Bilkent University
Department of Computer Engineering

CS353 Database Systems

Group 13 Project Design Report
Car Rental System
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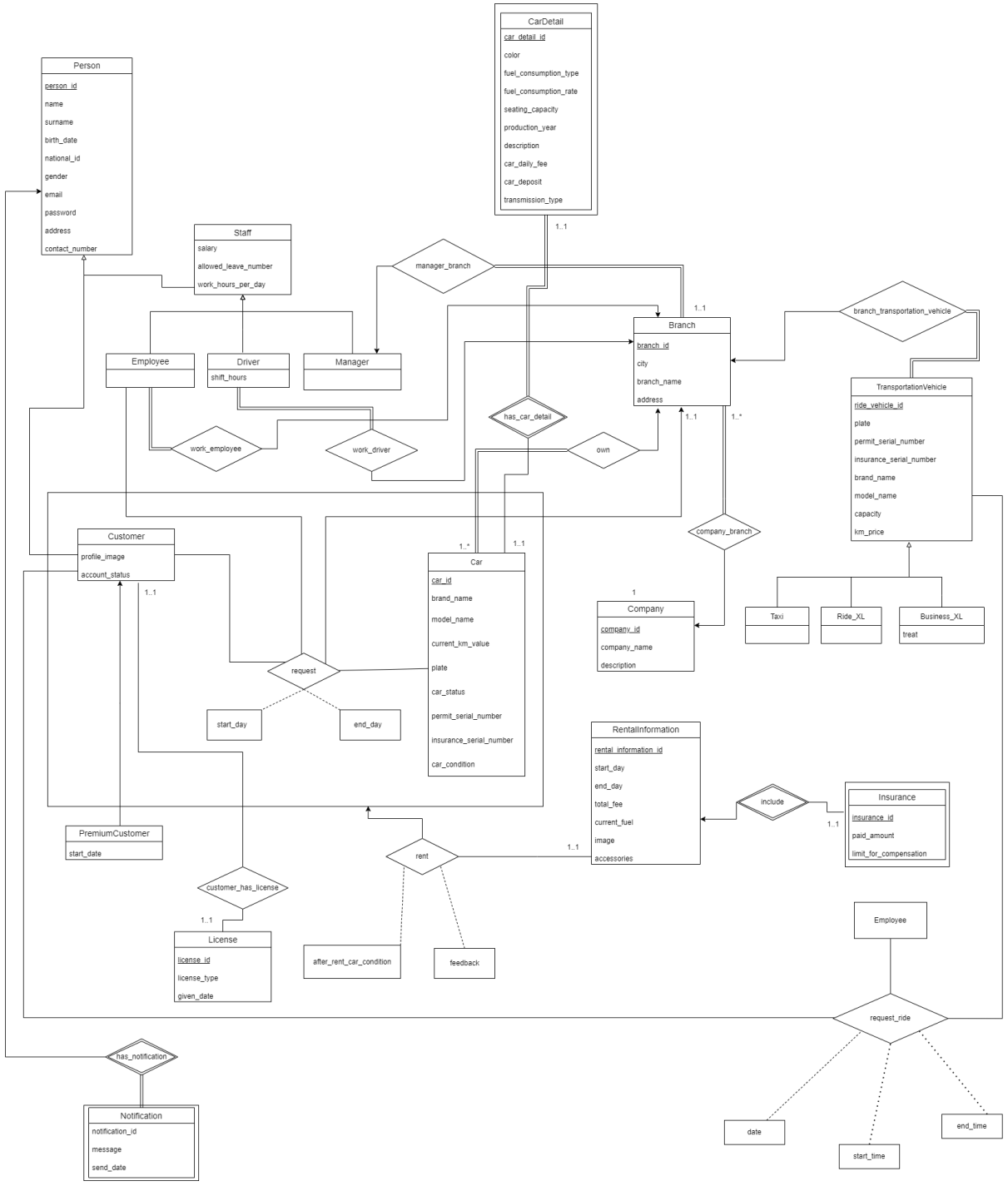
https://berkeceran.github.io/CarRentalSystem/

1. Revised E/R Model

Changes

- The manager entity is added with its relation to the branch as manager_branch.
- The driver entity (who is the driver in the branch that is employed for the transportation functionality) with its relation is added.
- The employee entity's name is changed to staff to indicate differences between a classic employee, a driver and a manager.
- For the driver entity, shift_hours attribute is added to indicate if the driver is working during day or night shift.
- Transportation vehicle entity is added with its' specialization entities: taxi, ride XL, and business XL with its' new attribute treat which indicates that users who are using Business XL vehicles will have treats on their journey.
- The weak entities from the previous design of E-R diagram such as cars are corrected.
- The weak notification entity is added to the E-R diagram with its' relation between customer which is the messages given by the system to customers.
- A request_ride relation is added between the customers, employees and transportation vehicles to indicate that customers can request rides for transportation vehicles from employees in the system within a specific date, beginning and end time (as the relation's attributes).
- PersonDetail weak entity class has been eliminated and its attributes are added to Person entity.
- For extra functionality of our system, requesting a transportation vehicle (a ride) is added for this functionality: the transportation vehicle entity and its' specialization entities such as Taxi added. Moreover for the extra functionality, the Driver entity is added.
- For each staff entity's specialization, a new relation such as manager_branch is introduced. The underlying reason that introducing 3 relations for each specialization entity is that their multiplicities are different.



2. Relation Schemas

2.1. Person

Model:

Person(person_id, name, surname, birth_date, national_id, gender, email, password, address, contact_number)

Candidate Keys:

{(person_id), (national_id), (email)}

Primary Key:

(person_id)

Functional Dependencies:

person_id → name, surname, birth_date, national_id, gender, email, password, address, contact_number

national_id → person_id, name, surname, birth_date, gender, email, password, address, contact_number

email → person_id, name, surname, birth_date, national_id, gender, password, address, contact_number

Normal Form:

BCNF

Table Definition:

```
CREATE TABLE Person(
person_id   INT NOT NULL AUTO_INCREMENT PRIMARY KEY,
name        VARCHAR(20) NOT NULL,
surname     VARCHAR(25) NOT NULL,
birth_date  DATE NOT NULL,
national_id VARCHAR(32) NOT NULL,
gender      VARCHAR(32),
email       VARCHAR(128) NOT NULL UNIQUE,
password    VARCHAR(21) NOT NULL,
address     VARCHAR(128) NOT NULL,
contact_number  VARCHAR(20) NOT NULL) ENGINE = InnoDB;
```

2.2. Staff

Model:

Staff(person_id, salary, allowed_leave_number, work_hours_per_day)

Foreign Key: person_id references Person(person_id)

Candidate Keys:

{(person_id)}

Primary Key:

(person_id)

Functional Dependencies:

person_id → salary, allowed_leave_number, work_hours_per_day

Normal Form:

BCNF

Table Definition:

CREATE TABLE Staff(

person_id INT NOT NULL PRIMARY KEY,

salary FLOAT NOT NULL,

allowed_leave_numberINT,

work_hours_per_day INT,

FOREIGN KEY (person_id) REFERENCES Person(person_id)) ENGINE = InnoDB;

2.3. Employee

Model:

Employee(employee_id, branch_id)

Foreign Key: employee_id references Person(person_id)

Foreign Key: branch_id references Branch(branch_id)

Candidate Keys:

{(employee_id)}

Primary Key:

(employee_id)

Functional Dependencies:

employee_id → branch_id

Normal Form:

BCNF

Table Definition:

CREATE TABLE Employee(

employee_id INT NOT NULL PRIMARY KEY,

branch_id INT NOT NULL,

FOREIGN KEY (employee_id) REFERENCES Person(person_id),

FOREIGN KEY (branch_id) REFERENCES Branch(branch_id)) ENGINE = InnoDB;

2.4. Driver

Model:

Driver(person_id, shift_hours, branch_id)

Foreign Key: person_id references Person(person_id)

Foreign Key: branch_id references Branch(branch_id)

Candidate Keys:

{(person_id)}

Primary Key:

(person_id)

Functional Dependencies:

person_id → shift_hours, branch_id

Normal Form:

BCNF

Table Definition:

CREATE TABLE Driver(

person_id INT NOT NULL PRIMARY KEY,

shift_hours VARCHAR(15),

branch_id INT NOT NULL

FOREIGN KEY (person_id) REFERENCES Person(person_id),

FOREIGN KEY (branch_id REFERENCES Branch(branch_id))) ENGINE = InnoDB;

2.5. Manager

Model:

Manager(manager_id)

Foreign Key: manager_id references Person(person_id)

Candidate Keys:

{(manager_id)}

Primary Key:

(manager_id)

Functional Dependencies:

None

Normal Form:

BCNF

Table Definition:

CREATE TABLE Manager(

manager_id INT NOT NULL PRIMARY KEY,

FOREIGN KEY (person_id) REFERENCES Person(person_id)) ENGINE = InnoDB;

2.6. Customer

Model:

Customer(customer_id, profile_image, account_status, license_id)

Foreign Key: customer_id references Person(person_id)

Foreign Key: license_id references License(license_id)

Candidate Keys:

{(customer_id)}

Primary Key:

(customer_id)

Functional Dependencies:

customer_id → profile_image, account_status, license_id

Normal Form:

BCNF

Table Definition:

CREATE TABLE Customer(

customer_id INT NOT NULL PRIMARY KEY,

profile_image VARCHAR(128),

account_status VARCHAR(10),

license_id INT NOT NULL UNIQUE,

FOREIGN KEY (license_id) REFERENCES License(license_id),

FOREIGN KEY (customer_id) REFERENCES Person(person_id)) ENGINE = InnoDB;

2.6. PremiumCustomer

Model:

PremiumCustomer(person_id, start_date)

Foreign Key: person_id references Person(person_id)

Candidate Keys:

{(person_id)}

Primary Key:

(person_id)

Functional Dependencies:

person_id → start_date

Normal Form:

BCNF

Table Definition:

CREATE TABLE PremiumCustomer(

person_id INT NOT NULL PRIMARY KEY,

start_date DATE,

FOREIGN KEY (person_id) REFERENCES Person(person_id)) ENGINE = InnoDB;

2.7. Car

Model:

Car(car_id, brand_name, model_name, current_km_value, plate, car_status, permit_serial_number, insurance_serial_number, car_condition, branch_id)

Foreign Key: branch_id references Branch(branch_id)

Candidate Keys:

{(car_id), (plate), (permit_serial_number), (insurance_serial_number)}

Primary Key:

(car_id)

Functional Dependencies:

car_id → brand_name, model_name, current_km_value, plate, car_status, permit_serial_number, insurance_serial_number, car_condition, branch_id

plate → car_id, brand_name, model_name, current_km_value, car_status, permit_serial_number, insurance_serial_number, car_condition, branch_id

permit_serial_number → car_id, brand_name, model_name, current_km_value, plate, car_status, insurance_serial_number, car_condition, branch_id

insurance_serial_number → car_id, brand_name, model_name, current_km_value, plate, car_status, permit_serial_number, car_condition, branch_id

Normal Form:

BCNF

Table Definition:

```
CREATE TABLE Car(
car_id                  INT NOT NULL AUTO_INCREMENT PRIMARY KEY,
brand_name      VARCHAR(20) NOT NULL,
model_name      VARCHAR(20) NOT NULL,
current_km_value        INT NOT NULL,
plate           VARCHAR(20) NOT NULL UNIQUE,
car_status      VARCHAR(20),
permit_serial_number  VARCHAR(10) NOT NULL UNIQUE,
insurance_serial_number      VARCHAR(10) NOT NULL UNIQUE,
car_condition      VARCHAR(20),
branch_id       INT NOT NULL,
FOREIGN KEY (branch_id) REFERENCES Branch(branch_id)) ENGINE = InnoDB;
```

2.8. CarDetail

Model:

CarDetail(car_id, car_detail_id, color, fuel_consumption_type, fuel_consumption_rate, seating_capacity, production_year, description, car_daily_fee, car_deposit, transmission_type)

Foreign Key: car_id references Car(car_id)

Candidate Keys:

{(car_id, car_detail_id)}

Primary Key:

(car_id, car_detail_id)

Functional Dependencies:

car_id, car_detail_id → color, fuel_consumption_type, fuel_consumption_rate, seating_capacity, production_year, description, car_daily_fee, car_deposit, transmission_type

Normal Form:

BCNF

Table Definition:

```
CREATE TABLE CarDetail(
car_id                  INT NOT NULL,
car_detail_id       INT NOT NULL AUTO_INCREMENT,
color                   VARCHAR(10),
fuel_consumption_typeVARCHAR(10),
fuel_consumption_rate VARCHAR(10),
seating_capacity INT,
production_year  VARCHAR(10),
description         VARCHAR(128),
car_daily_fee       INT NOT NULL,
car_deposit             INT NOT NULL,
transmission_type               VARCHAR(20),
```

PRIMARY KEY (car_id, car_detail_id),

FOREIGN KEY (car_id) REFERENCES Car(car_id))ENGINE = InnoDB;

2.9. Branch

Model:

Branch(branch_id, city, branch_name, address, manager_id, company_id)

Foreign Key: manager_id references Manager(person_id)

Foreign Key: company_id references Company(company_id)

Candidate Keys:

{(branch_id)}

Primary Key:

(branch_id)

Functional Dependencies:

branch_id → city, branch_name, address, manager_id, company_id

Normal Form:

BCNF

Table Definition:

CREATE TABLE Branch(

branch_id INT NOT NULL AUTO_INCREMENT PRIMARY KEY,

city VARCHAR(20),

branch_name VARCHAR(20),

address VARCHAR(128),

manager_id INT NOT NULL UNIQUE,

company_id INT NOT NULL,

FOREIGN KEY (manager_id) REFERENCES Manager(person_id),

FOREIGN KEY (company_id) REFERENCES Company(company_id)

) ENGINE = InnoDB;

2.10. Company

Model:

Company(company_id, company_name, description)

Candidate Keys:

{(company_id), (company_name)}

Primary Key:

(company_id)

Functional Dependencies:

company_id → company_name, description

company_name → company_id, description

Normal Form:

BCNF

Table Definition:

CREATE TABLE Company(

company_id INT NOT NULL AUTO_INCREMENT PRIMARY KEY,

company_name VARCHAR(20) NOT NULL UNIQUE,

description VARCHAR(128)) ENGINE = InnoDB;

2.11. TransportationVehicle

Model:

TransportationVehicle(ride_vehicle_id, plate, permit_serial_number, insurance_serial_number, brand_name, model_name, capacity, km_price, branch_id)

Foreign Key: branch_id references Branch(branch_id)

Candidate Keys:

{(ride_vehicle_id), (plate), (permit_serial_number), (insurance_serial_number)}

Primary Key:

(ride_vehicle_id)

Functional Dependencies:

ride_vehicle_id → plate, permit_serial_number, insurance_serial_number, brand_name, model_name, capacity, km_price, branch_id

plate → ride_vehicle_id, permit_serial_number, insurance_serial_number, brand_name, model_name, capacity, km_price, branch_id

permit_serial_number → ride_vehicle_id, plate, insurance_serial_number, brand_name, model_name, capacity, km_price, branch_id

insurance_serial_number → ride_vehicle_id, plate, permit_serial_number, brand_name, model_name, capacity, km_price, branch_id

Normal Form:

BCNF

Table Definition:

```
CREATE TABLE TransportationVehicle(
ride_vehicle_id    INT NOT NULL AUTO_INCREMENT PRIMARY KEY,
plate          VARCHAR(20) NOT NULL UNIQUE,
permit_serial_number  VARCHAR(20) NOT NULL UNIQUE,
insurance_serial_number  VARCHAR(20) NOT NULL UNIQUE,
brand_name       VARCHAR(20),
model_name       VARCHAR(20),
capacity            INT,
km_price            INT,
branch_id           INT NOT NULL UNIQUE,
```

FOREIGN KEY(branch_id) REFERENCES Branch(branch_id)

) ENGINE = InnoDB;

2.12. Taxi

Model:

Taxi(ride_vehicle_id)

Foreign Key: ride_vehicle_id references to TransportationVehicle

Candidate Keys:

{(ride_vehicle_id)}

Primary Key:

(ride_vehicle_id)

Functional Dependencies:

None

Normal Form:

BCNF

Table Definition:

CREATE TABLE Taxi(

ride_vehicle_id INT NOT NULL PRIMARY KEY,

FOREIGN KEY (ride_vehicle_id) REFERENCES TransportationVehicle(ride_vehicle_id)

) ENGINE = InnoDB;

2.13. Ride_XL

Model:

Ride_XL(ride_vehicle_id)

Foreign Key: ride_vehicle_id references to TransportationVehicle

Candidate Keys:

{(ride_vehicle_id)}

Primary Key:

(ride_vehicle_id)

Functional Dependencies:

None

Normal Form:

BCNF

Table Definition:

CREATE TABLE Ride_XL(

ride_vehicle_id INT NOT NULL PRIMARY KEY,

FOREIGN KEY (ride_vehicle_id) REFERENCES TransportationVehicle(ride_vehicle_id)

) ENGINE = InnoDB;

2.14. Business_XL

Model:

Business_XL(ride_vehicle_id, treat)

Foreign Key: ride_vehicle_id references to TransportationVehicle

Candidate Keys:

{(ride_vehicle_id)}

Primary Key:

(ride_vehicle_id)

Functional Dependencies:

ride_vehicle_id → treat

Normal Form:

BCNF

Table Definition:

CREATE TABLE Business_XL(

ride_vehicle_id INT NOT NULL PRIMARY KEY,

treat VARCHAR(20),

FOREIGN KEY (ride_vehicle_id) REFERENCES TransportationVehicle(ride_vehicle_id)

) ENGINE = InnoDB;

2.15. License

Model:

License(license_id, license_type, given_date)

Candidate Keys:

{(license_id)}

Primary Key:

(license_id)

Functional Dependencies:

license_id → license_type, given_date

Normal Form:

BCNF

Table Definition:

CREATE TABLE License(

license_id INT NOT NULL AUTO_INCREMENT PRIMARY KEY,

license_type VARCHAR(5) NOT NULL,

given_date DATE NOT NULL

) ENGINE = InnoDB;

2.16. RentalInformation

Model:

RentalInformation(rental_information_id, start_day, end_day, total_fee, current_fuel, image, accessories, car_id, customer_id, employee_id, after_car_rent_condition, feedback)

Foreign Key: car_id references Car(car_id)

Foreign Key: customer_id references Customer(person_id)

Foreign Key: employee_id references Employee(person_id)

Candidate Keys:

{(rental_information_id)}

Primary Key:

(rental_information_id)

Functional Dependencies:

rental_information_id → start_day, end_day, total_fee, current_fuel, image, accessories, car_id, customer_id, employee_id, after_car_rent_condition, feedback

Normal Form:

BCNF

Table Definition:

CREATE TABLE RentalInformation(

rental_information_id INT NOT NULL AUTO_INCREMENT PRIMARY KEY,

start_day DATE NOT NULL,

end_day DATE NOT NULL,

total_fee FLOAT,

current_fuel FLOAT,

image VARCHAR (128),

accessories VARCHAR (32),

car_id INT NOT NULL,

employee_id INT NOT NULL,

customer_id INT NOT NULL,

after_car_rent_condition VARCHAR (128),

feedback VARCHAR (128),

FOREIGN KEY (car_id) REFERENCES Car(car_id),

FOREIGN KEY (employee_id) REFERENCES Employee(person_id),

FOREIGN KEY (customer_id) REFERENCES Customer(person_id)

) ENGINE = InnoDB;

2.17. Insurance

Model:

Insurance(insurance_id, paid_amount, limit_for_compensation, rental_information_id)

Foreign Key: rental_information_id references RentalInformation(rental_information_id)

Candidate Keys:

{(insurance_id)}

Primary Key:

(insurance _id)

Functional Dependencies:

insurance _id → paid_amount, limit_for_compensation, rental_information_id

Normal Form:

BCNF

Table Definition:

CREATE TABLE Insurance (

insurance _id INT NOT NULL AUTO_INCREMENT PRIMARY KEY,

paid_amount INT,

limit_for_compensationINT NOT NULL,

rental_information_id INT NOT NULL UNIQUE,

FOREIGN KEY (rental_information_id) REFERENCES RentalInformation(rental_information_id)

) ENGINE = InnoDB;

2.18. request

Model:

request(employee_id, customer_id, car_id, branch_id, start_day, end_day)

Foreign Key: employee_id references Employee(person_id)

Foreign Key: customer_id references Customer(person_id)

Foreign Key: car_id references Car(car_id)

Foreign Key: branch_id references Branch(branch_id)

Candidate Keys:

{(employee_id, customer_id, car_id, branch_id)}

Primary Key:

(employee_id, customer_id, car_id, branch_id)

Functional Dependencies:

employee_id, customer_id, car_id, branch_id → start_day, end_day

Normal Form:

BCNF

Table Definition:

```
CREATE TABLE request (
employee_id     INT NOT NULL,
customer_id     INT NOT NULL,
car_id          INT NOT NULL,
branch_id       INT NOT NULL,
start_day       DATE NOT NULL,
end_day         DATE NOT NULL,
```

PRIMARY KEY (employee_id, customer_id, car_id),

FOREIGN KEY (employee_id) REFERENCES Employee(person_id),

FOREIGN KEY (customer_id) REFERENCES Customer(person_id),

FOREIGN KEY (car_id) REFERENCES Car(car_id),

FOREIGN KEY (branch_id) REFERENCES Branch(branch_id)

) ENGINE = InnoDB;

2.19. request_ride

Model:

request_ride(employee_id, customer_id, ride_vehicle_id, date, start_time, end_time)

Foreign Key: employee_id references Employee(person_id)

Foreign Key: customer_id references Customer(person_id)

Foreign Key: ride_vehicle_id references Car(car_id)

Candidate Keys:

{(employee_id, customer_id, ride_vehicle_id)}

Primary Key:

(employee_id, customer_id, ride_vehicle_id)

Functional Dependencies:

employee_id, customer_id, ride__vehicle_id → date, start_time, end_time

Normal Form:

BCNF

Table Definition:

CREATE TABLE request_ride (

employee_id INT NOT NULL,

customer_id INT NOT NULL,

ride_vehicle_id INT NOT NULL,

date DATE NOT NULL,

start_time TIME NOT NULL,

end_time TIME,

PRIMARY KEY (employee_id, customer_id, ride_vehicle_id),

FOREIGN KEY (employee_id) REFERENCES Employee(person_id),

FOREIGN KEY (customer_id) REFERENCES Customer(person_id),

FOREIGN KEY (ride_vehicle_id) REFERENCES TransportationVehicle(ride_vehicle_id)

) ENGINE = InnoDB;

2.20. Notification

Model:

Notification(person_id, notification_id, message, send_date)

Foreign Key: person_id references Person(person_id)

Candidate Keys:

{(person_id, notification_id)}

Primary Key:

(person_id, notification_id)

Functional Dependencies:

person_id, notification_id → message, send_date

Normal Form:

BCNF

Table Definition:

CREATE TABLE Notification (

person_id INT NOT NULL ,

notification_id INT NOT NULL AUTO_INCREMENT,

message VARCHAR(32),

send_date DATE,

PRIMARY KEY (person_id, notification_id),

FOREIGN KEY (person_id) REFERENCES Person(person_id)

) ENGINE = InnoDB;

All relational schemas in our system are in BCNF by having trivial functional dependencies thus all our relational schemas also in 3NF form.

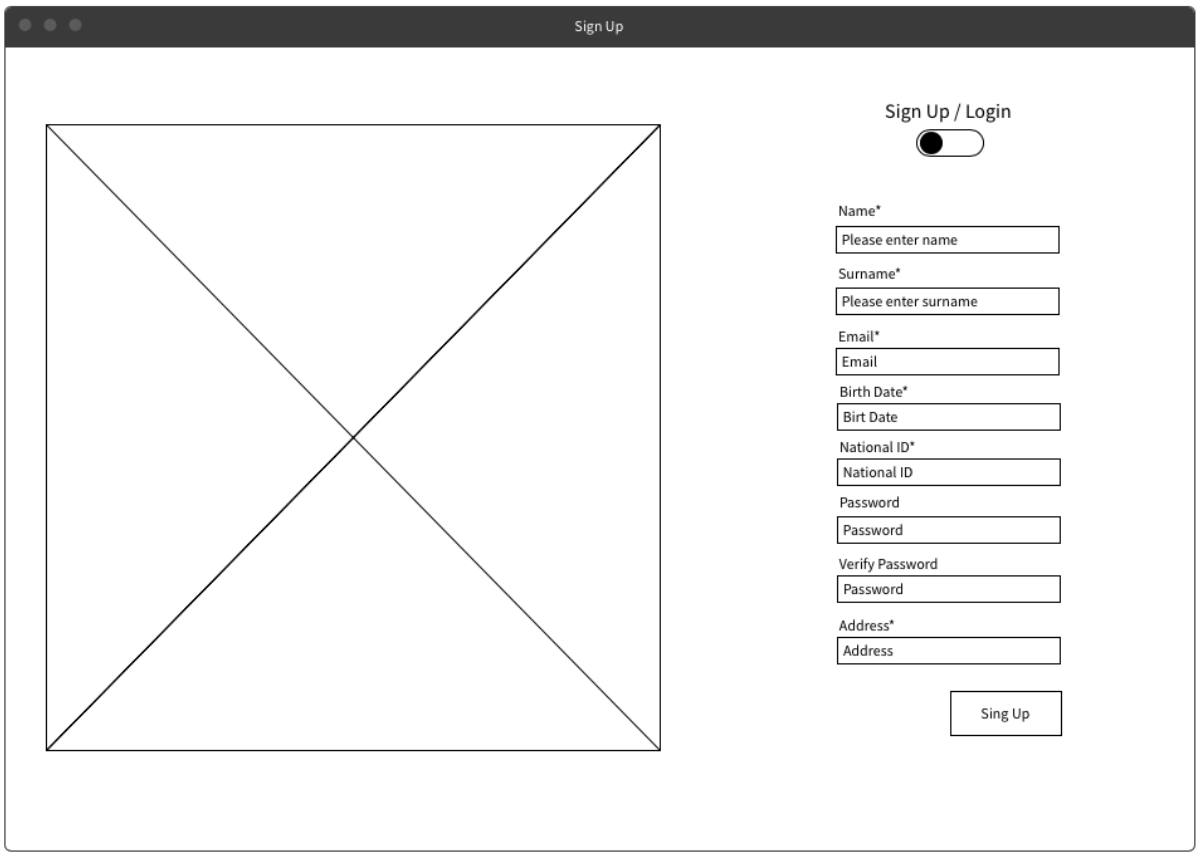
3. Functional Dependencies

The functional dependencies are given with its' normalization forms in the previous section.

4. UI Design And Corresponding SQL Statements

NOTE : The @ sign used below is for the values taken from the system, and the values in the database are written unsigned.

4.1. Sign Up Page

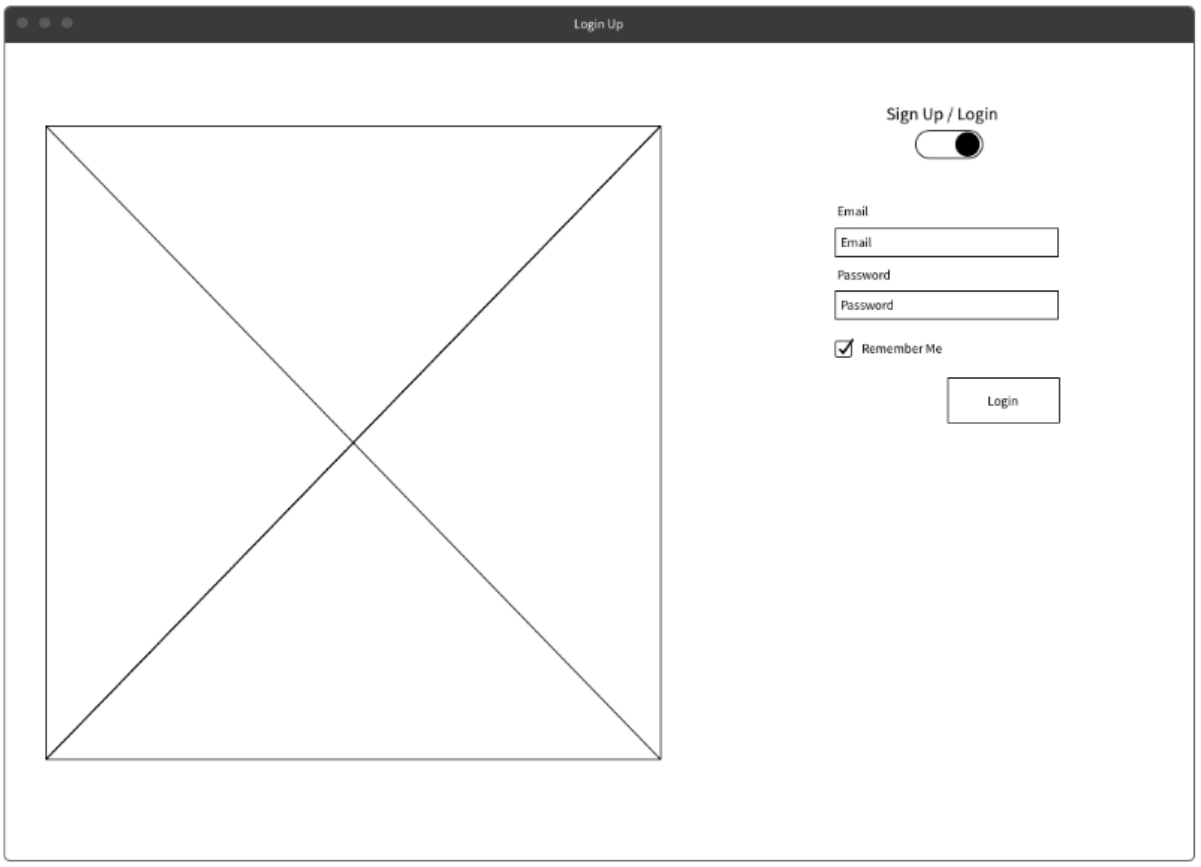


The login and sign up is located in single but accessed by the switch as it is shown above. If the user uses a switch, then the appropriate page components will show up. Only customers can create accounts since employees will have a predefined account (defined by manager).

Check whether user exists
SELECT person_id
FROM person
WHERE email = @email;

Registering person
INSERT INTO person (name, surname, birth_date, national_id, gender, email, password, address)
VALUES(@name, @surname, @birth_date, @national_id, NULL, @email, @password, @address);

4.2. Login Page



The Login Page is the same for all types of users. After the validation, different types of users will be directed to the different types of main pages.

Login Statements for Customer

*SELECT **

FROM Customer

WHERE email = @email AND password = @password;

Login Statements for Employee

*SELECT **

FROM Employee

WHERE email = @email AND password = @password;

Login Statements for Driver

*SELECT **

FROM Driver

WHERE email = @email AND password = @password;

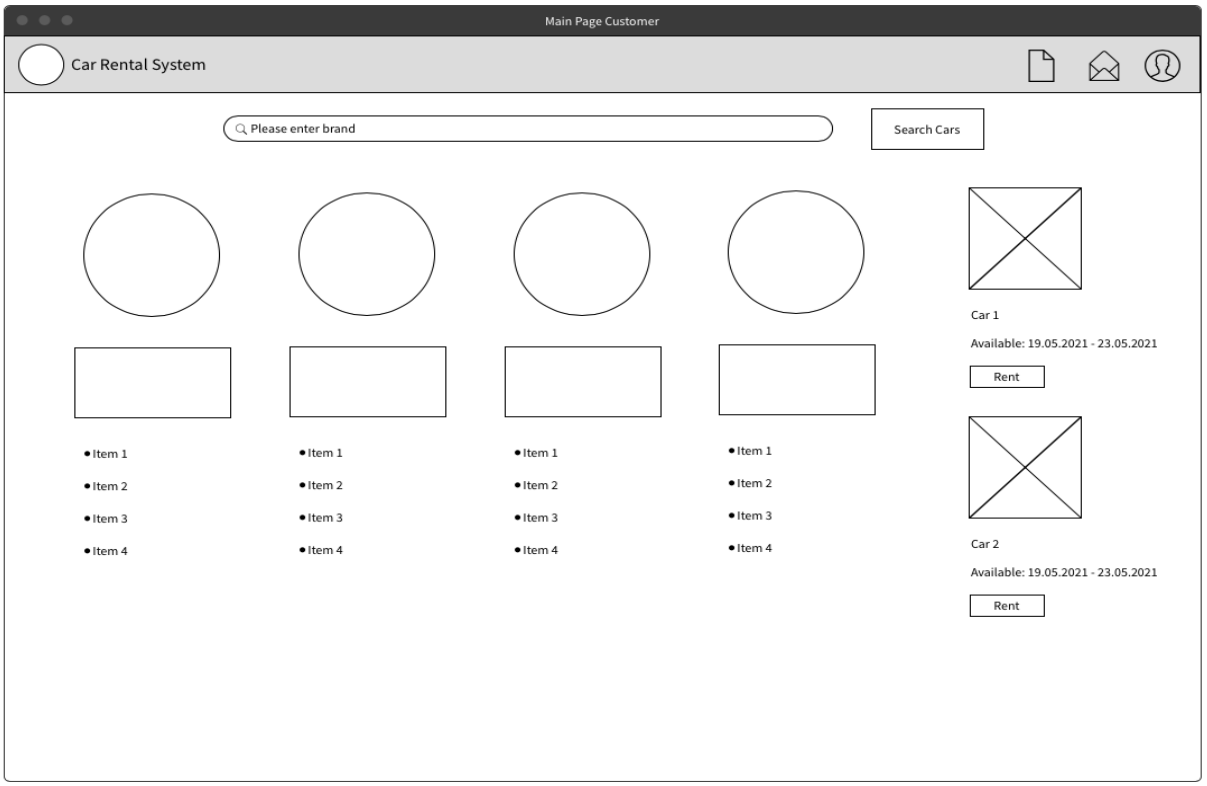
Login Statements for Manager

*SELECT **

FROM Manager

WHERE email = @email AND password = @password;

4.3. Customer Main Page



The main page of Customer consists of 3 parts. First part is the search bar. Users can type brand, model or color, so filtered outputs (cars) will be displayed to him. The search page is discussed in the following sections. The second part is the company's advertisements. This part displays the cars that are grouped by the brand. And the last part is also advertisements but it is targeted at the customer by displaying cars that are available.

SQL statement for the search bar

*SELECT **

FROM Car

WHERE brand_model = @search_bar OR model_name = @search_bar OR color = @search_bar;

SQL statement for the advertisement

SELECT brand_name FROM Car Grouped By brand_name;

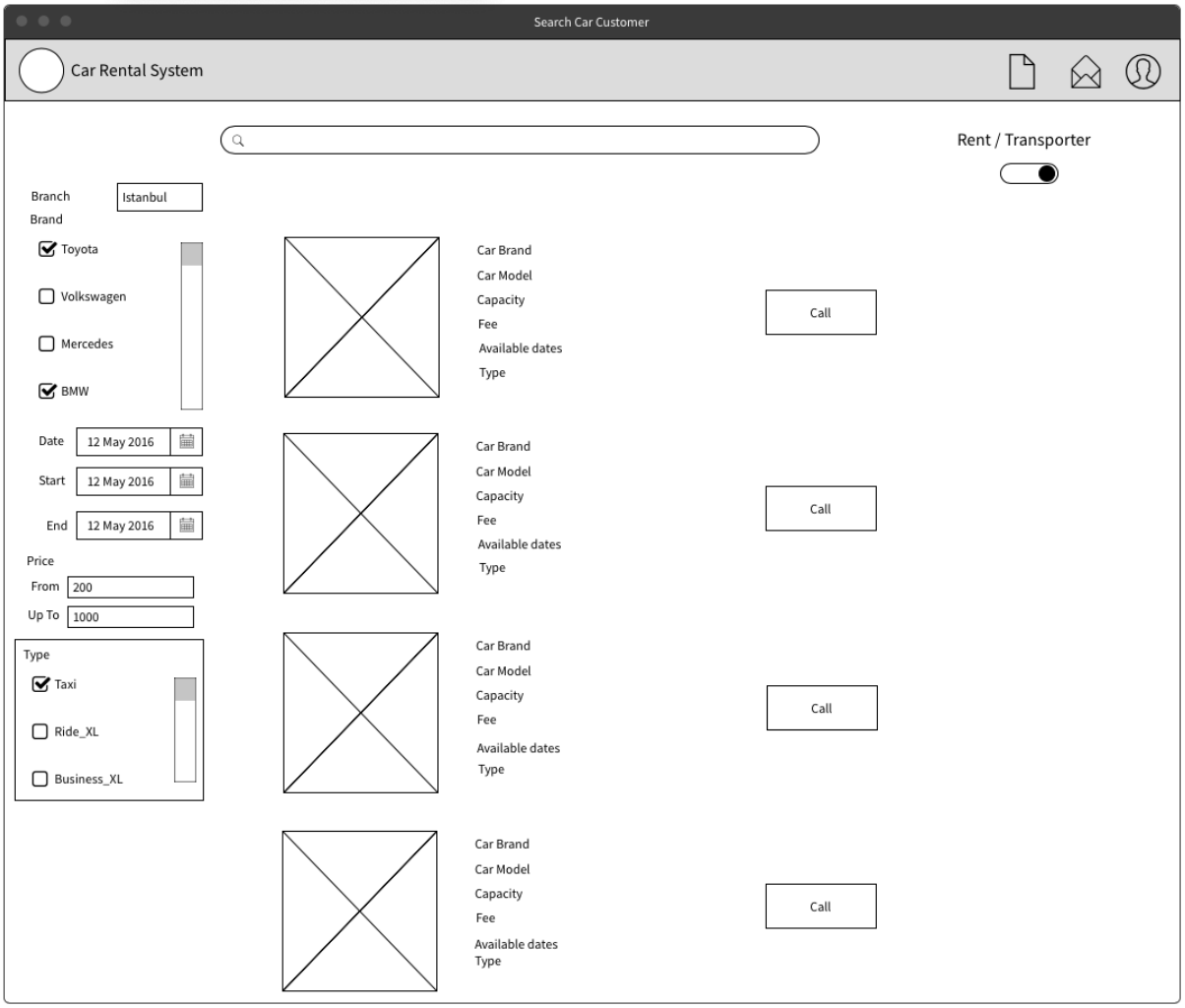
*SELECT * FROM Car WHERE brand_name = @brand_name;*

These queries will be called one after another. Firstly, the brand names will be retrieved from the database and according to those names, the cars will be searched and retrieved (First 4

cars will be displayed in front end. If there is less than 4 cars, the web page will display the number of cars that brand exists in database)

SQL statement for the suggesting car
*SELECT * FROM Car WHERE car_status = “available”;*

4.4. Search Car Customer



The search for the rents or transporters will be done by retrieving all the cars and filtering according to the user inputs. Since for every filter, a different sql query needs to be implemented, this is a more efficient method to do.

The query that retrieves all the branches
*SELECT * FROM Branch;*

The query that retrieves all brand names

SELECT brand_name FROM Car GROUP BY brand_name;

The query for the rental cars

*SELECT **

FROM Car NATURAL JOIN CarDetail

WHERE brand_model = @search_bar OR model_name = @search_bar OR color = @search_bar AND branch_id=@branch_id;

The query for the Businexx_XL

*SELECT **

FROM TransportationVehicle NATURAL JOIN Businexx_XL

WHERE brand_model = @search_bar OR model_name = @search_bar OR color = @search_bar AND branch_id=@branch_id;

The query for the transporters cars

*SELECT **

FROM TransportationVehicle

WHERE brand_model = @search_bar OR model_name = @search_bar OR color = @search_bar AND branch_id=@branch_id;

The query that inserts the request_ride if user calls transporter

INSERT INTO request_ride(employee_id, customer_id, ride_vehicle_id, date, start_time, end_time)

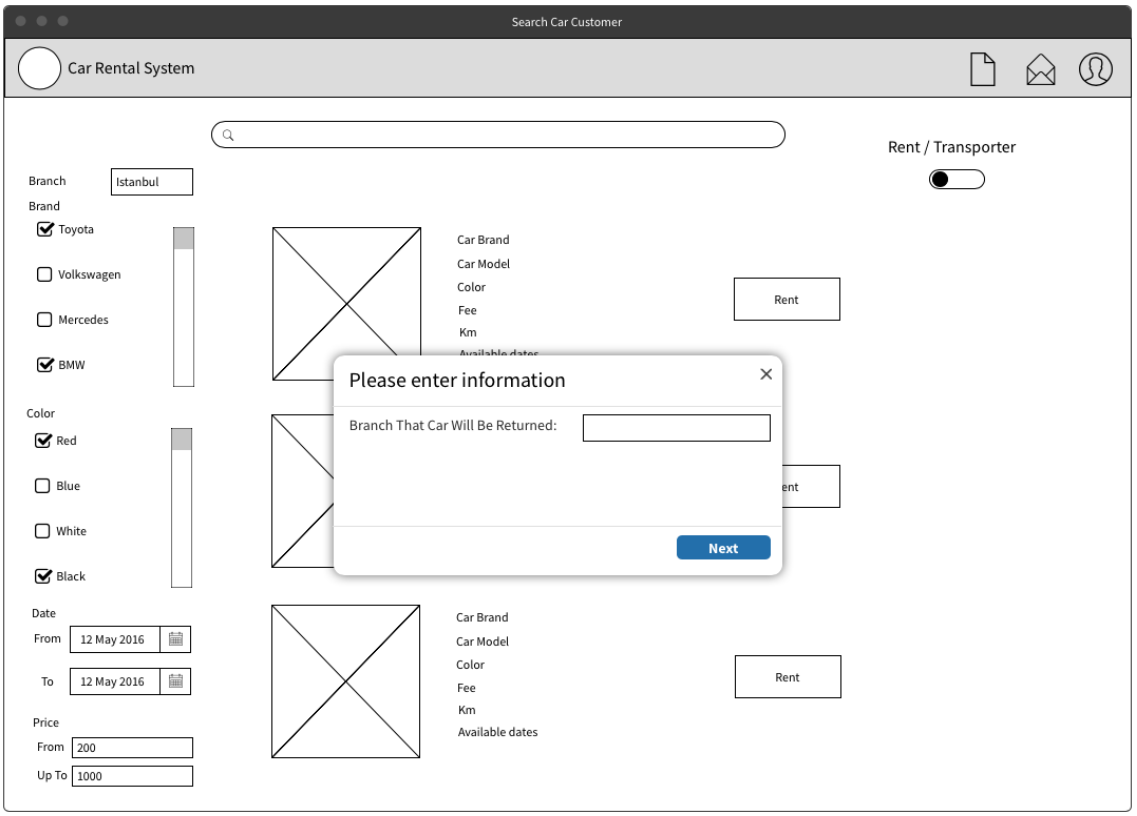
VALUES(@employee_id, @customer_id, @ride_vehicle_id, @date, @start_time, @end_time);

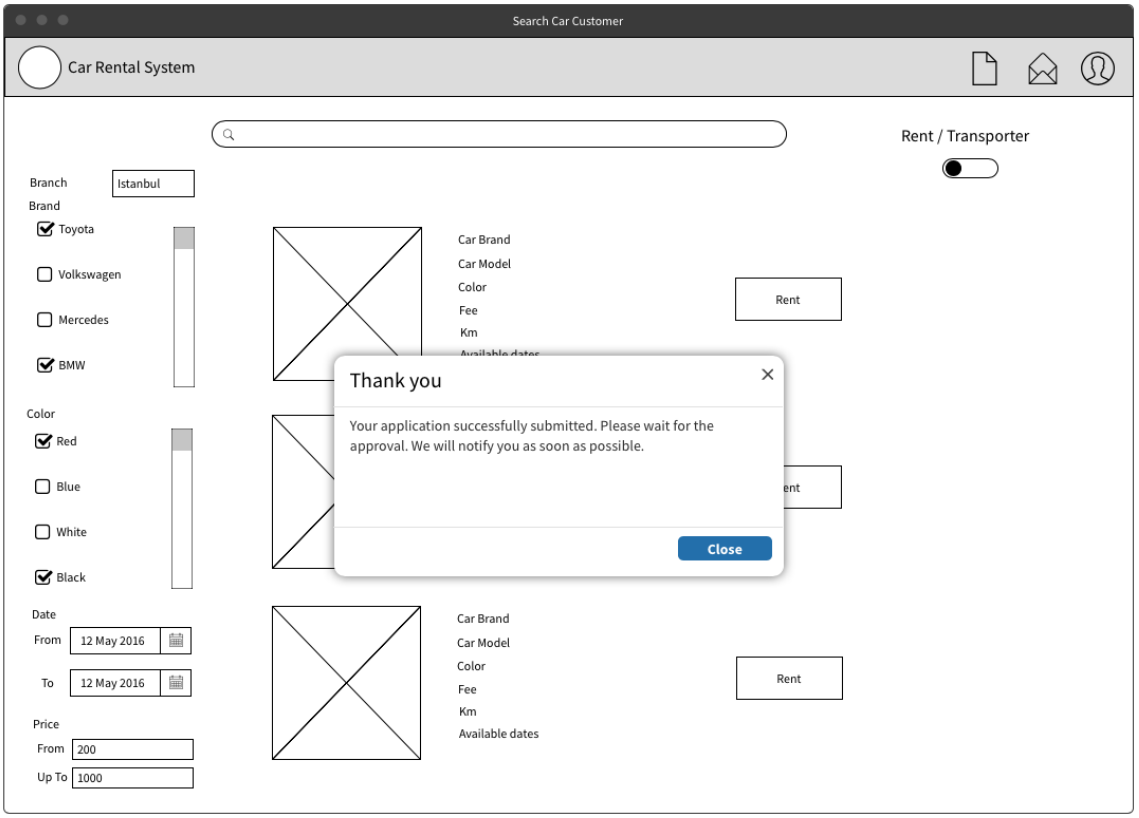
The employee id will be retrieved from the following query

```
SELECT e.id
FROM (      SELECT COUNT(customer_id) as process_count, employee_id as id
            FROM request
            GROUP BY employee_id) as e
ORDER BY e.process_count ASC
LIMIT 1;
```

The branch_id will be taken from the branch's row that is retrieved from the first query. Brand names will also be taken from the second query.

The UI design given above illustrates how the branches will be taken as an input from the user if he/she rents a car. If the user calls for the transporter, then this popup will not be displayed.





Retrieval of branches and brand names will be retrieved with the same query given above. The colors will be assigned automatically and be independent from the backend.

The query that inserts the rental information

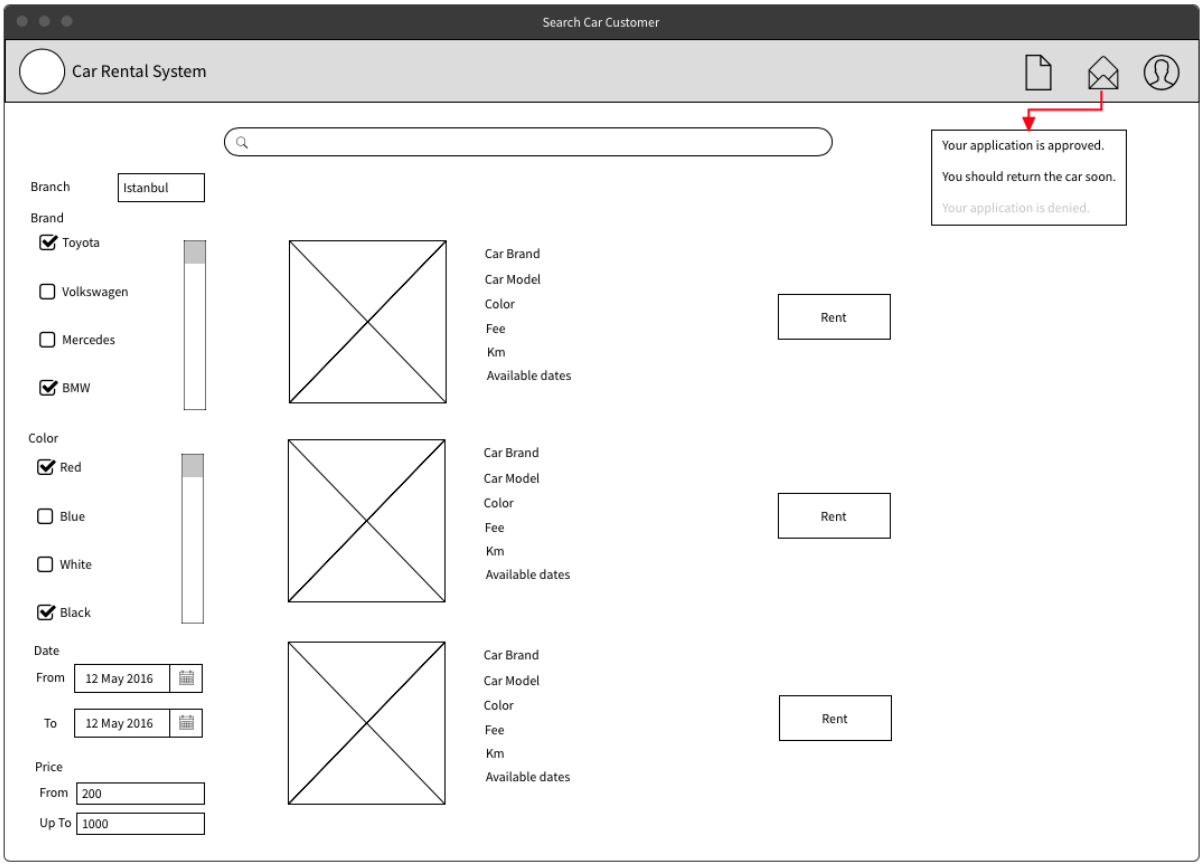
```
INSERT INTO request (employee_id, customer_id, branch_id, start_day, end_day)
VALUES(@employe_id, @customer_id, @branch_id, @start_day, @end_day);
```

The query that will retrieve the employee id that has the least processes ongoing.

```
SELECT e.id
FROM (      SELECT COUNT(customer_id) as process_count, employee_id as id
            FROM request
            GROUP BY employee_id) as e
ORDER BY e.process_count ASC
LIMIT 1;
```

The user will be informed as given above related to the successful rental form submission.

4.5. Customer Notifications



The user will also be able to see the notifications from the notifications part. All the notification sending will be done by the system automatically (inserting new notification by implementing triggers).

The query for retrieval of notifications.

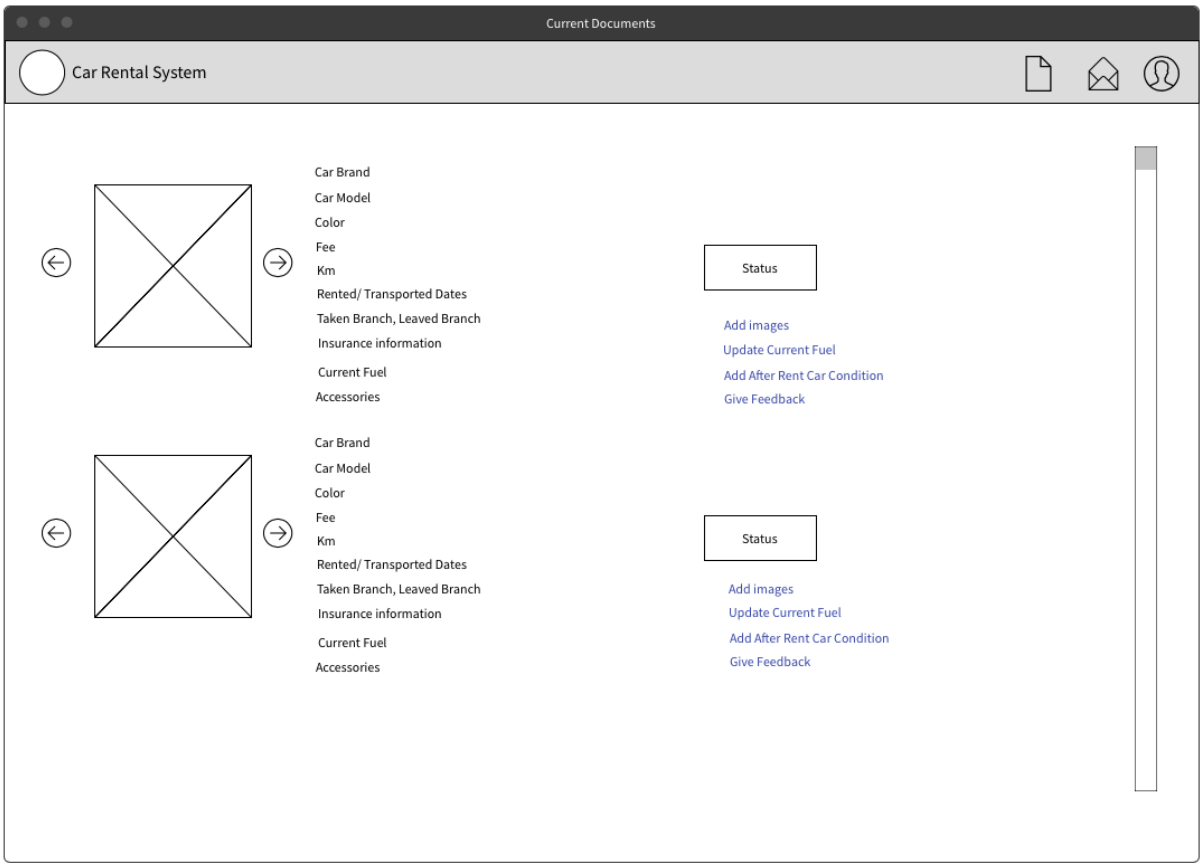
*SELECT **

FROM Notification

WHERE person_id = @person_id

ORDER BY send_date ASC;

4.6. Customer Current Documents Page



This is the document page where customers can see the rental information (previous rentals as well as in process and ongoing).

The query for the rental information is

*SELECT **

FROM RentalInformation NATURAL JOIN Car NATURAL JOIN CarDetail

WHERE customer_id=@customer_id;

*SELECT **

FROM request NATURAL JOIN Car NATURAL JOIN CarDetail

WHERE customer_id=@customer_id;

The query for the that adds images

UPDATE RentalInformation

SET image=@image

WHERE rental_information_id=@rental_information_id;

The query for the that adds feedback

UPDATE RentalInformation

SET feedback=@feedback

WHERE rental_information_id=@rental_information_id;

The query for the that adds current fuel

UPDATE RentalInformation

SET current_fuel=@current_fuel

WHERE rental_information_id=@rental_information_id;

The query for the that adds after_car_rent_condition

UPDATE RentalInformation

SET after_car_rent_condition=@after_car_rent_condition

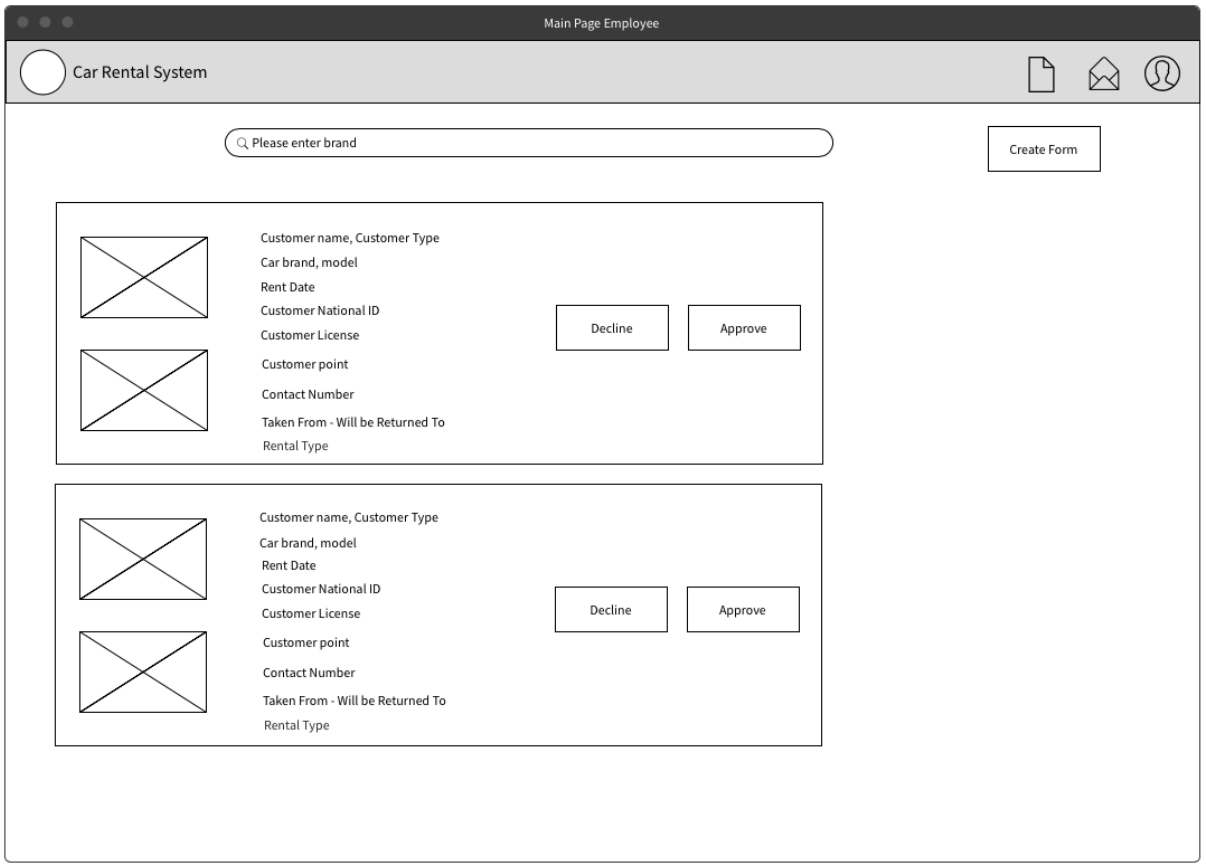
WHERE rental_information_id=@rental_information_id;

The queries given 4 for update RentalInformation are only available if the rental request is approved. If the process is ongoing, then those links will not appear.

The information about image, current_fuel, car_condition and feedback will be taken from the popups. We did not include those popups since it would have taken a lot of space.

The customer_id will be taken from the Session that is saved in login.

4.7. Employee Main Page



This is the main employee page where employees can approve or decline a car rental request. For the request, the information in customer and car needs to be retrieved in respect to the requests.

The query for the rental requests is (start_day and end_day shown as Rent Date):

```
SELECT *
FROM request
WHERE  employee_id = @person_id;
```

The query for getting the taken from and will be returned to branch ids (The taken from branch is the employee's branch and the returned to branch is the branch_id which is gotten from the above request query's branch_id):

```
SELECT branch_id, branch_name
FROM Employee NATURAL JOIN Branch
WHERE  employee_id = @person_id;
```

The above query gets the taken from branch id with its name.

SELECT branch_name
FROM branch
WHERE branch_id = @branch_id;

The above query is used to get branch_name from the branch_id in the first query to find the returned branch.

The query for getting customer information whose request is shown (each customer_id is gotten from the above SQL query):
SELECT name, surname, national_id, contact_number
FROM Person
WHERE person_id = @customer_id;

For getting the customer type if it is premium or not, the customer_ids from PremiumCustomer will be gotten and the program in the front-end will check whether the customer_id is in that list or not:

SELECT person_id
FROM PremiumCustomer

The query about getting car information whose request is shown (each car_id is gotten from the first SQL query):

SELECT brand_name, model_name
FROM Car
WHERE car_id = @car_id;

The query about getting the license information of the customer whose id is gotten from the first query:

*SELECT **
FROM License NATURAL JOIN Customer
WHERE cutomer_id = @customer_id;

For the requests that the employee declines there is nothing to be done except deleting the request from the request query.

DELETE FROM request WHERE employee_id = @employee_id AND customer_id = @customer_id AND car_id = @car_id AND branch_id = @branch_id;

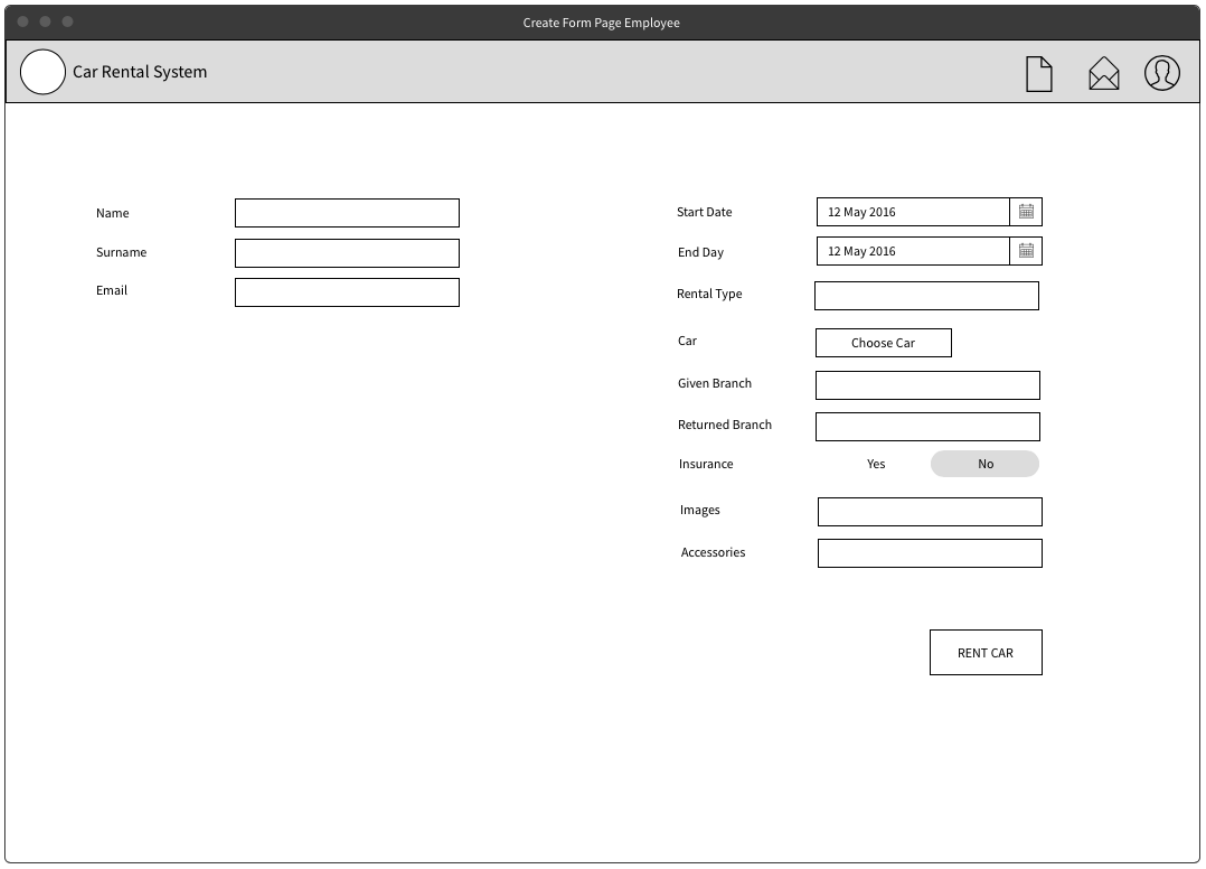
For the request that is accepted it needs to be deleted from the request table and added to the rent table.

DELETE FROM request WHERE employee_id = @employee_id AND customer_id = @customer_id AND car_id = @car_id AND branch_id = @branch_id;

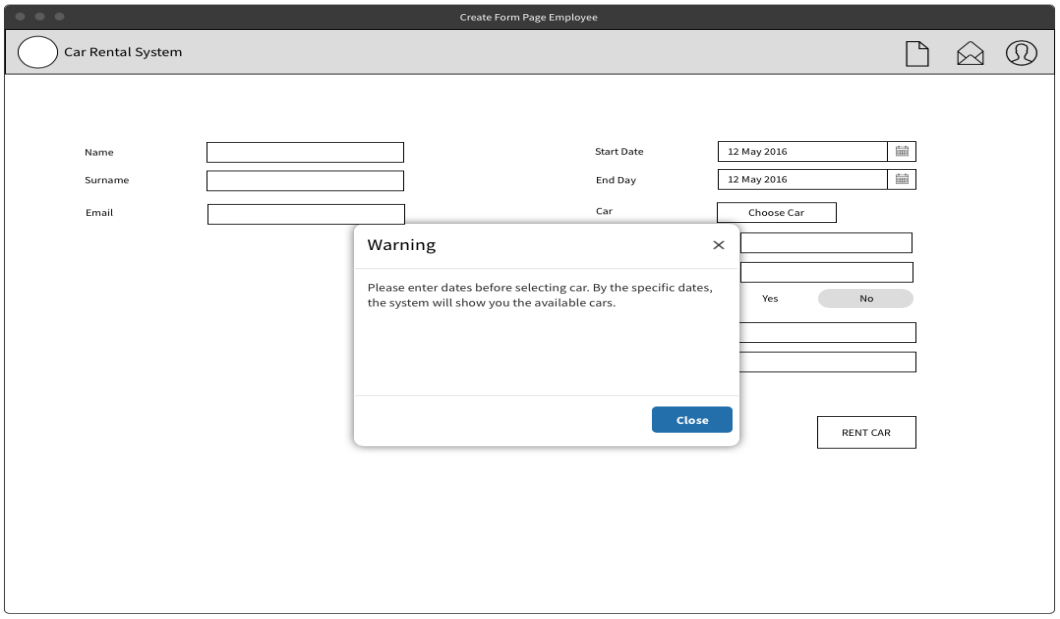
INSERT INTO RentalInformation(rental_information_id, start_day, end_day, total_fee, current_fuel, image, accessories, car_id, customer_id, employee_id, after_car_rent_condition) VALUES(@start_day, @end_day, @total_fee, @current_fuel, @image, @accessories, @car_id, @customer_id, @employee_id, NULL, NULL);

The variables in RentalInformation are obtained from the variables in the request table and other queries.

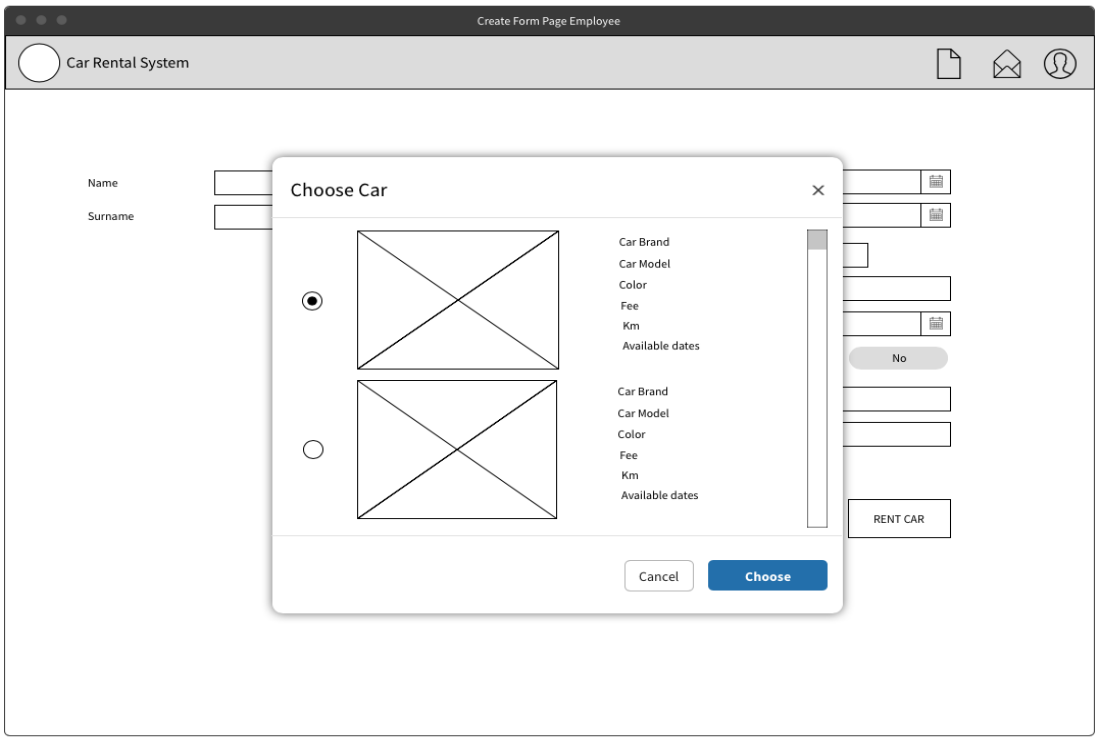
4.8. Employee Create Form Page



This is the creating form page of employees where employees can create a form for rental car requests to someone who wants to come to the branch and rent a car.



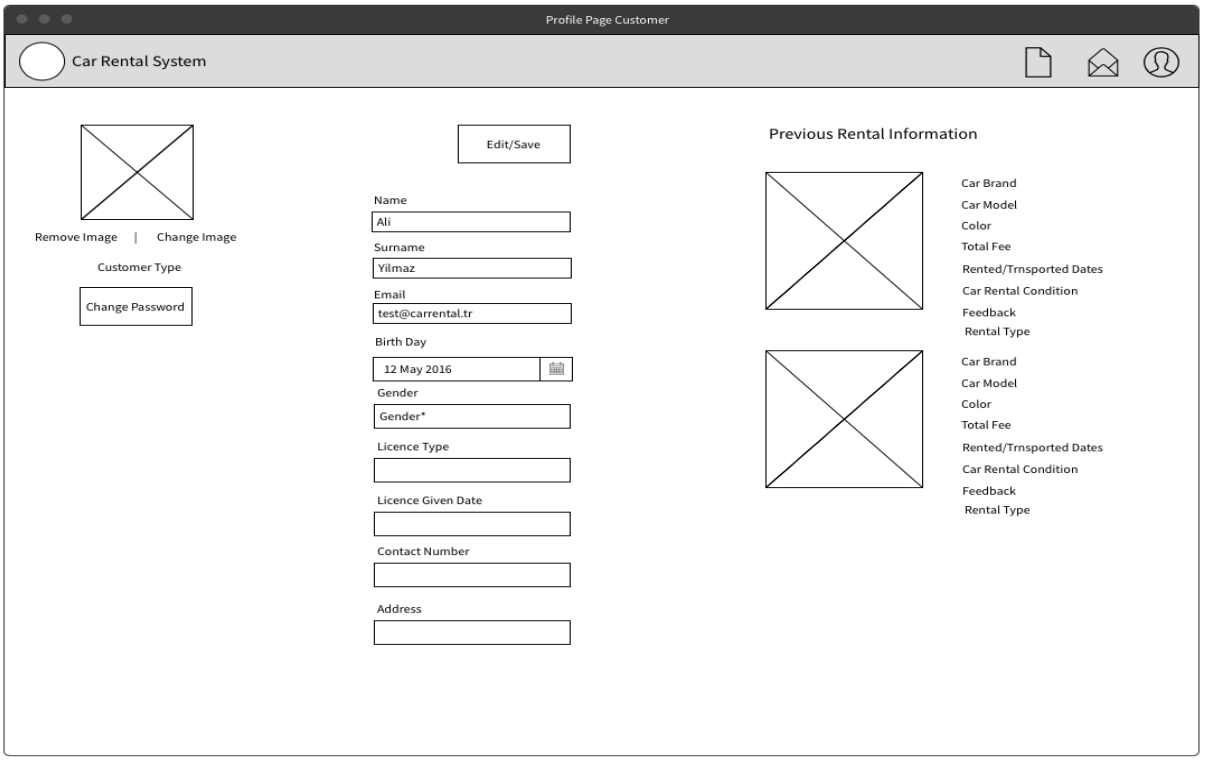
This is the same page above where giving a pop-up message about selecting dates for renting a car. This page does not do any SQL queries since it shows a warning message.



This is the same page above where giving a pop-up message about selecting available cars on the selected date for renting a car.

```
SELECT *
FROM  Car
WHERE car_id IN (SELECT car_id
                 FROM RentalInformation
                 WHERE @start_day > end_day)
UNION ALL car_id IN (SELECT car_id
                  FROM RentalInformation
                   WHERE @start_day < start_day AND @end_day < start_day)
UNION ALL car_id NOT IN (SELECT car_id
                  FROM RentalInformation);
```

4.9. Customer Profile Page



This is the profile page of the customer where the customer can change or edit his/her datas in the web application. Also, on this page, customers can see his/her previous rental information.

The query that retrieves all information that belongs to the customer.

*SELECT **

FROM Customer

WHERE person_id = @person_id;

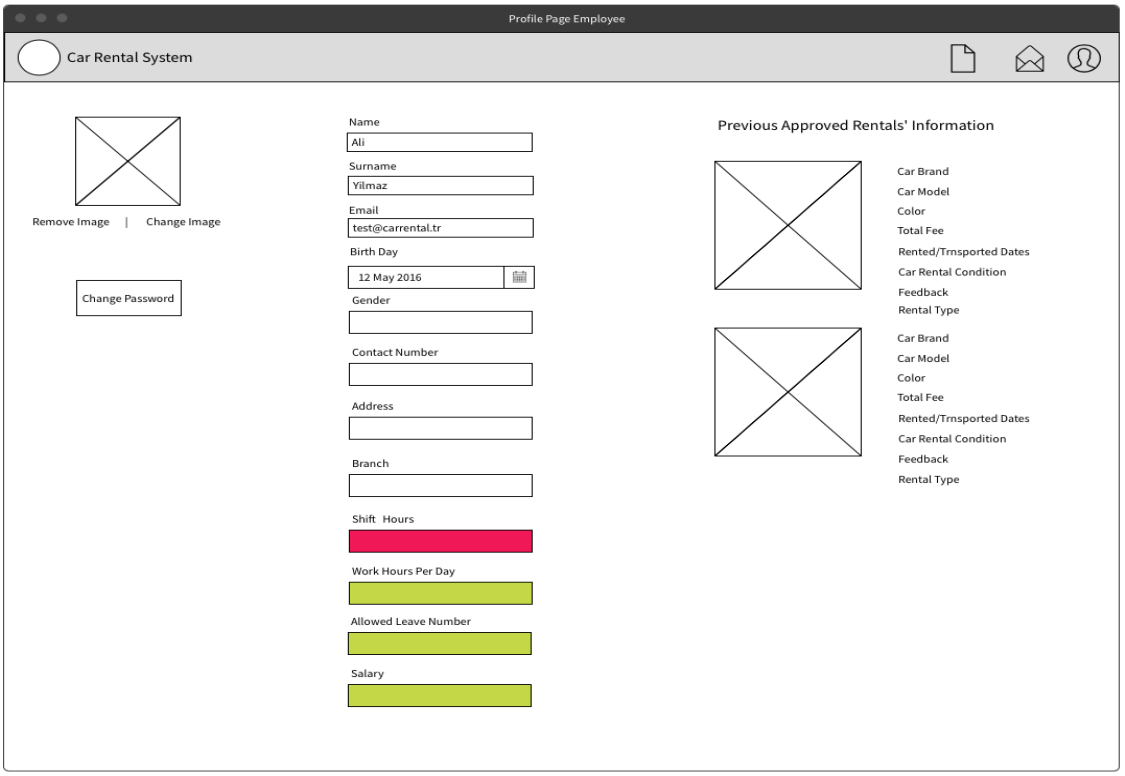
The query that updates information that belongs to the customer.

UPDATE Customer INNER JOIN License

SET name = @name, surname = @surname, email = @email, birth_date = @birth_date, gender = @gender, license_type = @license_type, given_date = @license_given_date, contact_number = @contact_number, address = @address

WHERE email = @email;

4.10. Employee Profile Page



This is the profile page where the employee can see his information and change his password. Also, he can see the rental information that they used to accept.

The red part that stores shift_hour is only visible if the profile is being displayed belonging to the driver.

The greed part is visible only for the manager and person to himself/herself that profile belongs.

The sql statement that retrieves information if the profile belongs to *Driver*.

*SELECT **
FROM Person NATURAL JOIN Driver,
WHERE person_id=@person_id;

The query that retrieves all information that belongs to the *Employee*.
*SELECT **
FROM Person NATURAL JOIN Employee,
WHERE person_id=@person_id;

The query that retrieves all information that belongs to the *Manager.*
*SELECT **
FROM Person NATURAL JOIN Manager,
WHERE person_id=@person_id;

The query that updates personal information of the user*.*
UPDATE Person
SET name=@name, surname=@surname, birth_date=@birth_date,
national_id=@national_id, national_id=@gender, national_id=@emai, address=@address,
contact_number=@contact_number)
WHERE person_id=@person_id;

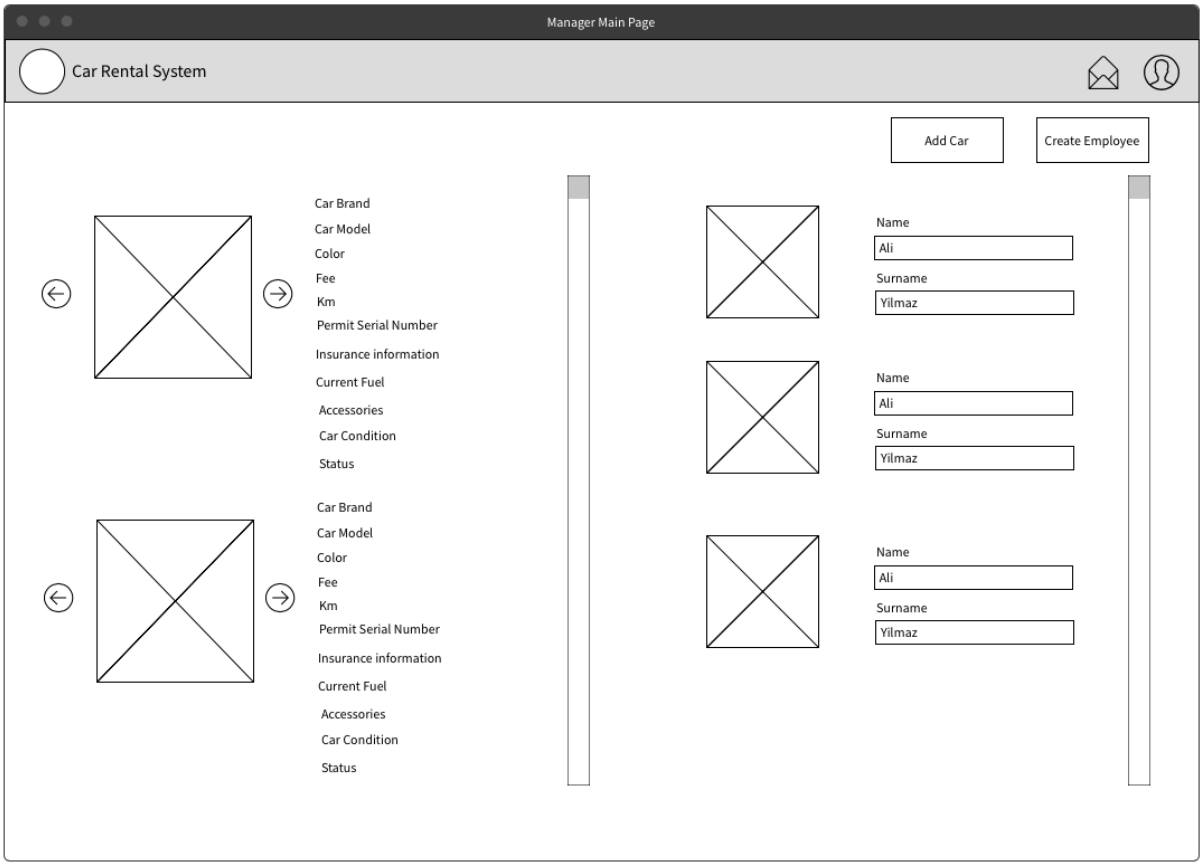
The query that updates the password of Person
UPDATE Person
SET password=@password
WHERE person_id=@person_id;

The query that updates the password of the Driver
UPDATE Driver
SET shift_hours=@shift_hours
WHERE person_id=@person_id;

The query that updates password of Staff*..*
UPDATE Staff
SET salary=@salary, allowed_leave_number=@allowed_leave_number,
work_hours_per_day=@work_hours_per_day
WHERE person_id=@person_id;

This is the profile page of the employee where the employee can change or edit his/her datas in the web application. Also, on this page, an employee can see his/her previous rental information.

4.11. Manager Main Page



This page will display all the employers and cars that belong to the branch.

The query that retrieves branch_id
SELECT branch_id
FROM branch
WHERE manager_id=@manager_id;

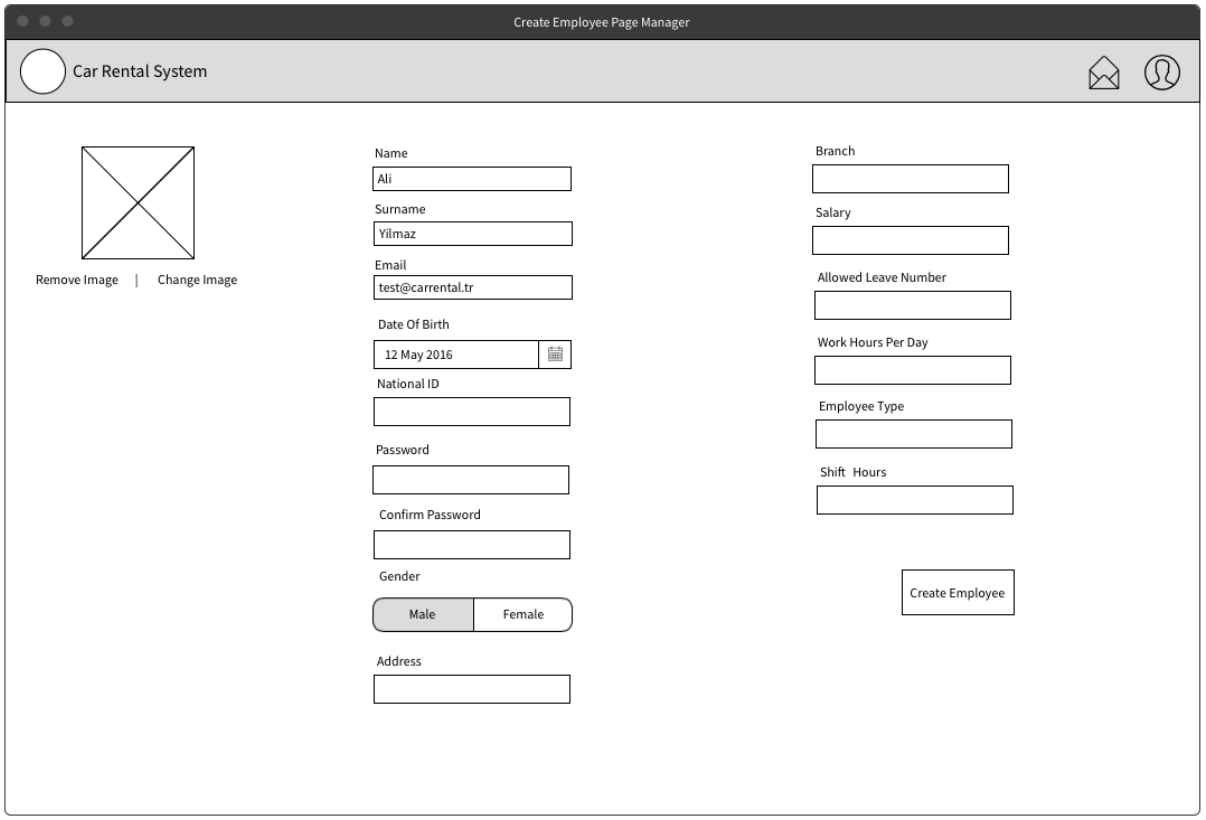
The query that retrieves all cars that belong to the manager's branch
*SELECT **
FROM Car
WHERE branch_id=@branch_id;

The query that retrieves all employees that belong to the manager's branch
*SELECT **
FROM Employee
WHERE branch_id=@branch_id;

The query that retrieves all drivers that belong to the manager's branch

*SELECT **
FROM Driver
WHERE branch_id=@branch_id;

4.12. Create Employee Page



This is the adding employees to the branch page where the manager can add a specific employee to the branch.

SQL that checks existence of the person in the system according to the national idl number
*SELECT **
FROM Person
WHERE national_id=@national_id;

SQL statement that inserts new employee to the brand
INSERT INTO Person(name, surname, birth_date, national_id, gender, email, password, address, contact_number)
VALUES (@name, @surname, @birth_date, @national_id, @gender, @email, @password, @address, @contact_number);

The query that retrieves the person_id inserted
SELECT person_id
FROM Person
ORDER BY person_id DESC

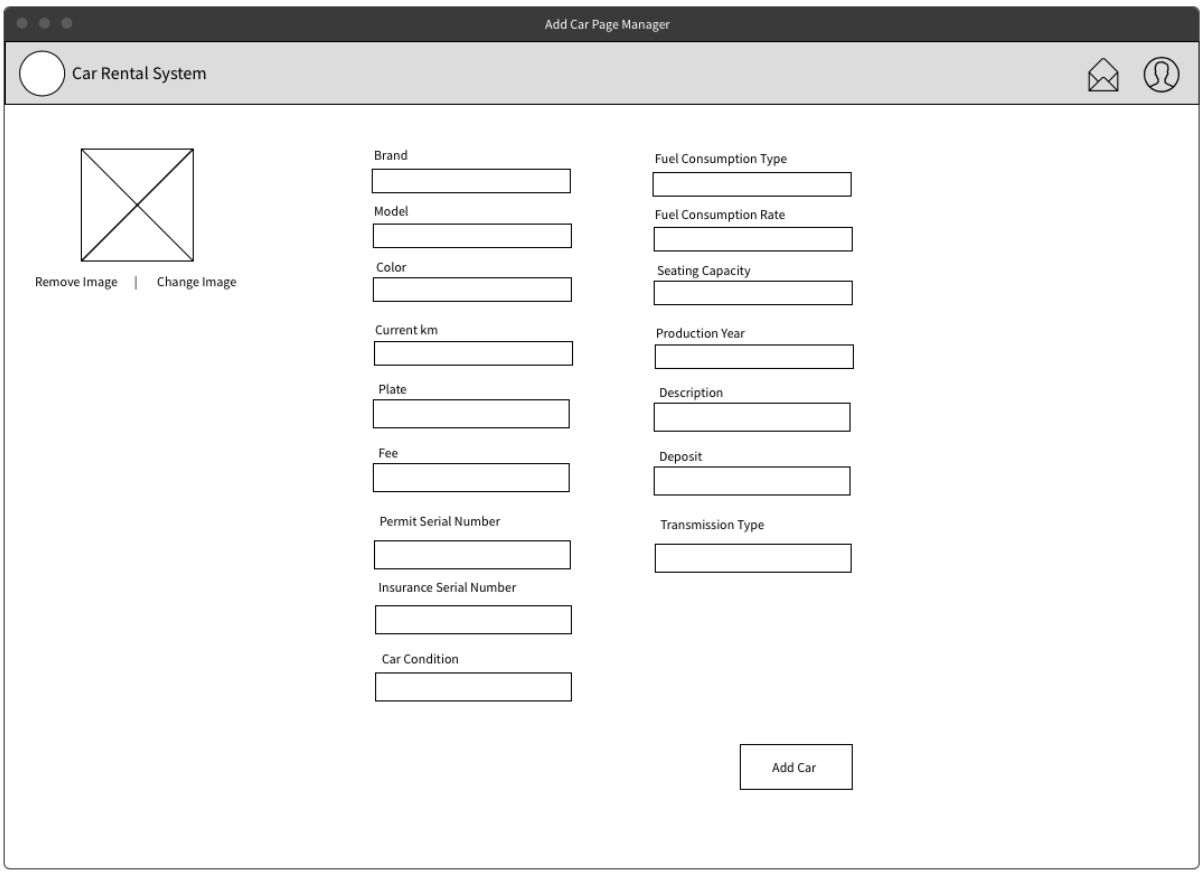
LIMIT 1;

The query that inserts staff.
INSERT INTO Staff(person_id, salary, allowed_leave_number, work_hours_per_day)
VALUES(@person_id, @salary, @allowed_leave_number, @work_hours_per_day);

The query that inserts the driver if toggle is on.
INSERT INTO Driver(person_id, shift_hours, branch_id)
VALUES(@person_id, @shift_hours, @branch_id);

The query that inserts the employee if toggle is on.
INSERT INTO Employee(person_id, shift_hours, branch_id)
VALUES(@person_id, @shift_hours, @branch_id);

4.13. Add Car Page



This is the adding car to the branch page where the manager can add a specific car to the branch.

SQL that checks existence of the car in the system according to the permit serial number or plate

*SELECT **
FROM car
WHERE plate=@plate OR permit_serial_number=@permit_serial_number;

SQL statement that inserts new car to the brand
INSERT INTO Car(brand_name, model_name, current_km_value, plate, car_status, permit_serial_number, insurance_serial_number, car_condition, branch_id)
VALUES (@brand_name, @model_name, @current_km_value, @plate, @car_status, @permit_serial_number, @insurance_serial_number, @car_condition, @branch_id);

The query that retrieves the car_id inserted
SELECT car_id
FROM Car
ORDER BY car_id DESC
LIMIT 1;

The query that inserts car details.
INSERT INTO CarDetail(car_id, car_detail_id, color, fuel_consumption_type, fuel_consumption_rate, seating_capacity, production_year, description, car_daily_fee, car_deposit, transmission_type)
VALUES(car_id, @color, fuel_consumption_type, @fuel_consumption_rate, @seating_capacity, @production_year, @description, @car_daily_fee, @car_deposit, @transmission_type);

5. Implementation Plan

We are planning to use the React JS framework of JavaScript for the frontend and we will use Dijkstra MySQL as the database. For the backend, we will use PHP, and also we are planning to use RESTful API for the connections of the frontend and backend.