quantity

Sale: We have a module to add sale details to the DB. Sale can be initiated by employees. Once a sale is initiated, items can be added for this transaction from a list of all available items at the Showroom.

Supermarket

Suppliers

Purchase

Godowns

Restock

Showrooms

Sale

Customers

Items

Details

LOGOUT

Customer ID	Customer Name	Sales Exec ID	Contact Number
1	Suresh	2	9999999995
2	Ram	1	1234567890
3	Hitesh	1	1212121212
4	Ramesh	1	7897897899

Add Customers :

Name

Contact

Add

Customer: We have a module where customers can be added to the DB. The Employee registering the customer will be automatically be added as the Sales Executive for that customer.

Supermarket

[Suppliers](#)[Purchase](#)[Godowns](#)[Restock](#)[Showrooms](#)[Sale](#)[Customers](#)[Items](#)[Details](#)[LOGOUT](#)

All Items

Item ID	Item Name	Item Units	Item Unit Price
1	Good day	piece	6
2	Good day cashew	piece	10
3	Good day golden	piece	12
4	Tomato	kg	20
5	Potato	kg	15
6	Bread	Loaf	30
7	Mango	kg	50
8	Banana	dozen	35
9	Cashew	kg	1000
10	Oranges	kg	50
11	Apples	kg	100

Supermarket

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11	Apples	kg	100
12	asd	piece	15

Add Items :

Name

Units of Measurement

Price per unit

Add

[Back](#)

Items: We have a module where new type of products can be added to the DB. This contains all the items and their details like price and Units of measurement. This helps in calculation of prices in all other modules.

Supermarket

SuppliersPurchaseGodownsRestockShowroomsSaleCustomersItemsDetailsLOGOUT

Employees under you

Employee ID	Employee Name	Employee Contact
2	K Rahul Reddy	9999999999
4	abc	9999999994

Your contact details

Employee ID	Employee Address	Employee Contact
1	asdasd131	9879635456
1	asdasd131	9999999994

Add Phone

Number

Details: We have a module where an Employee can view details of himself and all other employees working under them. This section can be used to add Contact Numbers by the employee.

5. TOOLS

FRONT END TOOLS

The Supermarket Management System uses the standard front end tools; HTML5 and CSS3 along with a CSS library, Bootstrap4.

HTML stands for Hyper Text Markup Language and it is the most widely used language to develop web pages. HTML5 is the fifth and current major version of HTML. Its goals were to improve the language with support for the latest multimedia and other new features; to keep the language both easily readable by humans and consistently understood by computers and devices such as web browsers, parsers, etc. HTML5 includes detailed processing models to encourage more interoperable implementations; it extends, improves and rationalizes the markup available for documents, and introduces markup and application programming interfaces (APIs) for complex web applications.

CSS stands for Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language like HTML. CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file, and reduce complexity and repetition in the structural content.

Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains CSS- and (optionally) JavaScript-based design templates for typography, forms, buttons, navigation and other interface components. Bootstrap focuses on simplifying the development of informative web pages. Once added to a project, Bootstrap provides basic style definitions for all HTML elements. The result is a uniform appearance for prose, tables and form elements across web browsers. In addition, we can take advantage of CSS classes defined in Bootstrap to further customize the appearance of their contents.

BACKEND TOOLS

Backend tools used in this project are PHP programming language and XAMPP web server to host MySQL database on the localhost system.

XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in PHP and Perl programming languages. Since most actual web server deployments use the same components as XAMPP, it makes transitioning from a local test server to a live server possible. XAMPP also provides support for creating and manipulating databases in MariaDB, MySQL and SQLite among others. This project uses XAMPP to host MySQL and Apache servers to run the Supermarket Management System locally or on internal networks. This provides extra safety from external attacks and improved convenience for setup.

PHP stands for PHP: Hypertext Preprocessor is a general-purpose programming language designed for web development. PHP code may be executed with a command line interface (CLI), embedded into HTML code, or used in combination with various web template systems, web content management systems, and web frameworks. The usage of PHP in the Supermarket Management System project is done alongside HTML and CSS. Here, PHP is used as a connection between the frontend of the System and the database and the tables in the backend. PHP commands carry the MySQL queries to the backend from the frontend after embedding the data received from the user interacting with frontend of the System.

MySQL stands for My- Structured Query Language and is an open-source relational database management system (RDBMS). MySQL is offered under two different editions: the open source MySQL Community Server and the proprietary Enterprise Server. This project uses the open source version of MySQL thus providing global access for development and review of the system if need be. MySQL is used to create, maintain and protect the database and to add, manipulate and retrieve data stored in the database tables.

6. RESULTS

With a total of 16 tables, our Database can store all the data regarding Suppliers, Godowns, Restockings, Showrooms, Sales, Customers and other info for maintaining an Enterprise with multiple outreaches. Though we have implemented this project as a Supermarket DB, any other business chain with similar structure can easily adapt this structure for their use. Since we have used PHP as the server-side language, support is easily available for future work or reference.

Table	Action	Rows	Type	Collation	Size	Overhead
customer		4	InnoDB	latin1_swedish_ci	32 K1B	-
employee		4	InnoDB	latin1_swedish_ci	32 K1B	-
employee_contacts		4	InnoDB	latin1_swedish_ci	16 K1B	-
godown		5	InnoDB	latin1_swedish_ci	32 K1B	-
godown_item_details		9	InnoDB	latin1_swedish_ci	32 K1B	-
item		12	InnoDB	latin1_swedish_ci	16 K1B	-
purchase		6	InnoDB	latin1_swedish_ci	48 K1B	-
purchase_item_details		9	InnoDB	latin1_swedish_ci	32 K1B	-
restock		4	InnoDB	latin1_swedish_ci	48 K1B	-
restock_item_details		8	InnoDB	latin1_swedish_ci	32 K1B	-
sale		4	InnoDB	latin1_swedish_ci	48 K1B	-
sale_item_details		4	InnoDB	latin1_swedish_ci	32 K1B	-
showroom		6	InnoDB	latin1_swedish_ci	32 K1B	-
showroom_employee_details		5	InnoDB	latin1_swedish_ci	32 K1B	-
showroom_item_details		4	InnoDB	latin1_swedish_ci	32 K1B	-
supplier		4	InnoDB	latin1_swedish_ci	16 K1B	-
16 tables	Sum	92	InnoDB	latin1_swedish_ci	512 K1B	0 B

Database structure as seen in the MySQL server.

We have been able to provide smooth transactions for purchases, restocking, and sales based on available quantities of items without errors. The structured approach followed throughout the course helped us design this database schema, which made the implementation part very easy and smooth.