

Vehicle Parking System - Project Report

Author

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BSc Data Science student currently at Diploma level who also is also pursuing a dual degree in BCA. This project reflects my skills in full-stack development and interest in creating structured solutions.

Description

This project involves developing a web-based vehicle parking system with two types of users — admin and clients. Admins can manage lots and monitor parking activities, while users can book and release parking spots. The goal is to automate slot allocation and ensure a seamless user experience across all operations.

Technologies Used

- **Python + Flask:** Core web framework used for server-side logic and routing.
- **Flask-SQLAlchemy:** ORM (Object-Relational Mapping) for managing models and database communication.
- **SQLite:** Lightweight database used for local development.
- **Bootstrap 5:** For responsive, mobile-friendly and clean UI design.
- **Jinja2:** For dynamic HTML rendering.
- **Flask Blueprints:** For modular routing (admin, auth, client).
- **HTML5 + CSS3 + JS:** Base front-end technologies for form handling and flash behaviour.

These technologies were selected as per the mandatory requirement of the project.

DB Schema Design

The app uses five main tables:

1. **client:**
 - email (PK), name, address, pincode, password
 - Used for user authentication and reservation tracking
2. **superuser:**
 - username (PK), password
 - Used for admin login
3. **parking_lot:**
 - lot_id (PK), location, address, pin_code, price, status
 - Represents a complete parking lot

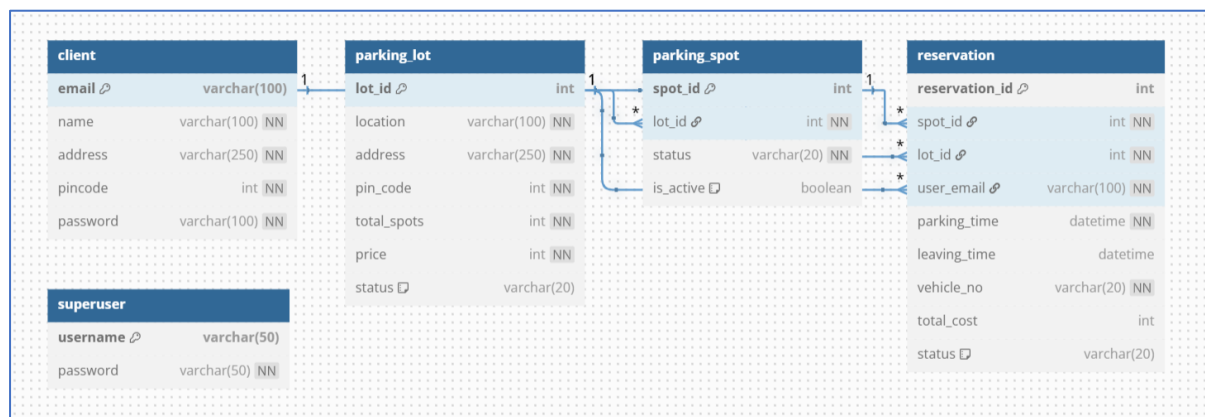
4. **parking_spot:**

- spot_id (PK), lot_id (FK), status, is_active
- Individual spot associated with a lot

5. **reservation:**

- reservation_id (PK), user_email (FK), lot_id (FK), spot_id (FK), vehicle_no, parking_time, leaving_time, total_cost, status
- Stores each parking record

The schema is normalized with strong constraints and relationships for efficient data integrity.



Architecture and Features

• **Project Structure:**

- app/routes/: Contains Flask Blueprints for admin, client, and auth (authorization).
- app/models/: SQLAlchemy model definitions.
- app/templates/: HTML templates categorized by role (admin/client/login).
- app/static/: Images.

• **Implemented Features:**

- **Admin:**
 - Create, view, and delete parking lots (only if empty)
 - Auto-generate parking spots
 - View all registered users
 - Summary dashboard
 - Searching across all models
- **Client:**
 - View/update profile
 - View lots and book parking
 - Auto slot allocation



- View, release, and track past reservations
- Individual summary dashboard (analytics for each user)
- **UI/UX:**
 - Fully responsive layout using Bootstrap and CSS
 - Flash messages with auto-dismiss
 - Confirm prompts for delete and release actions
 - Elegant English-themed color scheme

Video

Link: <https://drive.google.com/file/d/1gAcWDN1Z4VZHdt4fXoJ9C3tfsJQW0x0d/view?usp=sharing>

AI Usage Declaration

I have used around 20-25% AI-generated content was used during development for complex problem solving, understanding and learning few concepts, and debugging — but not misused in any manner, just for gaining knowledge purpose and limited to guidance and brainstorming. All code and logic were implemented by me from scratch in a hands-on manner, ensuring originality and full understanding.

THANKING YOU

Screen Shots of the project

LOGIN PAGES

Admin Login

Username:

Password:

Login

User Signup

Email:

Name:

Address:

Pincode:

Password:

Signup

[Login here!](#)

User Login

Email:

Password:

Login

[Create Account?](#)



ADMIN DASHBOARD

Welcome Admin!

HomeUsersSearchSummaryLogout

Edit Profile

Parking Lot

Legend: A - Available O - Occupied

Parking#1
(Occupied: 2/25)

EditDelete

O	O	A	A	A	A
A	A	A	A	A	A
A	A	A	A	A	A
A	A	A	A	A	A
A					

Parking#2
(Occupied: 1/18)

EditDelete

O	A	A	A	A	A
A	A	A	A	A	A
A	A	A	A	A	A

+ Add Lot

127.0.0.1:5000/view-spot/55

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Welcome Admin!

HomeUsersSearchSummaryLogout

Edit Profile

Registered Users

Search here

Q

Serial Number	Email	Full Name	Address	Pin code
1	23f3001028@ds.study.iitm.ac.in	Harshit Jain	H-3 / 325, Sector 16, Rohini	110089

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Welcome Admin!

HomeUsersSearchSummaryLogout

Edit Profile

Search

Choose Category

Choose Category

Parking Lots

Clients

Reservations

Parking Spots

Enter search keyword...

Search

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Welcome Admin!

HomeUsersSearchSummaryLogout

Edit Profile

Admin Summary Dashboard

Total Active Lots
2

Total Active Spots
33

Average Parking Duration
1.64 hrs

Average Spot per Lot
16

Average Parking Price
₹ 38.75

Avg Revenue per Client
₹ 1290.0

Active Reservations
0

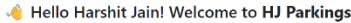
Total Reservations
12


Total Clients
1

Total Revenue
₹ 1290


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USER DASHBOARD







Parking Locations
Find parking and reserve a spot




My Reservations
Current and past bookings




Summary
Booking insights




View Profile
Edit your personal information



Logout
End your session



Your Profile



Profile Details

Email

23f3001028@dis.study.iitm.ac.in

Full Name

Harshit Jain

Address


H-3 / 325, Sector 16, Rohini

Pin Code


110089

Password


secret






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Active Parking Lots






Lot ID	Location	Address	Pincode	Available Spots	Price/hr	Action
3	cyberhub	gurgaon	110096	25	₹50	
4	JK center	Janakpuri	110048	18	₹35	


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Reservation History




Current Reservations


Reservation ID	Lot ID	Spot ID	Vehicle No	Parking Time	Action
9	3	52	RJ 2B CG 9583	15-06-2025 06:17 AM	

Past Reservations

Reservation ID	Lot ID	Spot ID	Vehicle No	Parking Time	Parked Out At	Total Cost
1	3	52	DL 8CBA 3547	13-06-2025 10:46 PM	14-06-2025 04:35 AM	₹300
2	2	16	RJ 7D 7658	14-06-2025 04:44 AM	14-06-2025 04:45 AM	₹50
3	2	17	DL 8CBA 3547	14-06-2025 04:45 AM	14-06-2025 04:45 AM	₹50
4	2	16	srdgwr1	14-06-2025 05:31 AM	14-06-2025 05:47 AM	₹50



User Summary Dashboard



Total Reservations
12

Active Reservations
0

Average Parking Duration
1.64 hrs

Average Money Spent
₹ 107.5

Total Revenue Paid
₹ 1290

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