PARKING MANAGEMENT SYSTEM

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Project Report: Parking Management System

1. Introduction

The **Parking Management System** is a software application designed to manage parking operations efficiently. This system allows users to add, remove, and search for vehicles in a parking lot. It provides real-time data about parking slots, vehicle types, and other important details such as parking fees and vehicle status. The project is implemented using Assembly Language, which provides low-level control over the system and enhances its performance.

Purpose of the System

The primary goal of this system is to provide a comprehensive solution to manage parking slots in a facility. It offers functionalities like:

- **Adding a New Vehicle** to the parking.
- **Removing a Vehicle** (vacating a slot) when the vehicle leaves.
- **Viewing Parking Slots** to check the current status of the parking lot.
- **Searching Vehicles** based on their number plate.
- **Viewing Parking Details**, which includes the total number of vehicles, available space, and total revenue.

By using this system, parking administrators can manage parking efficiently and ensure smooth operations.

2. System Features

Main Menu

The **Main Menu** presents various options for the user to interact with the system. The user can choose from the following options:

1. **Add New Vehicle**: Register a new vehicle in the parking system.
2. **Remove Vehicle (Vacate Slot)**: Remove a vehicle from the parking slot.
3. **View All Parking Slots**: Display the current status of all parking slots.
4. **Search Vehicle by Number**: Search for a vehicle using its number plate.
5. **View Rules & Regulations**: Display parking rules.
6. **View Parking Details**: Show detailed statistics about the parking lot such as the total number of vehicles, available slots, and revenue.
7. **Exit**: Exit the system.

Each option triggers specific functions that interact with the parking data, updating the information as required.

Add New Vehicle

The **Add Vehicle** feature allows users to input the vehicle's number plate, type, owner's name, contact information, and the parking fee. Based on the type of vehicle (Car, Bike, Rickshaw), a specific parking fee is assigned. The system then generates a parking ticket that includes:

- Vehicle Number
- Owner Name
- Slot Number
- Parking Fee
- Parking Status
- Contact Information

The system ensures that the details are stored and updated, maintaining an accurate record of each vehicle in the parking lot.

Remove Vehicle (Vacate Slot)

When a vehicle leaves the parking, the user can choose the **Remove Vehicle** option. This removes the vehicle from the system and frees up the parking slot. The vehicle is searched by its number plate, and if found, the slot is marked as available.

View All Parking Slots

This feature displays the details of all the parking slots, including the number plate, type of vehicle, owner's name, contact info, parking fee, and parking status for each vehicle. This gives the parking lot administrator an overview of the current parking status.

Search Vehicle by Number

Users can search for a vehicle by entering its **number plate**. The system will look for the vehicle in the database and display the details if it is found. If no vehicle is found with the entered number plate, an error message is shown.

View Rules & Regulations

This feature displays the rules and regulations of the parking lot. It may include guidelines such as:

- Parking fee structure.
- Maximum allowed parking time.
- Vehicle types allowed.

These rules are essential to ensure that all users follow the same guidelines when using the parking facility.

View Parking Details

The **View Parking Details** option provides the administrator with a summary of the current state of the parking lot. This includes:

- **Total number of vehicles** parked in the lot.
- **Total revenue generated** from parking fees.
- **Number of cars, bikes, and rickshaws** in the parking lot.
- **Available parking spaces**.

This data helps in monitoring parking capacity and calculating revenue generated by the facility.

3. System Implementation

Data Structures

The system uses several data structures to store and manage information:

1. **Number Plates**: Array to store vehicle number plates.
2. **Vehicle Types**: Array to store the type of vehicles (Car, Bike, Rickshaw).
3. **Parking Slot Numbers**: Array to store the assigned parking slot number for each vehicle.
4. **Owner Names**: Array to store the name of the vehicle owner.
5. **Contact Information**: Array to store the contact information of the vehicle owner.
6. **Parking Fees**: Array to store the parking fee for each vehicle based on its type.
7. **Vehicle Status**: Array to store the status of the vehicle (Parked or Not Parked).

These arrays allow the system to store up to 10 vehicles in the parking lot. Each array is linked to the vehicle's respective data, ensuring that all information is easily accessible and manageable.

Parking Fee Calculation

The system calculates the parking fee based on the type of vehicle:

- **Car**: 1000 units.
- **Bike**: 500 units.
- **Rickshaw**: 350 units.

This ensures that different vehicles are charged accordingly, and the revenue generated is calculated correctly.

Slot Assignment

Each vehicle is assigned a parking slot upon entry. The system assigns a slot based on the available space. The slot number is stored in the **Parking Slot Number** array.

User Interface

The system uses a text-based user interface (UI) where the user interacts by entering choices using the keyboard. The menu options are displayed with prompts, and the user's input is processed accordingly. The UI is simple and straightforward, making it easy for the parking administrator to manage parking efficiently.

4. Code Breakdown

Main Menu

The program starts by displaying a welcome message and the main menu with the options listed. The user selects an option by entering a number, and the program jumps to the corresponding procedure.

Adding a Vehicle

When the user selects the "Add New Vehicle" option, the system prompts for the vehicle's details, including number plate, vehicle type, owner's name, and contact info. The system assigns the parking fee based on the vehicle type and generates a ticket.

Removing a Vehicle

The system allows the removal of a vehicle by searching for it using its number plate. Once found, the vehicle's parking slot is vacated, and its details are erased from the system.

Searching a Vehicle

When the user wants to search for a vehicle, the system searches for it using the number plate. If the vehicle is found, its details are displayed.

View Parking Slots

This function displays the status of all the parking slots, including the vehicle details.

Viewing Parking Details

This function shows the total vehicles parked, the available slots, and the total revenue generated from parking fees.

5. Conclusion

The **Parking Management System** is an efficient tool for managing a parking facility. It handles vehicle registrations, parking fee calculation, slot assignment, and provides easy-to-understand reports for administrators. The system's design ensures that the operations are smooth and easy to manage. Using Assembly Language, the system is optimized for performance and can handle basic parking tasks effectively.

With features such as adding/removing vehicles, searching by number plate, and viewing detailed reports, this system is a comprehensive solution for parking management in a small to medium-sized parking facility.

In the future, this system can be extended to handle more complex parking operations, such as online payments and real-time parking slot availability updates.