VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELAGAVI, KARNATAKA- 590018

PROJECT REPORT

ON

COLD STORAGE MANAGEMENT SYSTEM

Submitted in partial fulfillment of the requirements as a part of DBMS Lab for the V Semester of degree of **Bachelor of Engineering in Computer Science and Engineering** of Visvesvaraya Technological University, Belagavi

Submitted by

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CERTIFICATE

This is to certify that the project work entitled "COLD STORAGE MANAGEMENT SYSTEM" is a bonafide work carried out by Khushi Rani (1JS20CS079), M Varsha (1JS20CS086) and Raj Harsh (1JS20CS124) in partial fulfillment of the requirements for DBMS Laboratory with Mini Project (18CSL58) of 5th Semester Bachelor of Engineering in Computer Science and Engineering of the Visvesvaraya Technological University, Belgavi during the academic year 2022-2023.It is certified that all corrections and suggestions indicated for Internal Assessment have been incorporated in the report deposited in the department Library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said degree.

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1. ……... ……..

2. ……... ……..

Abstract

The World of data is constantly changing and evolving every second. This in turn has created a completely new dimension of growth and challenges for companies around the globe. By accurately recording data,storing, updating and tracking them on an efficient and regular basis,companies can address their challenges on one hand and make use of the immense potentials offered by this sector on the other hand. A database management system stores,organizes and manages a large amount of information within a single software application. The use of this system increases efficiency of business operations and reduce overall costs.

Cold storage stores are facilities that are specifically designed to maintain a low temperature in order to preserve perishable goods such as food, medicine, and flowers. These facilities play an important role in the food industry by extending the shelf life of products and reducing food waste. The use of cold storage technology allows products to be stored for longer periods of time while maintaining their freshness and quality. A typical cold storage facility includes a refrigeration system, which maintains the low temperature, and insulation to prevent heat gain.

The CSMS will also include a security module that will ensure that only authorized personnel have access to the system and the data stored within it. This will include the implementation of user authentication and access controls to ensure that only authorized personnel can access and modify the data. The system will also include an audit trail feature that will keep track of all the changes made to the data and who made them, in order to maintain transparency and accountability.

The CSMS will be designed to be scalable and adaptable, to cater to the needs of different types of cold storage facilities. The system can be easily customized to suit the specific requirements of the facility, including the type of products stored, the temperature and humidity range, and the capacity of the facility. This will enable the system to be used in various types of cold storage facilities such as refrigerated warehouses, frozen warehouses, and blast freezers. Additionally, the system can be integrated with other systems in the facility, such as automated inventory systems or temperature monitoring devices, to provide a comprehensive view of the facility's operations.

Acknowledgement

We express our humble pranams to His Holiness Jagadaguru Sri Sri Shivaratri Deshikendra Mahaswamiji for showering his blessings onus to receive good education and have a successful career.

The completion of any project involves the efforts of many people. We have been lucky enough to have received a lot of support from all ends during the course of this project. So. we take the opportunity to express our gratitude to all whose guidance and encouragement helped us emerge successful.

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Chapter 1: Preamble

1.1 Introduction

A database is an organized collection of data. A relational database, more restrictively, is a collection of schemas, tables, queries, reports, views, and other elements. A database management system (DBMS) is a computer-software application that interacts with end- users, other applications, and the database itself to capture and analyze data. A general-purpose DBMS allows the definition, creation, querying, update, and administration of databases. There is a need for an application to make it easy for industries and trading companies to maintain their records and have a track of goods. Supply chain management streamlines everything from product flow to unexpected natural disasters. With an effective COLD STORAGE MANAGEMENT, organizations can diagnose problems and disruptions correctly. COLD STORAGE MANAGEMENT plays an important role in moving items quickly and efficiently to destination.

Database Management System (DBMS)

Following the technology progress in the areas of processors, computer memory, computer storage, and computer networks, the sizes, capabilities, and performance of databases and their respective DBMSs have grown in orders of magnitude. The development of database technology can be divided into three eras based on data model or structure: navigational, SQL/relational, and post-relational. The two main early navigational data models were the hierarchical model, epitomized by IBM's IMS system, and the CODASYL model (network model), implemented in a number of products such as IDMS. The relational model employs sets of ledger-style tables, each used for a different type of entity. Only in the mid-1980s did computing hardware become powerful enough to allow the wide deployment of relational systems (DBMSs plus applications). By the early 1990s, however, relational systems dominated in all large-scale data processing applications, and as of 2015 they remain dominant: IBM DB2, Oracle, MySQL, and Microsoft SQL Server are the top DBMS. The dominant database language, standardized SQL for the relational model, has influenced database languages for other data models.

1.1.1 Python Programming

Python is a high-level, general-purpose programming language. Its design philosophy emphasizes code readability with the use of significant indentation. Python is dynamically-typed and garbage-collected. It supports multiple programming paradigms, including structured (particularly procedural), object-oriented and functional programming. It is often described as a "batteries included" language due to its comprehensive standard library. Guido van Rossum began working on Python in the late 1980s as a successor to the ABC programming language and first released it in 1991 as Python 0.9.0. Python 2.0 was released in 2000 and introduced new features such as list comprehensions, cycle-detecting garbage collection, reference counting, and Unicode support. Python 3.0, released in 2008, was a major revision not completely backward-compatible with earlier versions. Python 2.7.18, released in 2020, was the last release of Python 2. Python consistently ranks as one of the most popular programming languages.

1.1.2 VS Code

Visual Studio Code, also commonly referred to as **VS Code**, is a source-code editor made by Microsoft with the Electron Framework, for Windows, Linux and macOS. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git. Users can change the theme, keyboard shortcuts, preferences, and install extensions that add additional functionality. In the Stack Overflow 2021 Developer Survey, Visual Studio Code was ranked the most popular developer environment tool among 82,000 respondents, with 70% reporting that they use it.

Visual Studio Code is a source-code editor that can be used with a variety of programming languages, including C#, Java, JavaScript, Go, Node.js, Python, C++, C, Rust and Fortran. It is based on the Electron framework, which is used to develop Node.js web applications that run on the Blink layout engine. Visual Studio Code employs the same editor component (codenamed "Monaco") used in Azure DevOps. Visual

Studio Code can be extended via extensions, available through a central repository. This includes additions to the editor and language support.

1.1.3 Database - MySQL

MySQL is a fast, easy-to-use RDBMS being used for many small and big businesses. MySQL is developed, marketed and supported by MySQL AB, which is a Swedish company. MySQL is becoming so popular because of many good reasons. MySQL is released under an open-source license. So, we have nothing to pay to use it. MySQL is a very powerful program in its own right. It handles a large subset of the functionality of the most expensive and powerful database packages. MySQL uses a standard form of the well-known SQL data language.

MySQL works on many operating systems and with many languages including PHP, PERL, C, C++, JAVA, etc. It works very quickly and works well even with large data sets. MySQL is very friendly to PHP, the most appreciated language for web development. MySQL supports large databases, up to 50 million rows or more in a table. The default file size limit for a table is 4GB, but you can increase this (if your operating system can handle it) to a theoretical limit of 8 million terabytes (TB) and is customizable. The open-source GPL license allows programmers to modify the MySQL software to fit their own specific environments.

1.1.4 Normalization

Normalization is a process of organizing the data in database to avoid data redundancy, insertion anomaly, update anomaly & deletion anomaly. To overcome these anomalies, we need to normalize the data. There are 4 basic types of normalizations. They are:

- First normal form(1NF)
- Second normal form(2NF)
- Third normal form(3NF)
- Boyce & Codd normal form (BCNF)

First normal form (1NF) is defined as per rule as: an attribute (column) of a table cannot hold multiple values. It should hold only atomic values. This means that there shouldn't be repetition of data in the tables.

A table is said to be in 2NF if the two conditions stated are satisfied. The table is in First normal form and all the non-prime attribute are dependent on the proper subset of any candidate key of table. The attribute that is not part of any candidate key are known as non-prime attribute.

A table design is said to be in 3NF if the table is in 2NF and Transitive functional dependency of non-prime attribute on any super key are removed.

Boyce Codd normal form (BCNF) is the advance version of 3NF that's why it is also referred as 3.5NF. BCNF is stricter than 3NF. A table complies with BCNF if it is in 3NF and for every functional dependency X->Y, X should be the super key of the table.

1.2 Objectives

Objectives of the **COLD STORAGE MANAGEMENT SYSTEM** are:

- Prolonged shelf-life of fruits and vegetables
- Temperature Control
- Cost-effective
- Transportation of products
- Frees up space
- Storage for Chemicals

1.3 Organization of Report

Chapter 1 provides the information about the basics of Java Swings and MySQL. In **Chapter 2**, we discuss the software and hardware requirements to run the above applications. **Chapter 3** gives the idea of the project and its actual implementation. **Chapter 4** discusses about the results and discussions of the program. **Chapter 5** concludes by giving the direction for future enhancement.

1.4 Summary

The chapter discussed before is an overview about the **Python Programming, VS Code** and **MySQL Database DBMS**. The scope of study and objectives of the project are mentioned clearly. The organization of the report is been pictured to increase the readability. Further, coming up chapters depicts the use of various queries to implement various changes like insert, update, delete and also triggers to perform various functions.

Chapter 2 : Requirement Specifications

2.1 SOFTWARE SPECIFICATION

- **Operating System**: Windows 11 and Linux Mint
- **Front End**: HTML CSS
- **Rear End**: MySQL and Python Programming

2.2 HARDWARE SPECIFICATION

- Processor: x86 compatible processor with 1.7 GHz Clock Speed
- RAM: 512 MB or greater
- Hard Disk: 20 GB or grater
- Monitor: VGA/SVGA
- Keyboard: 104 keys standard
- Mouse: 2/3 button. Optical/Mechanical.

2.3 USER CHARACTERISTICS

Every user:

- Should be comfortable with basic working of the computer
- Must have basic knowledge of English
- Must carry a login ID and password used for authentication

Chapter 3: System Design and Implementation

3.1 Introduction

Systems design is the process or art of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. One could see it as the application of systems theory to product development. This Project is implemented using Python Programming and VS Code, which is proven to be a very efficient tool in the field of Java programming. It is done under Windows11 and Linux Mint platform. Library modules are used to create the objects and to translate them. Python programming language is used to implement the entire code. Interface to the program is provided with the help of MySQL Database.

3.2 Relational Schema

The schema diagram of a database system is its structure described in a formal language supported by the database management system (DBMS). The formal definition of a database schema is a set of formulas called integrity constraints imposed on a database. The term "schema" refers to the organization of data as a blueprint of how the database is constructed. These integrity constraints ensure compatibility between parts of the schema. All constraints are expressible in the same language. A database can be considered a structure in realization of the database language. The states of a created conceptual schema are transformed into an explicit mapping, the database schema. This describes how real-world entities are modeled in the database. A database schema specifies, based on the database administrator's knowledge of possible applications, the facts that can enter the database, or those of interest to the possible end-users."[2] The notion of a database schema plays the same role as the notion of theory in predicate calculus. A model of this "theory" closely corresponds to a database, which can be seen at any instant of time as a mathematical object. Thus a schema can contain formulas representing integrity constraints specifically for an application and the constraints specifically for a type of database, all expressed in the same database language.[1] In a relational database, the schema defines the tables, fields, relationships, views, indexes, packages, procedures, functions, queues, triggers, types, sequences, materialized views, synonyms, database links, directories, XML schemas, and other elements.

Figure 3.2 Schema is defined for an Inventory Management System. All the various table used are described in the following schema. The necessary Primary key’s and the corresponding Foreign keys are also represented.

3.3 ER Diagram

An entity–relationship model or the ER Diagram describes inter-related things of interest in a specific domain of knowledge. An ER model is composed of entity types and specifies relationships that can exist between instances of those entity types. In software engineering, an ER model is commonly formed to represent things a business needs to remember in order to perform business processes. Consequently, the ER model becomes an abstract data model, that defines a data or information structure which can be implemented in a database, typically a relational database. (**Figure 3.2** represents ER Diagram)

Entity–relationship modelling was developed for database and design by Peter Chen and published in a 1976 paper,[1] with variants of the idea existing previously, but today it is commonly used for teaching students the basics of data base structure.[2] Some ER models show super and subtype entities connected by generalization-specialization relationships,[3] and an ER model can be used also in the specification of domain-specific ontologies. An ER model is typically implemented as a database. In a simple relational database implementation, each row of a table represents one instance of an entity type, and each field in a table represents an attribute type.

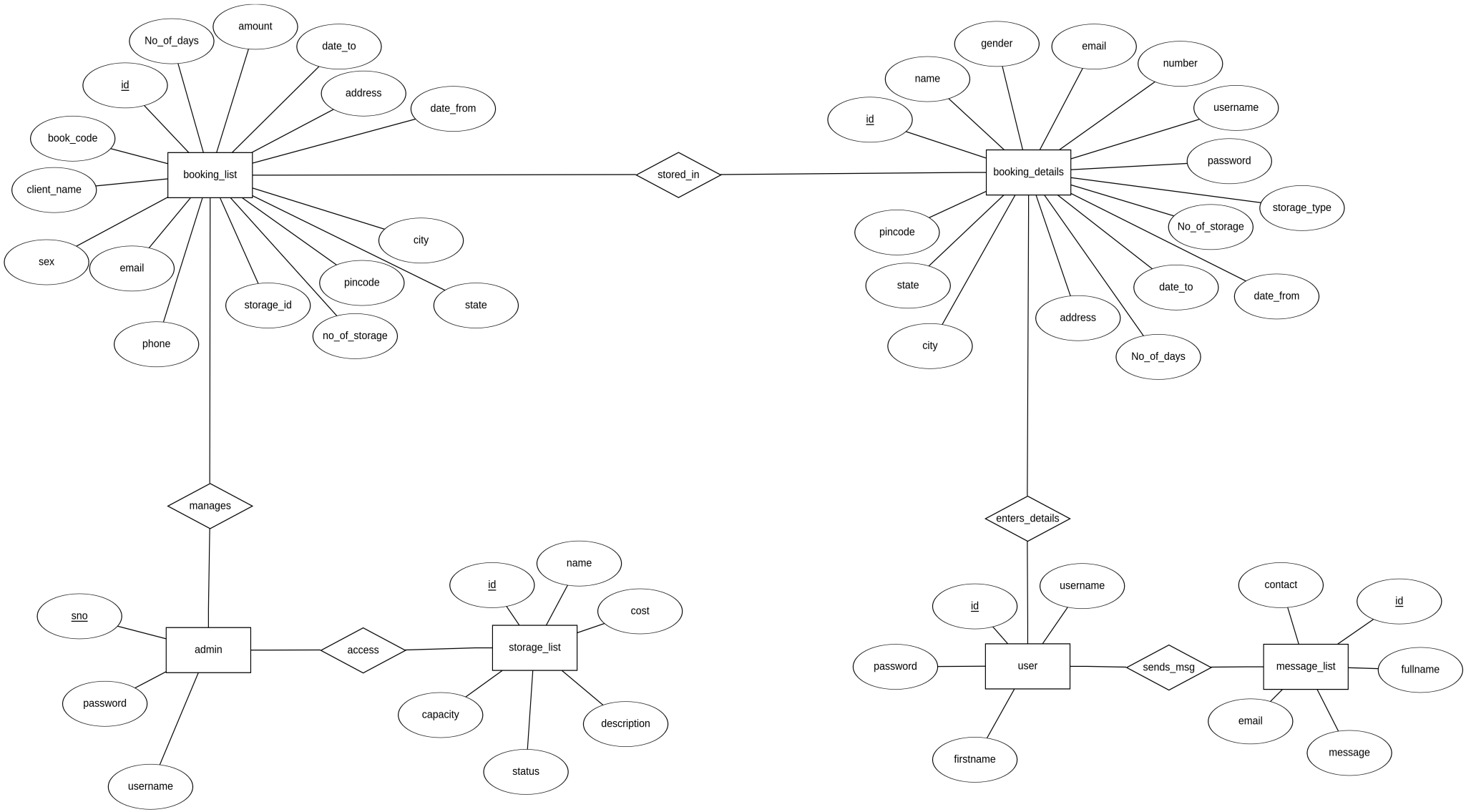


Fig: ER Diagram

Relational Schema:

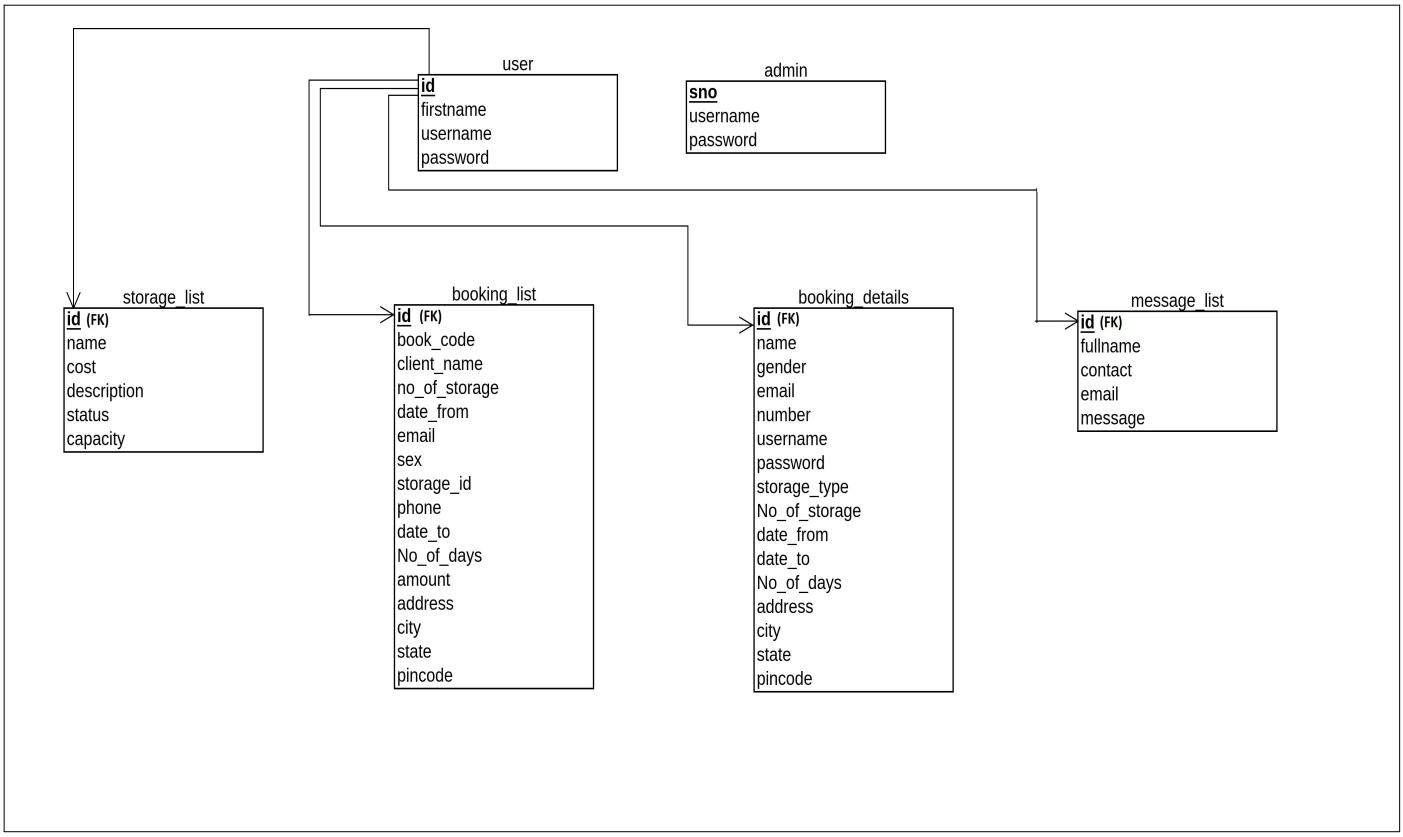


Figure 3.3 Schema Diagram

3.4 Queries

The below mentioned are all the queries used to perform various tasks in MySQL such as insert, delete, update. A short description of the query is also provided.

3.4.1 Creating Tables

1. booking_details:

```
CREATE TABLE `booking_details`
(
    `id` int(30) NOT NULL,
    `name` varchar(50) NOT NULL,
    `gender` text NOT NULL,
    `email` varchar(50) NOT NULL,
    `number` varchar(50) NOT NULL,
    `username` varchar(50) NOT NULL,
    `password` varchar(15) NOT NULL,
    `storage_type` int(5) NOT NULL,
    `No_of_storages` int(11) NOT NULL,
    `date_from` date NOT NULL,
    `date_to` date NOT NULL,
```

```
    `No_of_days` int(5) NOT NULL,
    `address` varchar(50) NOT NULL,
    `city` text NOT NULL,
    `state` text NOT NULL,
    `pincode` int(10) NOT NULL
);
```

Field	Type	Null	Key	Default	Extra
id	int	not NULL	Primary Key	None	
name	varchar	not NULL		None	
gender	text	not NULL		None	
email	varchar	not NULL		None	
number	varchar	not NULL		None	
username	varchar	not NULL		None	
password	varchar	not NULL		None	
storage_type	text	not NULL		None	
No_of_storage	text	not NULL		None	
date_from	date	not NULL		None	
date_to	date	not NULL		None	
No_of_days	int	not NULL		None	
address	varchar	not NULL		None	
city	text	not NULL		None	
state	text	not NULL		None	
pincode	int	not NULL		None	

Table 3.4.1 booking_details

2. booking_list:

```
CREATE TABLE `booking_list`
(
    `id` int(30) NOT NULL,
    `book_code` varchar(100) NOT NULL,
    `client_name` varchar(50) NOT NULL,
    `gender` text NOT NULL,
    `email` varchar(50) NOT NULL,
    `number` varchar(50) NOT NULL,
    `username` varchar(50) NOT NULL,
    `password` varchar(15) NOT NULL,
    `storage_type` int(5) NOT NULL,
    `No_of_storages` int(11) NOT NULL,
    `date_from` date NOT NULL,
    `date_to` date NOT NULL,
    `No_of_days` int(5) NOT NULL,
    `address` varchar(50) NOT NULL,
    `city` text NOT NULL,
```

```
`state` text NOT NULL,
`pincode` int(10) NOT NULL
);
```

Field	Type	Null	Key	Default	Extra
id	int	not NULL	Primary Key	None	
book_code	varchar	not NULL		None	
client_name	varchar	not NULL		None	
gender	text	not NULL		None	
email	varchar	not NULL		None	
number	varchar	not NULL		None	
username	varchar	not NULL		None	
password	varchar	not NULL		None	
storage_type	text	not NULL		None	
No_of_storage	text	not NULL		None	
date_from	date	not NULL		None	
date_to	date	not NULL		None	
No_of_days	int	not NULL		None	
address	varchar	not NULL		None	
city	text	not NULL		None	
state	text	not NULL		None	
pincode	int	not NULL		None	

Table 3.4.2 booking_list

3. message_list:

```
CREATE TABLE `message_list`
(
    `id` int(5) NOT NULL,
    `fullname` text NOT NULL,
    `contact` text NOT NULL,
    `email` text NOT NULL,
    `message` text NOT NULL
) ;
```

Field	Type	Null	Key	Default	Extra
id	int	not NULL	Primary Key	None	
fullname	text	not NULL		None	
contact	test	not NULL		None	
email	text	not NULL		None	
message	text	not NULL		None	

Table 3.4.3 message_list

4. admin:

```
CREATE TABLE `admin`
(
    `sno` int(1) NOT NULL,
    `username` varchar(20) NOT NULL,
```

```
    `password` varchar(10) NOT NULL
);
```

Field	Type	Null	Key	Default	Extra
sno	int	not NULL	Primary Key	None	
username	varchar	not NULL		None	
password	varchar	not NULL		None	

Table 3.4.4 admin

5. users:

```
CREATE TABLE `users`
(
    `id` int(50) NOT NULL,
    `firstname` varchar(250) NOT NULL,
    `username` text NOT NULL,
    `password` text NOT NULL
);
```

Field	Type	Null	Key	Default	Extra
id	int	not NULL	Primary Key	None	
firstname	varchar	not NULL		None	
username	text	not NULL		None	
password	text	not NULL		None	

Table 3.4.5 users

6. storage_list:

```
CREATE TABLE `storage_list`
(
    `id` int(30) NOT NULL,
    `name` text NOT NULL,
    `cost` float NOT NULL DEFAULT 0,
    `description` text NOT NULL,
    `Capacity` int(5) NOT NULL,
    `status` text NOT NULL DEFAULT 'Available'
);
```

Field	Type	Null	Key	Default	Extra
id	int	not NULL	Primary Key	None	
name	text	not NULL		None	
cost	float	not NULL		None	
description	text	not NULL		None	
capacity	int	not NULL		None	
status	text	not NULL		None	

Table 3.4.5 storage_lists

3.4.2 Inserting values into Tables

Actual data stored in the database

1. INSERT INTO `admin` (`sno`, `username`, `password`) VALUES(1, 'Varsha_7', 'varsha7007');

2. INSERT INTO `booking_details` (`id`, `name`, `gender`, `email`, `number`, `username`, `password`, `storage_type`, `No_of_storages`, `date_from`, `date_to`, `No_of_days`, `address`, `city`, `state`, `pincode`) VALUES(2, 'Varsha', 'Female', 'varshacs086@gmail.com', '6299188694', 'varsha_8', '1js20cs086', 1, 2, '2023-01-18', '2023-01-24', 0, 'JSSATE Girls Hostel', 'Bangalore', 'Karnataka', 560060);

3. INSERT INTO `booking_list` (`id`, `book_code`, `client_name`, `sex`, `email`, `Phone`, `storage_id`, `No_of_storages`, `date_from`, `date_to`, `No_of_days`, `amount`, `address`, `city`, `state`, `pincode`) VALUES(1, 'KVR-0000000001', 'M Kartik Kumar', 'Male', 'kartiksachu@gmail.com', '9876546752', 5, 2, '2021-12-17', '2021-12-31', 14, 14000, 'Jayanagar', 'Bangalore', 'Karnataka', 560090);

4. INSERT INTO `message_list` (`id`, `fullname`, `contact`, `email`, `message`) VALUES(1, 'Khushi Rani', '09123456789', 'khushi@gmail.com', '--');

5. INSERT INTO `storage_list` (`id`, `name`, `cost`, `description`, `Capacity`, `status`) VALUES(1, 'Storage 1', 250, 'KVR refrigerated containers come in a variety of sizes from 10ft to 45ft and have a temperature range of -40°C to +10°C. Most cold store units are portable and can be used to transport goods safely. Mega Cold Stores are also a popular option for larger businesses. These units are combined with multiple cold storage units to make a mega refrigerated solution.\r\nThe air conditioning cold room is used for long-term storage of fresh fruits, vegetables, etc. In addition to the control of temperature and moisture in the cold room, we need to consider the respiration of plants in the cold room at the same time, but also regulate and control O2, CO, N2, and ethylene, inhibits respiration and metabolism of fruits and vegetables in a dormant state, in order to achieve the purpose of long-term storage.\r\n\r\n', 5, 'Available');

6. INSERT INTO `users` (`id`, `firstname`, `username`, `password`) VALUES(1, 'Khushi', 'khushi_rani', '4744ddea876b11dcb1d169fadf494418'),

3.4.3 Query to demonstrate Deleting the value in the table:

```
@app.route("/delete/<string:id>", methods=['GET','POST'])
def delete(id):
booking_list=Booking_list.query.filter_by(id=id).first()
db.session.delete(booking_list)
db.session.commit()
return  "Successfully Deleted"
```

Description: This query is used to delete a row in booking_details table when the name entered in text field matches in the booking_details table of database.

3.4.4 Stored Procedures

A stored procedure is nothing more than prepared SQL code that the developer saves so the application can reuse the code over and over again. So, if the developer thinks about a query that you write over and over again, instead of having to write that query each time you would save it as a stored procedure and then just call the stored procedure to execute the SQL code that you saved as part of the stored procedure.

Procedure:

1. **getstorage:**

```
DROP PROCEDURE `getstorage`; CREATE DEFINER=`root`@`localhost`
PROCEDURE `getstorage`(IN `sid` INT) NOT DETERMINISTIC CONTAINS SQL
SQL SECURITY DEFINER select * from storage_list WHERE id=sid
```

2. **getuserdetails:**

```
DROP PROCEDURE `getuserdetails`; CREATE DEFINER=`root`@`localhost`
PROCEDURE `getuserdetails`(IN `bcode` VARCHAR(100)) NOT
DETERMINISTIC CONTAINS SQL SQL SECURITY DEFINER SELECT * from
booking_list WHERE book_code=bcode
```

Description: Here whenever the Stored Procedure is called the storage details and user details table will be displayed accordingly

3.4.5 Triggers

Triggers are stored programs, which are automatically executed or fired when some events occur. Triggers are stored into database and invoked repeatedly, when specific condition match.

Trigger:

1. **get_bookcode :**

```
DROP TRIGGER IF EXISTS `get_bookcode`;
CREATE DEFINER=`root`@`localhost` TRIGGER `get_bookcode` BEFORE
        INSERT ON `booking_list` FOR EACH ROW BEGIN SET
        NEW.book_code=CONCAT ("KVR-",LPAD(LAST_INSERT_ID(),10 ,"0"));
END
```

2. **insert_user :**

```
DROP TRIGGER IF EXISTS `insert_user`;
CREATE DEFINER=`root`@`localhost` TRIGGER `insert_user` AFTER INSERT
ON `booking_details` FOR EACH ROW INSERT INTO users VALUES (null,NEW
.name,NEW.username,NEW.password)
```

3. **booking_list :**

```
DROP TRIGGER IF EXISTS `insert_booking_list`;
CREATE DEFINER=`root`@`localhost` TRIGGER `insert_booking_list` AFTER
INSERT ON `booking_details` FOR EACH ROW INSERT INTO booking_list
VALUES(null,null,NEW.name,NEW.gender,NEW.email,NEW.number,
NEW.storage_type,NEW.No_of_storages,NEW.date_from,NEW.date_to,NEW.
No_of_days,NEW.No_of_storages*NEW.No_of_days*500,NEW.address,
NEW.city,NEW.state,NEW.pincode)
```

Description: This trigger is triggered when the insertion or deletion is done on the booking_details table and the rows in booking_lists are modified.

3.5 Pseudo Code

Pseudocode is a simple, informal language used to describe the logic of a computer program or algorithm. It is not a formal programming language, but rather a way to express algorithms and ideas in a readable and understandable form. The syntax of pseudocode is designed to be similar to that of a programming language, but it is not bound by the same strict rules and conventions.

Pseudocode is typically used to express the logic of a program or algorithm before it is implemented in a specific programming language. It is used to plan and design the logic of a program, and to communicate the logic to other programmers. Pseudocode is also used to teach programming concepts, as it is easier to understand than a specific programming language.

3.5.1 Algorithm for Login

Step 1: BEGIN
Step 2: Enter username and password
Step 3: Verify the credentials entered with that in the login table
Step 4: If Credentials match, then proceed to the Admin page
Else show login failed
Step 5: End if
Step 6: END

3.5.2 Algorithm for Table Display

Step 1: BEGIN
Step 2: Establish connection with the database using the username and password of the database.
Step 3: Define the select query to retrieve all the values from the DBMS
Step 4: Define DefaultTableModel for the table and fetch the details from the database.
Step 5: END

3.5.3 Algorithm for Insert

Step 1: BEGIN
Step 2: Get all the necessary values required for insertion into variable defined in the method.
Step 3: Define the query for insertion as stated above.
Step 4: Execute the Query using the (Select * from) the required table.
Step 5: END

3.5.4 Algorithm for Update

Step 1: BEGIN
Step 2: Get all the necessary values required for updating the values into the variable defined in the method.
Step 3: UPDATE table name
SET column1 = value1, column2 = value2, ...
WHERE condition;
Step 4: Define the Query for Updating as stated above.
Step 5: Execute the Query using the executeUpdate() method defined.
Step 6: END

3.5.5 Algorithm for Delete

Step 1: BEGIN
Step 2: Get the model number of the instrument which is to be deleted into variable defined in the method.
Step 3: Delete from table_name where condition;
Step 4: Define the Query for deleting as stated above.
Step 5: Execute the Query using the executeUpdate() method defined .
Step 6: END

Chapter 4: Results and Discussions

The project is compiled and executed using Python programming and MySQL. We have put in few screen shots here to show the working of our Application.

phpMyAdmin (XAMPP)

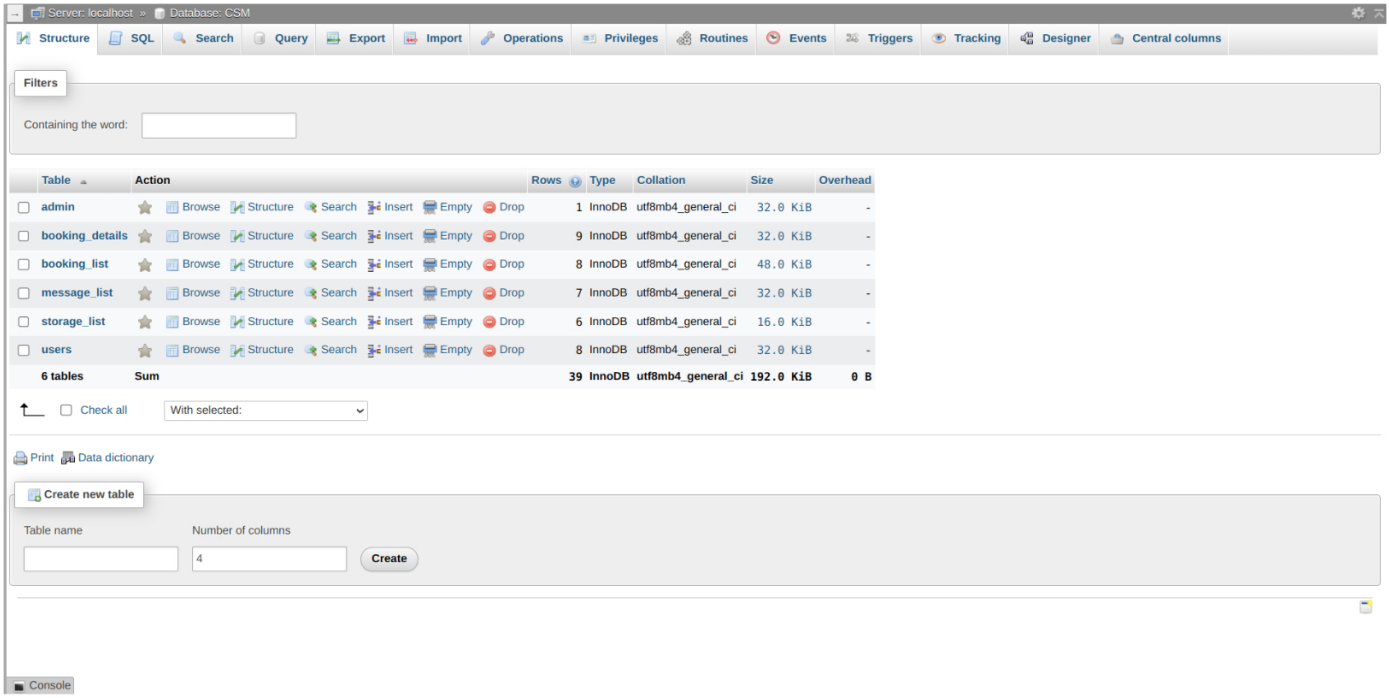


Figure: Database

VS Code

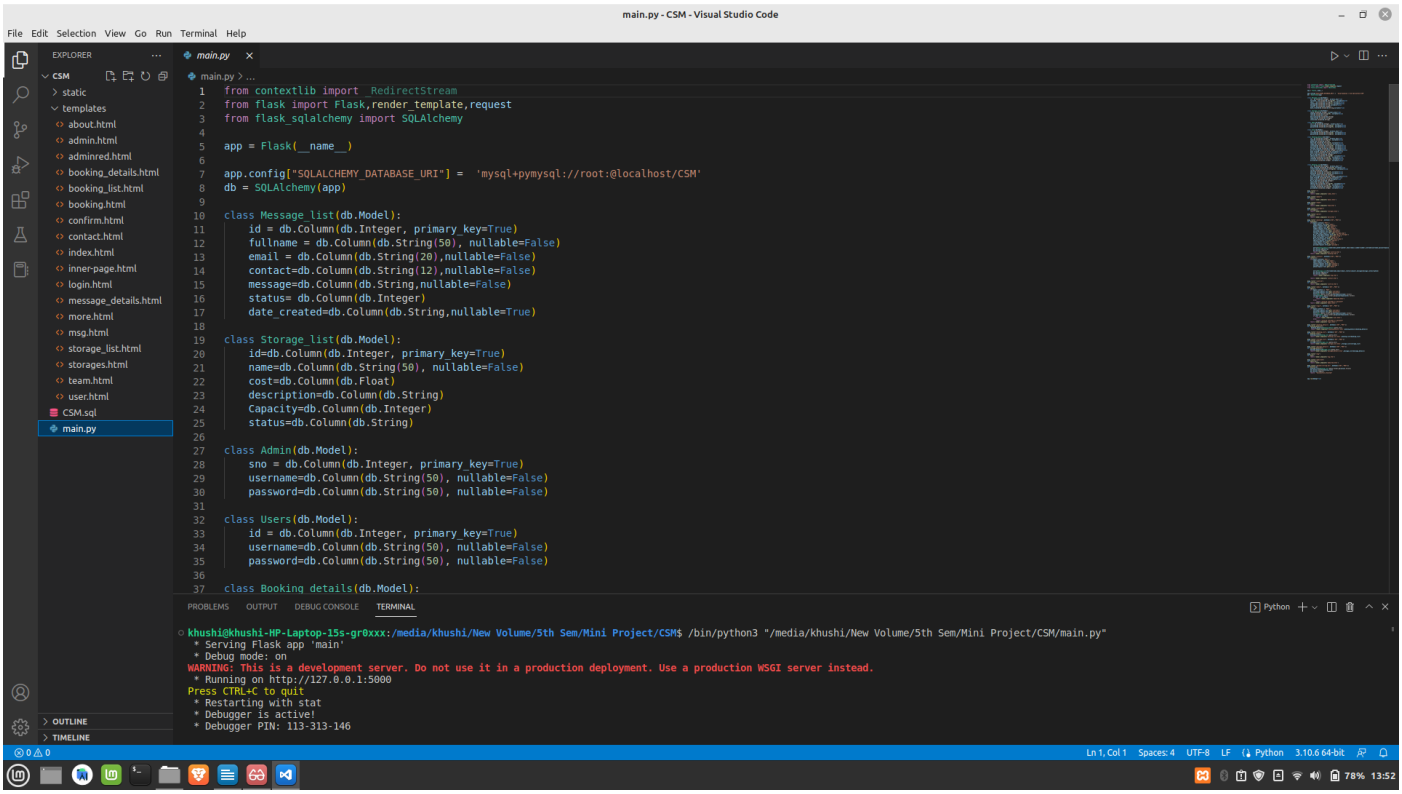


Figure: Python Programming using VS Code

Index Page

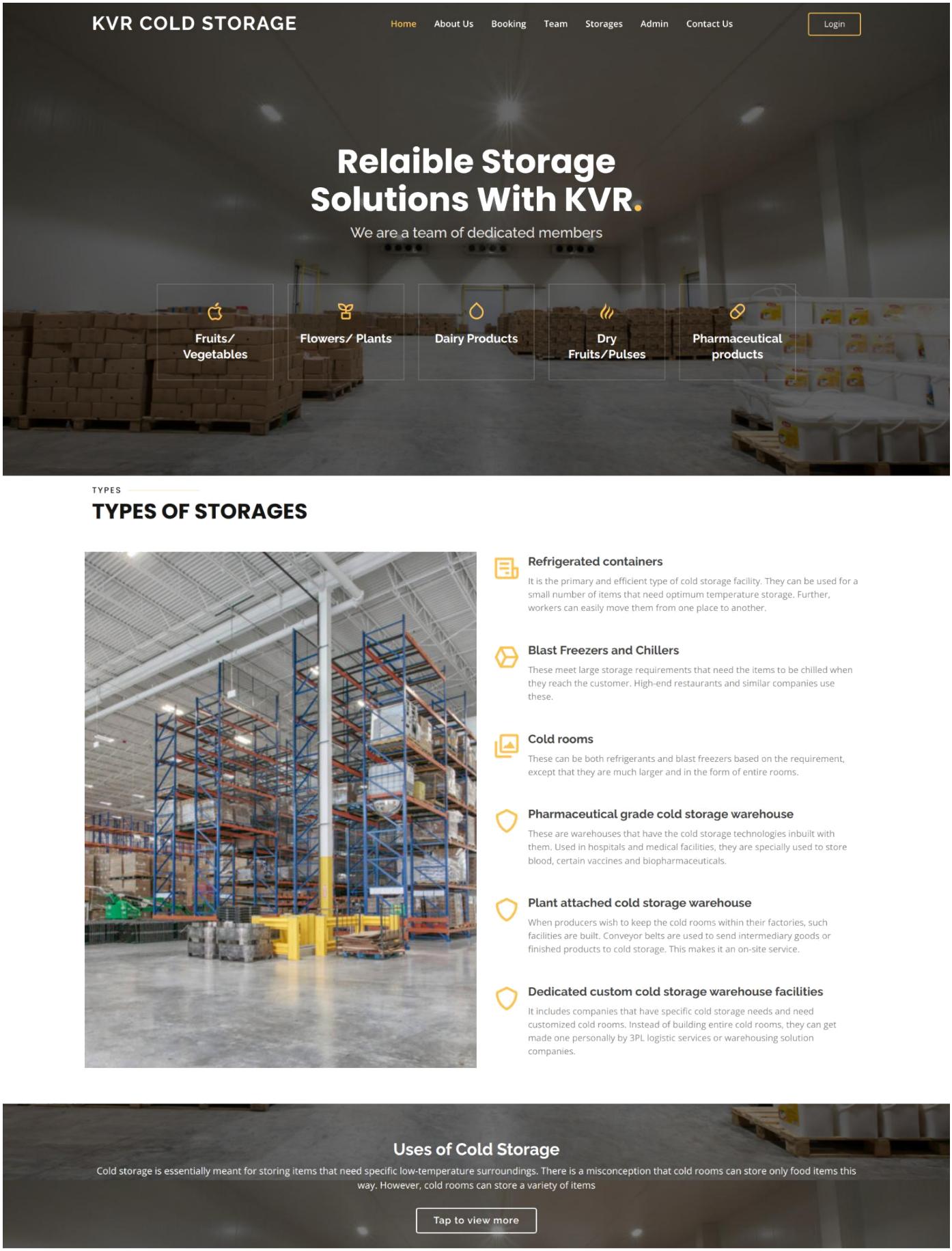


Figure: Index page

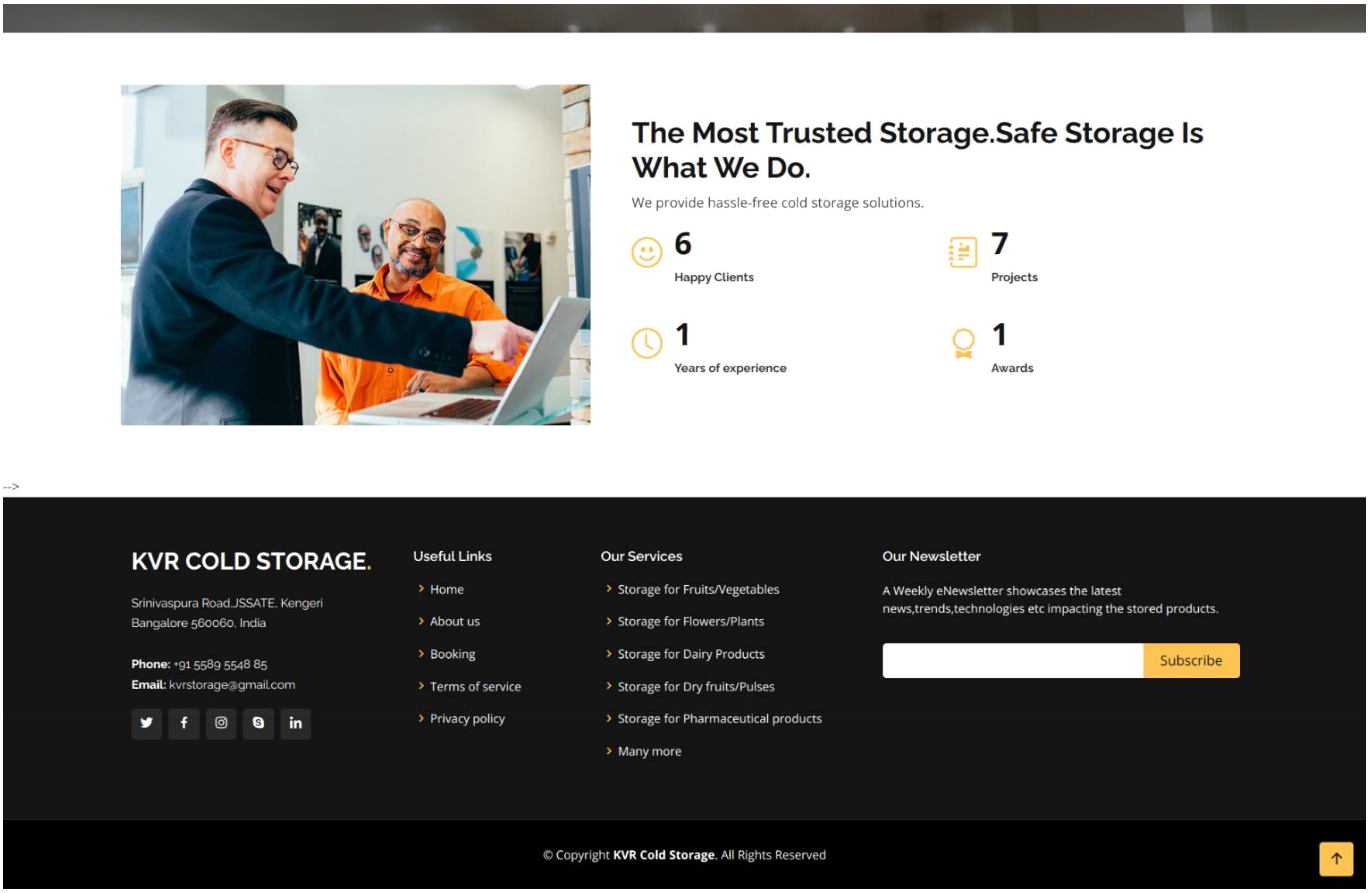


Figure: Index page

About us

ABOUT

ABOUT US

Welcome to KVR Cold Storage.

KVR COLD STORAGE

Cold storage is a facility that primarily stores items that are short-lived and highly likely to get spoilt under normal conditions. These may include fruits, vegetables, fish, meat etc. These food items are stored under optimum temperature(primarily low) and humid environment as required for individual items. Almost all cold storage rooms are designed such that these properties are pre-configured based on what is being stored. Some cold rooms are made such that these properties are adjustable.

Construction and Working of a Cold Storage Plant

A cold-storage facility works on a refrigeration system which helps maintain an adequate temperature and environment as per the specifications of each item being stored. These are the main components of a cold storage room:

- **Compressor** :It is the main component that runs the cold room. It is the only device that needs the energy to run. The compressor consumes almost all the power in a cold room. It is used to raise the temperature and pressure of the refrigerant vapour coming out of the Evaporator. As the pressure is increased, the boiling point increases and the compressor can condense the refrigerant(for example, ammonia) at the temperature of the condenser.
- **Condenser** : It is required to remove the heat from the refrigerant and the circulating water. It carries out phase change of the condenser from gas to liquid at high temperature and pressure. The condenser acts as a heat sink, and its heat exchange efficiency determines the efficiency of the cold storage plant.
- **Receiver** : The high-pressure liquid condensate is stored here. It is here that the refrigerant comes after phase change from the condenser. After it has reached the receiver component, the liquid refrigerant goes to the expansion valve to decrease the temperature and pressure.
- **Expansion Valve** : It reduces the temperature and pressure of the refrigerant using a throttling device. The throttling process occurs through friction and there is a change in the temperature and pressure of the refrigerant. Its pressure changes from that in the Receiver to that in the Evaporator.
- **Evaporator** : The cyclic process that decreases the temperature of the items stored takes place here. It takes heat from the storage compartment or atmosphere that is supposed to be cooled. This heat is then used to vaporize the liquid refrigerant. This way, the food items are cooled and preserved.
- **Blowers** : The cooled air is spread across the room through the convection process, thus, achieving the desired temperature of the room.

In short, the refrigerant's boiling point is reduced by increasing its temperature and pressure by the compressor. Heat is removed from the refrigerant as it is changed from gaseous to the liquid state by the condenser. Now the refrigerant is transferred to the reservoir for storage. Further, the refrigerant is moved to an expansion valve to reduce the temperature and pressure in the liquid state. The last step takes place in the Evaporator, where the heat from the surroundings is used to change the refrigerant again to a gaseous state, thus causing the cooling effect. The blower circulates this cool air.

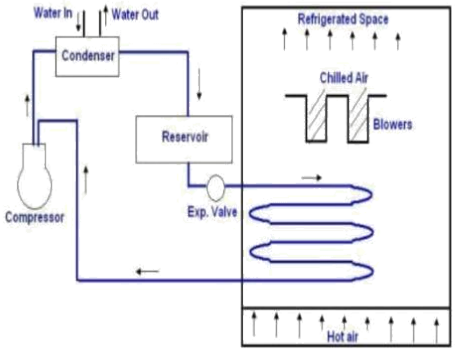


Figure: About us

Booking

- Bookings can be made by filling the given form in the booking section.
- The compartment will be allocated according to the booking requirements filled by the user in the booking form.

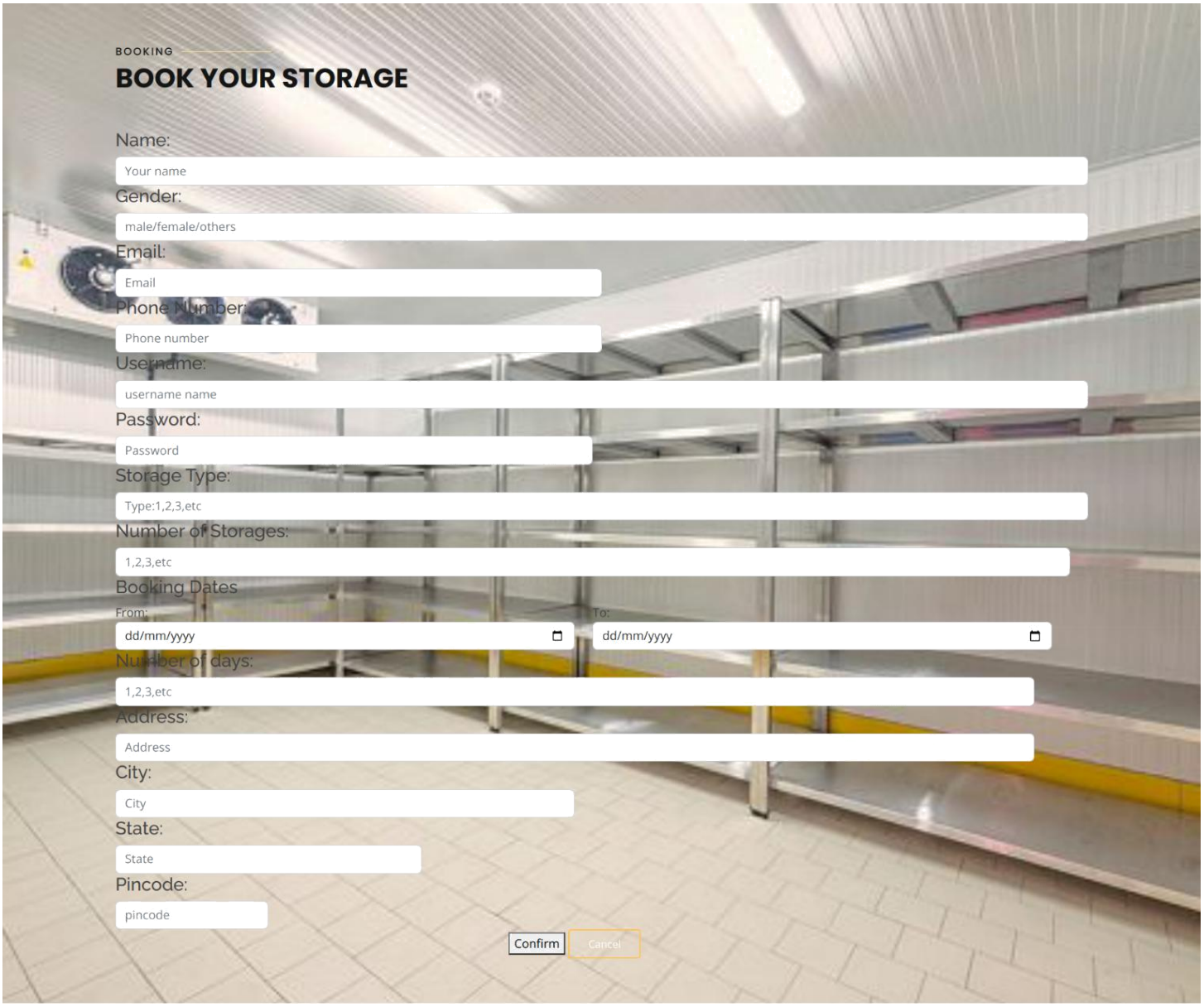


Figure: Booking Page

Storages

- Storages available along with their fares for 1 day

STORAGES

CHECK OUR STORAGES

Storage 1

Book Details

250 INR /day/storage

Storage 2

Book Details

350 INR /day/storage

Storage 3

Book Details

280 INR /day/storage

Storage 4

Book Details

450 INR /day/storage

Storage 5

Book Details

500 INR /day/storage

Storage 6

Book Details

550 INR /day/storage

Figure: Storage Selection Page

Admin Login

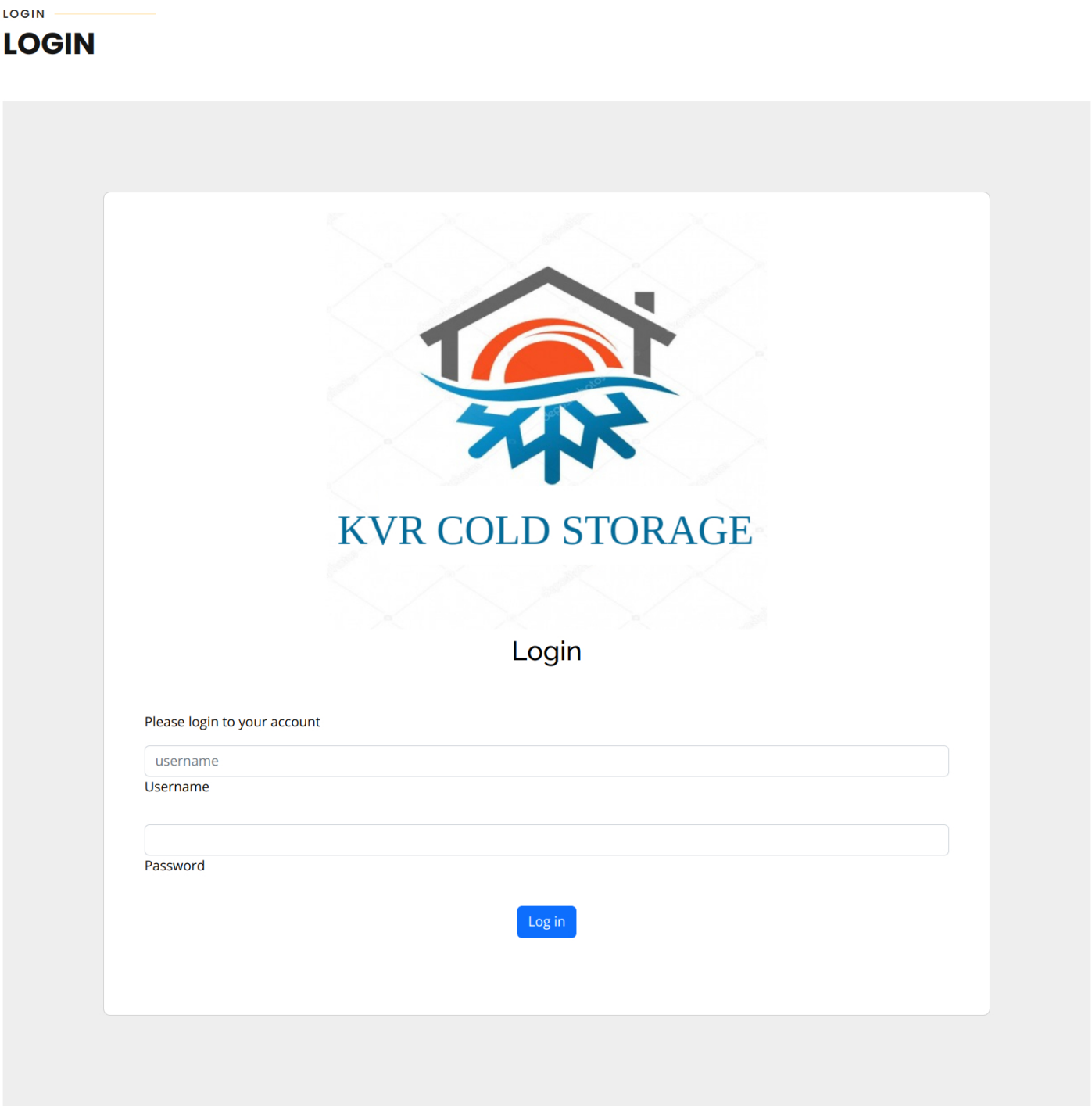


Figure: Admin Login Page

Admin Section

There are two options under admin sections:

- Booking Details
- Reviews

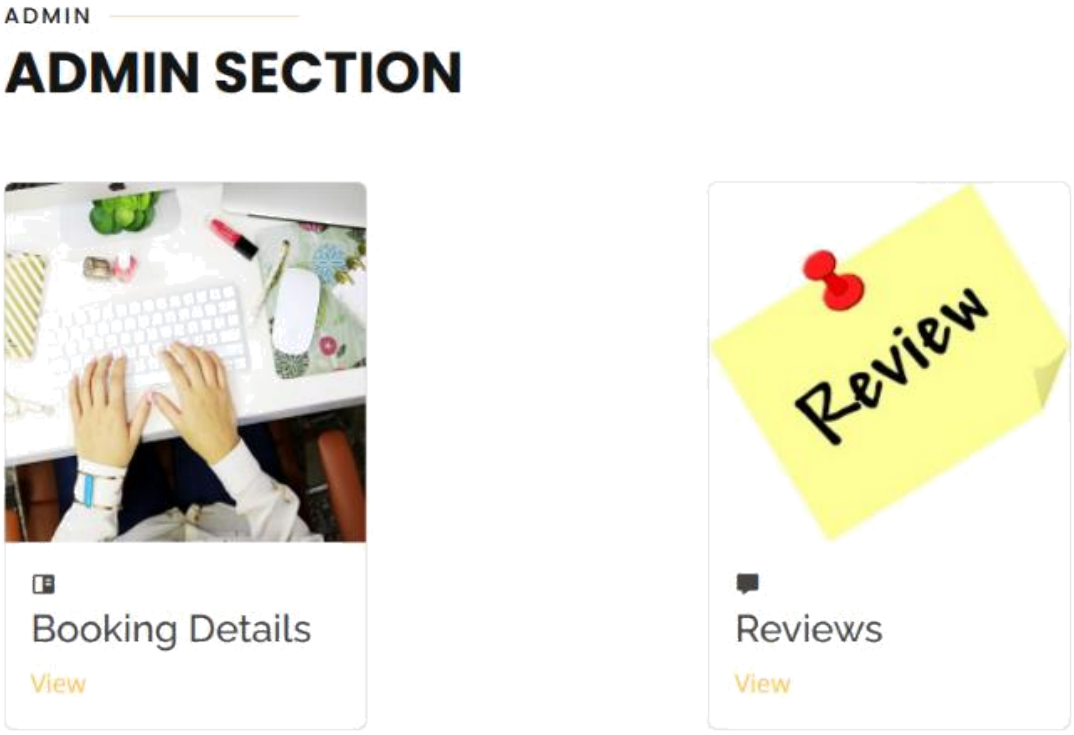


Figure: Admin Section Page

Bookings

- Booking details available in the admin section of the KVR Cold Storages

DETAILS

LIST OF ALL STORAGE BOOKINGS

id	Booking code	Client Name	Storage Id	Sex	Email	Phone	No of storages	Date From	Date To	No of Days	Amount	Address	City	State	Pincode	
1	KVR-0000000001	M Kartik Kumar	5	Male	kartiksachu@gmail.com	9876546752	2	2021-12-17	2021-12-31	14	14000.0	Jayanagar	Bangalore	Karnataka	560090	Delete
2	KVR-0000000002	K Homi	6	Female	imoh@gmail.com	9765376521	3	2021-12-20	2022-01-01	11	18150.0	Block no.1, Shastrinagar	Jamshedpur	Jharkhand	830050	Delete
7	KVR-0000000023	Anushka Sinha	1	Female	anu@gmail.com	2345678912	2	2023-01-25	2023-01-30	5	2500.0	JSSATE Girls Hostel	Bangalore	Karnataka	560060	Delete
8	KVR-0000000024	Aditya Vaibhav	2	Male	adi23@gmail.com	6299188694	5	2023-01-20	2023-01-25	5	8750.0	Bayapanahalli	Bangalore	Karnataka	560080	Delete
12	KVR-0000000028	Sudeep Kumar	4	Male	sudeepdino@gmail.com	1234567891	2	2023-01-20	2023-01-27	7	6300.0	South end circle	Bangalore	Karnataka	560060	Delete
14	KVR-0000000030	Pallavi A	5	Female	pallavi@gmail.com	2345678912	7	2023-01-20	2023-01-22	2	7000.0	Indranagar	Bangalore	Karnataka	560080	Delete
16	KVR-0000000032	M Rachita	6	Female	rachita@gmail.com	8765432109	9	2023-01-20	2023-01-30	10	45000.0	block no 1,shastrinagar,kadma	Jamshedpur	Jharkhand	850010	Delete
26	KVR-0000000015	Vishnu Ojha	2	Male	vishnu@gmail.com	8765432109	1	2023-01-21	2023-01-31	10	10000.0	Bayapanahalli	Bangalore	Karnataka	560080	Delete

Figure: Booking Page Initially

booking _details Table

- Booking details available in the database of the KVR Cold Storages

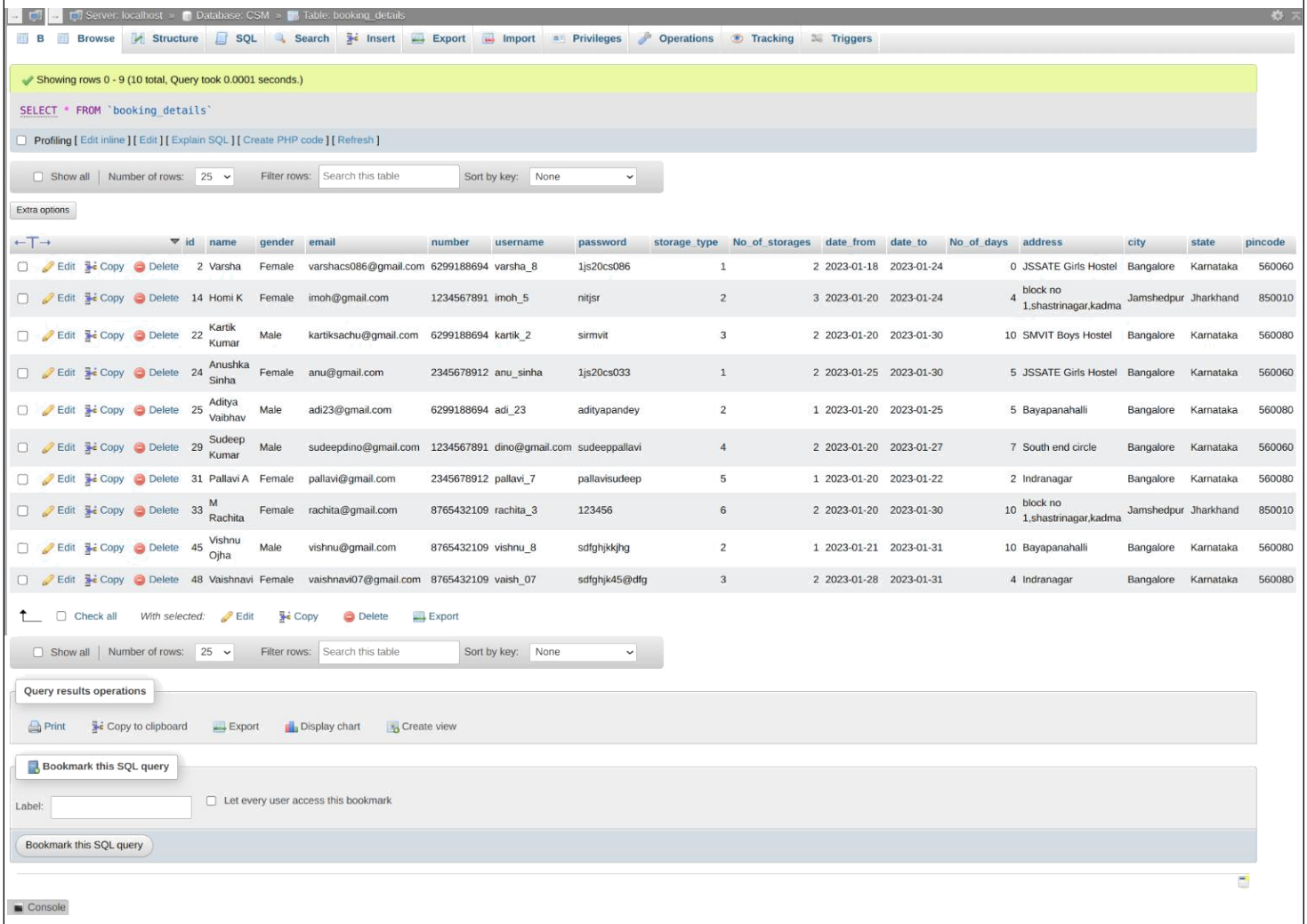


Figure: Database after booking

Triggers

Insertion and deletions performed on booking_details table is reflected back to the booking_list managed by the admin of the database. This is achieved with the help of triggers.

Trigger:

1. get_bookcode :

```
DROP TRIGGER IF EXISTS `get_bookcode`;
CREATE DEFINER=`root`@`localhost` TRIGGER `get_bookcode` BEFORE
        INSERT ON `booking_list` FOR EACH ROW BEGIN SET
        NEW.book_code=CONCAT ("KVR-",LPAD(LAST_INSERT_ID(),10 ,"0"));
END
```

2. insert_user :

```
DROP TRIGGER IF EXISTS `insert_user`;
CREATE DEFINER=`root`@`localhost` TRIGGER `insert_user` AFTER INSERT
ON `booking_details` FOR EACH ROW INSERT INTO users VALUES (null,NEW
.name,NEW.username,NEW.password)
```

3. booking_list :

```
DROP TRIGGER IF EXISTS `insert_booking_list`;
CREATE DEFINER=`root`@`localhost` TRIGGER `insert_booking_list` AFTER
INSERT ON `booking_details` FOR EACH ROW INSERT INTO booking_list
VALUES(null,null,NEW.name,NEW.gender,NEW.email,NEW.number,
NEW.storage_type,NEW.No_of_storages,NEW.date_from,NEW.date_to,NEW.
No_of_days,NEW.No_of_storages*NEW.No_of_days*500,NEW.address,
NEW.city,NEW.state,NEW.pincode)
```

Description: This trigger is triggered when the insertion or deletion is done on the booking_details table and the rows in booking_lists are modified.

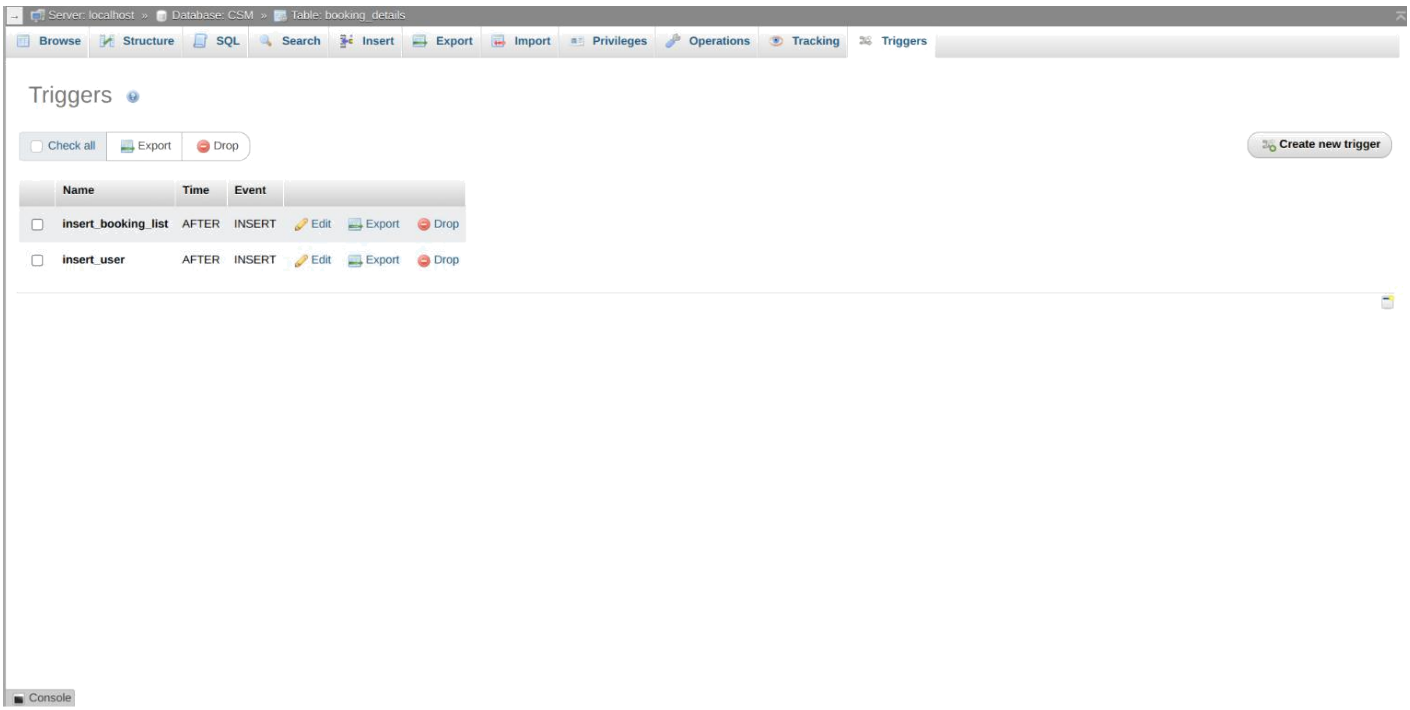
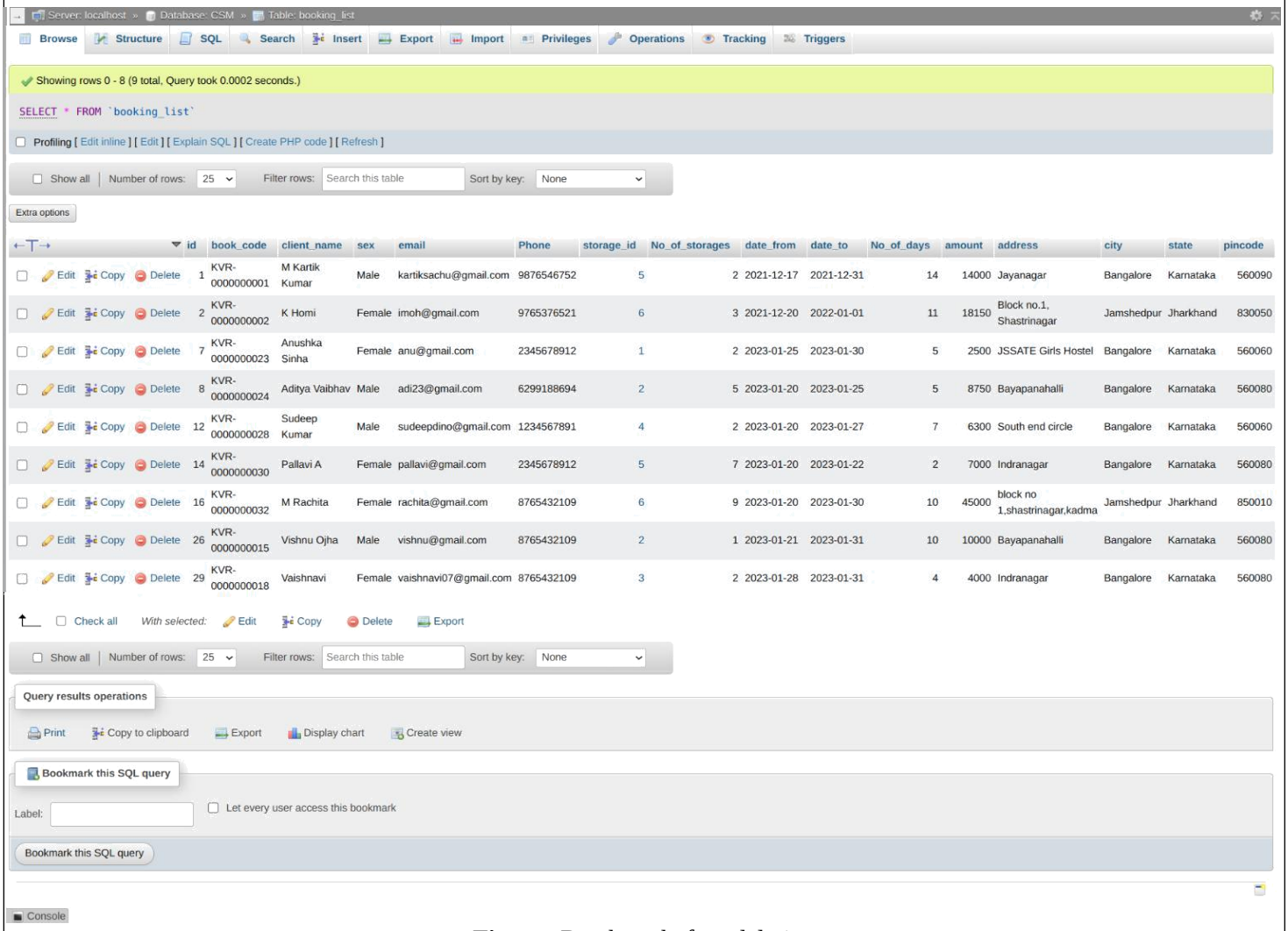


Figure: Triggers in the Database

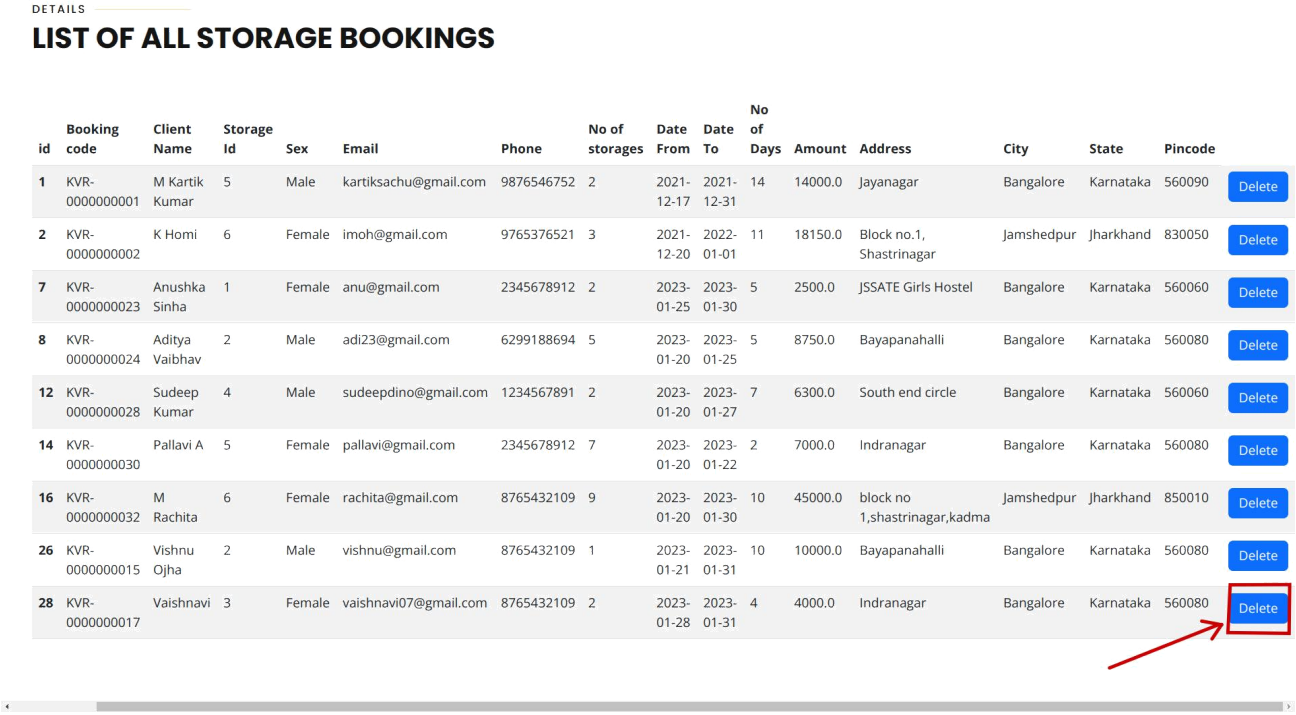
1. Database before delete



id	book_code	client_name	sex	email	Phone	storage_id	No_of_storages	date_from	date_to	No_of_days	amount	address	city	state	pincode
1	KVR-0000000001	M Kartik Kumar	Male	kartiksachu@gmail.com	9876546752	5	2	2021-12-17	2021-12-31	14	14000	Jayanagar	Bangalore	Karnataka	560090
2	KVR-0000000002	K Homi	Female	imoh@gmail.com	9765376521	6	3	2021-12-20	2022-01-01	11	18150	Block no.1, Shastrinagar	Jamshedpur	Jharkhand	830050
7	KVR-0000000023	Anushka Sinha	Female	anu@gmail.com	2345678912	1	2	2023-01-25	2023-01-30	5	2500	JSSATE Girls Hostel	Bangalore	Karnataka	560060
8	KVR-0000000024	Aditya Vaibhav	Male	adi23@gmail.com	6299188694	2	5	2023-01-20	2023-01-25	5	8750	Bayapanahalli	Bangalore	Karnataka	560080
12	KVR-0000000028	Sudeep Kumar	Male	sudeepdino@gmail.com	1234567891	4	2	2023-01-20	2023-01-27	7	6300	South end circle	Bangalore	Karnataka	560060
14	KVR-0000000030	Pallavi A	Female	pallavi@gmail.com	2345678912	5	7	2023-01-20	2023-01-22	2	7000	Indranagar	Bangalore	Karnataka	560080
16	KVR-0000000032	M Rachita	Female	rachita@gmail.com	8765432109	6	9	2023-01-20	2023-01-30	10	45000	block no 1,shastrinagar,kadma	Jamshedpur	Jharkhand	850010
26	KVR-0000000015	Vishnu Ojha	Male	vishnu@gmail.com	8765432109	2	1	2023-01-21	2023-01-31	10	10000	Bayapanahalli	Bangalore	Karnataka	560080
29	KVR-0000000018	Vaishnavi	Female	vaishnavi07@gmail.com	8765432109	3	2	2023-01-28	2023-01-31	4	4000	Indranagar	Bangalore	Karnataka	560080

Figure: Database before deleting

2. Deleting an entry



id	Booking code	Client Name	Storage Id	Sex	Email	Phone	No of storages	Date From	Date To	No of Days	Amount	Address	City	State	Pincode	
1	KVR-0000000001	M Kartik Kumar	5	Male	kartiksachu@gmail.com	9876546752	2	2021-12-17	2021-12-31	14	14000.0	Jayanagar	Bangalore	Karnataka	560090	Delete
2	KVR-0000000002	K Homi	6	Female	imoh@gmail.com	9765376521	3	2021-12-20	2022-01-01	11	18150.0	Block no.1, Shastrinagar	Jamshedpur	Jharkhand	830050	Delete
7	KVR-0000000023	Anushka Sinha	1	Female	anu@gmail.com	2345678912	2	2023-01-25	2023-01-30	5	2500.0	JSSATE Girls Hostel	Bangalore	Karnataka	560060	Delete
8	KVR-0000000024	Aditya Vaibhav	2	Male	adi23@gmail.com	6299188694	5	2023-01-20	2023-01-25	5	8750.0	Bayapanahalli	Bangalore	Karnataka	560080	Delete
12	KVR-0000000028	Sudeep Kumar	4	Male	sudeepdino@gmail.com	1234567891	2	2023-01-20	2023-01-27	7	6300.0	South end circle	Bangalore	Karnataka	560060	Delete
14	KVR-0000000030	Pallavi A	5	Female	pallavi@gmail.com	2345678912	7	2023-01-20	2023-01-22	2	7000.0	Indranagar	Bangalore	Karnataka	560080	Delete
16	KVR-0000000032	M Rachita	6	Female	rachita@gmail.com	8765432109	9	2023-01-20	2023-01-30	10	45000.0	block no 1,shastrinagar,kadma	Jamshedpur	Jharkhand	850010	Delete
26	KVR-0000000015	Vishnu Ojha	2	Male	vishnu@gmail.com	8765432109	1	2023-01-21	2023-01-31	10	10000.0	Bayapanahalli	Bangalore	Karnataka	560080	Delete
28	KVR-0000000017	Vaishnavi	3	Female	vaishnavi07@gmail.com	8765432109	2	2023-01-28	2023-01-31	4	4000.0	Indranagar	Bangalore	Karnataka	560080	Delete

Figure: Deleting from bookings

Trigger for updating User table

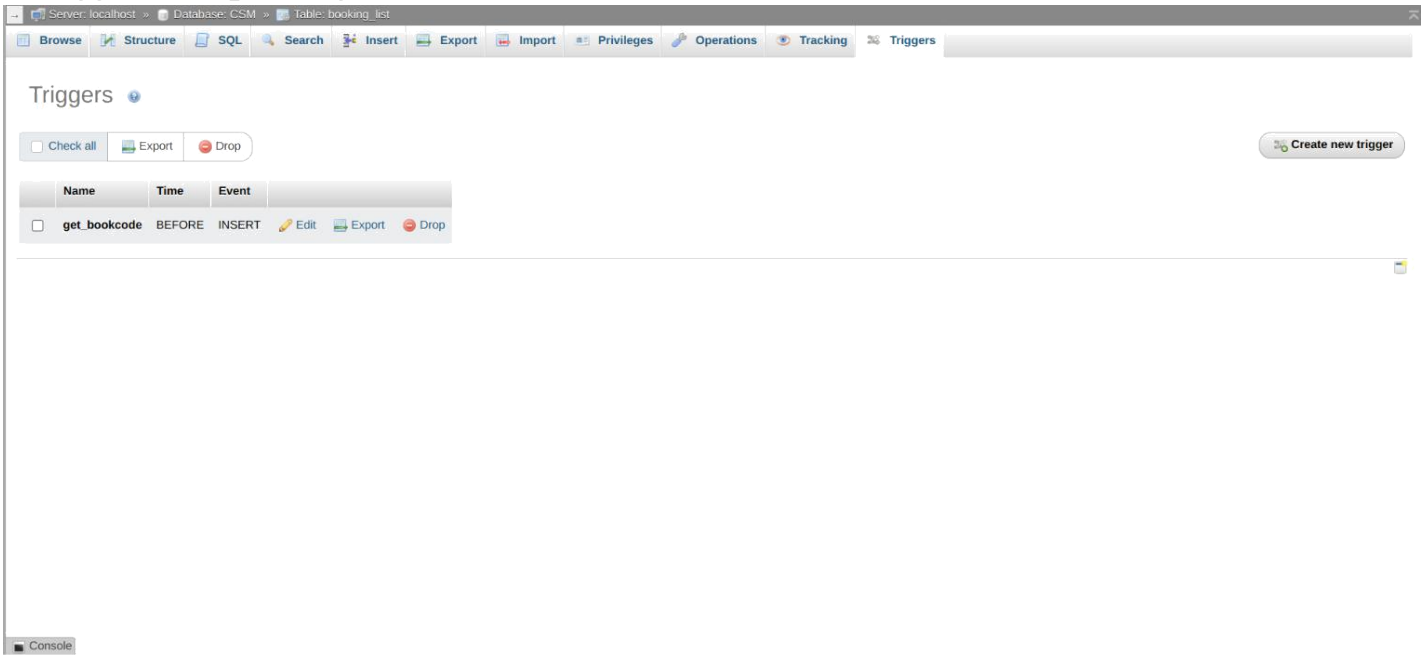


Figure: Trigger for updating user table

Database after updating user table

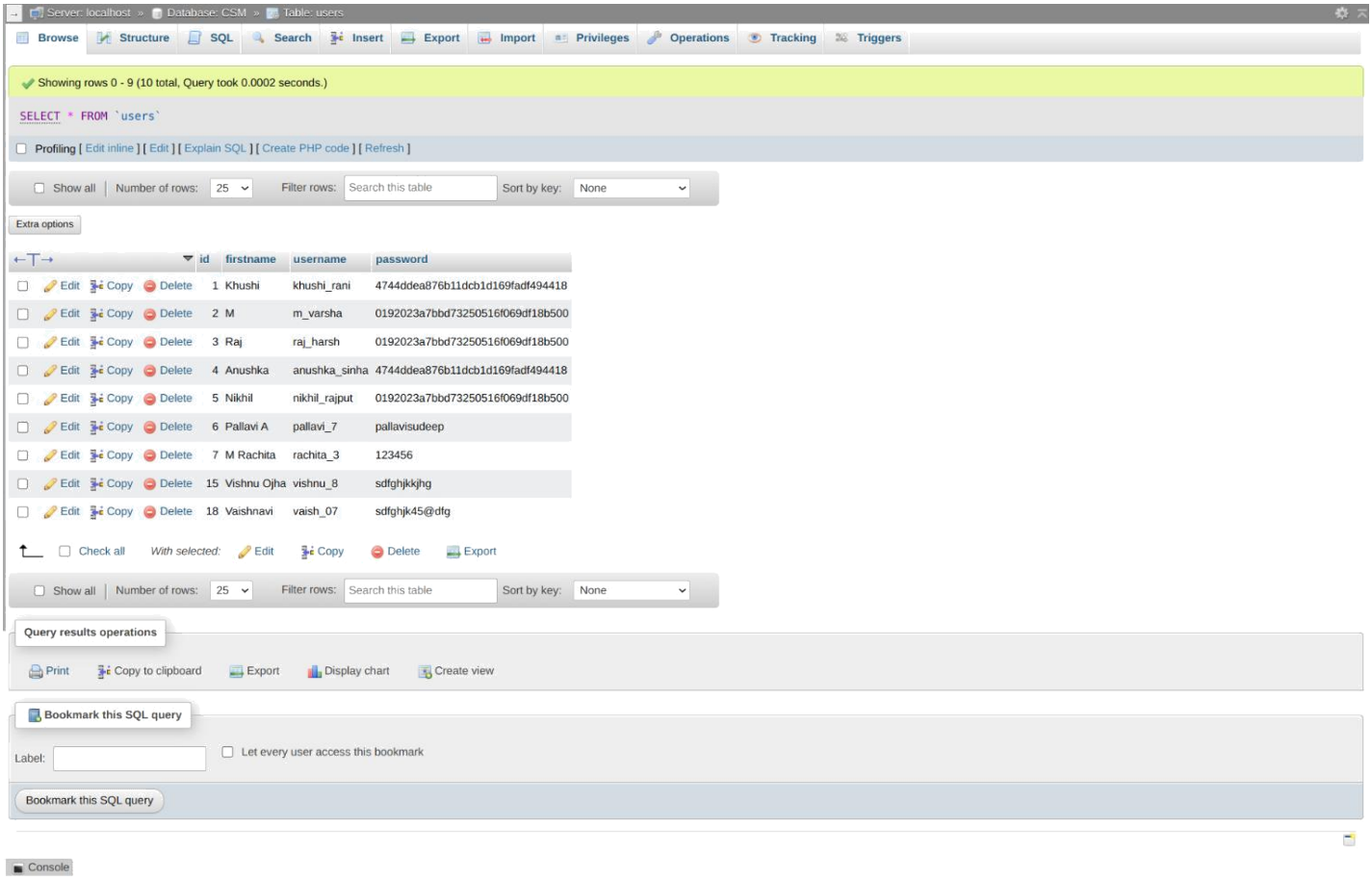
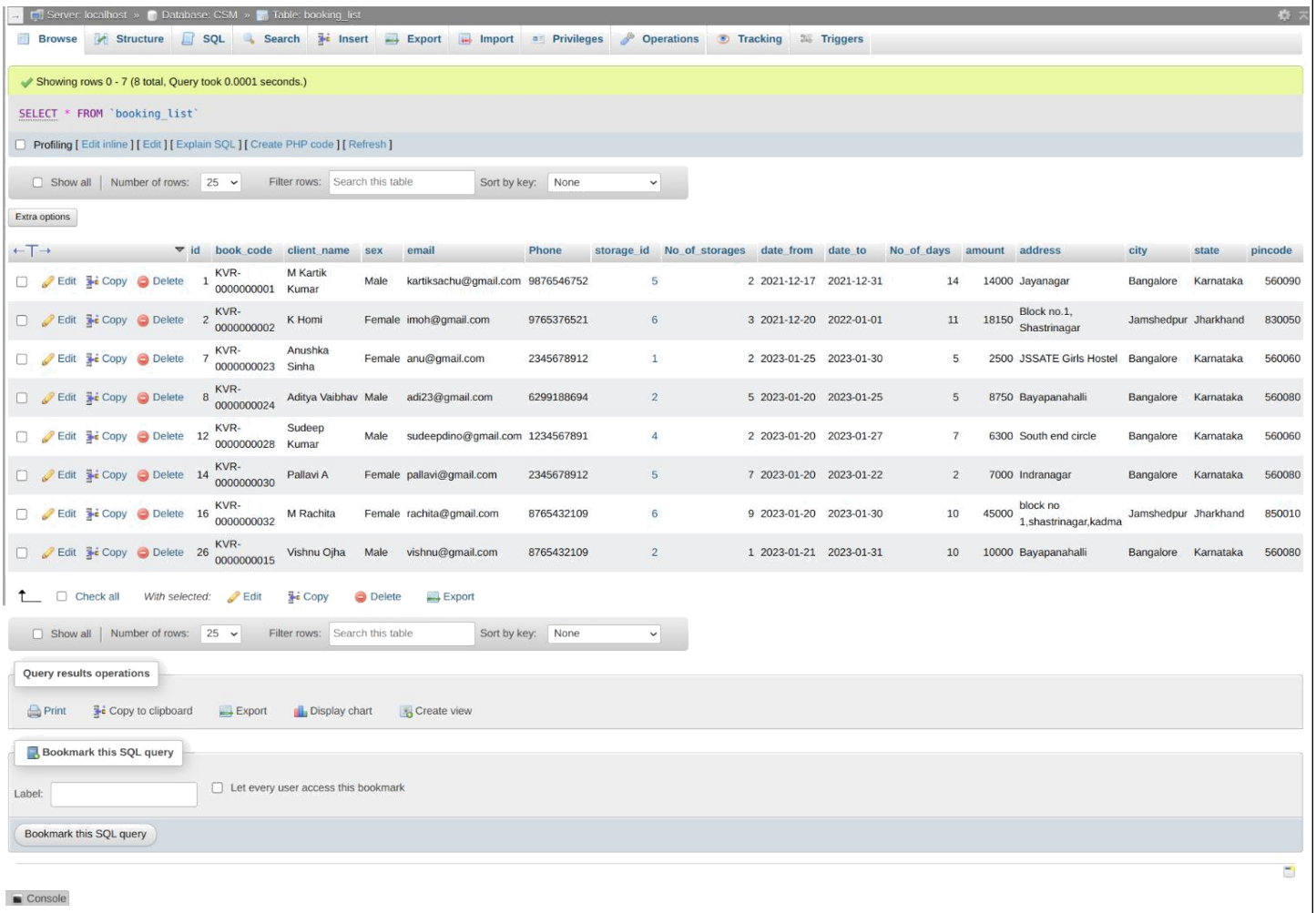


Figure: User table after updating

3. Database after deleting an entry

After an entry has been deleted from the database, that particular row will be removed from the booking_details table of the database and the corresponding changes will be reflected in the booking_list table of the database. This was achieved using triggers.

The similar changes will be observed in the database whenever an entry has been made such as booking a particular storage from the Cold Storage.



	id	book_code	client_name	sex	email	Phone	storage_id	No_of_storages	date_from	date_to	No_of_days	amount	address	city	state	pincode
Edit Copy Delete	1	KVR-0000000001	M Kartik Kumar	Male	kartiksachu@gmail.com	9876546752	5	2	2021-12-17	2021-12-31	14	14000	Jayanagar	Bangalore	Karnataka	560090
Edit Copy Delete	2	KVR-0000000002	K Homi	Female	imoh@gmail.com	9765376521	6	3	2021-12-20	2022-01-01	11	18150	Block no.1, Shastrinagar	Jamshedpur	Jharkhand	830050
Edit Copy Delete	7	KVR-0000000023	Anushka Sinha	Female	anu@gmail.com	2345678912	1	2	2023-01-25	2023-01-30	5	2500	JSSATE Girls Hostel	Bangalore	Karnataka	560060
Edit Copy Delete	8	KVR-0000000024	Aditya Vaibhav	Male	adi23@gmail.com	6299188694	2	5	2023-01-20	2023-01-25	5	8750	Bayapanahalli	Bangalore	Karnataka	560080
Edit Copy Delete	12	KVR-0000000028	Sudeep Kumar	Male	sudeepdino@gmail.com	1234567891	4	2	2023-01-20	2023-01-27	7	6300	South end circle	Bangalore	Karnataka	560060
Edit Copy Delete	14	KVR-0000000030	Pallavi A	Female	pallavi@gmail.com	2345678912	5	7	2023-01-20	2023-01-22	2	7000	Indranagar	Bangalore	Karnataka	560080
Edit Copy Delete	16	KVR-0000000032	M Rachita	Female	rachita@gmail.com	8765432109	6	9	2023-01-20	2023-01-30	10	45000	block no 1,shastrinagar,kadma	Jamshedpur	Jharkhand	850010
Edit Copy Delete	26	KVR-0000000015	Vishnu Ojha	Male	vishnu@gmail.com	8765432109	2	1	2023-01-21	2023-01-31	10	10000	Bayapanahalli	Bangalore	Karnataka	560080

Figure: Changes in the database after deleting

Storage Procedures

1. Storage details

DETAILS

STORAGE DETAILS

id	Name	Cost	Description	Capacity	Status
1	Storage 1	250.0	KVR refrigerated containers come in a variety of sizes from 10ft to 45ft and have a temperature range of -40°C to +10°C. Most cold store units are portable and can be used to transport goods safely. Mega Cold Stores are also a popular option for larger businesses. These units are combined with multiple cold storage units to make a mega refrigerated solution. The air conditioning cold room is used for long-term storage of fresh fruits, vegetables, etc. In addition to the control of temperature and moisture in the cold room, we need to consider the respiration of plants in the cold room at the same time, but also regulate and control O2, CO, N2, and ethylene, inhibits respiration and metabolism of fruits and vegetables in a dormant state, in order to achieve the purpose of long-term storage.	5	Available
2	Storage 2	350.0	Flower storage cold room, 100~200 PU/PIR panel with good insulation, high efficiency condensing unit, power consumption saving cost.Suitable temperature range:- (1) For ordinary flowers, 1~3 ℃. (2) For tropical flowers, 10~12℃, humidity: 60%-85%. (Fresh flowers are placed in such a cold storage environment with a shelf life of up to 1 month). The air conditioning cold room is used for long-term storage of plants,flowers, etc. In addition to the control of temperature and moisture in the cold room, we need to consider the respiration of plants in the cold room at the same time, but also regulate and control O2, CO, N2, and ethylene, inhibits respiration and metabolism of plants in a dormant state, in order to achieve the purpose of long-term storage.	5	Available
3	Storage 3	280.0	Cold storage for Dairy products, temperatures ranging from -40°C to +18°C, suitable for a variety of dairy products. Temperature range:0~25℃,-5~25℃,-15~25℃,-25~25℃,-35~25℃,-50~25℃. Panels surface for choice SUS304: Best for anti-rust/corrosion. Salinization sheet: One more salinization layer than color plate, anti-rust/corrosion/scratch, feel likes leather and plastic, nice. Color plate: Most popular and cost-effective. Galvanized sheet: Very hard and heavy. Aluminum: Nice and soft, we use 0.7/0.8 mm, hard enough.	5	Available
4	Storage 4	450.0	Automation Grade:Fully Automatic; Capacity:4Ton; Temperature:-5 to +2 Degree Celsius; Dimensions:8x8 Feet; Relative Humidity:10-95%. This unit is properly ventilated and free from dirt, dust & rodents that assure complete safety of the stored products. Sub-divided into various categories for easy recognition and quick retrieval of products, this storage unit is installed with power back-up facility.Periodical checking of the stored lots is done for timely spray of insecticides for any visible insect activity.	5	Available
5	Storage 5	500.0	Room Temperature: Most of the Pharma products storage and activities are done at the room temperature at 20 to 25 degree Celsius. The controlled samples are also stored in this temperature. Cold Storage Conditions: 8 to 15 degree Celsius is popularly known as cool storage conditions. Some drugs degrade in room temperature. These drugs are stored in the cold storage conditions. FEATURES:- .The temperature range and amount/ quantity of the medicine is taken care effectively. .Temperature controls Fully air mapped and secure External temperature logging and data tracking .Cargo placement (evade areas where temperature variation) .The volume of medicinal product is taken care of effectively. GMP-compliant to protect any kind of damage, contamination, mix-ups and degradation of the products.	10	Available
6	Storage 6	550.0	KVR offers a range of modular,cold room storage units that are ideal for use in many industries. The range features units of all shapes and sizes. However, they are all highly specified to give optimum control and monitoring of temperate. Complete control makes general storage and stability testing much easier, with temperature modification to +/-0.05°C. Our modular applications lend themselves well to pharmaceutical cold rooms. In many cases Pharmaceutical companies will need a quick solution, that can be delivered and installed on site. Our modular cold rooms are ideal for this scenario, and with temperature ranges from -40°C to +60°C they will meet most storage requirements. Offering complete temperature uniformity through forced air circulation these modular cold room cold storage units are ideal for use in the pharma industry. Boasting internal and emergency lighting as standard and alarm systems to cover numerous types of change with in the cold room. Should you require a modular cold room freezer, our units can generate temperatures of down to -40°C, more than cold enough to freeze most substances. For stability testing, the modular cold rooms offer control and monitoring to an accuracy of at least +/-0.5°C and are calibrated at a minimum of three points across their normal reading range.	10	Available

Figure: Storage details

2. Stored Procedures in the database

Procedure:

1. **getstorage:**

   DROP PROCEDURE `getstorage`; CREATE DEFINER=`root`@`localhost` PROCEDURE `getstorage`(IN `sid` INT) NOT DETERMINISTIC CONTAINS SQL SQL SECURITY DEFINER select * from storage_list WHERE id=sid

2. **getuserdetails:**

   DROP PROCEDURE `getuserdetails`; CREATE DEFINER=`root`@`localhost` PROCEDURE `getuserdetails`(IN `bcode` VARCHAR(100)) NOT DETERMINISTIC CONTAINS SQL SQL SECURITY DEFINER SELECT * from booking_list WHERE book_code=bcode

Description: Here whenever the Stored Procedure is called the storage details and user details table will be displayed accordingly

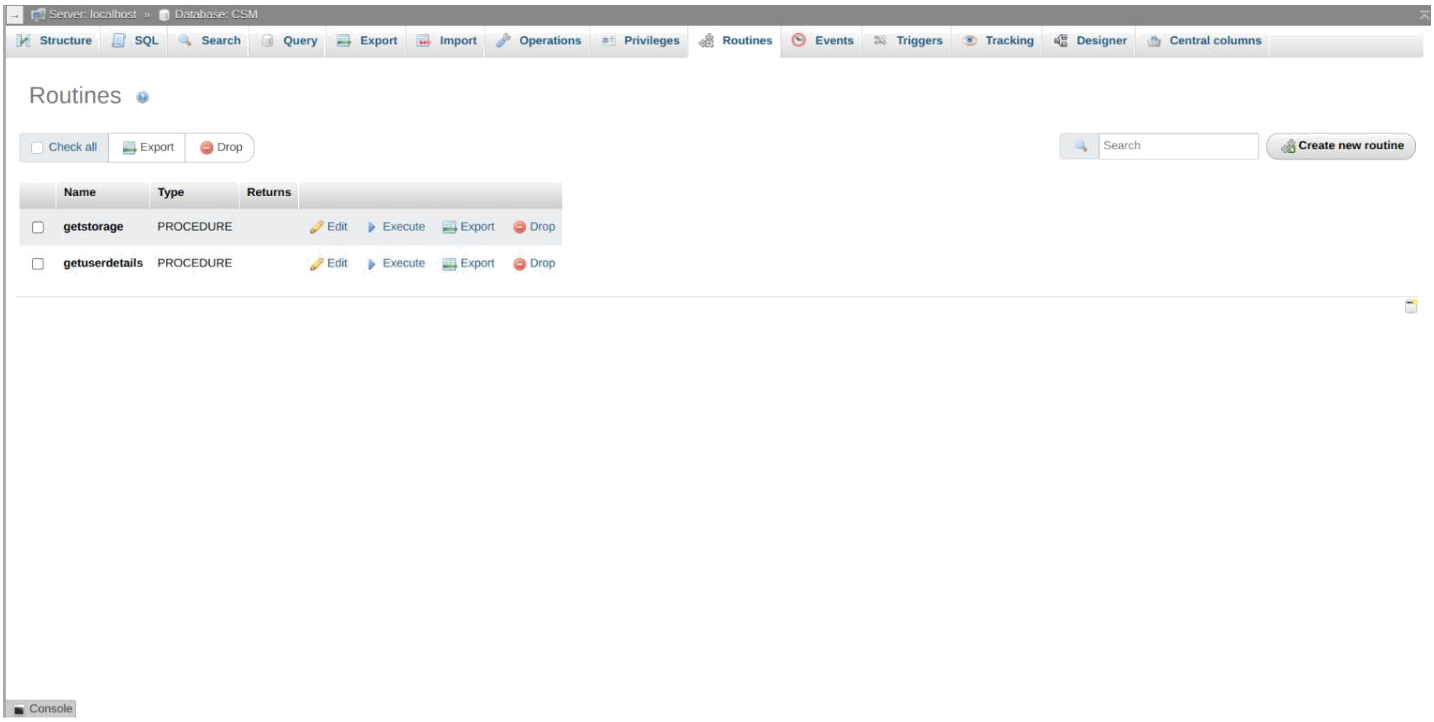


Figure: Stored procedures

Stored Procedure(i) execution

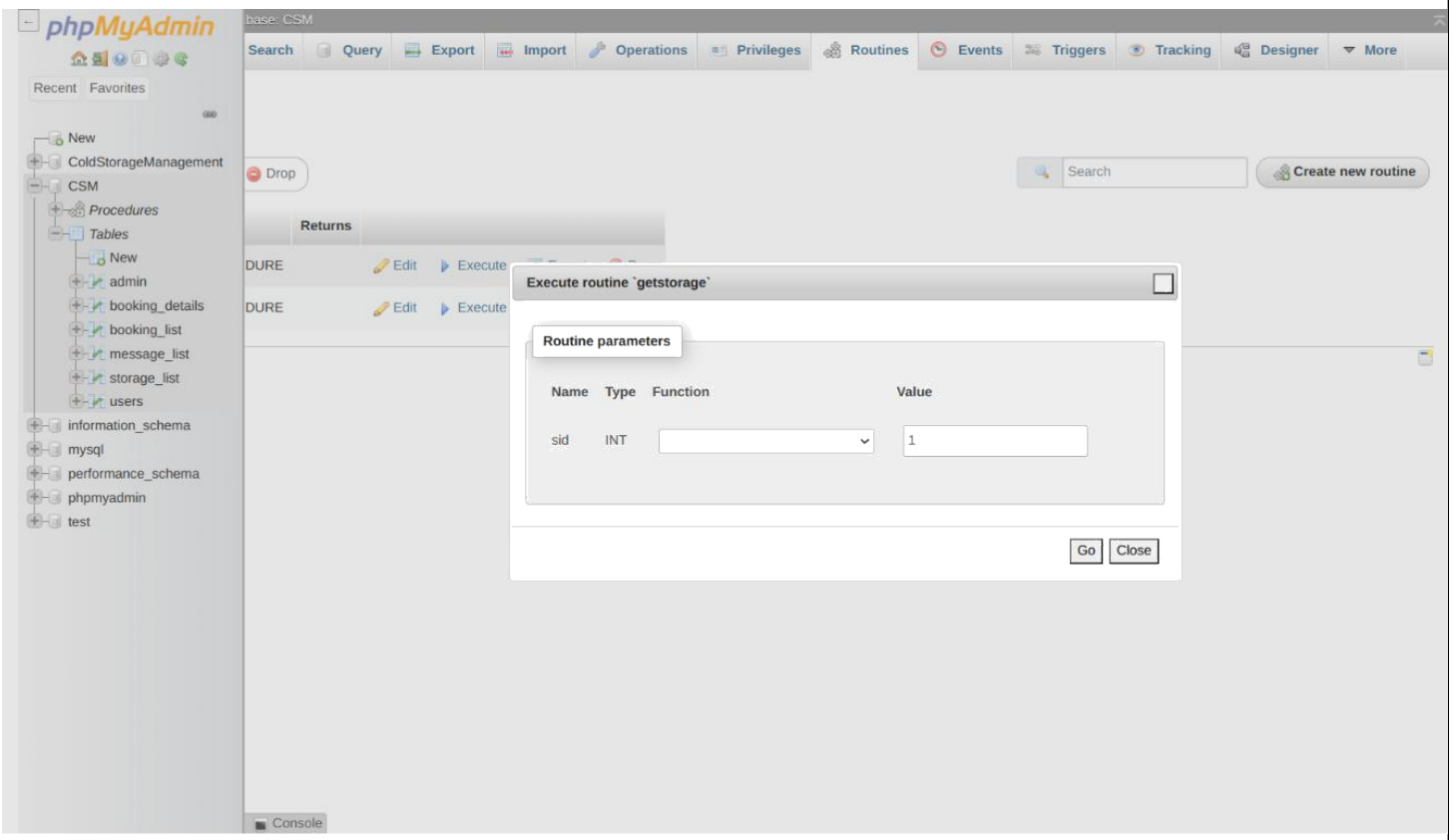


Figure: Stored procedure(i) execution

Stored Procedure(i) result

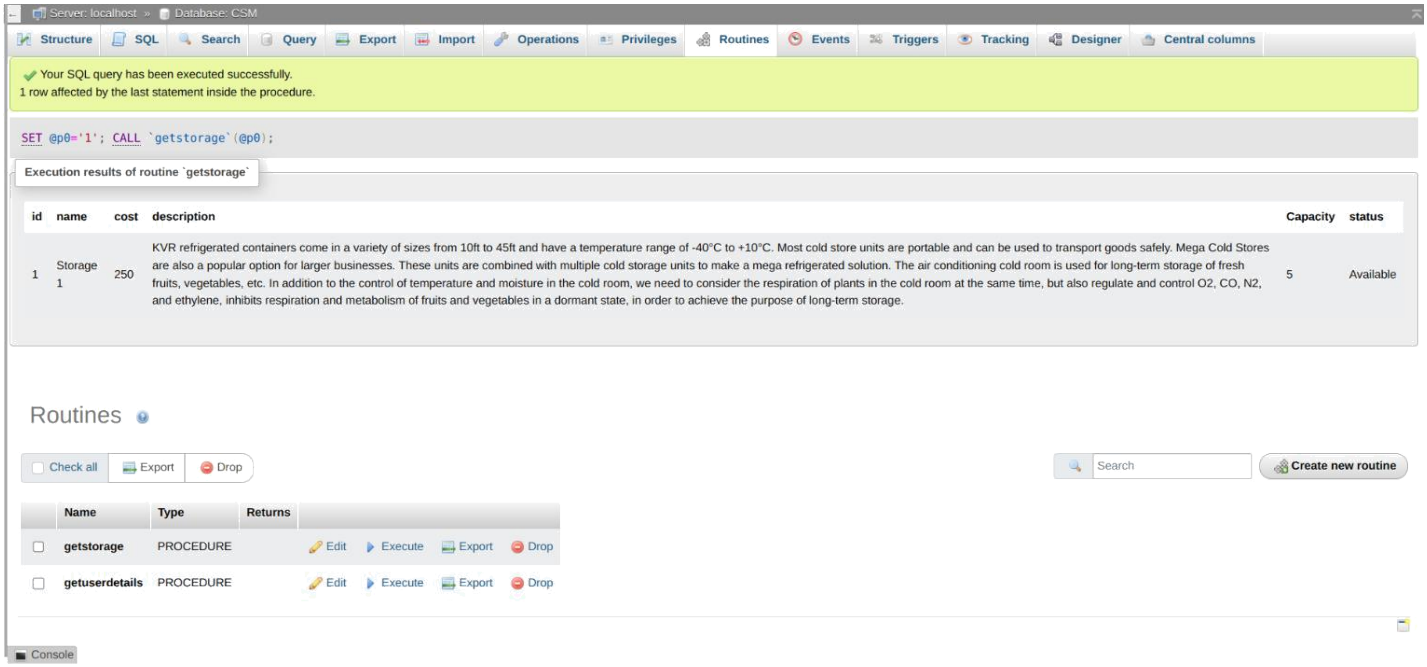


Figure: Stored procedure(i) result

Stored Procedures(ii) execution

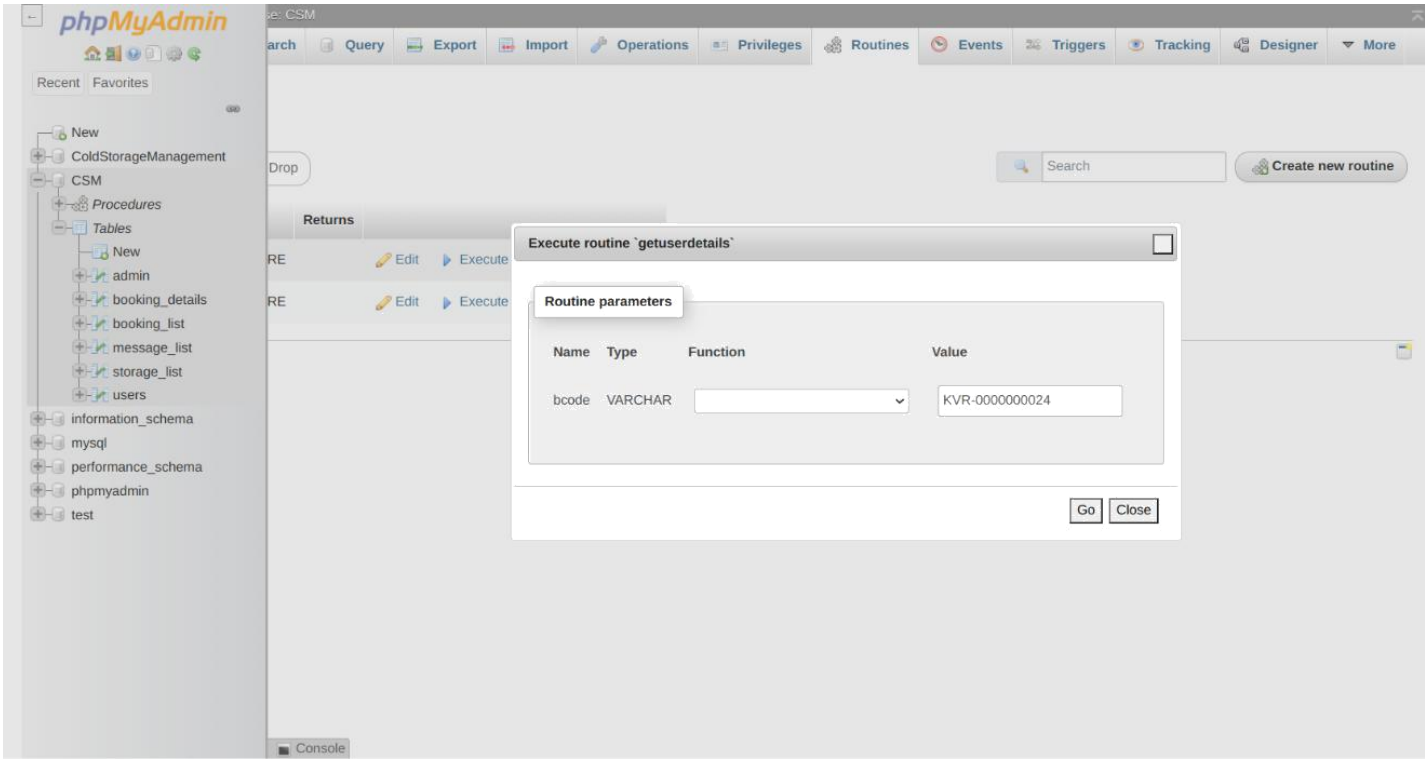


Figure: Stored procedure(ii) execution

Stored Procedure(ii) result

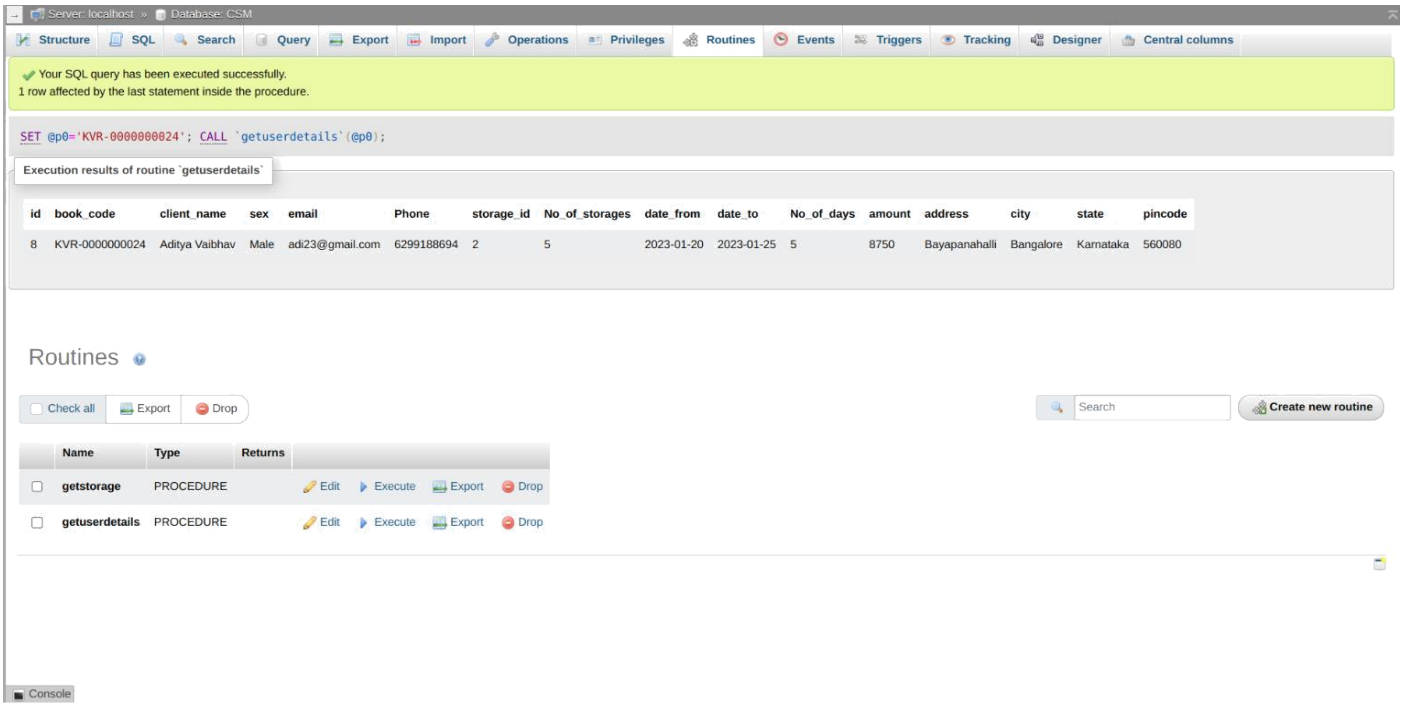


Figure: Stored procedure(ii) result

Assertions

In a database management system (DBMS), an assertion is a statement that a certain condition must always hold true within the database. Assertions are used to define integrity constraints, which ensure that the data in the database is consistent and accurate. Examples of assertions include statements such as "every customer must have a unique ID," or "the total amount of an invoice must be greater than zero." DBMSs typically provide mechanisms for defining and enforcing assertions, such as the use of triggers or check constraints.

The Admin control is the assertion in this project as it cannot be modified or removed under any circumstances.

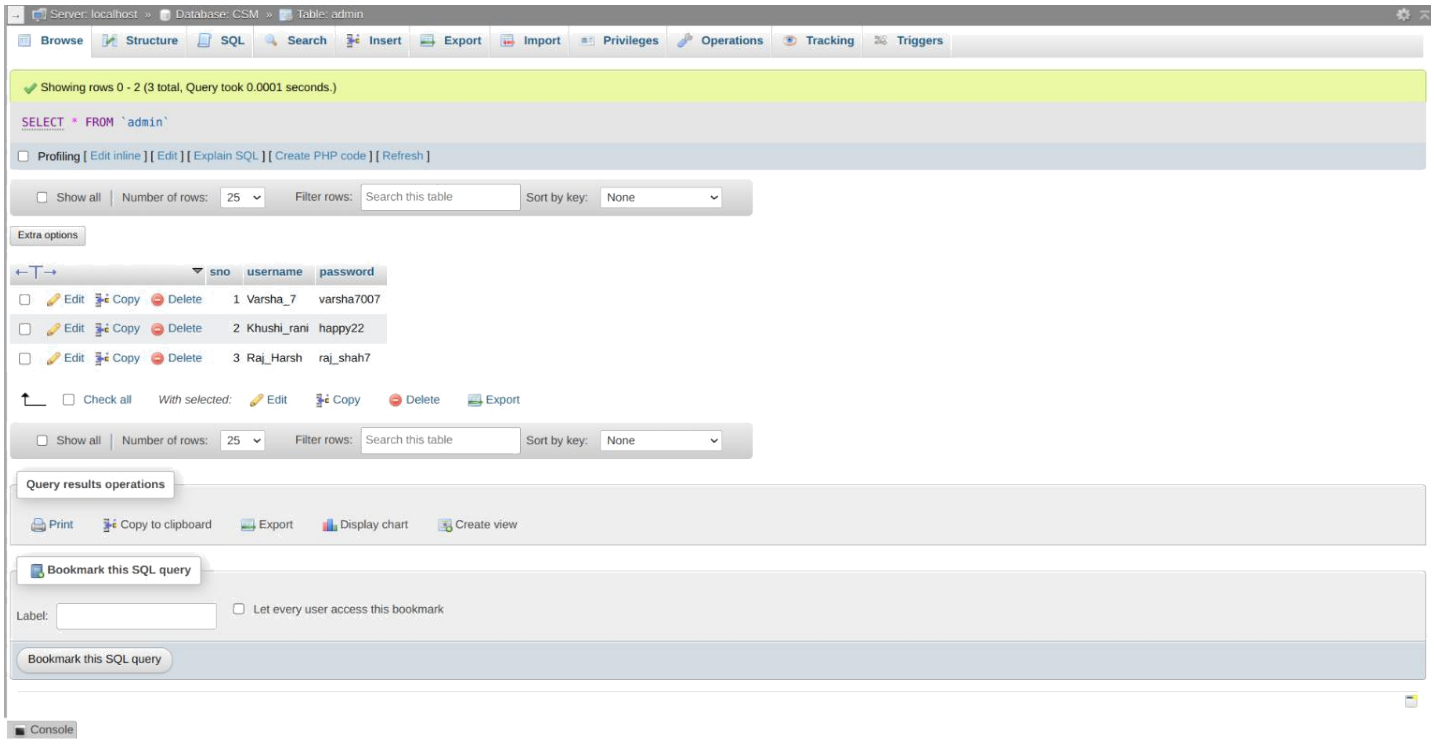


Figure: Admin assertion

User Login

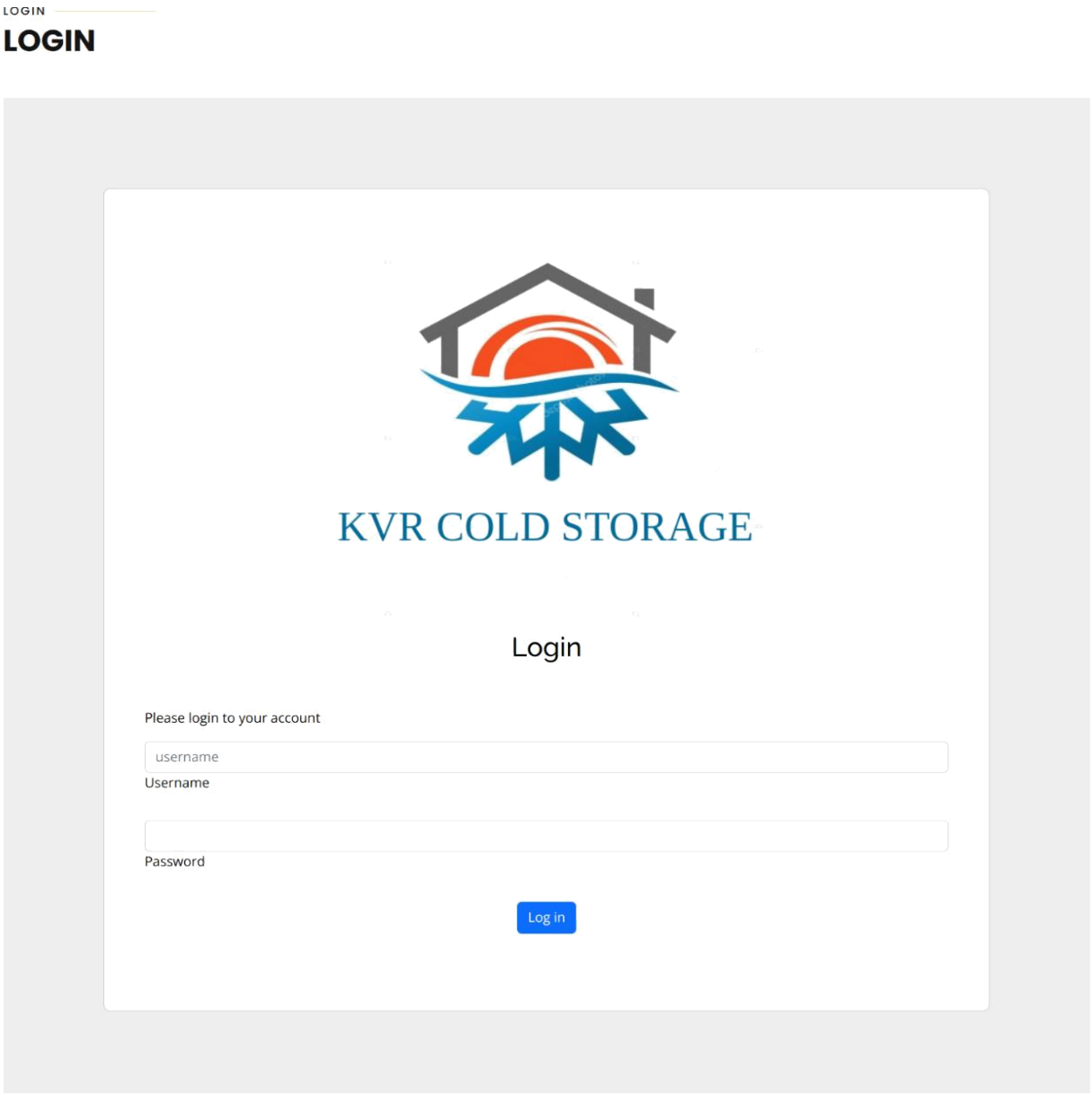


Figure: User Login page

User's Section

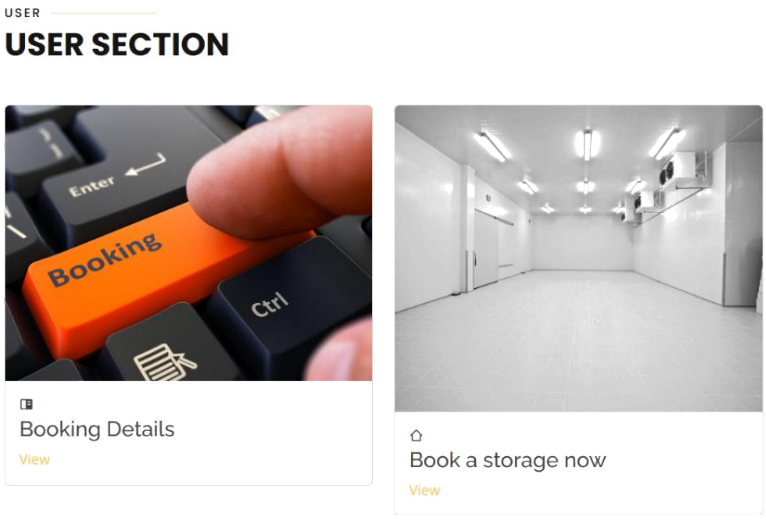


Figure: User Section

Contact Us

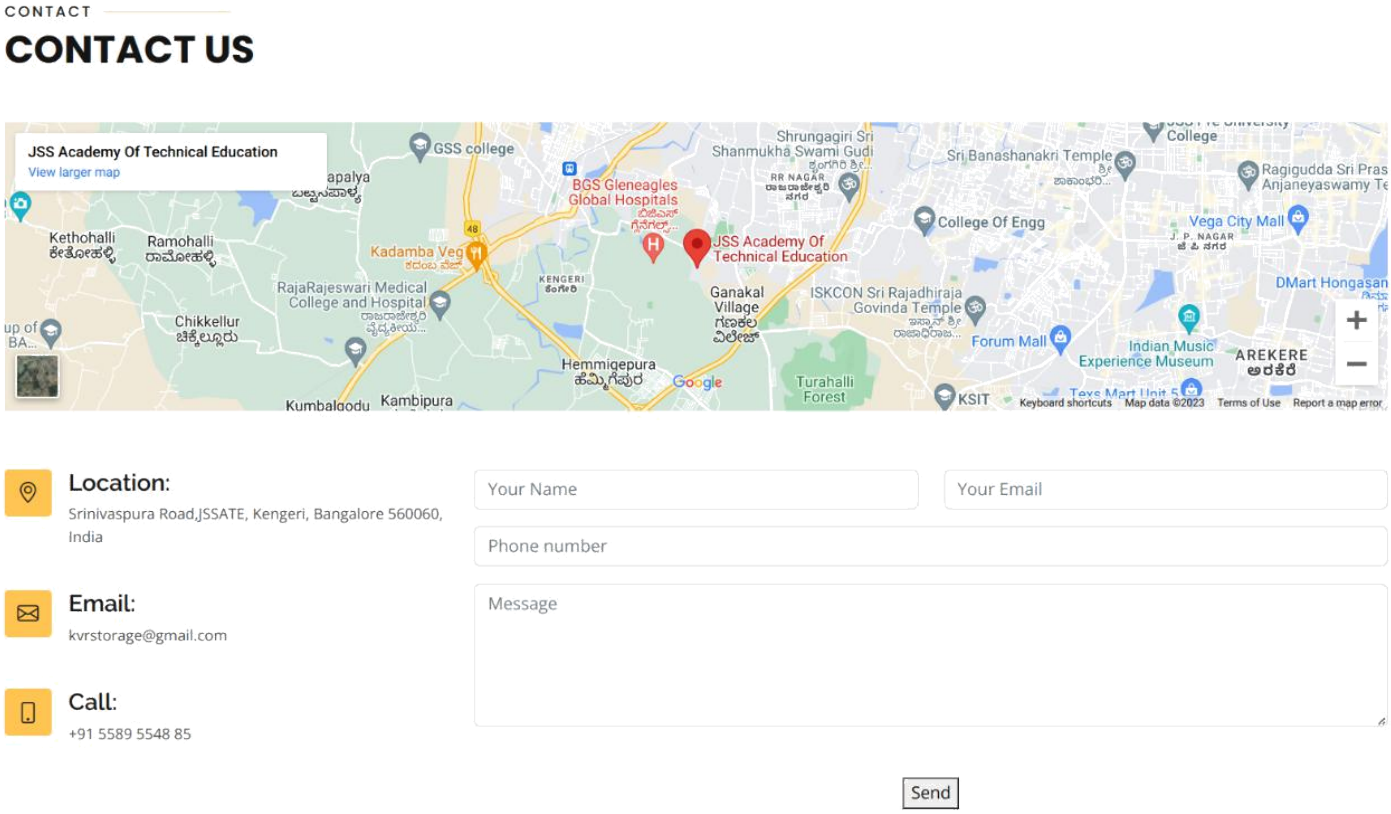


Figure: Contact page

Reviews

REVIEW DETAILS

REVIEWS

id	Name	Contact	Email	Message
1	Khushi Rani	09123456789	khushi@gmail.com	Excellent quality and value for money.
2	M Varsha	097894561423	mvarsha@gmail.com	Excellent service and amazing quality
3	Raj Harsh	09123456789	rajharsh@gmail.com	Various kinds of suitable and promising PCMs are provided by them. Satisfied with the service.
4	Anushka Sinha	097894561423	anushkasinha@gmail.com	Good service.
5	Nikhil Kumar Rajput	097894561423	nikhilrajput@gmail.com	I would recommend it to others.Used 2 storages to store the flowers and were perfectly fresh.
20	Aditya	098765234567	adi23@gmail.com	Amazing quality service and equiped with all modern day technologies.
24	Homi	8976543678	imoh@gmail.com	Amazing experience!

Figure: Reviews by the customers

Reviews stored in database

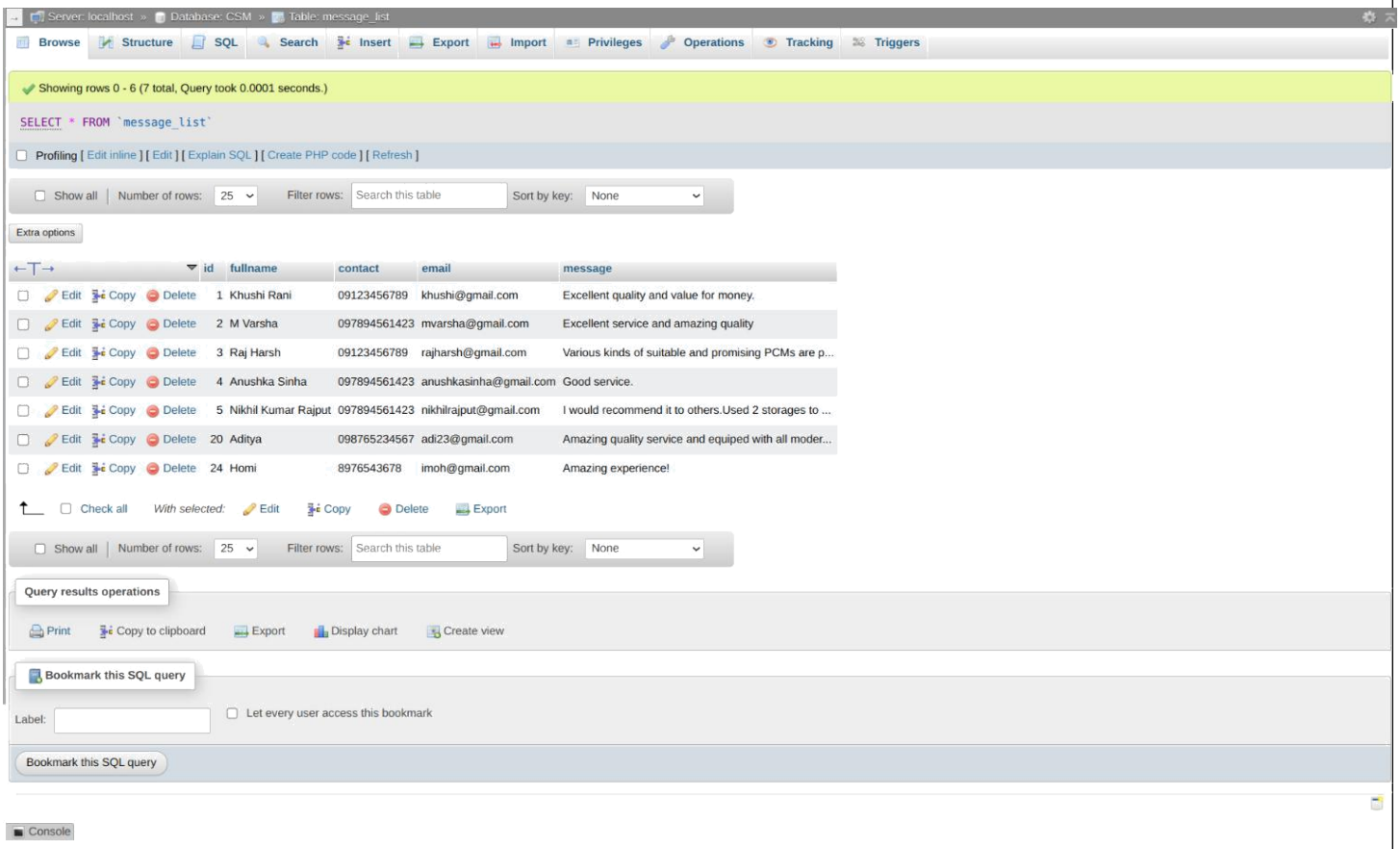


Figure: Reviews by the customers stored in message list

Team

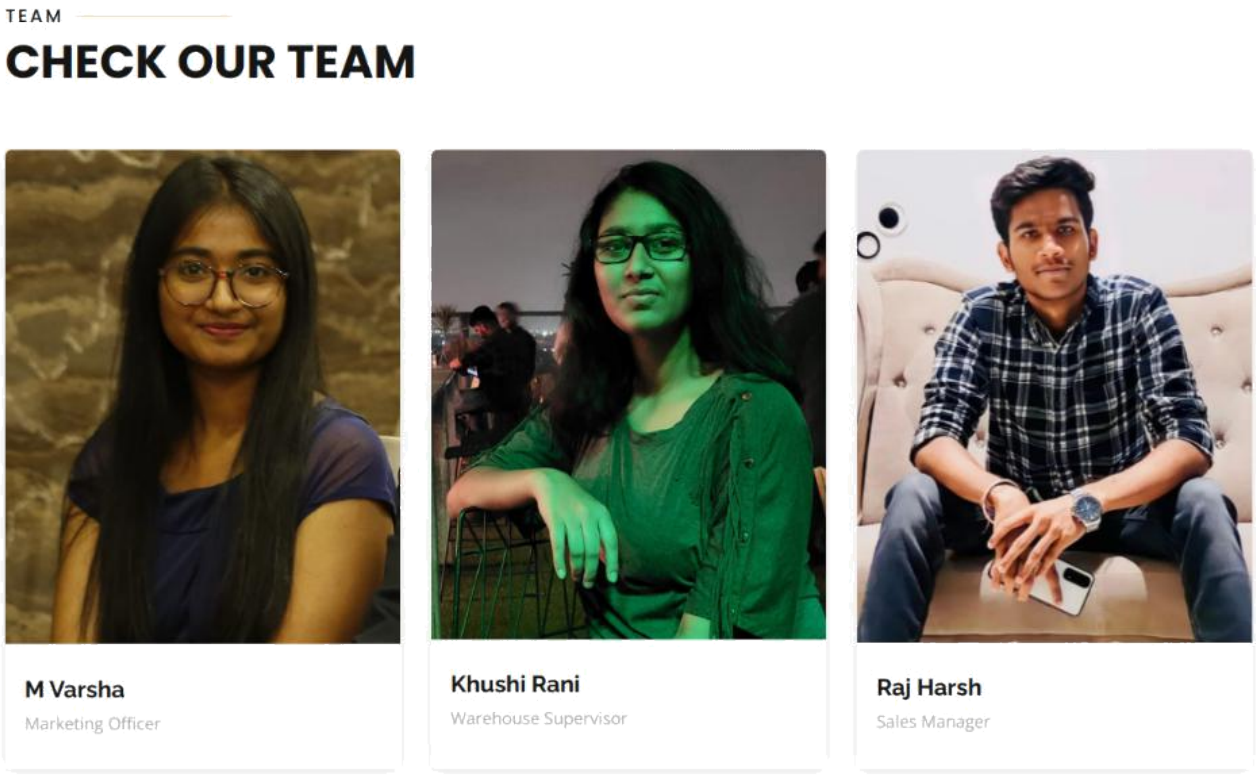


Figure: Team Members

Conclusion and Future Enhancements

Conclusion:

A Cold Storage Management System (CSMS) is a database-driven application that helps in managing the inventory and operations of a cold storage facility. The CSMS allows users to track the storage of perishable goods, such as fruits and vegetables, by monitoring the temperature and humidity levels, as well as the inventory of products stored.

The CSMS implemented in this project KVR Cold Storage Management System includes features such as:

- Real-time monitoring of temperature and humidity levels in the cold storage units
- Inventory management of products stored in the facility
- Recording of product information such as expiry dates, storage conditions, and quantity
- Automated alerts for temperature and humidity levels that fall outside of the acceptable range
- Generation of reports for inventory and temperature/humidity data

The implementation of a CSMS ensures that the stored products are always in good condition and reduces the risk of spoilage. It also helps in improving the efficiency of the cold storage facility by providing real-time monitoring of the inventory and temperature/humidity levels. Overall, the Cold Storage Management System is an important tool for managing the operations of a cold storage facility, and it can help in reducing costs and increasing profits for the facility owners.

Future Enhancements:

There are several potential enhancements that could be made to the Cold Storage Management System (CSMS) in the future:

1. Integration with other systems: The CSMS could be integrated with other systems such as a transportation management system, to track the movement of goods in and out of the cold storage facility.
2. IoT integration: The CSMS could be integrated with Internet of Things (IoT) devices, such as sensors, to collect real-time data on temperature, humidity, and other environmental factors in the cold storage units.
3. Predictive analytics: The CSMS could use predictive analytics to forecast the demand for products and optimize inventory levels, reducing the risk of stockouts and overstocking.
4. Mobile app: A mobile app for the CSMS could be developed, allowing users to access the system and view inventory data, temperature and humidity levels, and other important information from anywhere, at any time.
5. Automated ordering: The system could have an automated ordering system to order the product when the stock is low.
6. Data visualization: The CSMS could include data visualization tools to help users understand the data and trends in the system more easily.
7. Compliance and Audit tracking: The CSMS could be enhanced to include compliance and audit tracking features that allow users to track compliance with industry regulations and standards.

All of these enhancements can help in increasing the efficiency, accuracy, and scalability of the CSMS, making it an even more valuable tool for managing the operations of a cold storage facility.