# What is a Parking Management System?

A Parking Management System is a software solution designed to manage and automate the processes involved in parking lot operations. Its primary goal is to efficiently manage parking space allocation, vehicle tracking, and fee calculation. Such a system helps optimize the use of available parking spaces and can be used in various settings like commercial parking lots, residential complexes, and public parking areas.

# Key Components and Features

## Vehicle Management:

Entry and Exit Tracking: Record when vehicles enter and leave the parking lot.

Ticket Management: Generate and manage tickets for vehicles.

## Parking Slot Management:

* Slot Allocation: Assign available parking slots to vehicles.
* Availability Tracking: Monitor which slots are occupied or free.
* Fee Calculation:

Time-Based Fees: Calculate parking fees based on the duration of stay.

Rate Management: Define and update parking rates (e.g., hourly, daily).

## Reporting and Analytics:

* Usage Reports: Generate reports on parking slot usage and revenue.
* Data Visualization: Visualize data for better decision-making.

# How the System Will Work

## Database Setup:

* Tables: Create tables to store information about parking slots, vehicles, and transactions.
* Schema: Design the schema to support operations like booking, checking availability, and generating reports.

## User Interaction:

* Vehicle Entry: When a vehicle enters, the system records the entry time, assigns a parking slot (if available), and generates a ticket.
* Vehicle Exit: When a vehicle exits, the system calculates the parking fee based on the time spent, updates the slot availability, and processes the payment.

## System Components:

### Database Connection: Connect to the MySQL database to perform CRUD (Create, Read, Update, Delete) operations.

### Core Classes:

* Vehicle: Represents the vehicle with attributes like license plate, vehicle type, and timestamps.
* ParkingSlot: Represents the parking slot with attributes like slot number and occupancy status.
* ParkingLot: Manages the overall parking lot, including slot allocation and fee calculation.

**Implementation Steps:**

* Setup Database: Define and create the database schema with tables for vehicles and parking slots.
* Develop Core Classes: Implement classes to represent vehicles and parking slots and manage interactions.
* Implement Business Logic: Write methods for allocating parking slots, calculating fees, and generating reports.
* Testing: Test the system thoroughly to ensure it handles various scenarios, such as full parking lots and different vehicle types.

### Example Workflow

* Vehicle Entry:

A vehicle arrives and enters the parking lot. The system assigns an available parking slot and records the entry time. A ticket is generated and given to the driver.

* Vehicle Parking:

The vehicle is parked in the assigned slot.

The slot status is updated to occupied.

* Vehicle Exit:

When the vehicle leaves, the system calculates the total time parked. The parking fee is calculated based on the time spent. The slot is marked as available again.

* Reporting:

The system can generate reports on the number of vehicles, revenue generated, and slot utilization.