

# Parking Lot Management System

## Overview

The Parking Lot Management System is a Java-based application that simulates a multi-floor parking lot with different types of vehicles. The system efficiently assigns parking spots, tracks parked vehicles, and allows users to remove or locate vehicles as needed.

## System Architecture

The system is structured using object-oriented programming (OOP) principles with key components:

### 1. Vehicle Class Hierarchy

- Vehicle (Abstract Class): Represents a generic vehicle with attributes like license plate and vehicle type.
- Bike, Car, Truck (Derived Classes): Each type has specific space requirements (e.g., a truck requires two parking spots).

### 2. Parking Structure

- ParkingSpot: Represents an individual parking space with attributes like spot number and occupancy status.
- ParkingFloor: Contains a list of parking spots and manages parking operations.
- ParkingLot: Manages multiple floors and oversees vehicle parking and retrieval.

## Functionality

### Parking a Vehicle

- The system assigns the first available spot based on the vehicle type.
- Trucks require two adjacent spots.
- If parking is successful, the system returns a success message.

## Removing a Vehicle

- The system locates and frees the parking spot occupied by a vehicle.
- Trucks free two spots upon removal.

## Finding a Vehicle

- Users can input a license plate number to retrieve the location of a parked vehicle.

## Displaying Available Spots

- The system provides an overview of free parking spots on each floor.

## Example Interaction

1. Park Vehicle
2. Remove Vehicle
3. Find Vehicle
4. Display Available Spots
5. Exit

Choose an option: 1

Enter Vehicle Type (BIKE/CAR/TRUCK): CAR

Enter License Plate: ABC123

Parking: Success

## Technologies Used

- Java (JDK 8 or later)
- Object-Oriented Design
- Command Line Interface (CLI)

## Future Enhancements

- Implementing a GUI-based interface.
- Adding a payment system.
- Introducing automatic number plate recognition (ANPR).

## Conclusion

The Parking Lot Management System efficiently manages multi-floor parking, ensuring vehicles are parked and retrieved seamlessly. The modular design allows for scalability and future improvements.

## Author

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