CS 353 - Database Systems

Hotel Database Management System Design Report

Group 38

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Contents

1. Revised E/R Diagram

The E/R diagram from the Proposal Document, shown in Figure 1.1, has been improved according to feedback. The revised diagram is shown in Figure 1.2 below. The changes that leads to the revised diagram are:

- All the derived attributes are removed.
- Unnecessary discriminators in the weak entity sets are changed to regular attributes.
- Ternary relationship “Applies-to”, which allowed the employees to apply for training programs and managers to approve the applications, has been rearranged such that there are two separate aggregations: one for security staff, one for housekeepers. This way, the manager id’s do not become temporarily null and only the security staff and housekeepers can apply to training programs.
- Housekeeper cardinality is now 1 in “assigned-delivery” relationship.
- Building participation is now total in “Security-walk” relationship.
- Room participation is now total in “Cleaning-Duty” relationship.
- "totals" in Employee, Guest Activity, and Users are removed.
- Job-Application is now an entity.
- “Ordered-from” relationship is removed.
- Reservation is now an entity.
- Comment is now an entity.
- Ticket is now an entity.

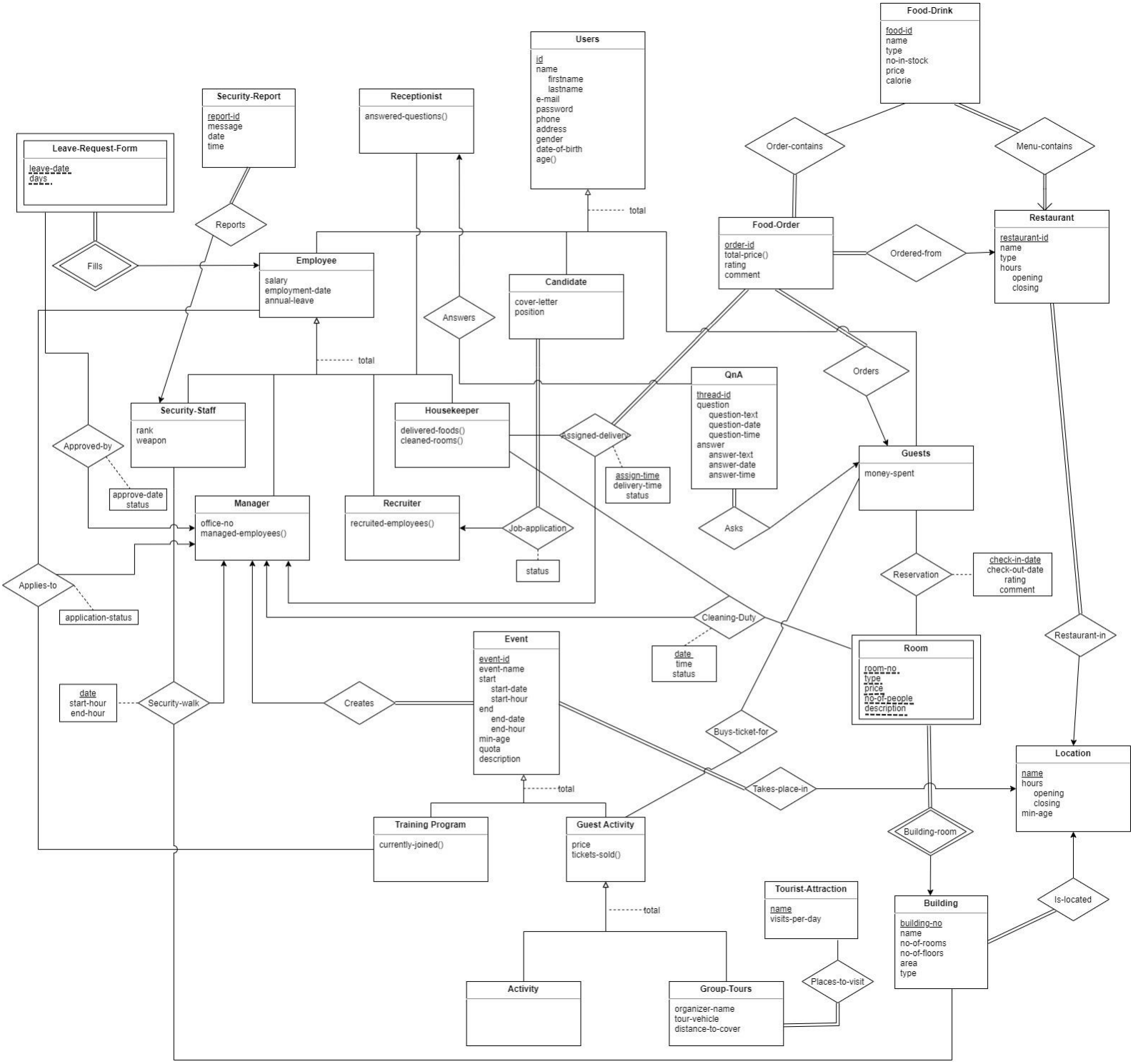


Figure 1.1: E/R Diagram from the Proposal Document

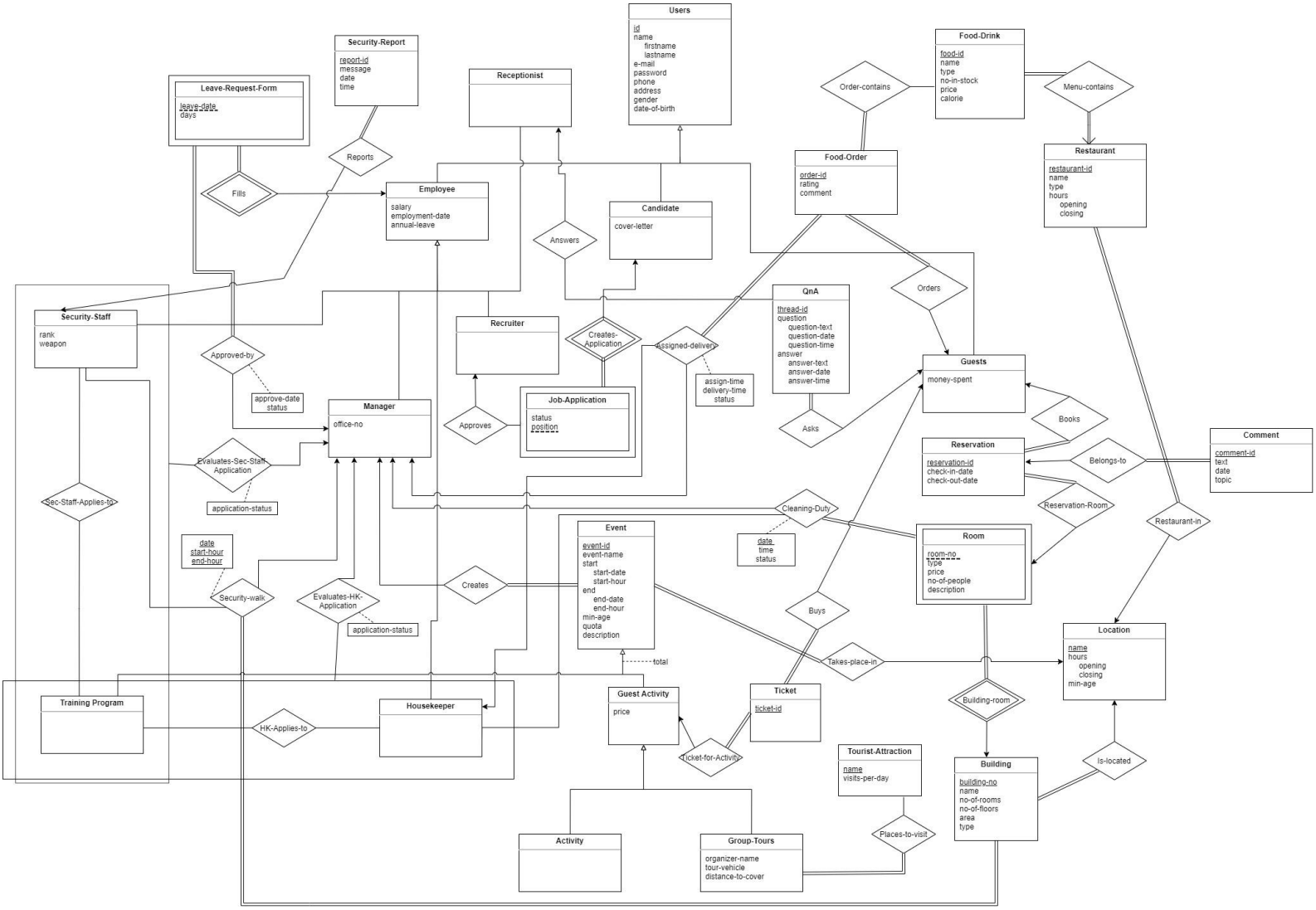


Figure 1.2: The Revised E/R Diagram

2. Table Schemas

2.1. Users

Users(id, firstname, lastname, email, password, phone, address, gender, date-of-birth)

Functional Dependencies:
id -> firstname, lastname, email, password, phone, address, gender, date-of-birth

Candidate Keys:
{id}
{email}

Primary Key:
{id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Users(
        id INT,
        firstname VARCHAR(50) NOT NULL,
        lastname VARCHAR(50) NOT NULL,
        email VARCHAR(75) NOT NULL UNIQUE,
        password VARCHAR(20) NOT NULL,
        phone VARCHAR(20),
        address VARCHAR(100),
        gender VARCHAR(20),
        date-of-birth DATE
        PRIMARY KEY (id)
        CHECK (date-of-birth < CAST(GETDATE() AS Date) AND id > 0 ) ) );
```

2.2. Employee

Employee(id, salary, employment-date, annual-leave)

Functional Dependencies:
id -> salary, employment-date, annual-leave

Candidate Keys:
{id}

Primary Key:
{id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Employee(
        id INT,
        salary NUMERIC(18, 2) NOT NULL,
        employment-date DATE NOT NULL,
        annual-leave INT NOT NULL,
        PRIMARY KEY (id)
        CHECK (salary >= 0 AND id > 0 AND annual-leave > 0) );
```

2.3. Manager

Manager(id, office-no)

Functional Dependencies:
id -> office-no

Candidate Keys:
{id}

Primary Key:
{id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Manager(
        id INT,
        office-no VARCHAR(10) NOT NULL,
        PRIMARY KEY (id),
        FOREIGN KEY (id) REFERENCES Employee(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (id > 0) );
```

2.4. Security-Staff

Security-staff(id, rank, weapon)

Functional Dependencies:
id -> rank, weapon

Candidate Keys:
{id}

Primary Key:
{id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Security-Staff(
        id INT,
        rank VARCHAR(20) NOT NULL,
        weapon VARCHAR(20),
        PRIMARY KEY (id)
        FOREIGN KEY (id) REFERENCES Employee(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (id > 0)  );
```

2.5. Housekeeper

Housekeeper(id)

Candidate Keys:
{id}

Primary Key:
{id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Housekeeper(
        id INT,
        PRIMARY KEY (id),
        FOREIGN KEY (id) REFERENCES Employee(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (id > 0));
```

2.6. Recruiter

Recruiter(id)

Candidate Keys:
{id}

Primary Key:
{id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Recruiter(
        id INT,
        PRIMARY KEY (id),
        FOREIGN KEY (id) REFERENCES Employee(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (id > 0));
```

2.7. Receptionist

Receptionist(id)

Candidate Keys:
{id}

Primary Key:
{id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Receptionist(
        id INT,
        PRIMARY KEY (id),
        FOREIGN KEY (id) REFERENCES Employee(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (id > 0));
```

2.8. Candidate

Candidate(id, cover-letter)

Functional Dependencies:
id -> cover-letter

Candidate Keys:
{id}

Primary Key:
{id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Candidate(
        id INT,
        cover-letter VARCHAR(5000) NOT NULL,
        PRIMARY KEY (id),
        FOREIGN KEY (id) REFERENCES Users(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (id > 0));
```

2.9. Guests

Guests(id, money-spent)

Functional Dependencies:
id -> money-spent

Candidate Keys:
{id}

Primary Key:
{id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Guests(
        id INT,
        money-spent NUMERIC(18, 2) NOT NULL,
        PRIMARY KEY (id),
        FOREIGN KEY (id) REFERENCES Users(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (id > 0 AND money-spent > 0) );
```

2.10. Room

Room(<u>room-no, building-no</u>, type, description)

Functional Dependencies:
room-no, building-no -> type, description

Candidate Keys:
{room-no, building-no}

Primary Key:
{room-no, building-no}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Room (
        room-no INT,
        building-no VARCHAR(50),
        type VARCHAR(50) NOT NULL,
        description VARCHAR(5000)
        PRIMARY KEY (room-no, building-no),
        FOREIGN KEY (type) REFERENCES Room-type(type)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (building-no) REFERENCES Building(building-no)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (room-no > 0 AND  LEN(building-no) > 0 AND LEN(type) > 0))  );
```

2.11. Room-type

Room-type(<u>type</u>, price, no-of-people)

Functional Dependencies:
type->price, no-of-people

Candidate Keys:
{type}

Primary Key:
{type}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Room-type (
        type VARCHAR(50),
        price NUMERIC(18, 2) NOT NULL,
        no-of-people INT NOT NULL,
        PRIMARY KEY (type)
        CHECK ( LEN(type) > 0) );
```

2.12. Reservation

Reservation(reservation-id, guest-id, room-no, building-no, check-in-date, check-out-date)

Functional Dependencies:
reservation-id -> guest-id, check-in-date, check-out-date

Candidate Keys:
{reservation-id}

Primary Key:
{reservation-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Reservation(
        reservation-id INT,
        guest-id INT NOT NULL,
        room-no INT,
        building-no VARCHAR(50),
        check-in-date DATE NOT NULL,
        check-out-date DATE NOT NULL,
        PRIMARY KEY (reservation-id),
        FOREIGN KEY (guest-id) REFERENCES Guests(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (room-no,building-no) REFERENCES Room(room-no, building-no)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (reservation-id > 0 AND guest-id > 0 AND check-in-date < check-out-date
AND room-no > 0 AND  LEN(building-no) > 0) );
```

2.13. Comment

Comment(comment-id, reservation-id, text, date, topic)

Functional Dependencies:
comment-id -> text, reservation-id, date, topic

Candidate Keys:
{comment-id}

Primary Key:
{comment-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Comment(
        comment-id INT,
        reservation-id INT NOT NULL,
        text VARCHAR(5000) NOT NULL,
        date DATE NOT NULL,
        topic VARCHAR(50),
        PRIMARY KEY (comment-id),
        FOREIGN KEY (reservation-id) REFERENCES Reservation(reservation-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (comment-id > 0 AND reservation-id > 0) );
```

2.14. QnA

QnA(thread-id, guest-id,question-text, question-date, question-time, answer-text, answer-date, answer-time)

Functional Dependencies:
thread-id -> guest-id, receptionist-id, question-text, question-date, question-time, answer-text, answer-date, answer-time

Candidate Keys:
{thread-id}

Primary Key:
{thread-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE QnA(
        thread-id INT,
        guest-id INT NOT NULL,
        receptionist-id INT,
        question-text VARCHAR(5000) NOT NULL,
        question-date DATE NOT NULL,
        question-time TIME NOT NULL,
        answer-text VARCHAR(5000),
        answer-date DATE,
        answer-time TIME,
        PRIMARY KEY (thread-id),
        FOREIGN KEY (guest-id) REFERENCES Guests(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (receptionist-id) REFERENCES Receptionist(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (thread-id > 0 AND guest-id > 0 AND receptionist-id > 0) );
```

2.15. Building

Building(<u>building-no</u>, location-name, name, no-of-rooms, no-of-floors, area,type)

Functional Dependencies:
building-no -> location-name, name, no-of-rooms, no-of-floors, area,type

Candidate Keys:
{building-no}

Primary Key:
{building-no}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Building(
        building-no VARCHAR(50),
        location-name VARCHAR(50) NOT NULL,
        name VARCHAR(50) NOT NULL,
        no-of-rooms INT NOT NULL,
        no-of-floors INT NOT NULL,
        area INT NOT NULL,
        type VARCHAR(50) NOT NULL,
        PRIMARY KEY (building-no),
        FOREIGN KEY (location-name) REFERENCES Location(name)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (no-of-rooms > 0 AND no-of-floors > 0 AND area > 0 AND  LEN(building-
no) > 0 AND LEN(location-name) > 0) );
```

2.16. Security-walk

Security-walk(manager-id,security-staff-id, building-no, date, start-hour, end-hour)

Candidate Keys:
{manager-id,security-staff-id, building-no, date, start-hour, end-hour}

Primary Key:
{manager-id,security-staff-id, building-no, date, start-hour, end-hour}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Security-walk(
        manager-id INT,
        security-staff-id INT,
        building-no VARCHAR(50),
        date DATE,
        start-hour TIME,
        end-hour TIME,
        PRIMARY KEY (manager-id,security-staff-id, building-no, date, start-hour, end-
hour),
        FOREIGN KEY (manager-id) REFERENCES Manager(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (security-staff-id) REFERENCES Security-staff(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (building-no) REFERENCES Building(building-no)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (manager-id > 0 AND security-staff-id > 0 AND LEN(building-no) > 0));
```

2.17. Cleaning-Duty

Cleaning-Duty(housekeeper-id, room-no, building-no, date, time, status, manager-id)

Candidate Keys:
{housekeeper-id, room-no, building-no, date}

Primary Key:
{housekeeper-id, room-no, building-no, date}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Cleaning-Duty(
        housekeeper-id INT,
        room-no INT,
        building-no VARCHAR(50),
        date DATE,
        time TIME,
        status VARCHAR(20) NOT NULL,
        manager-id INT NOT NULL,
        PRIMARY KEY (housekeeper-id, room-no, building-no, date),
        FOREIGN KEY (housekeeper-id) REFERENCES Housekeeper(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (room-no) REFERENCES Room(room-no)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (building-no) REFERENCES Building(building-no)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (manager-id) REFERENCES Manager(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (housekeeper-id > 0 AND room-no > 0 AND LEN(building-no) > 0 AND
                manager-id > 0 AND CAST(GETDATE() AS Date ) <= date AND
                CAST(GETDATE() AS Time ) <= time  ));
```

2.18. Location

Location(<u>name</u>, opening, closing, min-age)

Functional Dependencies:
name -> opening, closing, min-age

Candidate Keys:
{name}

Primary Key:
{name}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Location(
        name VARCHAR(50),
        opening TIME,
        closing TIME,
        min-age INT,
        PRIMARY KEY (name),
        CHECK ( LEN(name) > 0 AND opening < closing AND min-age > 0) );
```

2.19. Event

Event(event-id, event-name, location-name, start-date, start-hour, end-date, end-hour, min-age, quota, description, manager-id)

Functional Dependencies:
event-id -> event-name, location-name, start-date, start-hour, end-date, end-hour, min-age, quota, description, manager-id

Candidate Keys:
{event-id}

Primary Key:
{event-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Event(
        event-id INT,
        event-name VARCHAR(50) NOT NULL,
        location-name VARCHAR(50) NOT NULL,
        start-date DATE NOT NULL,
        start-hour TIME NOT NULL,
        end-date DATE NOT NULL,
        end-hour TIME NOT NULL,
        min-age INT,
        quota INT,
        description VARCHAR(3000),
        manager-id INT NOT NULL,
        PRIMARY KEY (event-id),
        FOREIGN KEY (location-name) REFERENCES Location(name)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (manager-id) REFERENCES Manager(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK((event-id > 0) AND ((start-date < end-date) OR (start-date = end-date AND
                start-hour < end-hour))));
```

2.20. Guest-Activity

Guest-Activity(event-id, price)

Functional Dependencies:
event-id -> price

Candidate Keys:
{event-id}

Primary Key:
{event-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Guest-Activity(
        event-id INT,
        price NUMERIC (18, 2) NOT NULL,
        PRIMARY KEY (event-id),
        FOREIGN KEY (event-id) REFERENCES Event(event-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (event-id > 0 AND price >= 0.0));
```

2.21. Activity

Activity(event-id)

Candidate Keys:
{event-id}

Primary Key:
{event-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Activity(
        event-id INT,
        PRIMARY KEY (event-id),
        FOREIGN KEY (event-id) REFERENCES Event(event-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (event-id > 0));
```

2.22. Guest-Tours

Group-Tours(event-id, organizer-name, tour-vehicle, distance-to-cover)

Functional-Dependencies:
event-id -> organizer-name, tour-vehicle, distance-to-cover

Candidate Keys:
{event-id}

Primary Key:
{event-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Group-Tours(
        event-id INT,
        organizer-name VARCHAR(50) NOT NULL,
        tour-vehicle VARCHAR(20),
        distance-to-cover INT NOT NULL,
        PRIMARY KEY (event-id),
        FOREIGN KEY (event-id) REFERENCES Guest-Activity(event-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (event-id > 0 AND distance-to-cover > 0));
```

2.23. Training-Program

Training-Program(event-id)

Candidate Keys:
{event-id}

Primary Key:
{event-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Training-Program(
        event-id INT,
        PRIMARY KEY (event-id),
        FOREIGN KEY (event-id) REFERENCES Event(event-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (event-id > 0));
```

2.24. Ticket

Ticket(ticket-id, event-id, guest-id)

Functional Dependencies:
ticket-id -> event-id, guest-id

Candidate Keys:
{ticket-id}

Primary Key:
{ticket-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Ticket(
        ticket-id INT,
        event-id INT NOT NULL,
        guest-id INT NOT NULL,
        PRIMARY KEY(ticket-id),
        FOREIGN KEY event-id REFERENCES Guest-Activity(event-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY guest-id REFERENCES Guests(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (ticket-id > 0 AND event-id > 0 AND guest-id > 0));
```

2.25. Tourist-Attraction

Tourist-Attraction(name, visits-per-day)

Functional Dependencies:
name -> visits-per-day

Candidate Keys:
{name}

Primary Key:
{name}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Tourist-Attraction(
        name VARCHAR(50),
        visits-per-day INT NOT NULL,
        PRIMARY KEY (name),
        CHECK (visits-per-day >= 0));
```

2.26. Places-to-visit

Places-to-visit(event-id, attraction-name)

Candidate Keys:
{event-id, attraction-name}

Primary Key:
{event-id, attraction-name}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Places-to-visit(
        event-id INT,
        attraction-name VARCHAR(50),
        PRIMARY KEY (event-id, attraction-name),
        FOREIGN KEY (event-id) REFERENCES Group-Tours(event-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (attraction-name) REFERENCES Tourist-Attraction(name)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (event-id > 0));
```

2.27. Sec-staff-applies-to

Sec-staff-applies-to(sec-staff-id, training-program-id)

Candidate Keys:
{sec-staff-id, training-program-id}

Primary Key:
{sec-staff-id, training-program-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Sec-staff-applies-to(
        sec-staff-id INT,
        training-program-id INT,
        PRIMARY KEY (sec-staff-id, training-program-id),
        FOREIGN KEY (training-program-id) REFERENCES Training Program(event-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (sec-staff-id) REFERENCES Security-Staff(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (training-program-id > 0 AND sec-staff-id > 0));
```

2.28. Evaluates-sec-staff-application

Evaluates-sec-staff-application(sec-staff-id, training-program-id, manager-id, application-status)

Candidate Keys:
{sec-staff-id, training-program-id}

Primary Key:
{sec-staff-id, training-program-id}

Functional Dependencies:
sec-staff-id, training-program-id -> manager-id, application-status

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Evaluates-sec-staff-application(
        sec-staff-id INT,
        training-program-id INT,
        manager-id INT,
        application-status VARCHAR(50),
        PRIMARY KEY (sec-staff-id, training-program-id),
        FOREIGN KEY (training-program-id) REFERENCES Training Program(event-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (sec-staff-id) REFERENCES Security-Staff(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (manager-id) REFERENCES Manager(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (training-program-id > 0 AND sec-staff-id > 0 AND manager-id > 0));
```

2.29. HK-applies-to

HK-applies-to(housekeeper-id, training-program-id)

Candidate Keys:
{housekeeper-id, training-program-id}

Primary Key:
{housekeeper-id, training-program-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE HK-applies-to(
        housekeeper-id INT,
        training-program-id INT,
        manager-id INT,
        PRIMARY KEY (sec-staff-id, training-program-id, manager-id),
        FOREIGN KEY (training-program-id) REFERENCES Training Program(event-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (housekeeper-id) REFERENCES Housekeeper(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (training-program-id > 0 AND housekeeper-id> 0));
```

2.30. Evaluates-hk-application

Evaluates-hk-application(housekeeper-id, training-program-id, manager-id, application-status)

Functional Dependencies:
housekeeper-id, training-program-id -> manager-id, application-status

Candidate Keys:
{housekeeper-id, training-program-id}

Primary Key:
{housekeeper-id, training-program-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Evaluates-HK-application(
        housekeeper-id INT,
        training-program-id INT,
        manager-id INT,
        application-status VARCHAR(50),
        PRIMARY KEY (housekeeper-id, training-program-id),
        FOREIGN KEY (training-program-id) REFERENCES Training Program(event-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (housekeeper-id) REFERENCES Housekeeper(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (manager-id) REFERENCES Manager(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (housekeeper-id > 0 AND training-program-id > 0 AND manager-id > 0));
```

2.31. Food-Drink

Food-Drink(food-id, name, type, no-in-stock, price, calorie, restaurant-id)

Functional Dependencies:
food-id -> name, type, no-in-stock, price, calorie, restaurant-id

Candidate Keys:
{food-id}

Primary Key:
{food-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Food-Drink(
        food-id INT,
        name VARCHAR(50) NOT NULL,
        type VARCHAR(20),
        no-in-stock INT NOT NULL,
        price NUMERIC(18, 2) NOT NULL,
        calorie INT,
        restaurant-id INT NOT NULL,
        PRIMARY KEY (food-id),
        FOREIGN KEY (restaurant-id) REFERENCES Restaurant(restaurant-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (food-id > 0 AND no-in-stock >= 0 AND price >= 0 AND          restaurant-
                id > 0));
```

2.32. Order-contains

Order-contains(<u>order-id, food-id</u>)

Candidate Keys:
{order-id, food-id}

Primary Key:
{order-id, food-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Order-contains(
        order-id INT,
        food-id INT,
        PRIMARY KEY (order-id, food-id),
        FOREIGN KEY (order-id) REFERENCES Food-Order(order-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (food-id) REFERENCES Food-Drink(food-id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (order-id > 0 AND food-id > 0));
```

2.33. Food-Order

Food-Order(order-id, rating, comment, guest-id, manager-id, housekeeper-id, assign-time, delivery-time, status)

Functional Dependencies:
order-id -> rating, comment, guest-id, manager-id, housekeeper-id, assign-time, delivery-time, status

Candidate Keys:
{order-id}

Primary Key:
{order-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Food-Order(
        order-id INT,
        rating INT,
        comment VARCHAR(1000),
        guest-id INT NOT NULL,
        manager-id INT,
        housekeeper-id INT,
        assign-time TIMESTAMP NOT NULL,
        delivery-time TIMESTAMP,
        status VARCHAR(20),
        PRIMARY KEY (order-id),
        FOREIGN KEY (guest-id) REFERENCES Guests(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (manager-id) REFERENCES Manager(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (housekeeper-id) REFERENCES Housekeeper(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (order-id > 0 AND guest-id > 0 AND assign-time <=
                CURRENT_TIMESTAMP()));
```

2.34. Restaurant

Restaurant(<u>restaurant-id</u>, location-name, name, type, hours-opening, hours-closing)

Functional Dependencies:
restaurant-id -> name, location-name, type, hours-opening, hours-closing

Candidate Keys:
{restaurant-id}

Primary Key:
{restaurant-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Restaurant(
        restaurant-id INT,
        location-name VARCHAR(50) NOT NULL,
        name VARCHAR(50) NOT NULL,
        type VARCHAR(20),
        hours-opening TIME,
        hours-closing TIME,
        PRIMARY KEY (restaurant-id),
        FOREIGN KEY (location-name) REFERENCES Location(name)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (restaurant-id > 0 AND LEN(location-name) > 0));
```

2.35. Job-Application

Job-Application(id, position, status)

Functional Dependencies:
id, position -> status

Candidate Keys:
{id, position}

Primary Key:
{id, position}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Job-Application (
        id INT,
        position VARCHAR(50),
        status VARCHAR(20) NOT NULL,
        PRIMARY KEY (id, position),
        FOREIGN KEY (id) REFERENCES Candidate(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (id > 0));
```

2.36. Approves

Approves(candidate-id, position, recruiter-id)

Candidate Keys:
{candidate-id, position, recruiter-id}

Primary Key:
{candidate-id, position, recruiter-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Approves(
        candidate-id INT,
        position VARCHAR(50),
        recruiter-id INT,
        PRIMARY KEY (candidate-id, position, recruiter-id),
        FOREIGN KEY (candidate-id) REFERENCES Job-Application(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (position) REFERENCES Job-Application(position)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (recruiter-id) REFERENCES Recruiter(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (candidate-id > 0 AND recruiter-id > 0));
```

2.37. Security-Report

Security-Report(<u>report-id</u>, message, date, time, security-staff-id)

Functional Dependencies:
report-id -> message, date, time, security-staff-id

Candidate Keys:
{report-id}

Primary Key:
{report-id}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Security-Report(
        report-id INT,
        message VARCHAR(1000) NOT NULL,
        date DATE NOT NULL,
        time TIME NOT NULL,
        security-staff-id INT NOT NULL,
        PRIMARY KEY (report-id),
        FOREIGN KEY (security-staff-id) REFERENCES Security-Staff(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (report-id > 0 AND security-staff-id > 0));
```

2.38. Leave-Request-Form

Leave-Request-Form(id, leave-date, days, manager-id, approve-date, status)

Functional Dependencies:
id, leave-date -> days, manager-id, approve-date, status

Candidate Keys:
{id, leave-date}

Primary Key:
{id, leave-date}

Normal Form:
BCNF

Table Definition:

```
CREATE TABLE Leave-Request-Form(
        id INT,
        leave-date DATE,
        days INT NOT NULL,
        manager-id INT,
        approve-date DATE,
        status VARCHAR(20) NOT NULL,
        PRIMARY KEY (id, leave-date),
        FOREIGN KEY (id) REFERENCES Employee(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (manager-id) REFERENCES Manager(id)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        CHECK (leave-date >= CAST(GETDATE() AS Date) AND id > 0 AND days > 0));
```

3. User Interface Design and Corresponding SQL Statements

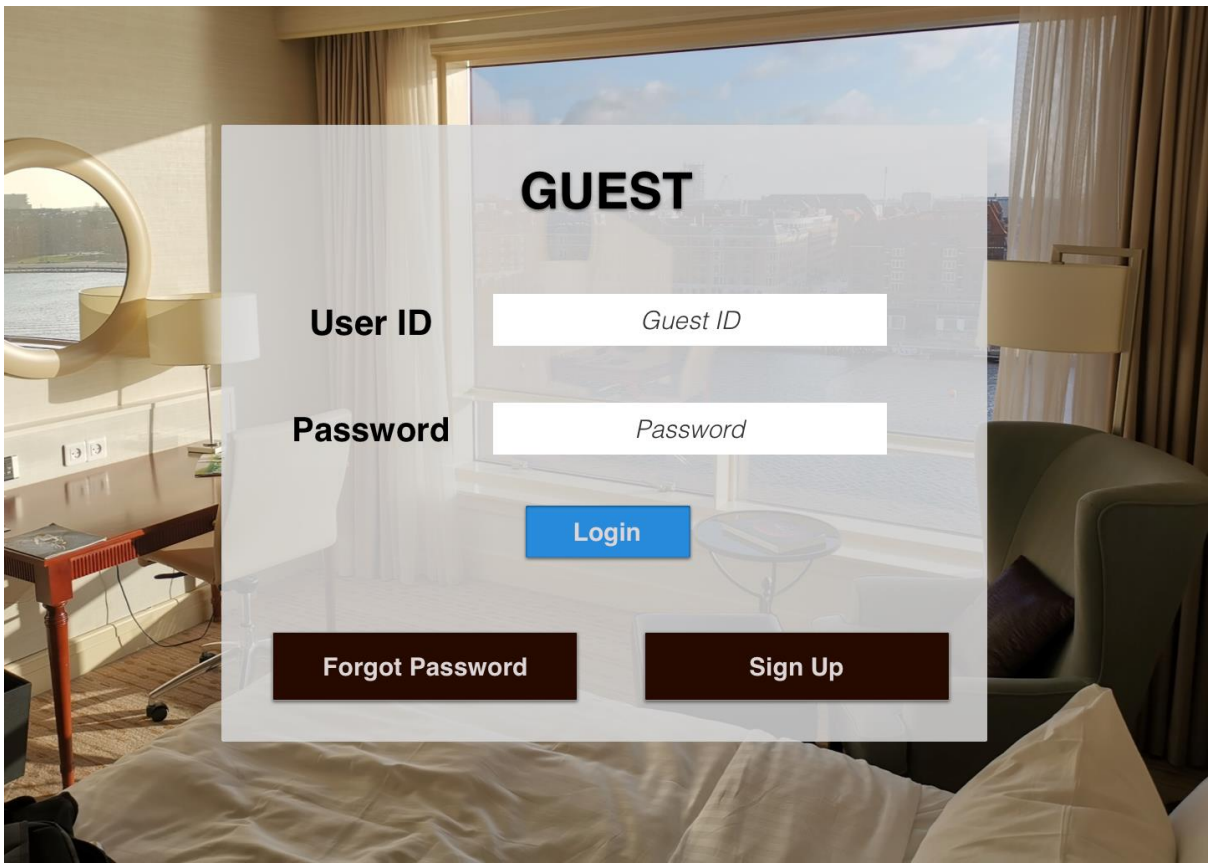
3.1. Homepage

Input: N/A

Process: This is the main menu from where the different users choose their specified category to go with. Each category is going to take the user to different screens.

SQL: N/A

3.2. Guest - Login



Inputs: @user_ID, @password

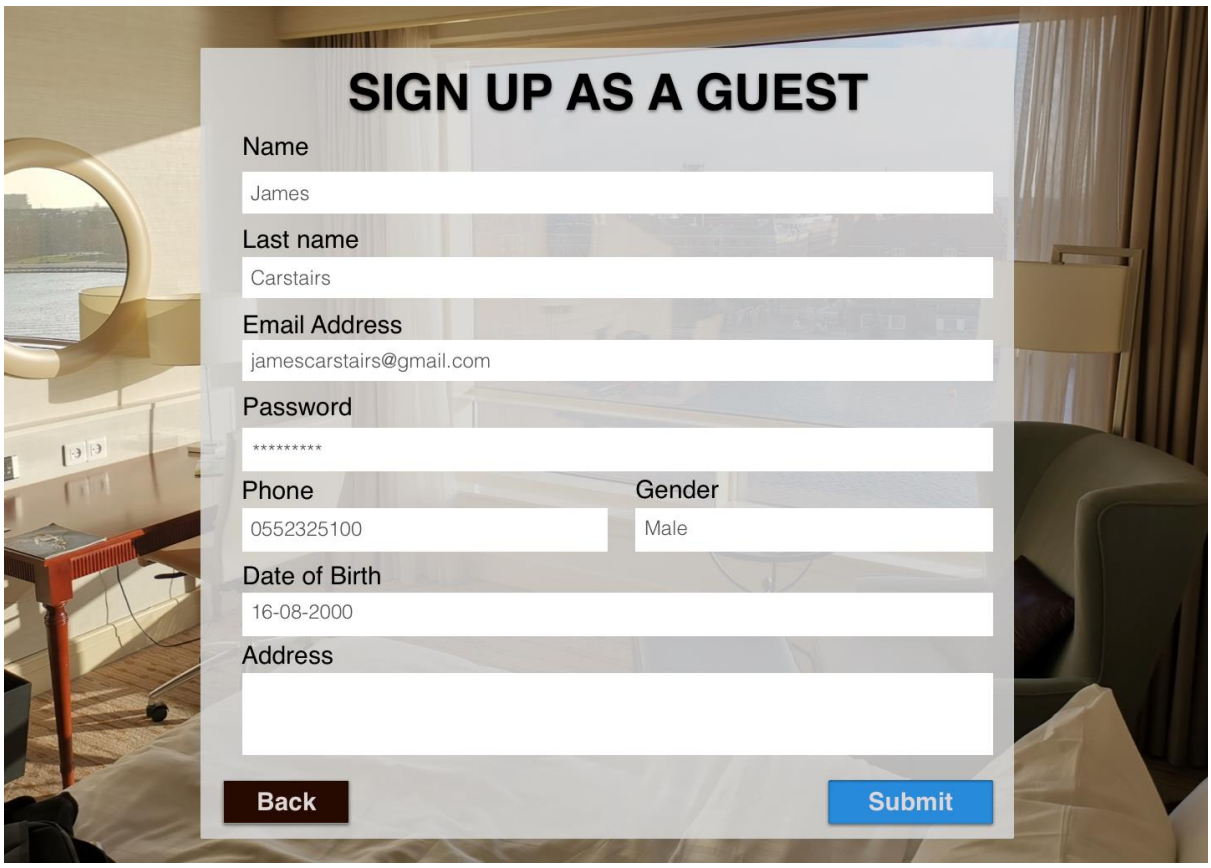
Process: After selecting the GUEST option from the main menu, the guest has to enter his/her guest ID and password in order to proceed. One can also go for sign up that will create a new user entry into the guest table. The user can also use forget password to reset his/her password.

SQL Statements:

Logging in

```
SELECT *
FROM guest
WHERE @user_ID = id AND @password = password;
```

3.3. Guest - Signup



Input: @name, @lastname, @email_address, @password, @phone, @gender, @date_of_birth, @address

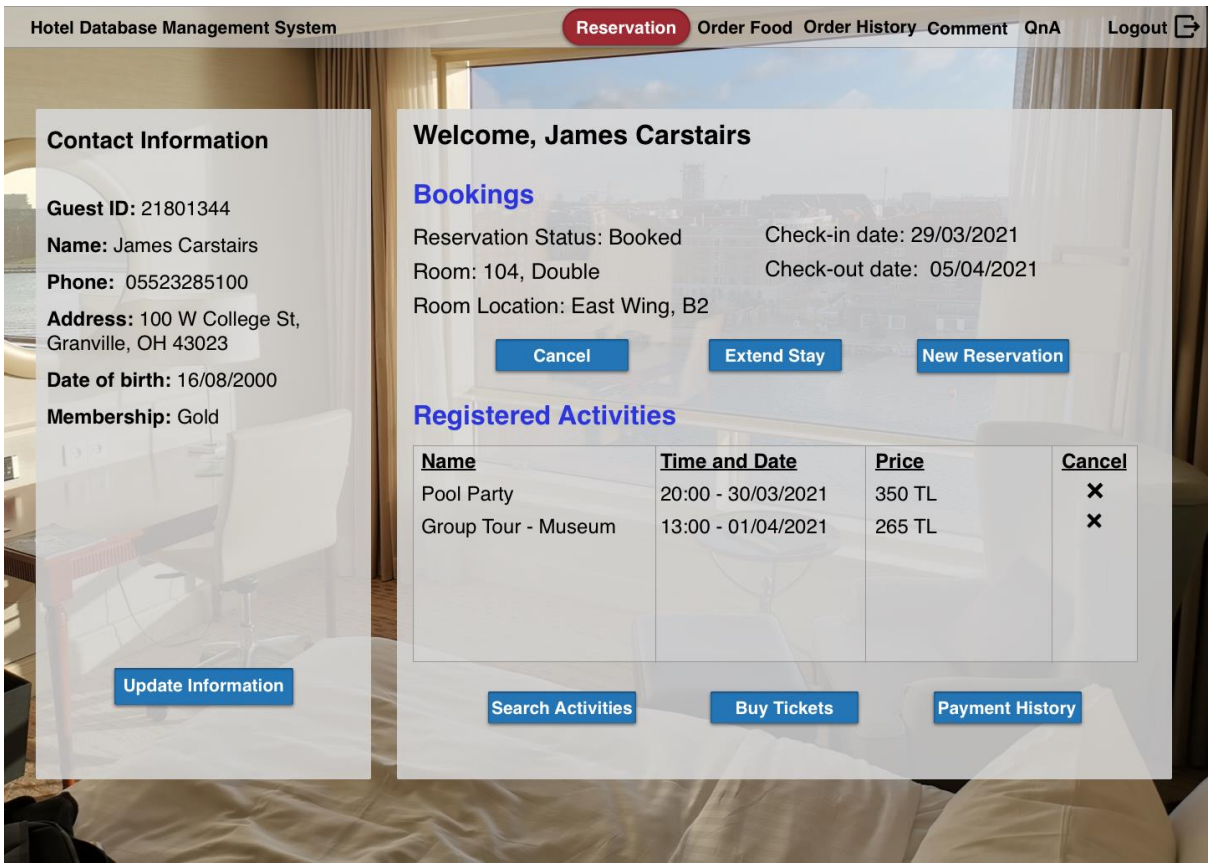
Process: The user will enter the specified information required to meet the criteria of the guest entity.

SQL:

Sign Up:

INSERT INTO guest
VALUES(@name, @lastname, @email_address, @password, @phone, @gender, @data_of_birth, @address);

3.4. Guest - Homepage/ Reservation



Input: N/A

Process: The reservation part of the guest screen leads the guest user to a screen where it is customised according to the user's selections of previous reservations. The guest user can further book a room only after cancelling the existing one though. The user can register for new activities.

SQL:

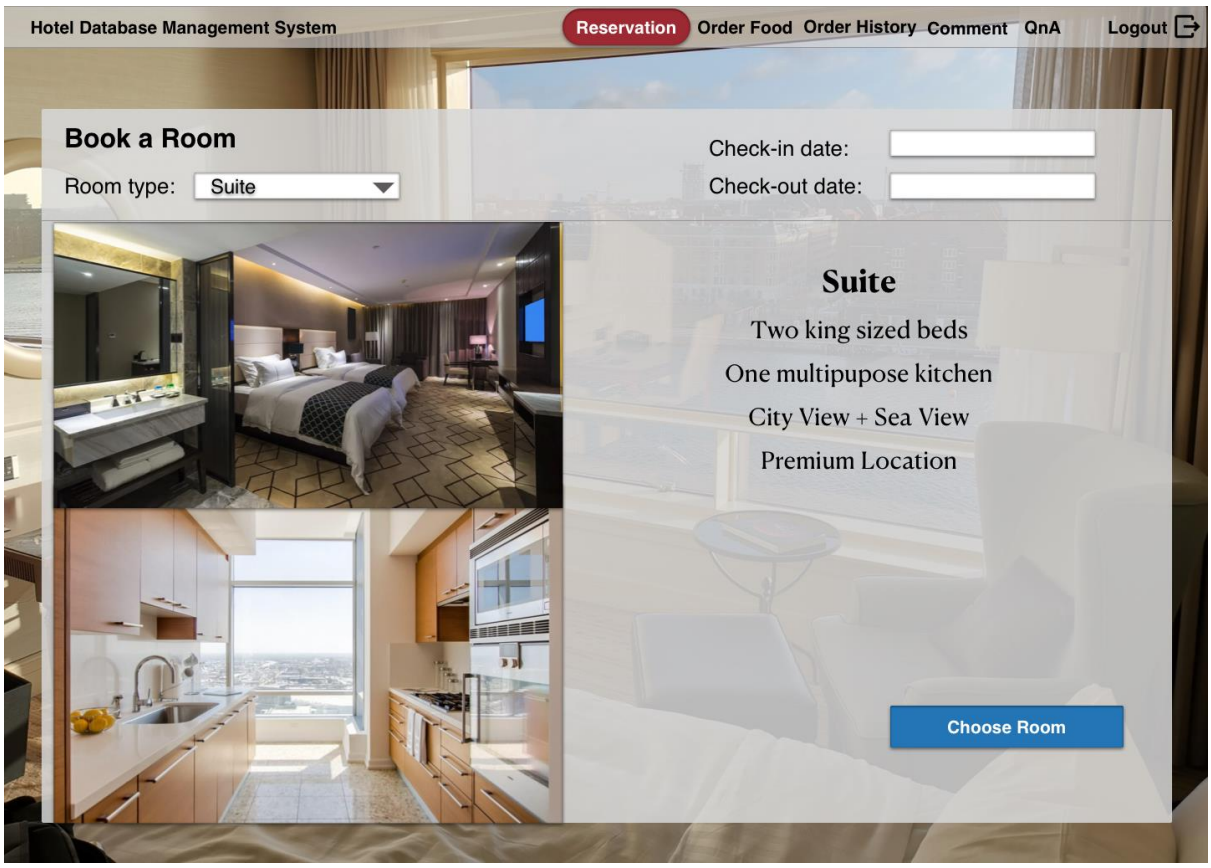
Bookings

SELECT reservation status, room, room location, check_in, check_out
FROM reservation JOIN guest
WHERE user_ID = id;

Registered activities

SELECT *
FROM guest NATURAL JOIN buys-ticket-for NATURAL JOIN Event;

3.5. Guest - Booking



Input: N/A

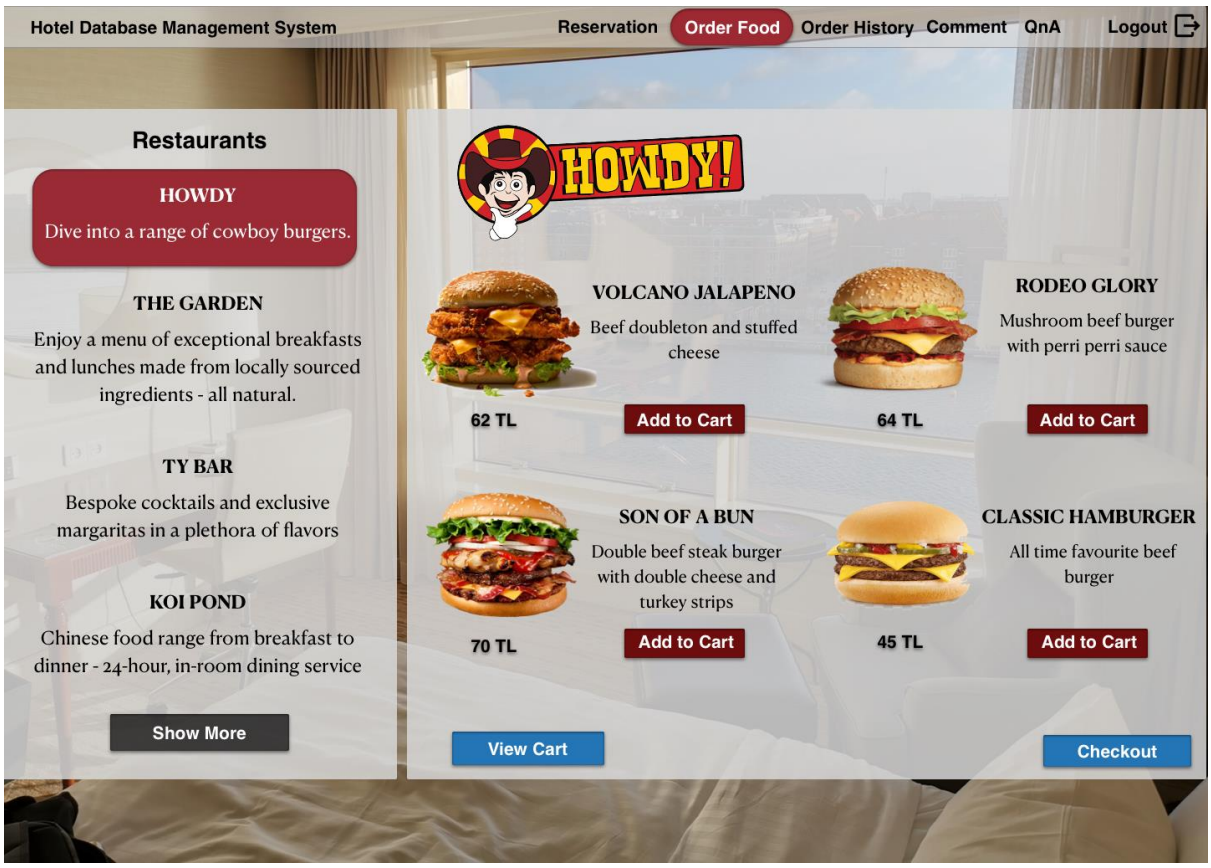
Process: The guest will specify the reservation details in this page by entering the necessary information.

SQL:

Room Reservation:
SELECT * FROM Room WHERE Room.type = @type;

INSERT INTO (Reservation) VALUES (@reservationId, @guestId, @room-no, @building-no, CURDATE(), @check-out-date);

3.6. Guest - Order Food



Input: N/A

Process: Here the user can select the food of his/her choice from different restaurants. Restaurants are listed in the left part of the screen and the food items the restaurant has to offer are on the right side with details of food items also portrayed.

SQL:

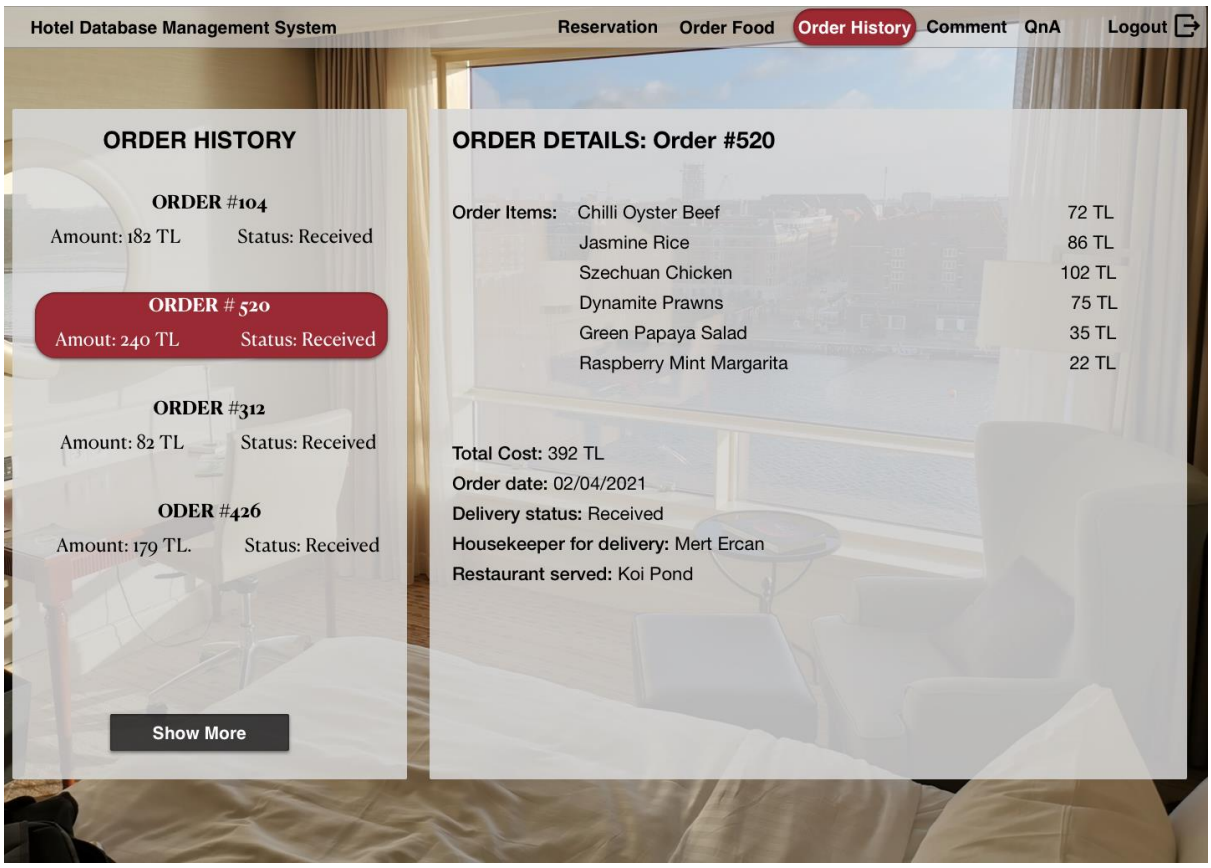
Restaurants

```
SELECT name, type, hours
FROM restaurant
GROUP BY restaurant_id;
```

Menu items

```
SELECT t.name,t.type, t.price, t.calories,
FROM food-drink t NATURAL JOIN restaurant
ORDER BY t.price;
```

3.7. Guest - Order History



Input: N/A

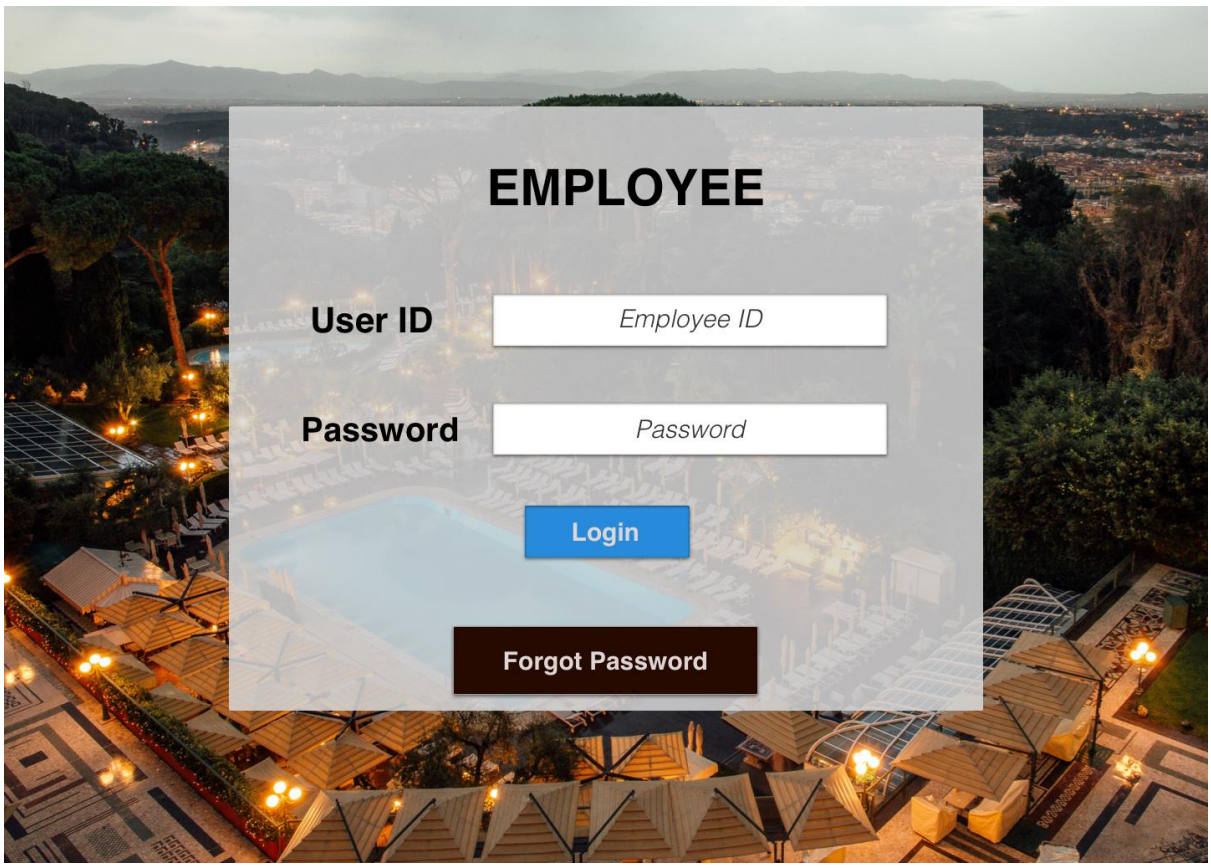
Process: The left half of the window contains the order history of the guest where the list of all orders made by that guest are listed. Secondly, the right half of the screen will have the order details, such as ordered items, cost, order date, etc.

SQL:

Order History

```
SELECT status, order-id,  SUM(x.price)
FROM order-contains NATURAL JOIN food-drink x NATURAL JOIN food-order t
WHERE user_ID = t.guest-id
GROUP BY order-id;
```

3.8. Employee - Login



Input: @user-id, @password

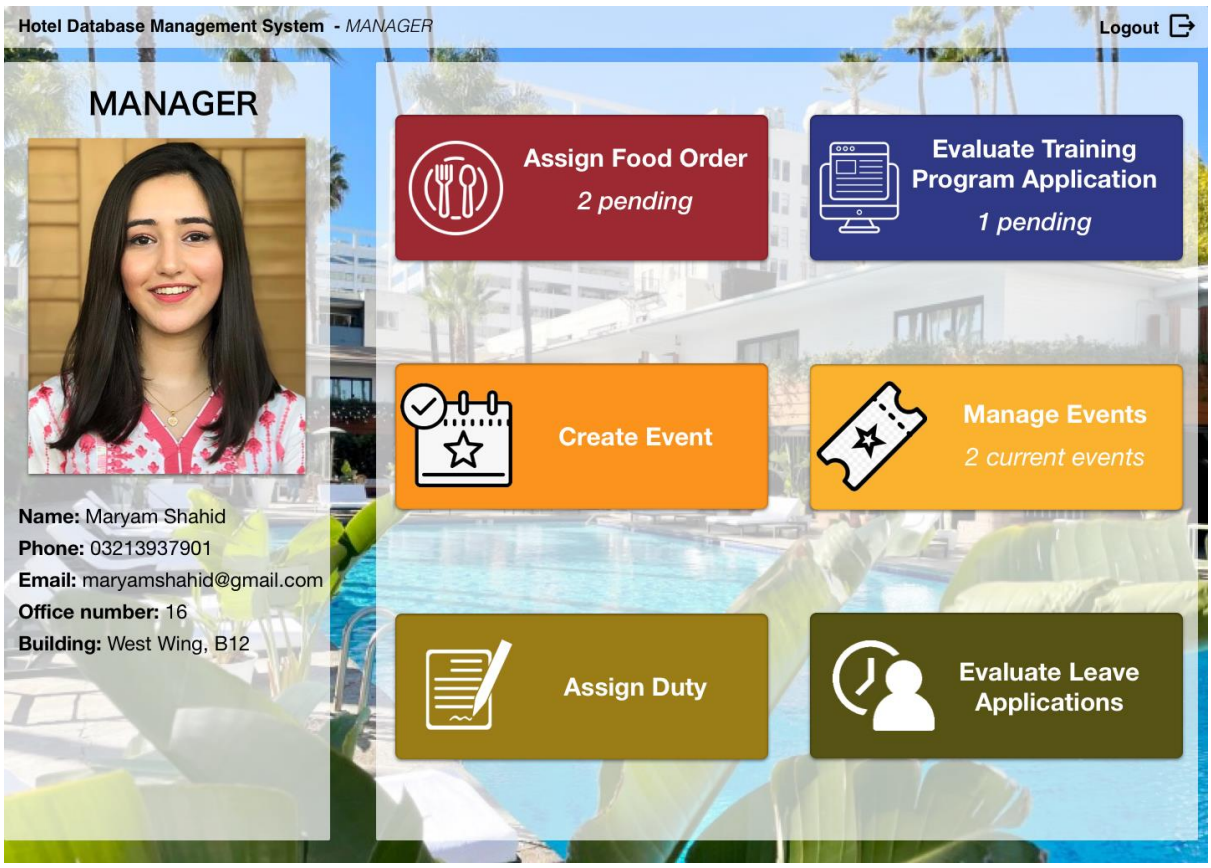
Process: Here the user employee is expected to enter the user ID and password which will be tested against the ID column in the employee entity. The screen will have forgot password option as well where one can renew their password as the database contains emails of each employee.

SQL:

Logging in

```
SELECT *
FROM employee
WHERE @user-id = id AND @password = password;
```

3.9. Manager - Homepage



Input: N/A

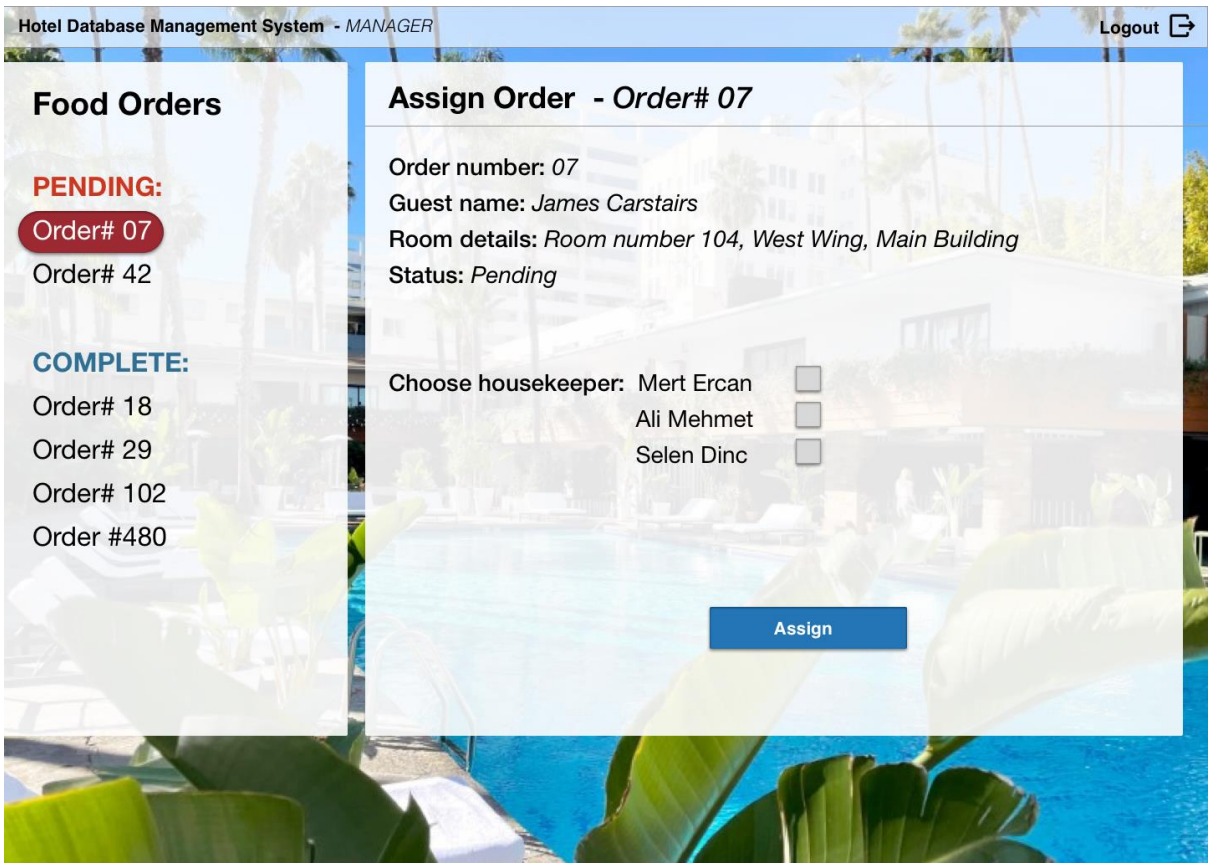
Process: After logging in, the manager employee will have this format as output on the screen. The left quarter of the window will have name, phone, email, office number, and location of the manager's office portrayed. The right three-quarters of the window will have several scenarios that the manager can go for, such as assign duty, evaluate leave application, manage events, create events, assign food order, evaluate training program application.

SQL:

Manager information

SELECT name, phone, email, office-no, address
FROM manager NATURAL JOIN user;

3.10. Manager - Assign Orders



Input: N/A

Process: This window would show the manager the complete and pending orders. The complete orders would have assigned housekeepers with status completed. Whereas, pending will allow the manager to assign the task to the housekeeper for completion.

SQL:

Specific Order:

SELECT o.order-id, g.firstname, g.lastname, r2.room-no, b.name, b.location-name FROM Food-order o, Guest g, (Reservation r NATURAL JOIN Room r2 NATURAL JOIN Building b NATURAL JOIN User u)
WHERE o.guest-id = g.id AND g.id = r.guest-id AND o.order-id = @order-id;

Housekeepers:

SELECT * FROM Housekeeper h;

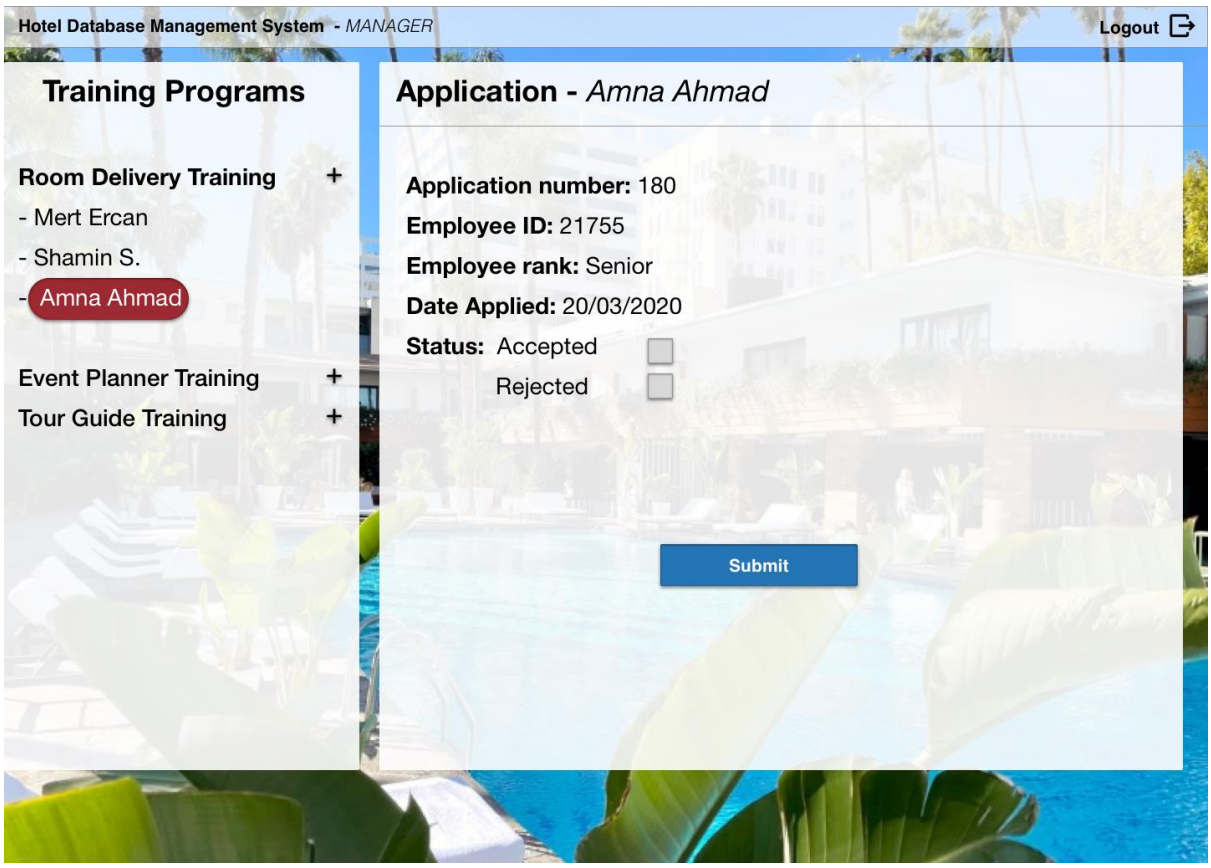
Left list:

SELECT o.order-id, o.status FROM Food-order;

Assign button:

UPDATE Food-order SET manager-id = @manager-id, housekeeper-id = @housekeeper-id, Assign-time = CURRENT_TIMESTAMP;

3.11. Manager - Evaluate Training Application



Input: N/A

Process: When clicked on training programs, this window would open up. It will allow the manager to view different training programs made by the manager and the employees that have applied for each training program. The manager would be allowed to either accept or reject the applicant with relevant information regarding the applicant depicted.

SQL:

List of training events

SELECT event-name
FROM manager m NATURAL JOIN event t NATURAL JOIN training-program;

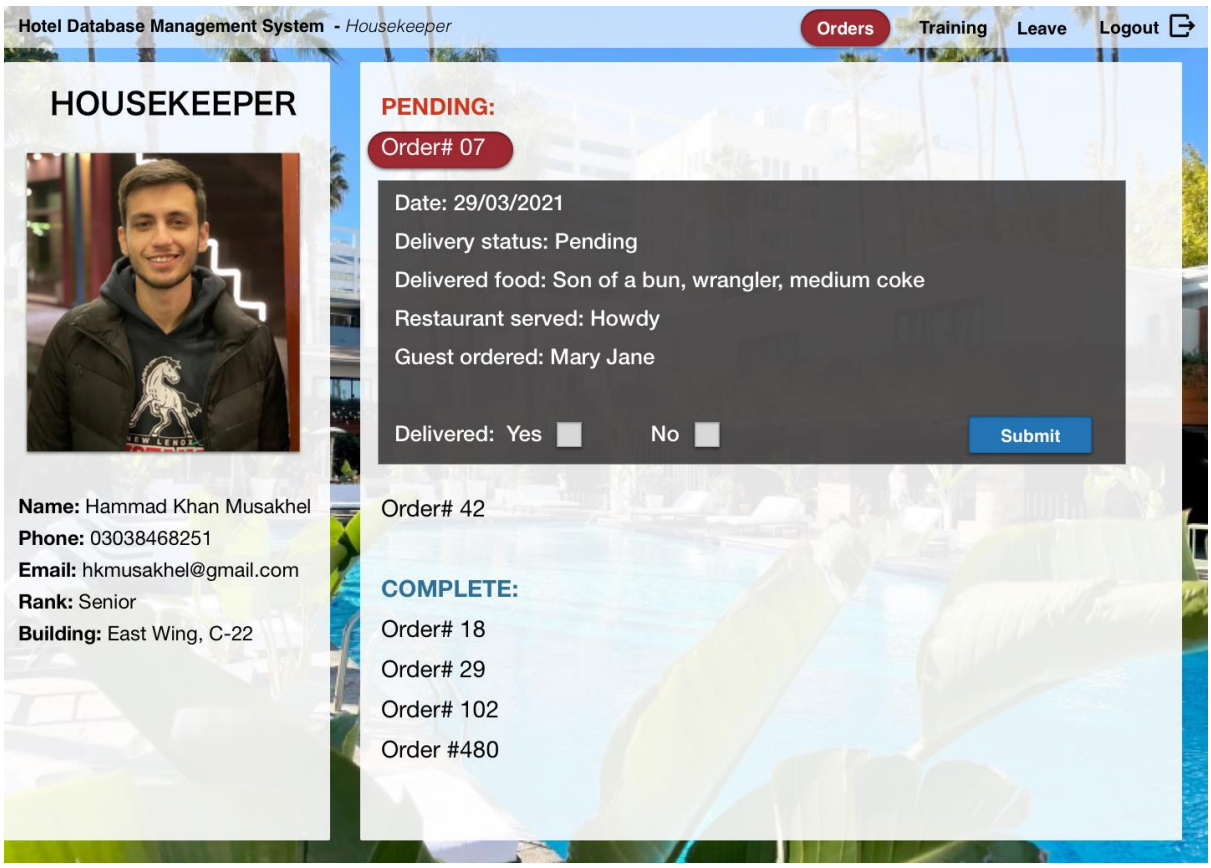
List of employees applied to training event

SELECT u.name
FROM event p NATURAL JOINtraining-program t NATURAL JOIN evaluate-sec-staff-application q NATURAL JOIN employee s NATURAL JOIN user u
WHERE p.name = (SELECT event-name
FROM manager m NATURAL JOIN event t NATURAL JOIN training-program)
ORDER BY q.training-program-id;

Application if accepted

INSERT INTO Evaluates-sec-staff-application VALUES (@sec-staff-id, @training-program-id, @manager-id, ‘Accepted’);

3.12. Housekeeper - Orders



Input: N/A

Process: When the housekeeper user opens the web application, the first option on the top bar has Orders. Orders opens up a window that enlist all the completed and pending orders. The housekeepers can update the status of a pending order by clicking on YES and submitting it.

SQL:

Left list

SELECT name, phone, email, address
FROM housekeeper h NATURAL JOIN user;

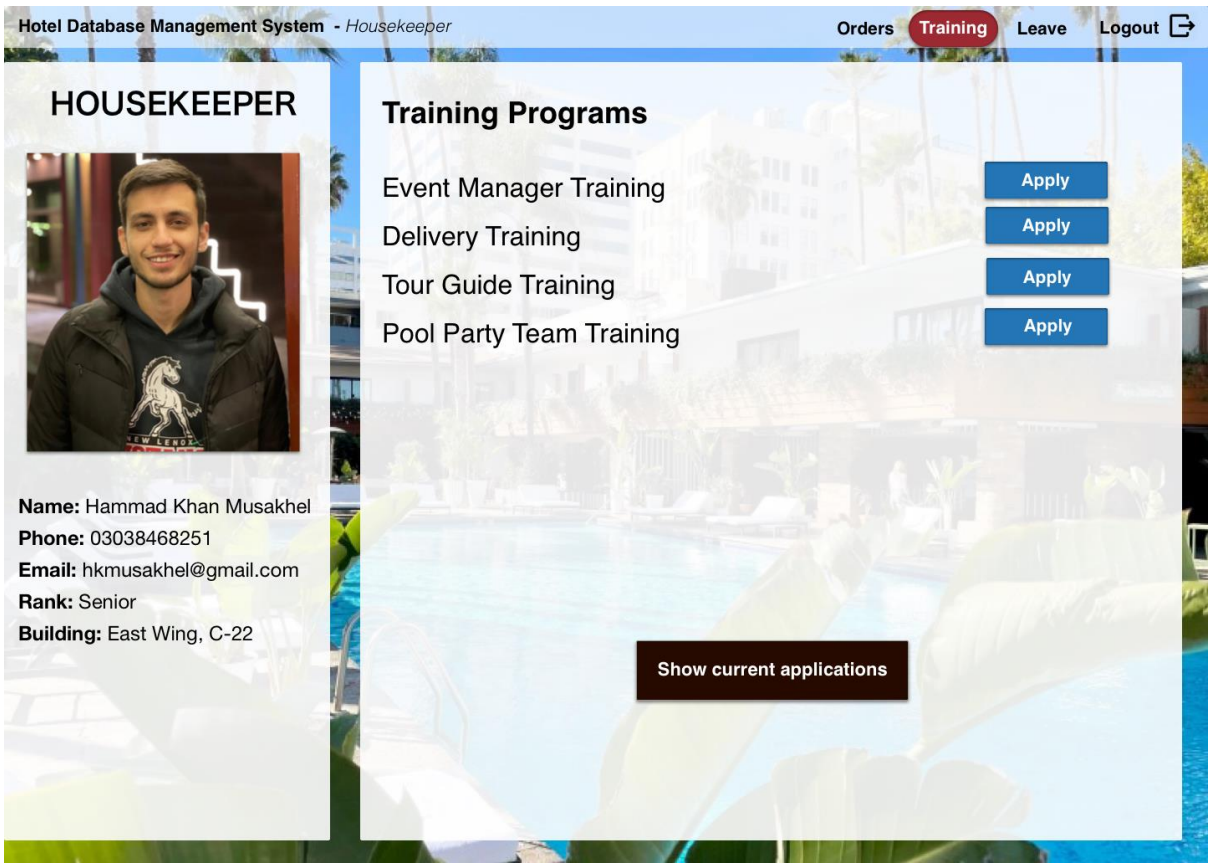
Pending

SELECT fo-status, fo.assign-time, fd.name, r.name, u.name
FROM food-order fo NATURAL JOIN order-contains oc NATURAL JOIN food-drink fd NATURAL JOIN restaurant r NATURAL JOIN housekeeper h NATURAL JOIN user u;

Delivered 'Yes'

UPDATE food-order
SET fo.status = delivered
FROM food-order fo NATURAL JOIN order-contains oc NATURAL JOIN housekeeper h
WHERE fo.status = not delivered AND oc.order-id = @order-id;

3.13. Housekeeper - Training Programs



Input: N/A

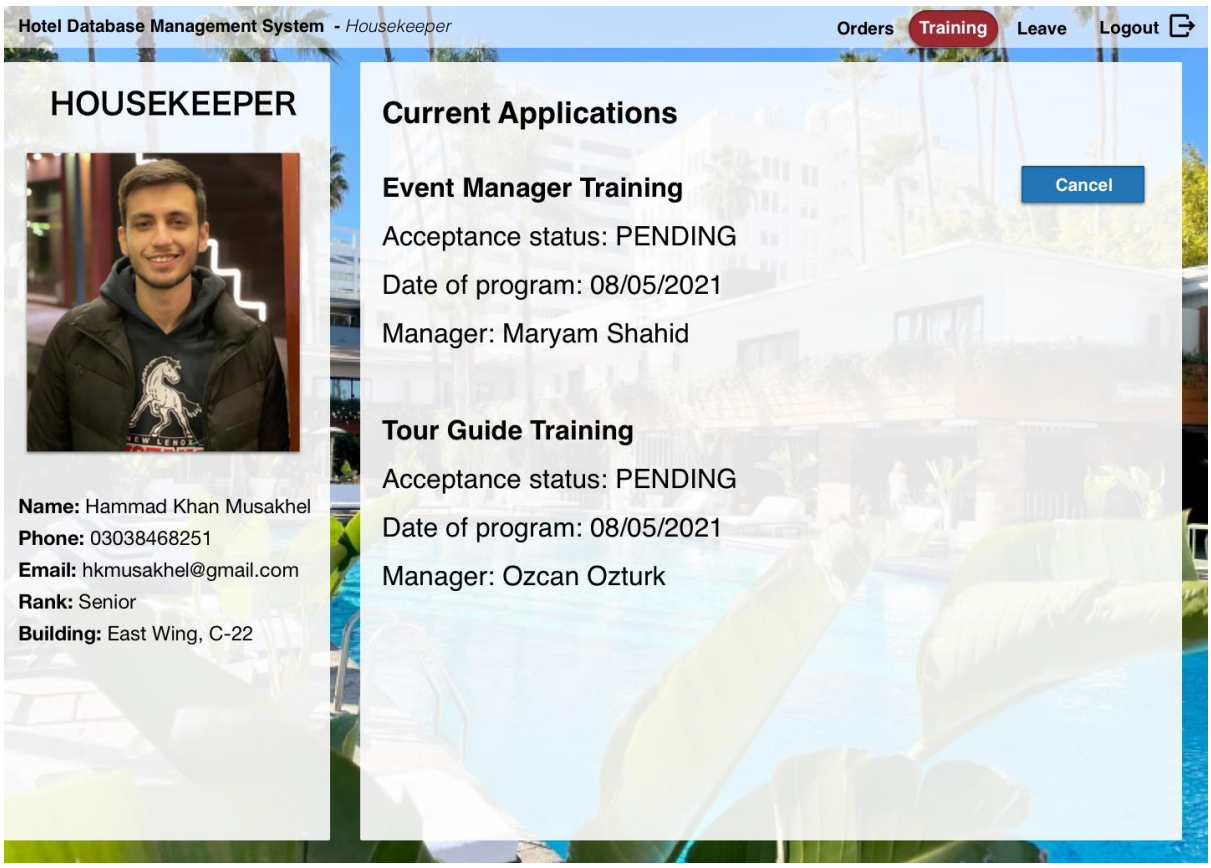
Process: This window shows the training programs the housekeeper can apply. The housekeeper can apply to a program by clicking the apply button next to the program name. Using the “Show current applications” button, they can see the programs they apply, as shown in section 3.13.

SQL:

Training Programs:

```
SELECT event-name
FROM Event NATURAL JOIN Training-Program
WHERE quota > 0 AND (@housekeeper-id NOT IN (SELECT housekeeper-id
                                              FROM HK-applies-to
                                              WHERE training-program-id = event-
                                             id));
```

3.14. Housekeeper - Current Applications



Input: N/A

Process: Here, the housekeeper can view his/her application status for different training applications submitted. The left side will have the general information about the housekeeper and the right side will have each application, its status, date of the program, and manager name. The cancel button will allow the housekeeper to cancel the application.

SQL:

Left list

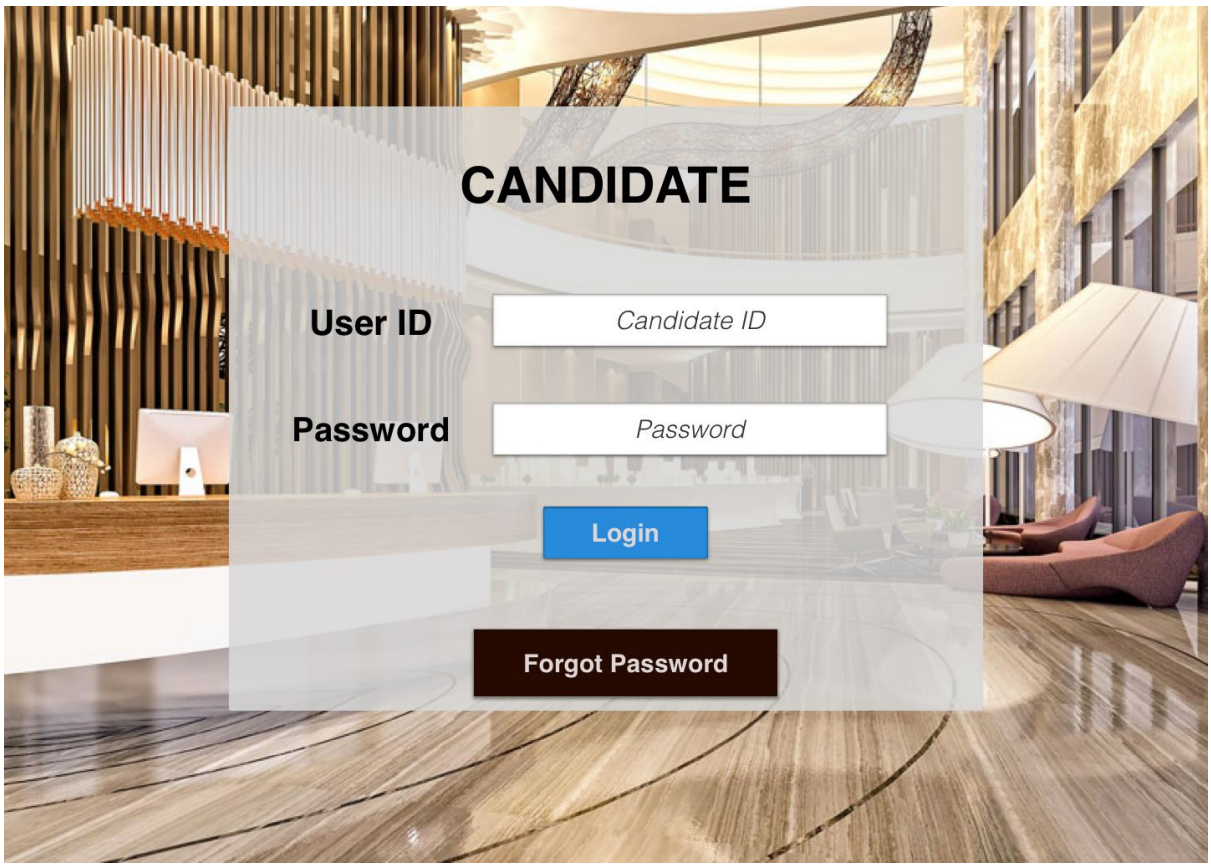
SELECT name, phone, email, address
FROM housekeeper NATURAL JOIN user;

Application Status

SELECT *
FROM (Housekeeper h NATURAL JOIN User u) housekeepers, (Manager m2 NATURAL JOIN User u3) creatingManagers ,(Event NATURAL JOIN Training Program) et, (HK-Applies-to at NATURAL JOIN Evaluates-hk-application) hke

WHERE creatingManagers.id = et.manager-id AND hke.training-program-id = et.event-id AND housekeepers.id = hke.housekeeper-id AND housekeeper.id = @housekeeper-id;

3.15. Candidate Login



Input: @user-id, @password

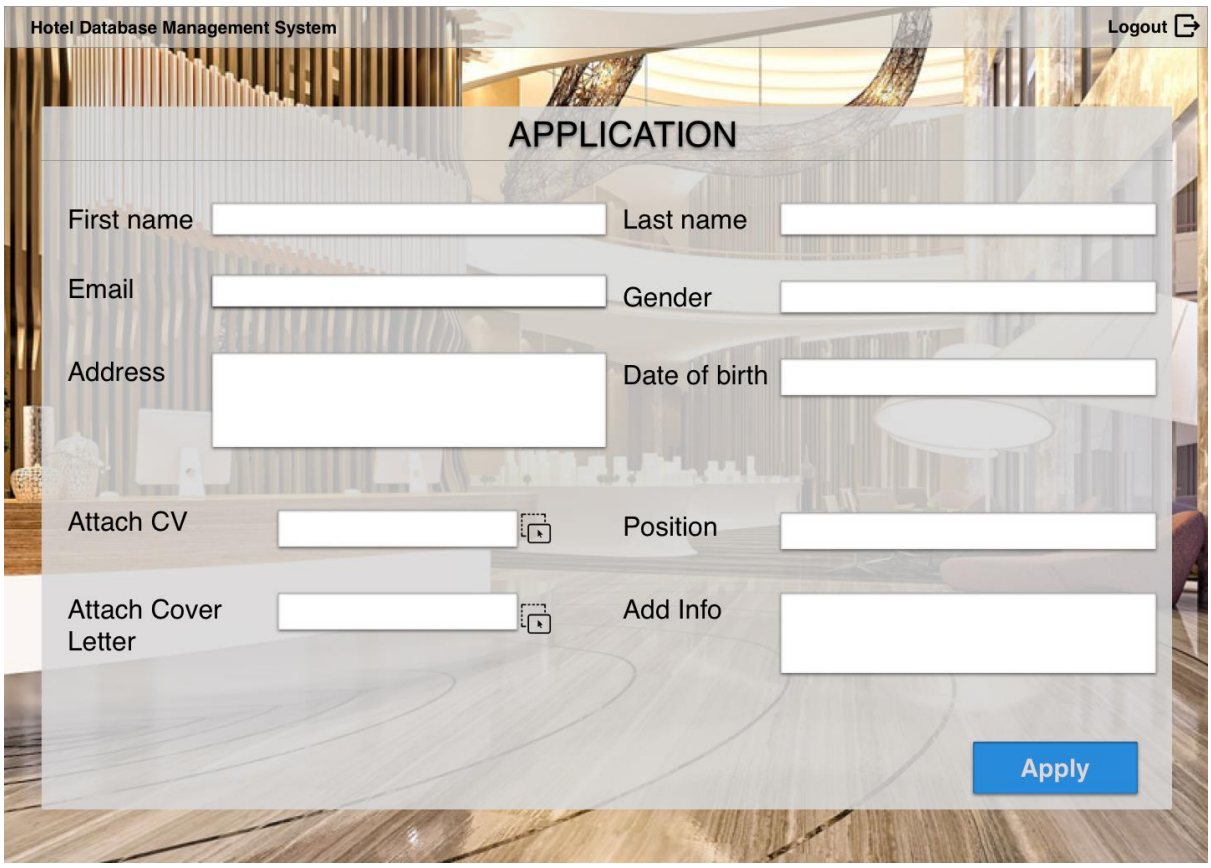
Process: Here the user candidate is expected to enter the user ID and password which will be tested against the ID column in the candidate entity. The screen will have a 'forgot password' option as well, where the user can renew their password as the database contains emails of each candidate.

SQL:

Logging in

```
SELECT *
FROM candidate
WHERE @user-id = id AND @password = password;
```

3.16. Candidate Application



Input @position

Process: Here the numerous inputs are dummy inputs for the time being. The candidate user will add the required information, especially Position. The candidate will have the opportunity to make numerous applications and apply. Candidate is an additional feature of our web application. A candidate will be assigned a new Employee ID once recruited. A candidate can be assumed as a portal to apply for jobs at the hotel.

SQL:

Add into job application list; submit button
INSERT INTO Job-Application VALUES(@user-id, @position, 'Pending');

5. Implementation Plan

- MySQL will be used as the DBM system in the implementation.
- Spring framework will be used in development.

6. Web Page

The reports of this project will be published on the following web page:

https://cs353-group38.github.io/