ParkSnap

ParkSnap Documentation v1.1

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Contents

Introduction

Park Snap is a compact application for managing parking lots with multiple parking slots. The system provides various features for managing vehicle parks

Proposed Features

The proposed features of the system are as follows.

- View parking slot occupation
- Reserve parking slots
- Web interface
- User registrations
- Admin panel
- Alerts and updates
- Weather information
- Analytics and Insights

Technologies

The following technologies and software are to be used in the development of the system.

- Technologies
    - HTML
    - CSS/Bootstrap
    - React/Js
    - SpringBoot
    - MySQL
- Software
    - Postman
    - Canva
    - Figma
    - IntelliJ IDEA
    - phpMyAdmin
    - MySQL Workbench
    - Git

Important links

- FigJam: The initial concepts, plans, and designs can be found in our FigJam board [Here]
- UX and wireframe design on Canva [Here]
- GitHub Repository [Here]
- Resources on GitHub Repository [Here]

Technical Specifications

ParkSnap is designed with a react frontend and a spring boot backend connected with a REST API.

Front-end

ParkSnap frontend is implemented with React. The initial UI/UX wireframe and design flow have been constructed with Canva. The UI design has been implemented with Figma. The UI has been developed with a combination of HTML, and CSS alongside Bootstrap.

Back-end

ParkSnap Backend is implemented with SpringBoot 3 on Java 21 with Maven. The system is compatible with a MySQL Database. The system utilizes spring data JPA for database access.

Brand Guidelines

Here are the brand guidelines

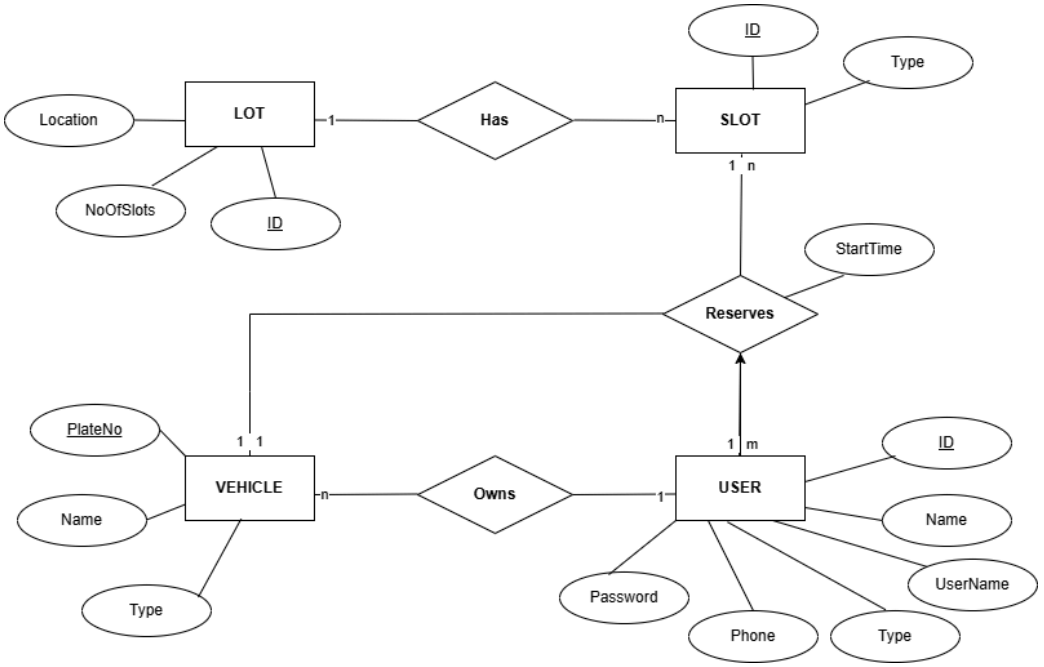
Database Specifications

The database is designed to account for multiple entities regarding the parking system. These entities are

- User
- Lot
- Slot
- Vehicle

Database design

the database was designed with the help of ER diagrams.



The design was originally drawn on a whiteboard [files], and then on draw.io [design files].

Database Schema

The database schema was derived from the ER diagrams.

Revision 1.0

The following are the relations (tables) decided for the application.

```
Lot(lot_id [PK],location,no_of_slots)
Slot(slot_id [PK], type, lot_id[FK])
User(userId[PK], name, type, phone, username, password)
Vehicle(vehicleId [PK], userId [FK], name, vehicle_type, license_plate)
Reservation(slotId [PK][FK], userId [PK][FK], vehicleId [PK][FK],
duration, startTime)
```

Additional tables to store user role names in the database. It can also implemented in the front end or in configs. It's optional on this scale but should be implemented if possible depending on the time frame.

```
UserType(typeId [PK], typeName)
SlotType(typeId [PK], typeName)
```

Note that there have been some changes since the initial whiteboard ER design

- Slot -> isAvailable; attribute present in the original whiteboard ER design should be derived (by checking the Reservations table) and thus removed from the schema. This is to minimize redundancies. otherwise, the same data is written in two places, which may lead to inconsistencies in making room for
- Vehicle -> vehicleId; is the PK. plate is now a string and should be a normal attribute.

Revision 2.0

The database schema has been changed to avoid some potential problems.

```
Lot(lot_id [PK], location, no_of_slots)
Slot(slot_id [PK], type_id [FK], lot_id[FK])
User(user_id[PK], name, type_id [FK], phone, username, password)
Vehicle(vehicle_id [PK], user_id [FK], name, vehicle_type, license_plate)
Reservation(reservation_id [PK], slot_id [FK], user_id [FK], vehicle_id
[FK], duration, start_time)
UserType(type_id [PK], type_name)
SlotType(type_id [PK], type_name)
```

This allows any reservations to be stored in the database with minimal redundancy. Additionally, it is now possible to store reservations of history. Furthermore, it's not necessary to delete records after the day. Having records of past reservations allows statistics to be processed to be displayed on the dashboards. Queries should be programmed to retrieve reservation information for a specific day.

UserType and SlotType are now in tables for easiness of maintaining clarity and consistency throughout the program.

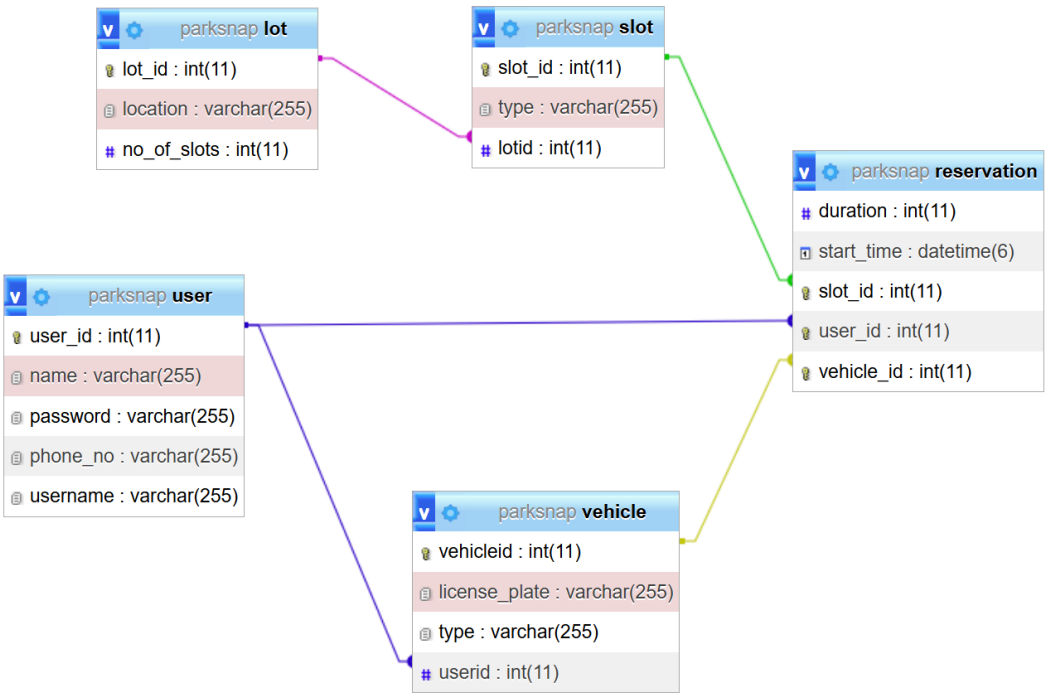
Database Implementation in Application

The database has been implemented in the application using Spring Data JPA. Entity classes have been programmed for each of the above entities.

The system automatically creates relations with all the primary and foreign keys on the first established connection with the database.

Note: Make sure the database is empty or made with the same schema when connecting it to the system for the first time. Otherwise, there might be conflicts.

The database schema of the database automatically generated by the system can be summarized in the following image. The image has been generated by phpMyAdmin, a database management tool.



The database specifications generated by phpMyAdmin can be found in our GitHub repository [here]. The specifications include all the relations, attributes, data types, keys, and other important aspects.

Additionally, all the database-related resources can be found in our GitHub repository [here].

```
The document end reached.
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