



# RENTAL MANAGEMENT SYSTEM

DATABASE MANAGEMENT SYSTEMS PROJECT



**PREPARED BY**  
**R. OM VENKAT SAI**  
**23CSB0A05**

**B. TECH CSE-A**  
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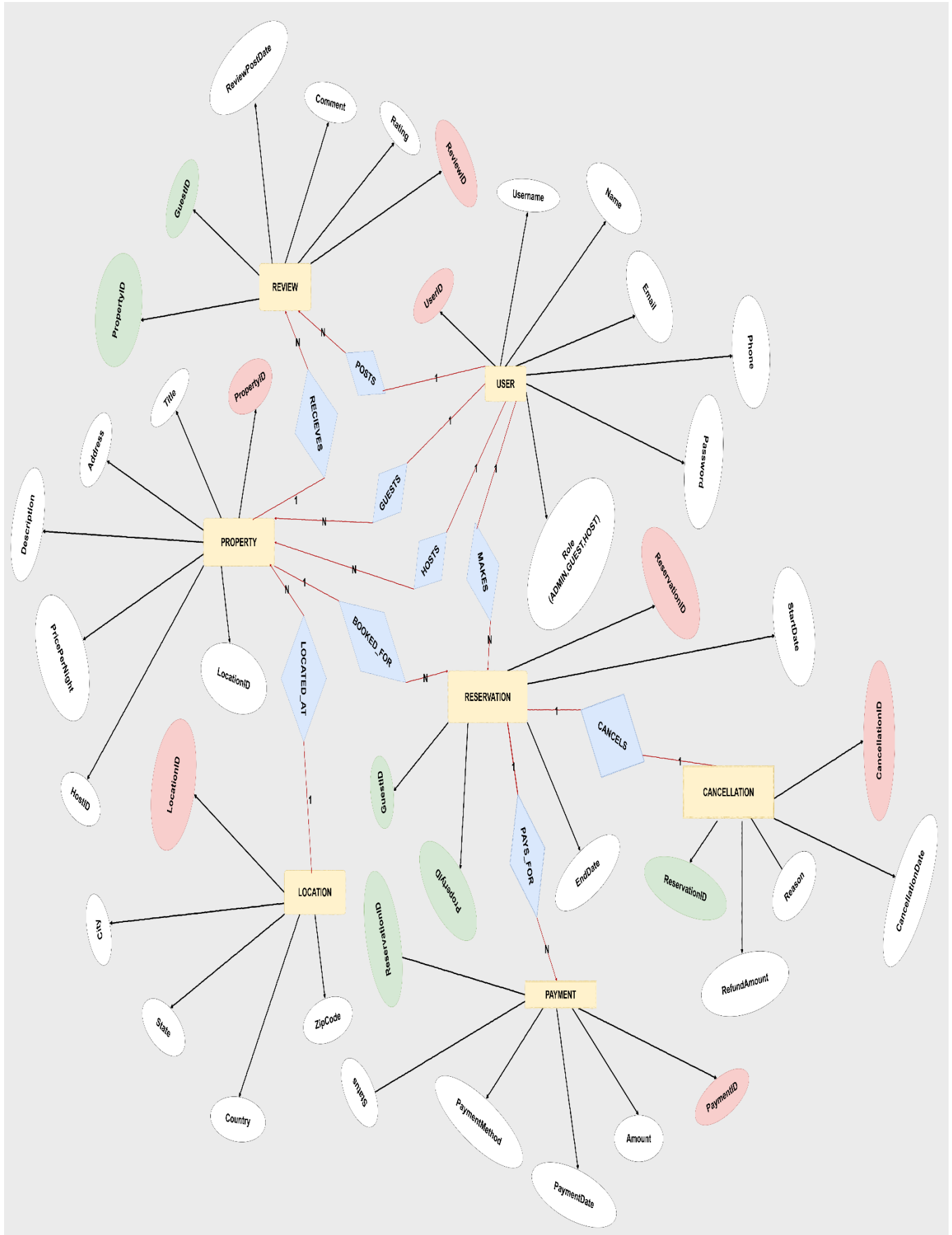
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## PROJECT OVERVIEW

- The **Rental Management System** is a comprehensive database designed to handle all aspects of property rental and booking.
- It consists of relations for users, properties, locations, reservations, payments, cancellations, reviews, and property restrictions.
- This system enables endless management of property listings by hosts and easy reservation and payment processes for guests.
- With its extensive features, it provides users with efficient tools to list, search, book, pay for, and review rental properties, making it very impactful for hosts, guests, and administrators alike.

# ER DIGRAM (ENTITY RELATIONSHIP DIGRAM)





Red coloured attribute in the ER Diagram implies that it is the part of the primary key for that relation.



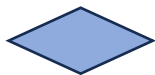
Green coloured attribute in the ER Diagram implies that it is one of the foreign keys of that relation.



Yellow coloured nodes represent the entities of the database.



Yellow coloured with double border represents weak entities of the database. (payment and cancellation entities in the ER diagram are weak entities)



Blue coloured diamond shaped node represent the relationship between two tables



Blue coloured double border represents the relationship between two corresponding tables is weak. (PAYS\_FOR and CANCELS in the ER diagram are weak relationships)

## ER-DIGRAM EXPLANATION

- **USER:**

**USER** relation Stores essential details of all users, including **UserID** (**primary key**), **username**, **name**, **email** (**unique**), **phone**, and **password**. Each user is assigned a role (**Guest**, **Host**, or **Admin**) **enforced via an ENUM**. This ensures access control, with admins managing the system, hosts listing properties, and guests making reservations.

- **LOCATION:**

**LOCATION** relation stores the details about the place where properties listed in the database are located. This relation includes **LocationID** (**primary key**), **city**, **state**, **country**, and optional **zip code**. This table normalizes location data, avoiding redundancy and allowing properties in the same city to share a single location record.

- **PROPERTY:**

Represents individual rental properties listed by hosts. Each Property record has a **PropertyID** (**primary key**), **foreign key HostID** referencing **USER** (who is the host), and a **foreign key LocationID** referencing **LOCATION**. Additional attributes include **title**, **address**, **description**, and **price per night**. The relationship between **PROPERTY** and **USER** is **many-to-one**: each property is owned by exactly one host, while a host can own multiple properties.

- **RESERVATION:**

**RESERVATION** relation stores bookings made by guests for properties. Each reservation has a **ReservationID** (**primary key**), **StartDate**, and **EndDate** (**with a constraint making sure that StartDate < EndDate**). It links to **PROPERTY** via **PropertyID** and to **USER** (**as Guest**) via **GuestID**. This models a **many-to-one** relationship from **RESERVATION** to **PROPERTY** (a property can have many reservations) and to **USER** (**a guest can make many reservations**). Participation is total for **RESERVATION** with respect to **PROPERTY** and **USER**, as every reservation must be tied to both.

- **PAYMENT:**

**PAYMENT** relation stores details regarding payments for reservations. Each Payment has a **PaymentID** (**primary key**), **foreign key ReservationID**, **amount**, **payment date**, **method**, and **status** (**with ENUM**

values **SUCCESS**, **PROCESSING**, **FAILED**). The relationship between **PAYMENT** and **RESERVATION** is **many-to-one**, allowing each reservation to have multiple associated payments if needed (e.g., installments).

- **CANCELLATION:**

**CANCELLATION** relation stores information about reservation cancellations. Each Cancellation has a **CancellationID** (**primary key**), **foreign key** **ReservationID**, **cancel date**, **reason**, and **refund amount**. This models a **one-to-one** relationship from **RESERVATION** to **CANCELLATION**, as a reservation can have at most one cancellation record.

- **REVIEW:**

**REVIEW** relation store information regarding guest reviews for properties. Each Review has a **ReviewID** (**primary key**), **foreign keys** **PropertyID** and **GuestID** **referencing** **PROPERTY** and **USER**, respectively, **rating**, **comment**, and **post date**. The relationship between **REVIEW** and **PROPERTY** is **many-to-one**, indicating that a property can have many reviews. Similarly, the relationship to **USER** (**as Guest**) is **many-to-one**, allowing each guest to leave multiple reviews.

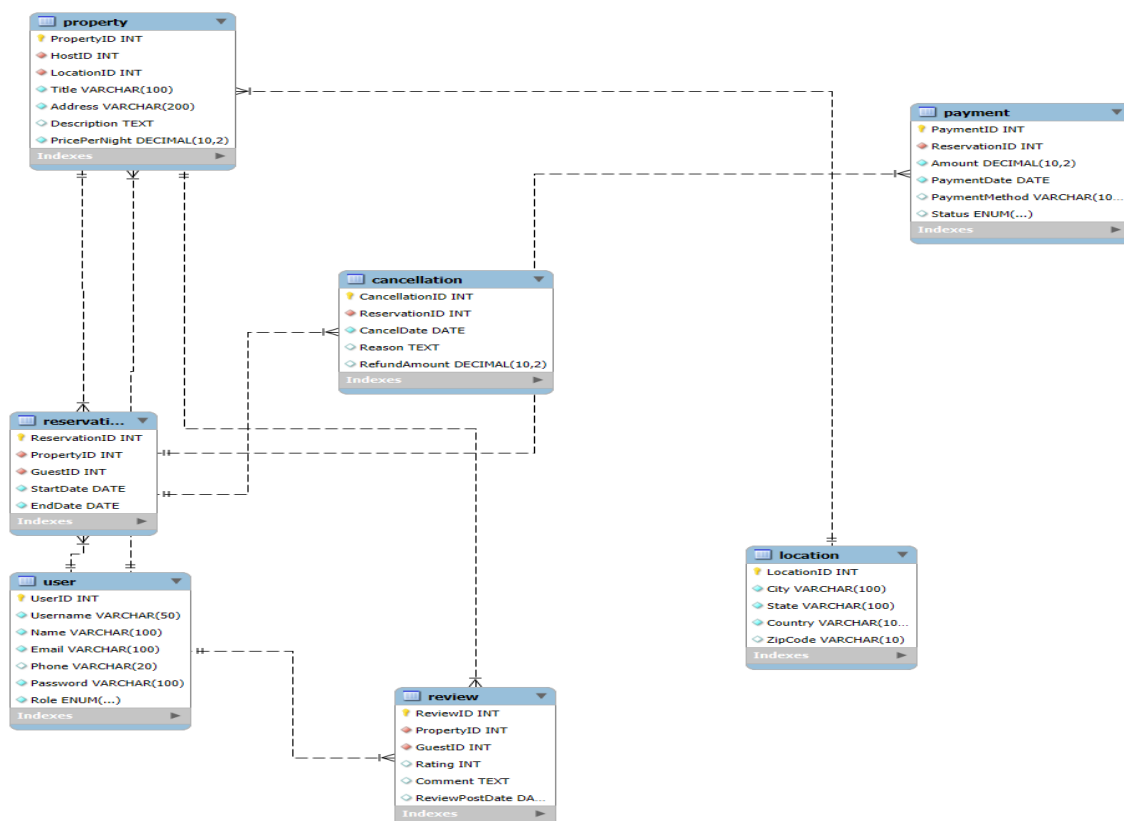
- **RELATIONSHIPS OVERVIEW:**

- **USER** hosts **PROPERTY** (**1:N**), which means one host can list multiple properties but one property can have only one host assuming no sharing properties.
- **USER** makes **RESERVATION** (**1:N**), it is allowed for one guest to book many reservations as he/she can, but once reserved that same **reservationID** can be assigned to any other user.
- **PROPERTY** receives **RESERVATION** (**1:N**), as a single property can be rented to any number of users at different time stamps.
- **RESERVATION** is paid via **PAYMENT** (**1:N**), for a single payment there will be only one reservation, but each reservation may have

multiple transaction as there can be failed payments or never successful processing.. payments

- **RESERVATION** may have a **CANCELLATION** (1:1), allowing optional cancellation records.
- **PROPERTY** receives **REVIEW** (1:N), enabling users to give an many review as they want to on the same property.
- **USER** posts **REVIEW** (1:N), supporting many reviews from each guest.
- **PROPERTY** is located at **LOCATION** (M:1), in the same city,country and state there may any number of properties, but a single property can be at a single location.

## RELATIONAL MODEL



## User:

*Attributes:* userID, username, name, email, phone, password, role

*Primary Key:* userID

### Functional Dependencies:

➤  $\text{userID} \rightarrow (\text{username}, \text{name}, \text{email}, \text{phone}, \text{password}, \text{role})$

## Location:

*Attributes:* locationID, city, state, country, zipCode

*Primary Key:* locationID

### Functional Dependencies:

➤  $\text{locationID} \rightarrow (\text{city}, \text{state}, \text{country}, \text{zipCode})$

## Property:

*Attributes:* propertyID, hostID, locationID, title, address, description, pricePerNight

*Primary Key:* propertyID

*Foreign Keys:* hostID (references User), locationID (references Location)

### Functional Dependencies:

➤  $\text{propertyID} \rightarrow (\text{hostID}, \text{locationID}, \text{title}, \text{address}, \text{description}, \text{pricePerNight})$

## Reservation:

*Attributes:* reservationID, propertyID, guestID, startDate, endDate

*Primary Key:* reservationID

*Foreign Keys:* propertyID (references Property), guestID (references User)



## Functional Dependencies:

- reservationID → (propertyID, guestID, startDate, endDate)

## Payment:

*Attributes:* paymentID, reservationID, amount, paymentDate, paymentMethod, status

*Primary Key:* paymentID

*Foreign Key:* reservationID (references Reservation)

## Functional Dependencies:

- paymentID → (reservationID, amount, paymentDate, paymentMethod, status)

## Cancellation:

*Attributes:* cancellationID, reservationID, cancelDate, reason, refundAmount

*Primary Key:* cancellationID

*Foreign Key:* reservationID (references Reservation)

## Functional Dependencies:

- cancellationID → (reservationID, cancelDate, reason, refundAmount)

## Review:

*Attributes:* reviewID, propertyID, guestID, rating, comment, reviewPostDate

*Primary Key:* reviewID

*Foreign Keys:* propertyID (references Property), guestID (references User)

## Functional Dependencies:

- reviewID → (propertyID, guestID, rating, comment, reviewPostDate)

# NORMALIZATION ANALYSIS (Up to BCNF)

## 1NF (First Normal Form)

- All relations must have atomic values (no repeating groups or arrays).
- Each attribute accommodates holds only one value.
- All relations satisfy 1NF.

## 2NF (Second Normal Form)

- All relations must have a **single-attributed primary key** (except Reservation with guestID, propertyID foreign keys—but PK is reservationID).
- No partial dependency on part of a composite key.
- All non-key attributes depend on the full primary key.
- All tables are in 2NF.

## 3NF (Third Normal Form)

- No transitive dependencies.
- All non-key attributes depend *only* on the primary key.
- User: all the attributes depend on **userID**.
- Location: all the attributes depend on **locationID**.
- Property: all the attributes depend on **propertyID**.
- Reservation: all the attributes depend on **reservationID**.
- Payment: all the attributes depend on **paymentID**.
- Cancellation: all the attributes depend on **cancellationID**.
- Review: all the attributes depend on **reviewID**.

CONCLUSION : All tables satisfy 3NF!

### BCNF (Boyce-Codd Normal Form)

- For every functional dependency  $X \rightarrow Y$ , X is a **superkey**.
- All tables have primary keys that determine all other attributes.
- No partial or transitive dependencies.
- No anomalies from functional dependencies violating BCNF.

CONCLUSION : All tables satisfy BCNF!

## DATABASE SCHEMA WITH DATA AND QUERIES:

### Database SetUp:

```
CREATE DATABASE IF NOT EXISTS RentalManagementDB;  
USE RentalManagementDB;
```

### Creating Tables: (SCHEMAS of each Relation)

```
CREATE TABLE USER  
(  
  UserID INT AUTO_INCREMENT PRIMARY KEY,  
  Username VARCHAR(50) UNIQUE NOT NULL,  
  Name VARCHAR(100) NOT NULL,  
  Email VARCHAR(100) UNIQUE NOT NULL,  
  Phone VARCHAR(20),  
  Password VARCHAR(100) NOT NULL,  
  Role ENUM('HOST', 'GUEST', 'ADMIN') NOT NULL  
);
```

```

CREATE TABLE LOCATION
(
    LocationID INT AUTO_INCREMENT PRIMARY KEY,
    City VARCHAR(100) NOT NULL,
    State VARCHAR(100) NOT NULL,
    Country VARCHAR(100) NOT NULL,
    ZipCode VARCHAR(10)
);

CREATE TABLE PROPERTY
(
    PropertyID INT AUTO_INCREMENT PRIMARY KEY,
    HostID INT NOT NULL,
    LocationID INT NOT NULL,
    Title VARCHAR(100) NOT NULL,
    Address VARCHAR(200) NOT NULL,
    Description TEXT,
    PricePerNight DECIMAL(10, 2) NOT NULL,
    FOREIGN KEY (HostID) REFERENCES USER(UserID) ON DELETE CASCADE,
    FOREIGN KEY (LocationID) REFERENCES LOCATION(LocationID) ON DELETE CASCADE
);

CREATE TABLE RESERVATION
(
    ReservationID INT AUTO_INCREMENT PRIMARY KEY,
    PropertyID INT NOT NULL,
    GuestID INT NOT NULL,
    StartDate DATE NOT NULL,
    EndDate DATE NOT NULL,
    FOREIGN KEY (PropertyID) REFERENCES PROPERTY(PropertyID) ON DELETE CASCADE,
    FOREIGN KEY (GuestID) REFERENCES USER(UserID) ON DELETE CASCADE,
    CHECK(StartDate < EndDate)
);

CREATE TABLE PAYMENT
(
    PaymentID INT AUTO_INCREMENT PRIMARY KEY,
    ReservationID INT NOT NULL,
    Amount DECIMAL(10, 2) NOT NULL,
    PaymentDate DATE NOT NULL,
    PaymentMethod VARCHAR(100),
    Status ENUM('SUCCESS', 'PROCESSING', 'FAILED') DEFAULT 'PROCESSING',
    FOREIGN KEY (ReservationID) REFERENCES RESERVATION(ReservationID) ON DELETE
CASCADE
);

CREATE TABLE CANCELLATION
(

```

```

CancellationID INT AUTO_INCREMENT PRIMARY KEY,
ReservationID INT NOT NULL,
CancelDate DATE NOT NULL,
Reason TEXT,
RefundAmount DECIMAL(10, 2) DEFAULT 0.00,
FOREIGN KEY (ReservationID) REFERENCES RESERVATION(ReservationID) ON DELETE
CASCADE
);

```

```

CREATE TABLE REVIEW
(
ReviewID INT AUTO_INCREMENT PRIMARY KEY,
PropertyID INT NOT NULL,
GuestID INT NOT NULL,
Rating INT CHECK (Rating BETWEEN 1 AND 5),
Comment TEXT,
ReviewPostDate DATE,
FOREIGN KEY (PropertyID) REFERENCES PROPERTY(PropertyID) ON DELETE CASCADE,
FOREIGN KEY (GuestID) REFERENCES USER(UserID) ON DELETE CASCADE
);

```

## Inserting data into Tables:

- USER Table data:

```

INSERT INTO USER (Username, Name, Email, Phone, Password, Role) VALUES
('rahulhost', 'Rahul Sharma', 'rahul.sharma@gmail.com', '9876543210', 'rahulpass',
'HOST'),
('sneha_guest', 'Sneha Iyer', 'sneha.iyer@gmail.com', '9123456780', 'snehapass',
'GUEST'),
('arvindhost', 'Arvind Kumar', 'arvind.kumar@gmail.com', '9988776655', 'arvindpass',
'HOST'),
('priya_guest', 'Priya Singh', 'priya.singh@gmail.com', '9876501234', 'priyapass',
'GUEST'),
('neerajhost', 'Neeraj Patel', 'neeraj.patel@gmail.com', '9876512345', 'neerajpass',
'HOST'),
('akash_guest', 'Akash Verma', 'akash.verma@gmail.com', '8765432109', 'akashpass',
'GUEST'),
('divya_host', 'Divya Menon', 'divya.menon@gmail.com', '9988123456', 'divyapass',
'HOST'),
('vijay_guest', 'Vijay Reddy', 'vijay.reddy@gmail.com', '9123498765', 'vijaypass',
'GUEST'),
('pallavi_host', 'Pallavi Desai', 'pallavi.desai@gmail.com', '9876540987',
'pallavipass', 'HOST'),
('adminuser', 'Admin User', 'admin@gmail.com', '9000000000', 'adminpass', 'ADMIN');

```

- LOCATION Table data:

```
INSERT INTO LOCATION (City, State, Country, ZipCode) VALUES
('Bengaluru', 'Karnataka', 'India', '560001'),
('Hyderabad', 'Telangana', 'India', '500001'),
('Mumbai', 'Maharashtra', 'India', '400001'),
('Chennai', 'Tamil Nadu', 'India', '600001'),
('New Delhi', 'Delhi', 'India', '110001'),
('Pune', 'Maharashtra', 'India', '411001'),
('Kolkata', 'West Bengal', 'India', '700001'),
('Ahmedabad', 'Gujarat', 'India', '380001'),
('Jaipur', 'Rajasthan', 'India', '302001'),
('Lucknow', 'Uttar Pradesh', 'India', '226001');
```

- PROPERTY Table data:

```
INSERT INTO PROPERTY (HostID, LocationID, Title, Address, Description,
PricePerNight) VALUES
(1, 1, '2BHK Apartment', 'MG Road, Bengaluru', 'Spacious 2BHK near city center',
3200.00),
(3, 2, 'Modern Studio', 'Madhapur, Hyderabad', 'Well-designed studio with AC',
2500.00),
(5, 3, 'Sea View Apartment', 'Marine Drive, Mumbai', 'Beautiful sea-facing flat',
4500.00),
(7, 4, 'Chettinad House', 'Mylapore, Chennai', 'Heritage house with courtyard',
2800.00),
(1, 5, 'Luxorius Flat', 'Connaught Place, New Delhi', 'Premium apartment in heart of
the city', 5200.00),
(3, 6, 'Budget Friendly Room', 'FC Road, Pune', 'Affordable stay with all basic
facilities', 1500.00),
(5, 7, 'Riverside Bungalow', 'Howrah, Kolkata', 'Spacious Bungalow by the river',
6000.00),
(7, 8, 'City Center Property', 'CG Road, Ahmedabad', 'Walkable to shops and
restaurants', 2700.00),
(9, 9, 'Jaipur heritage Bungalow', 'Amer Road, Jaipur', 'Royal experience in heritage
Bungalow', 4000.00),
(9, 10, 'Guesthouse in Lucknow', 'Hazratganj, Lucknow', 'Comfortable and centrally
located', 2300.00),
(3, 3, '3BHK Flat', 'Goregaon East, Mumbai', 'Spacious 3BHK near filmc city',
4500.00),
(1, 1, 'No-Booking Loft', 'Church Street, Bengaluru', 'Modern loft no bookings yet',
4000.00),
(3, 3, 'Empty Studio', 'Bandra, Mumbai', 'Studio apartment waiting for first guest',
2800.00);
```

- RESERVATION Table data:

```
INSERT INTO RESERVATION (PropertyID, GuestID, StartDate, EndDate) VALUES
(1, 2, '2024-09-22', '2024-09-25'),
(2, 4, '2024-10-15', '2024-10-17'),
(3, 6, '2024-11-02', '2024-11-04'),
(4, 8, '2024-12-08', '2024-12-10'),
(5, 2, '2025-01-01', '2025-01-03'),
(6, 4, '2025-01-05', '2025-01-07'),
(7, 6, '2025-02-10', '2025-02-12'),
(8, 8, '2025-03-15', '2025-03-20'),
(9, 2, '2025-04-25', '2025-04-28'),
(10, 4, '2025-05-01', '2025-05-05'),
(3, 2, '2025-06-10', '2025-06-13'),
(2, 4, '2025-06-15', '2025-06-17'),
(10, 4, '2025-07-01', '2025-07-03'),
(2, 2, '2025-08-01', '2025-08-05'),
(3, 2, '2025-09-10', '2025-09-12'),
(4, 4, '2025-08-15', '2025-08-18'),
(1, 2, '2023-05-10', '2023-05-15'),
(2, 4, '2025-10-20', '2025-10-23'),
(3, 6, '2022-01-10', '2022-01-15');
```

- PAYMENT Table data:

```
INSERT INTO PAYMENT (ReservationID, Amount, PaymentDate, PaymentMethod, Status)
VALUES
(1, 9600.00, '2024-09-19', 'UPI', 'SUCCESS'),
(2, 5100.00, '2024-10-11', 'Credit Card', 'SUCCESS'),
(3, 13750.00, '2024-10-30', 'Net Banking', 'SUCCESS'),
(4, 14500.00, '2024-12-04', 'UPI', 'SUCCESS'),
(5, 10450.00, '2024-12-29', 'Credit Card', 'SUCCESS'),
(6, 3100.00, '2025-01-03', 'UPI', 'PROCESSING'),
(7, 12200.00, '2025-02-04', 'Net Banking', 'SUCCESS'),
(8, 16500.00, '2025-03-10', 'Credit Card', 'SUCCESS'),
(9, 9400.00, '2025-04-21', 'UPI', 'FAILED'),
(9, 9400.00, '2025-04-21', 'Credit Card', 'SUCCESS'),
(10, 14050.00, '2025-04-27', 'UPI', 'SUCCESS'),
(14, 10000.00, '2025-07-25', 'Credit Card', 'SUCCESS'),
(15, 9500.00, '2025-09-01', 'UPI', 'PROCESSING'),
(16, 12000.00, '2025-08-10', 'Credit Card', 'FAILED'),
(6, 3100.00, DATE_SUB(CURDATE(), INTERVAL 400 DAY), 'UPI', 'PROCESSING'), -- fake
data to test the last query of the queries list
(17, 8000.00, '2023-05-05', 'UPI', 'PROCESSING');
```

- CANCELLATION Table data:

```
INSERT INTO CANCELLATION (ReservationID, CancelDate, Reason, RefundAmount) VALUES
(1, '2024-09-18', 'Change in travel plans', 9600.00),
(2, '2024-10-14', 'Found better option', 0.00),
(3, '2024-10-31', 'Unexpected emergency', 13750.00),
(5, '2024-12-27', 'Personal reasons', 5225.00),
(6, '2025-01-01', 'Schedule conflict', 3100.00),
(14, '2025-07-28', 'Change in plan', 10000.00),
(15, '2025-09-02', 'Work conflict', 4750.00),
(16, '2025-08-11', 'Emergency', 3000.00);
```

- REVIEW Table data:

```
INSERT INTO REVIEW (PropertyID, GuestID, Rating, Comment, ReviewPostDate) VALUES
(1, 2, 5, 'Amazing stay in Bengaluru, super clean!', '2024-09-25'),
(2, 4, 4, 'Nice location in Hyderabad.', '2024-10-18'),
(3, 6, 5, 'Seaview is worth every penny.', '2024-11-04'),
(4, 8, 3, 'Chennai home is nice but needs upkeep.', '2024-12-11'),
(5, 2, 5, 'Luxury experience in Delhi!', '2025-01-03'),
(6, 4, 4, 'The room was neat and clean.', '2025-01-08'),
(7, 6, 5, 'Riverside view made my day.', '2025-02-12'),
(8, 8, 4, 'Very convenient and sweet place to visit.', '2025-03-21'),
(9, 2, 5, 'Loved the royal bungalow in Jaipur.', '2025-04-28'),
(10, 4, 4, 'Guesthouse was very comfy.', '2025-05-06'),
(2, 2, 2, 'Not as clean as expected.', '2025-08-06'),
(3, 2, 3, 'Decent stay.', '2025-09-12'),
(4, 4, 5, 'Loved the heritage vibes!', '2025-08-18');
```

## Reading Data From Relations:

```
SELECT * FROM USER;
SELECT * FROM LOCATION;
SELECT * FROM PROPERTY;
SELECT * FROM RESERVATION;
SELECT * FROM PAYMENT;
SELECT * FROM CANCELLATION;
SELECT * FROM REVIEW;
```



## Initial data display:

- USER data:

UserID	Username	Name	Email	Phone	Password	Role
1	rahulhost	Rahul Sharma	rahul.sharma@gmail.com	9876543210	rahulpass	HOST
2	sneha_guest	Sneha Iyer	sneha.iyer@gmail.com	9123456780	snehapass	GUEST
3	arvindhost	Arvind Kumar	arvind.kumar@gmail.com	9988776655	arvindpass	HOST
4	priya_guest	Priya Singh	priya.singh@gmail.com	9876501234	priyapass	GUEST
5	neerajhost	Neeraj Patel	neeraj.patel@gmail.com	9876512345	neerajpass	HOST
6	akash_guest	Akash Verma	akash.verma@gmail.com	8765432109	akashpass	GUEST
7	divya_host	Divya Menon	divya.menon@gmail.com	9988123456	divyapass	HOST
8	vijay_guest	Vijay Reddy	vijay.reddy@gmail.com	9123498765	vijaypass	GUEST
9	pallavi_host	Pallavi Desai	pallavi.desai@gmail.com	9876540987	pallavipass	HOST
10	adminuser	Admin User	admin@gmail.com	9000000000	adminpass	ADMIN

- LOCATION data:

LocationID	City	State	Country	ZipCode
1	Bengaluru	Karnataka	India	560001
2	Hyderabad	Telangana	India	500001
3	Mumbai	Maharashtra	India	400001
4	Chennai	Tamil Nadu	India	600001
5	New Delhi	Delhi	India	110001
6	Pune	Maharashtra	India	411001
7	Kolkata	West Bengal	India	700001
8	Ahmedabad	Gujarat	India	380001
9	Jaipur	Rajasthan	India	302001
10	Lucknow	Uttar Pradesh	India	226001

- PROPERTY data:

PropertyID	HostID	LocationID	Title	Address	Description	PricePerNight
1	1	1	2BHK Apartment	MG Road, Bengaluru	Spacious 2BHK near city center	3200.00
2	3	2	Modern Studio	Madhapur, Hyderabad	Well-designed studio with AC	2500.00
3	5	3	Sea View Apartment	Marine Drive, Mumbai	Beautiful sea-facing flat	4500.00
4	7	4	Chettinad House	Mylapore, Chennai	Heritage house with courtyard	2800.00
5	1	5	Luxurious Flat	Connaught Place, New Delhi	Premium apartment in heart of the city	5200.00
6	3	6	Budget Friendly Room	FC Road, Pune	Affordable stay with all basic facilities	1500.00
7	5	7	Riverside Bungalow	Howrah, Kolkata	Spacious Bungalow by the river	6000.00
8	7	8	City Center Property	CG Road, Ahmedabad	Walkable to shops and restaurants	2700.00
9	9	9	Jaipur heritage Bungalow	Amer Road, Jaipur	Royal experience in heritage Bungalow	4000.00
10	9	10	Guesthouse in Lucknow	Hazrat Hazratganj, Lucknow	Comfortable and centrally located	2300.00
11	3	3	3BHK Flat	Goregaon East, Mumbai	Spacious 3BHK near film city	4500.00
12	1	1	No-Booking Loft	Church Street, Bengaluru	Modern loft no bookings yet	4000.00
13	3	3	Empty Studio	Bandra, Mumbai	Studio apartment waiting for first guest	2800.00
NULL	NULL	NULL	NULL	NULL	NULL	NULL

- RESERVATION data:

ReservationID	PropertyID	GuestID	StartDate	EndDate
1	1	2	2024-09-22	2024-09-25
2	2	4	2024-10-15	2024-10-17
3	3	6	2024-11-02	2024-11-04
4	4	8	2024-12-08	2024-12-10
5	5	2	2025-01-01	2025-01-03
6	6	4	2025-01-05	2025-01-07
7	7	6	2025-02-10	2025-02-12
8	8	8	2025-03-15	2025-03-20
9	9	2	2025-04-25	2025-04-28
10	10	4	2025-05-01	2025-05-05
11	3	2	2025-06-10	2025-06-13
12	2	4	2025-06-15	2025-06-17
13	10	4	2025-07-01	2025-07-03
14	2	2	2025-08-01	2025-08-05
15	3	2	2025-09-10	2025-09-12
16	4	4	2025-08-15	2025-08-18
17	1	2	2023-05-10	2023-05-15
18	2	4	2025-10-20	2025-10-23
19	3	6	2022-01-10	2022-01-15
NULL	NULL	NULL	NULL	NULL

- PAYMENT data:

PaymentID	ReservationID	Amount	PaymentDate	PaymentMethod	Status
1	1	9600.00	2024-09-19	UPI	SUCCESS
2	2	5100.00	2024-10-11	Credit Card	SUCCESS
3	3	13750.00	2024-10-30	Net Banking	SUCCESS
4	4	14500.00	2024-12-04	UPI	SUCCESS
5	5	10450.00	2024-12-29	Credit Card	SUCCESS
6	6	3100.00	2025-01-03	UPI	PROCESSING
7	7	12200.00	2025-02-04	Net Banking	SUCCESS
8	8	16500.00	2025-03-10	Credit Card	SUCCESS
9	9	9400.00	2025-04-21	UPI	FAILED
10	9	9400.00	2025-04-21	Credit Card	SUCCESS
11	10	14050.00	2025-04-27	UPI	SUCCESS
12	14	10000.00	2025-07-25	Credit Card	SUCCESS
13	15	9500.00	2025-09-01	UPI	PROCESSING
14	16	12000.00	2025-08-10	Credit Card	FAILED
15	6	3100.00	2024-05-24	UPI	PROCESSING
16	17	8000.00	2023-05-05	UPI	PROCESSING

- CANCELLATION data:

CancellationID	ReservationID	CancelDate	Reason	RefundAmount
1	1	2024-09-18	Change in travel plans	9600.00
2	2	2024-10-14	Found better option	0.00
3	3	2024-10-31	Unexpected emergency	13750.00
4	5	2024-12-27	Personal reasons	5225.00
5	6	2025-01-01	Schedule conflict	3100.00
6	14	2025-07-28	Change in plan	10000.00
7	15	2025-09-02	Work conflict	4750.00
8	16	2025-08-11	Emergency	3000.00



- REVIEW data:

ReviewID	PropertyID	GuestID	Rating	Comment	ReviewPostDate
1	1	2	5	Amazing stay in Bengaluru, super clean!	2024-09-25
2	2	4	4	Nice location in Hyderabad.	2024-10-18
3	3	6	5	Seaview is worth every penny.	2024-11-04
4	4	8	3	Chennai home is nice but needs upkeep.	2024-12-11
5	5	2	5	Luxury experience in Delhi!	2025-01-03
6	6	4	4	The room was neat and clean.	2025-01-08
7	7	6	5	Riverside view made my day.	2025-02-12
8	8	8	4	Very convenient and sweet place to visit.	2025-03-21
9	9	2	5	Loved the royal bungalow in Jaipur.	2025-04-28
10	10	4	4	Guesthouse was very comfy.	2025-05-06
11	2	2	2	Not as clean as expected.	2025-08-06
12	3	2	3	Decent stay.	2025-09-12
13	4	4	5	Loved the heritage vibes!	2025-08-18

## Some Demo Queries:

- List all properties with their host names and locations

```

SELECT P.PropertyID as Property_Id, U.Name AS Name, P.Title, P.PricePerNight,
L.City, L.State, L.Country
FROM
    PROPERTY P
    JOIN USER U ON P.HostID = U.UserID
    JOIN LOCATION L ON P.LocationID = L.LocationID
ORDER BY
    L.City,P.Title;

```

## OUTPUT:

Property_Id	Name	Title	PricePerNight	City	State	Country
8	Divya Menon	City Center Property	2700.00	Ahmedabad	Gujarat	India
1	Rahul Sharma	2BHK Apartment	3200.00	Bengaluru	Karnataka	India
12	Rahul Sharma	No-Booking Loft	4000.00	Bengaluru	Karnataka	India
4	Divya Menon	Chettinad House	2800.00	Chennai	Tamil Nadu	India
2	Arvind Kumar	Modern Studio	2500.00	Hyderabad	Telangana	India
9	Pallavi Desai	Jaipur heritage Bungalow	4000.00	Jaipur	Rajasthan	India
7	Neeraj Patel	Riverside Bungalow	6000.00	Kolkata	West Bengal	India
10	Pallavi Desai	Guesthouse in Lucknow	2300.00	Lucknow	Uttar Pradesh	India
11	Arvind Kumar	3BHK Flat	4500.00	Mumbai	Maharashtra	India
13	Arvind Kumar	Empty Studio	2800.00	Mumbai	Maharashtra	India
3	Neeraj Patel	Sea View Apartment	4500.00	Mumbai	Maharashtra	India
5	Rahul Sharma	Luxurious Flat	5200.00	New Delhi	Delhi	India
6	Arvind Kumar	Budget Friendly Room	1500.00	Pune	Maharashtra	India

- Show reservations with guest names and property titles.

```
SELECT R.ReservationId, U.Name as Name, P.Title
FROM
    RESERVATION R
    JOIN USER U ON R.GuestID = U.UserID
    JOIN PROPERTY P ON R.PropertyID = P.PropertyID;
```

OUTPUT:

ReservationId	Name	Title
1	Sneha Iyer	2BHK Apartment
5	Sneha Iyer	Luxorius Flat
9	Sneha Iyer	Jaipur heritage Bungalow
11	Sneha Iyer	Sea View Apartment
14	Sneha Iyer	Modern Studio
15	Sneha Iyer	Sea View Apartment
17	Sneha Iyer	2BHK Apartment
2	Priya Singh	Modern Studio
6	Priya Singh	Budget Friendly Room
10	Priya Singh	Guesthouse in Lucknow
12	Priya Singh	Modern Studio
13	Priya Singh	Guesthouse in Lucknow
16	Priya Singh	Chettinad House
18	Priya Singh	Modern Studio
3	Akash Verma	Sea View Apartment
7	Akash Verma	Riverside Bungalow
19	Akash Verma	Sea View Apartment
4	Vijay Reddy	Chettinad House
8	Vijay Reddy	City Center Property

- List all properties along with their reservation count [including properties with zero reservations]

```
SELECT P.PropertyID, P.Title, COUNT(R.ReservationID) AS COUNT
FROM
    PROPERTY P
    LEFT JOIN RESERVATION R ON P.PropertyID = R.PropertyID
GROUP BY P.propertyID;
```

OUTPUT:

PropertyID	Title	COUNT
1	2BHK Apartment	2
2	Modern Studio	4
3	Sea View Apartment	4
4	Chettinad House	2
5	Luxorius Flat	1
6	Budget Friendly Room	1
7	Riverside Bungalow	1
8	City Center Property	1
9	Jaipur heritage Bungalow	1
10	Guesthouse in Lucknow	2
11	3BHK Flat	0
12	No-Booking Loft	0
13	Empty Studio	0

- List average rating for each property.

```
SELECT P.PropertyID, P.Title, AVG(R.Rating) AS AVERGAE
FROM
    PROPERTY P
    JOIN REVIEW R ON R.PropertyID = P.PropertyID
GROUP BY P.PropertyID;
```

OUTPUT:

PropertyID	Title	AVERGAE
1	2BHK Apartment	5.0000
2	Modern Studio	3.0000
3	Sea View Apartment	4.0000
4	Chettinad House	4.0000
5	Luxorius Flat	5.0000
6	Budget Friendly Room	4.0000
7	Riverside Bungalow	5.0000
8	City Center Property	4.0000
9	Jaipur heritage Bungalow	5.0000
10	Guesthouse in Lucknow	4.0000

- Show total payment amount received per property. [After removing the Refund Amount if the transaction got cancelled in between ]

```

WITH
T AS
(
    SELECT R.ReservationID, SUM(Amount) AS Amount
    FROM
        RESERVATION R
        JOIN PAYMENT P ON R.ReservationID = P.ReservationID
    GROUP BY R.ReservationID
),
T1 AS
(
    SELECT P.PropertyID, T.ReservationID,
           CASE
               WHEN Amount IS NULL THEN 0
               ELSE Amount
           END AS Amount
    FROM PROPERTY P
    LEFT JOIN T ON P.PropertyID = (SELECT PropertyID FROM RESERVATION WHERE
ReservationID = T.ReservationID)
),
T2 AS
(
    SELECT T1.PropertyID, T1.Amount,
           CASE
               WHEN C.RefundAmount IS NULL THEN 0
               ELSE C.RefundAmount
           END AS RefundAmount
    FROM T1
    LEFT JOIN CANCELLATION C ON C.ReservationID = T1.ReservationID
)
SELECT PropertyID, Amount-RefundAmount AS Net_Amount
FROM T2
ORDER BY PropertyID ASC;

```

**OUTPUT:**

PropertyID	Net_Amount
1	8000.00
1	0.00
2	0.00
2	5100.00
3	4750.00
3	0.00
4	9000.00
4	14500.00
5	5225.00
6	3100.00
7	12200.00
8	16500.00
9	18800.00
10	14050.00
11	0.00
12	0.00
13	0.00

- Identify loyal or repeat customers. [in future if possible we can give a special discount to these].

```

SELECT U.Name, COUNT(ReservationID) AS VISIT_COUNT
FROM USER U
      JOIN RESERVATION R ON U.UserID = R.GuestID
WHERE U.Role = 'GUEST'
GROUP BY U.UserID
HAVING VISIT_COUNT > 2;

```

OUTPUT:

Name	VISIT_COUNT
Sneha Iyer	7
Priya Singh	7
Akash Verma	3



- Top 5 Properties by Review Rating.

```
SELECT DENSE_RANK() OVER (ORDER BY AVG(Rating) DESC) AS RNK,
P.PropertyID, P.Title, AVG(Rating) AS AVG_RATING
FROM REVIEW R
JOIN PROPERTY P ON R.PropertyID = P.PropertyID
GROUP BY P.PropertyID
ORDER BY RNK
LIMIT 5;
```

OUTPUT:

RNK	PropertyID	Title	AVG_RATING
1	1	2BHK Apartment	5.0000
1	5	Luxorius Flat	5.0000
1	7	Riverside Bunglow	5.0000
1	9	Jaipur heritage Bunglow	5.0000
2	3	Sea View Apartment	4.0000

- Top 5 most expensive properties.

```
SELECT DENSE_RANK() OVER (ORDER BY PricePerNight DESC) AS RNK,
P.PropertyID, P.Title, PricePerNight
FROM PROPERTY P
ORDER BY RNK
LIMIT 5;
```

OUTPUT:

RNK	PropertyID	Title	PricePerNight
1	7	Riverside Bunglow	6000.00
2	5	Luxorius Flat	5200.00
3	3	Sea View Apartment	4500.00
3	11	3BHK Flat	4500.00
4	9	Jaipur heritage Bunglow	4000.00

- procedure to update the property only by host.

```

DELIMITER $$
CREATE PROCEDURE UpdateProperty(
    IN inHostID INT,
    IN inPropertyID INT,
    IN inTitle VARCHAR(100),
    IN inAddress VARCHAR(200),
    IN inDescription TEXT,
    IN inPricePerNight DECIMAL(10, 2)
)
BEGIN
    IF (SELECT COUNT(*) FROM USER WHERE UserID = inHostID and Role = 'HOST') = 0
    THEN
        SIGNAL SQLSTATE '45000' SET MESSAGE_TEXT = 'UNAUTHORIZED USER'; -- CUSTOM
    ERROR
    ELSE
        UPDATE PROPERTY
        SET
            Title = inTitle,
            Address = inAddress,
            Description = inDescription,
            PricePerNight = inPricePerNight
        WHERE PropertyID = inPropertyID AND HostID = inHostID;
    END IF;
END$$
DELIMITER ;

```

- Delete old failed payments about 1 year before [made a procedure as it requires authentication].

```

DELIMITER $$
CREATE PROCEDURE DeleteOldFailedPayments(IN inAdminID INT)
BEGIN
    IF (SELECT COUNT(*) FROM USER WHERE UserID = inAdminID and Role = 'ADMIN') = 0
    THEN
        SIGNAL SQLSTATE '45000' SET MESSAGE_TEXT = 'UNAUTHORIZED USER'; -- CUSTOM
    ERROR
    ELSE
        DELETE FROM PAYMENT
        WHERE PaymentID IN (
            SELECT PaymentID
            FROM (
                SELECT PaymentID

```

```

        FROM PAYMENT
        WHERE (Status = 'FAILED' OR Status = 'PROCESSING')
              AND (PaymentDate < DATE_SUB(CURDATE(), INTERVAL 1 YEAR))
    ) AS sub
    );
END IF;
END$$
DELIMITER ;

```

- procedure for cancelling with automatic refund.

```

DELIMITER $$
CREATE PROCEDURE cancelReservation(IN resID INT, IN reason TEXT)
BEGIN
    -- our local variables
    DECLARE start_date DATE;
    DECLARE curr_amount DECIMAL(10,2);
    DECLARE Refund DECIMAL(10,2);

    IF (SELECT COUNT(*) FROM RESERVATION WHERE resID = ReservationID) > 0 THEN
        SELECT StartDate into start_date FROM RESERVATION WHERE ReservationID =
resID;
        SELECT P.Amount into curr_amount FROM PAYMENT P WHERE P.ReservationID =
resID;
        IF DATEDIFF(start_date, CURDATE()) >= 7 THEN
            SET Refund = curr_amount;
        ELSEIF DATEDIFF(start_date, CURDATE()) >= 5 THEN
            SET Refund = curr_amount/2;
        ELSEIF DATEDIFF(start_date, CURDATE()) >= 2 THEN
            SET Refund = curr_amount/4;
        ELSE
            SET Refund = 0;
        END IF;
    END IF;

    INSERT INTO CANCELLATION (ReservationID, CancelDate, Reason, RefundAmount)
    VALUES (resID, CURDATE(), reason, Refund);

END$$
DELIMITER ;

```

## @ DESTROYING STALE DATA WITH IN A PARTICULAR TIME

- delete all the payments whose status is processing and the deadline crossed

```
SET SQL_SAFE_UPDATES = 0;
DELETE FROM PAYMENT
WHERE Status = 'PROCESSING'
      AND ReservationID IN (
        SELECT ReservationID
        FROM RESERVATION
        WHERE StartDate <= CURDATE()
      );
SET SQL_SAFE_UPDATES = 1;
SELECT * FROM PAYMENT;
```

- delete user who reserved a property but did not go for payment with in 1 day

```
SET SQL_SAFE_UPDATES = 0;
DELETE FROM RESERVATION
WHERE reservationID NOT IN (
  SELECT reservationID
  FROM PAYMENT
);
SET SQL_SAFE_UPDATES = 1;
```

- delete user whose endDate has gone past one year ago

```
SET SQL_SAFE_UPDATES = 0;
DELETE FROM RESERVATION
WHERE CURDATE() >= DATE_ADD(endDate, INTERVAL 1 YEAR) ;
SET SQL_SAFE_UPDATES = 1;
```

## Conclusion:

This project successfully demonstrates most of the design and implementation of a Rental Management System using a relational database. The system incorporates essential entities such as Users, Properties, Reservations, Payments, Cancellations, Locations, and Reviews, ensuring data integrity through the use of foreign keys and normalization up to BCNF.

The developed ER diagram and normalized schema help to eliminate redundancy and maintain consistency across all operations, such as booking, payment processing, and cancellations.

Overall, this database solution offers a scalable and efficient backbone for any property rental application, supporting both hosts and guests in managing their bookings with ease.