Report

Vehicle Parking Management System

Project Id: P30

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Section: A1

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Problem Description:

The **Vehicle Parking Management System** is a simple software solution created using C programming language to help and manage parking areas in a more organized way. In real life, places like shopping malls, office buildings, airports and public parking areas usually handle vehicle entries and exits manually. This manual process can lead to confusions, mistakes in record-keeping or even unfair charge collection.

To solve these issues, this project is developed that allows vehicles to be parked in a systematic and digital manner. The system checks for available parking slots, registers each vehicle at the time of check-in and free the parking slot at the time of check-out. It will then calculate the parking charges based on the type of the vehicle for example a bike will have a lower charge than a car.

This program is using basic concepts of C programming like structures, conditionals and file handling. All the vehicle data, including vehicle type, entry and exit information and charges will be stored in files. This means the data is not lost even after the program is closed and it will be referred to later for tracking vehicle history or managing records.

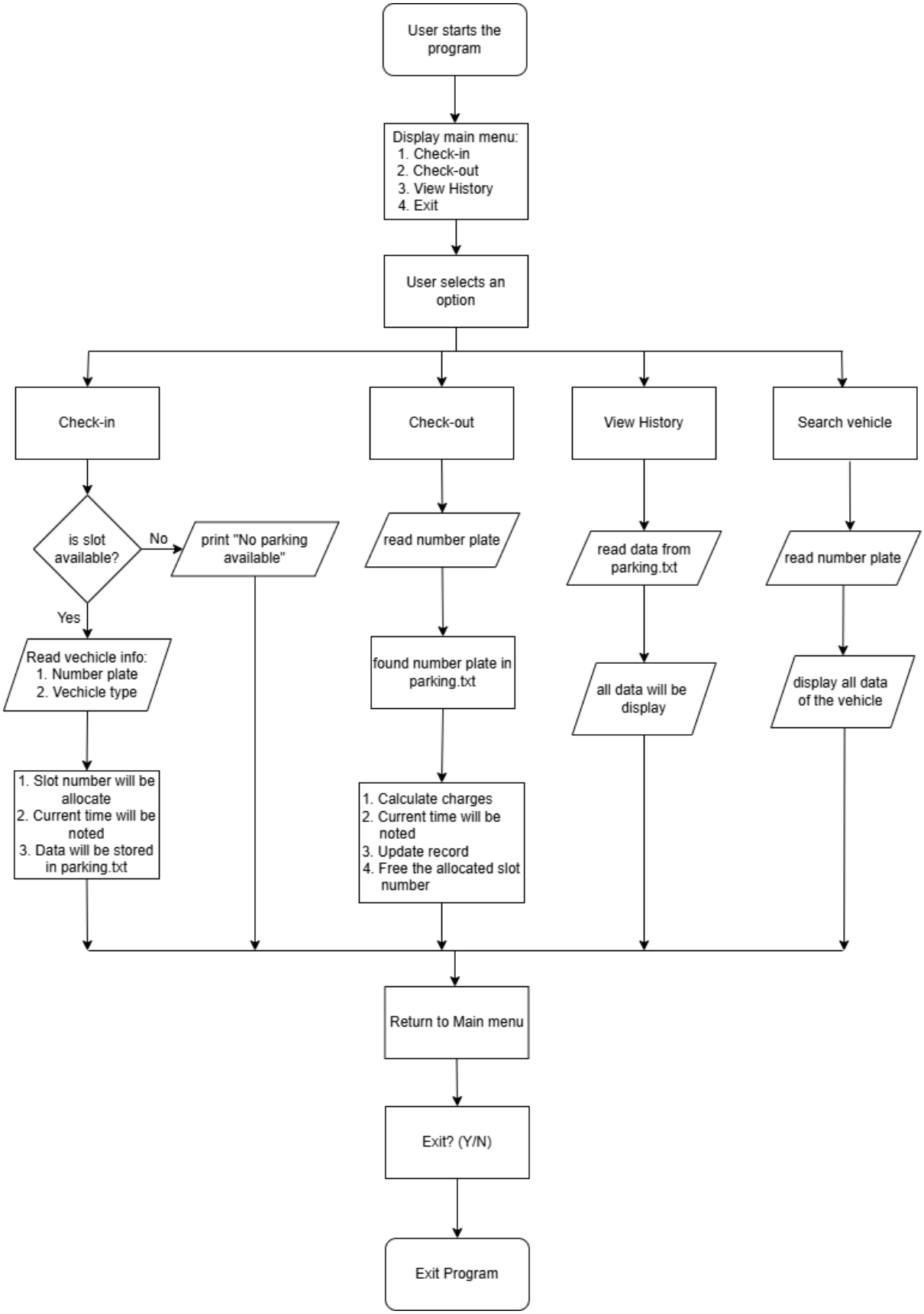
Unlike professional parking software used in smart cities, this system is a smaller version designed for educational purpose. It will help students understand how a real life system works and how programming can be used to solve daily life problems. Even though it is not connected to hardware like sensors or cameras, it still demonstrates the core logic behind digital parking systems.

In real life scenarios, such systems can save time, reduce manual errors and ensure fairness. It removes the dependency on handwritten slips and human memory. By charging based on the vehicle type, the system avoids confusion and speeds up the billing process. The user friendly program design makes it easier for parking staff to operate without any technical background.

This project is an example of how a simple C program can reflect a real world use case. It teaches students how to apply theoretical concepts of C in a practical and meaningful way. It also encourages logical thinking and better understanding of file handling which is an important part of real world software development.

Overall, the vehicle parking management system is not just a project! It is a step towards smart solutions for everyday challenges. It helps in building programming skills while also showing how software can be used to improve organizations and efficiency in real life.

Flow Diagram:



Modules for Project Implementation:

1. Vehicle Check-In & Slot Allocation Module

This module handles the entry of vehicles into the parking lot. It takes inputs like vehicle number, type (car, bike, etc.), and time of entry. Based on the vehicle type, it allocates an available parking slot. It ensures that slots are used efficiently and prevents overbooking. The module uses file handling to save each check-in record for future reference. It provides real-time feedback on available slots and confirms successful check-in. This feature ensures organized parking and helps track vehicle movements.

2. Vehicle Check-Out & Billing Module

This module facilitates vehicle check-out by matching the vehicle number to existing check-in records. It captures the check-out time and applies predefined rates to generate the final parking fee based on vehicle type. It updates the parking slot status to available after checkout. All transaction details are stored in files for recordkeeping. This module ensures fair billing, prevents unauthorized parking and maintains accurate logs for auditing and user transparency.

3. Parking Slot Management Module

This module tracks and manages the status of parking slots. It shows slot availability based on vehicle type and updates the status in real-time as vehicles check in or out. It uses file-based records to persistently track slot status even if the program restarts. The module ensures optimal use of parking space and allows users to view slot availability before entering. It is essential for efficient resource management and enhancing user experience.

4. Vehicle Search Module

This module allows users or admins to search for a vehicle using its number plate. It retrieves data like entry time, type and slot number from file records. This helps in quick location of vehicles, verification, or handling disputes. The search is optimized for speed and accuracy using structured file access. It supports both currently parked and historical vehicles, enhancing security and traceability within the system.

Platform Used:

➢ Visual Studio Code/ Code Blocks /Turbo C or any other platform.

Screenshots of Project Output:

```
PS C:\Users\Arin Ghanshala\OneDrive\Documents\VS_Code\Projects\Vehicle_parking_management_system> gcc system.c
PS C:\Users\Arin Ghanshala\OneDrive\Documents\VS_Code\Projects\Vehicle_parking_management_system> ./a.exe

************************************
* Vehicle Parking Management System  *
************************************

What do you want to do?:
1. Vehicle Check-in
2. Vehicle Check-out
3. View Parking History
4. Search Vehicle
5. Exit

Enter your choice: 1

Enter Plate Number: HP12AB1234
Enter Vehicle Type (car/bike/scooty): car

Check-in successful. Assigned Slot Number: 1

Press Enter to continue...
```

```
PS C:\Users\Arin Ghanshala\OneDrive\Documents\VS_Code\Projects\Vehicle_parking_management_system> gcc system.c
PS C:\Users\Arin Ghanshala\OneDrive\Documents\VS_Code\Projects\Vehicle_parking_management_system> ./a.exe

************************************
* Vehicle Parking Management System  *
************************************

What do you want to do?:
1. Vehicle Check-in
2. Vehicle Check-out
3. View Parking History
4. Search Vehicle
5. Exit

Enter your choice: 2
Enter Plate Number for Check-out: HP12AB1234
Parking charge: Rs. 30.00
Check-out successful

Press Enter to continue...
```

```
PS C:\Users\Arin Ghanshala\OneDrive\Documents\VS_Code\Projects\Vehicle_parking_management_system> gcc system.c
PS C:\Users\Arin Ghanshala\OneDrive\Documents\VS_Code\Projects\Vehicle_parking_management_system> ./a.exe

**********************************
* Vehicle Parking Management System  *
**********************************

What do you want to do?:
1. Vehicle Check-in
2. Vehicle Check-out
3. View Parking History
4. Search Vehicle
5. Exit

Enter your choice: 3

--- Parking History ---

Plate number : UP14T1234
Vehicle type : scooty
Slot number  : 1
Check-in     : 2025-05-15_17:07:57
Check-out    : 2025-05-24_18:44:14
Charge       : Rs. 20.00
---------------------------------
Plate number : UK07C1234
Vehicle type : car
Slot number  : 2
Check-in     : 2025-05-15_17:08:20
Check-out    : 2025-05-15_17:09:12
Charge       : Rs. 30.00
---------------------------------
Plate number : MP07C1234
Vehicle type : bike
Slot number  : 3
Check-in     : 2025-05-15_17:09:00
Check-out    : N/A
Charge       : Rs. 0.00
---------------------------------
```

```
PS C:\Users\Arin Ghanshala\OneDrive\Documents\VS_Code\Projects\Vehicle_parking_management_system> gcc system.c
PS C:\Users\Arin Ghanshala\OneDrive\Documents\VS_Code\Projects\Vehicle_parking_management_system> ./a.exe

**********************************
* Vehicle Parking Management System  *
**********************************

What do you want to do?:
1. Vehicle Check-in
2. Vehicle Check-out
3. View Parking History
4. Search Vehicle
5. Exit

Enter your choice: 4
Enter Plate Number to search: HP12AB1234

--- Vehicle Details ---

Plate number : HP12AB1234
Vehicle type : car
Slot number  : 1
Check-in     : 2025-05-25_18:19:44
Check-out    : 2025-05-25_18:21:33
Charge       : Rs. 30.00
---------------------------------

Press Enter to continue...
```

Conclusion and Future Scope:

The **Vehicle Parking Management System** is a basic yet useful project developed using the C programming language. It will help to manage parking areas in a smooth and organized way by keeping track of vehicle entries & exits and calculating parking charges based on vehicle type. With the help of file handling, it also stores parking history for future reference. This program plays an important role in reducing manual efforts, minimizing errors and saving time.

In a world where cities are getting more crowded and parking spaces are becoming limited, having a digital system like this can really make a difference. It provides a fair and fast process for managing different kinds of vehicles in places like malls, offices, airports and public areas. By using this system, we avoid confusions and bring more accuracy in handling parking data.

In the future, this project can be improved further by adding more features. For example, a graphical user interface(GUI) can be added to make it more user friendly. It can also be connected with sensors and IoT devices to detect the availability of slots automatically. Integrating with mobile applications or online booking systems can help users check and reserve slots in advance. The program can also be upgraded to support time based charging or monthly passes.

Overall, this project lays the foundation for building more advanced parking systems. It helps in understanding real life problems and shows how technology and programming can be used to solve them in a practical way.

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