East West University

Department of Computer Science and Engineering

Course Name: Structured Programming

Code: CSE103

Semester: Spring 2025

Project Name: Vehicle Management System (VMS)

Introduction

The Vehicle Management System (VHS) is an application developed and run on the terminal. It efficiently manages vehicle entry records in a large parking facility. This system provides a viable solution to effectively track vehicles in a large facility with functionalities such as registering new vehicles, removing existing ones, displaying all vehicles in the facility, searching for a particular vehicle and updating the entry times. This project uses fundamental C programming topics such as arrays, functions, conditionals and pointers to create a user-friendly interface.

Project Overview

The parking facilities require an organized system to track vehicles and manage their data. The main challenges include:

- ➔ Accurately inputting vehicles' information into the database (ID, type, entry, time)
- ➔ Efficiently retrieve vehicle data when required.
- ➔ Display a user-friendly interface where operators can input data efficiently.
- ➔ Ensure data is organized.

The Vehicle Management System aims to address these challenges by using a menu-type application that operates on the terminal.

Code Explanation

- 2D Arrays – A fundamental tool in C programming that allows users to store large amounts of similar type of data in a single variable of predetermined size.
    - o Array used: vehicles[Max_Vehicles][5] – stored all vehicle information:
        - ▪ Column 0 – Vehicle ID
        - ▪ Column 1 – Vehicle Type (Car, Bike, Truck)
        - ▪ Column 2 – Entry hour (1-12)
        - ▪ Column 3 – Entry minute (0-59)
        - ▪ Column 4 – AM/PM

- Functions – Functions are essential components in C programming that allows us to break large chunks of code into manageable portions that can interchangeably use and called upon when necessary. It allows us to code in a more organized way.
    - o Functions and their Purposes:

Function	Purpose	Pointer Usage
Welcome_Message()	Display the Welcome screen with project information and features	None
Starting_System()	Provide visual feedback during system initialization	None
menu()	Shows the main menu and accepts user menu choice input	None
head_Message(int *choice_pointer)	Displays appropriate menu according to user menu choice	Pointer used to access user choice of menu
Register_Vehicles()	Handles registration of new vehicles	None
is_Valid_Time(int *entry_hour, int *entry_min)	Verify if entry_hour and entry_min fall within the requirements	Pointers used to verify if entry_hour and entry_min falls within the requirements
Display_All_Vehicles()	Displays all vehicles that were pre-registered	None
Remove_Vehicle()	Removes an existing vehicle that the user wants	None

Search_Vehicle()	Search for a specific vehicle that the user wants	None
Update_Time()	Update the entry time of a specified vehicle	None
continue_exit(int *continue_terminate)	Handles program flow (return to menu or exit)	Pointer used to determine program flow

- Key Programming Concepts Used:
    - Arrays – Store data in an organized form; the data are of the same type.
    - Functions – Allow a more organized form of coding as large chunks of code can be divided into manageable portions.
    - Pointers – Enable direct modifications of variables in functions.
    - Loops – Necessary for iterations of menu selection, program design, and record searching.
    - Conditional Statements – Handle decision-making in the program.

Solutions

- System Designed
    - Used multiple functions to effectively organize the system.
    - Used a 2D array as the central database.
    - Created a menu-driven interface for easy navigation.
- Data Management
    - Used a 2D array to store input data from user.
    - Implemented validation to ensure data integrity.
- User Interface Design
    - Designed using borders and symbols for better readability and visuals.

- Implemented clear menu keywords with instructions.
- Added error messages to preserve data integrity.

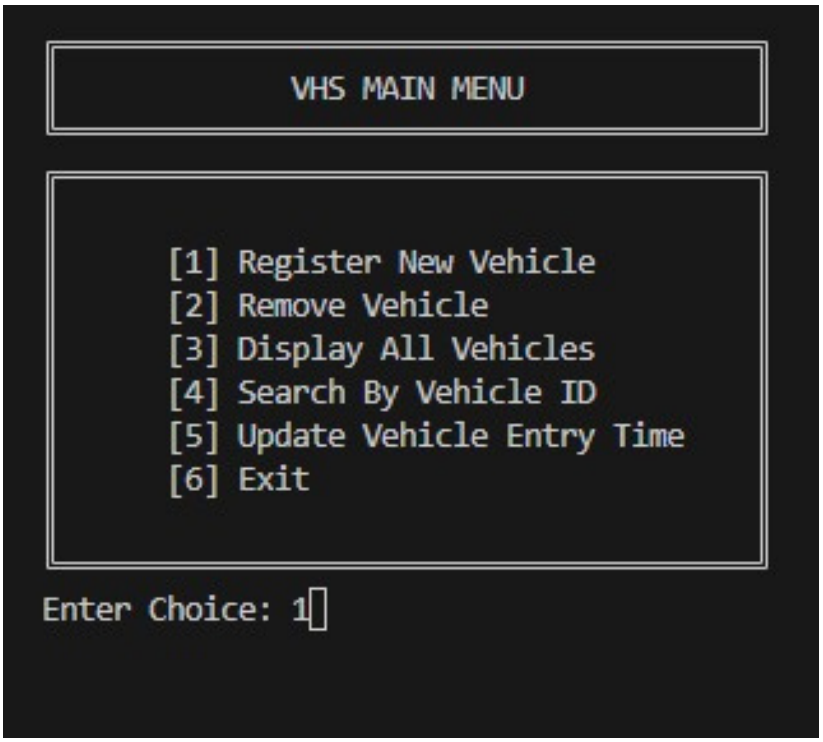
- Optimization

  - Utilized pointers to directly modify variables inside functions.
  - Implement array shifting for data deletion.

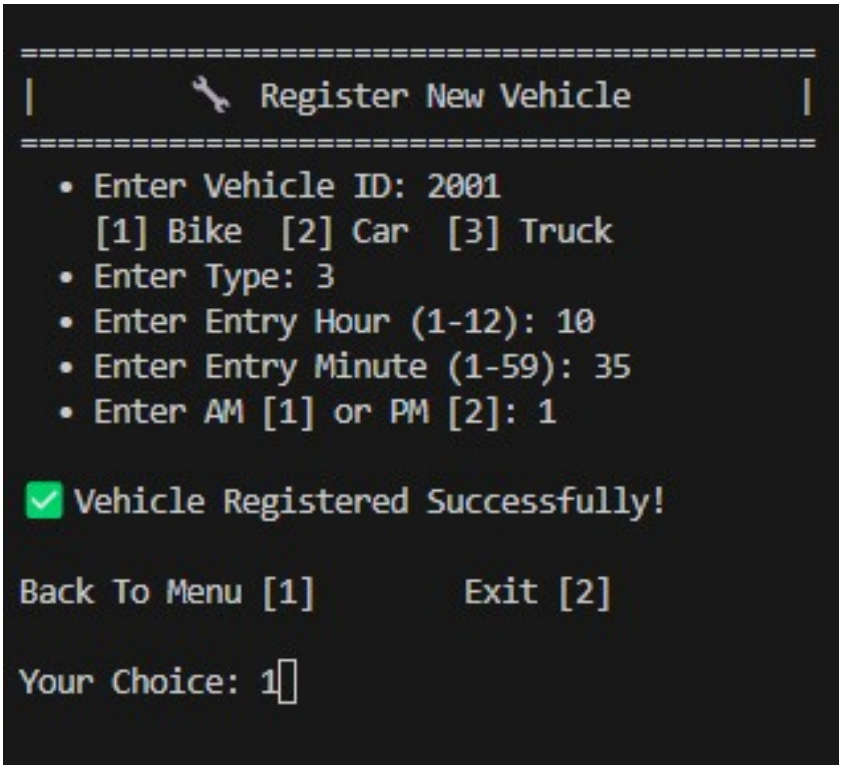
Sample Input Output (Screenshots)

- Welcome Message

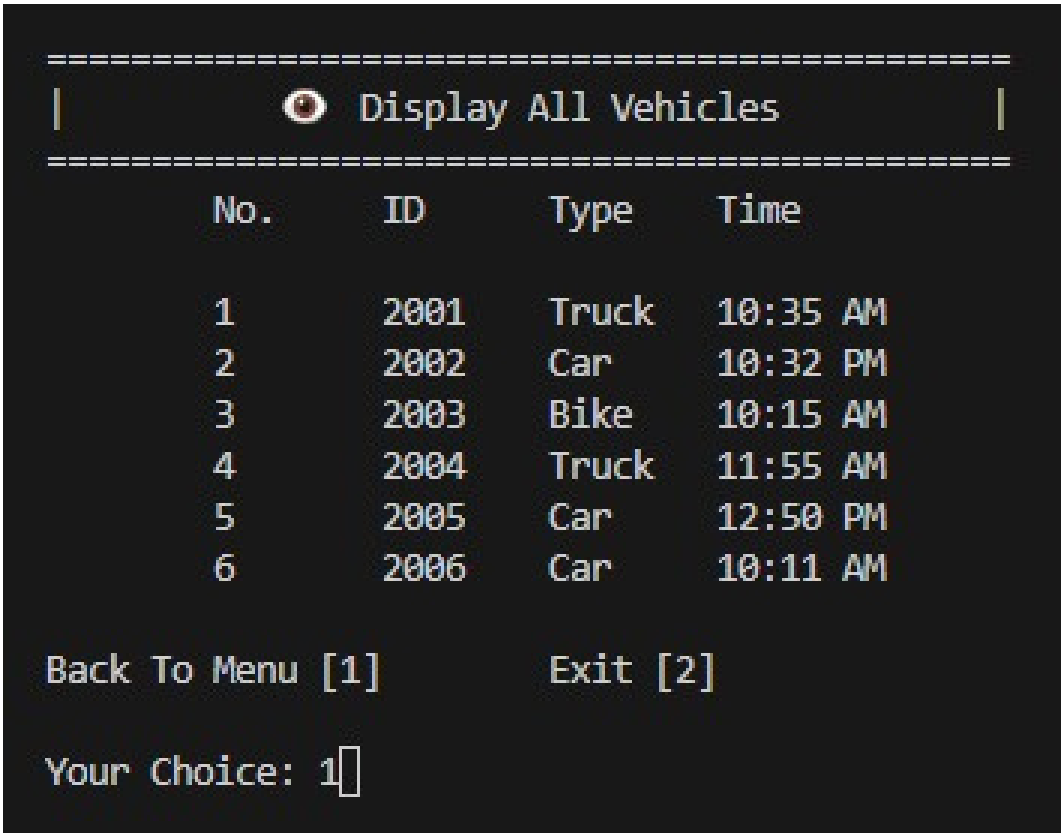
- Main Menu



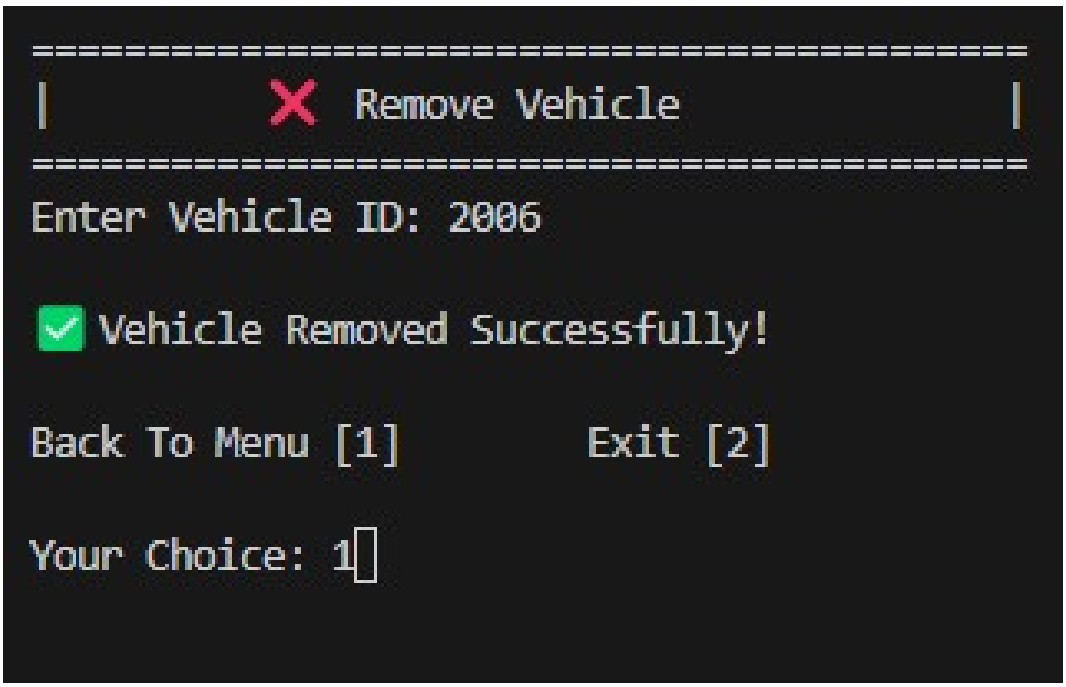
- Register New Vehicle



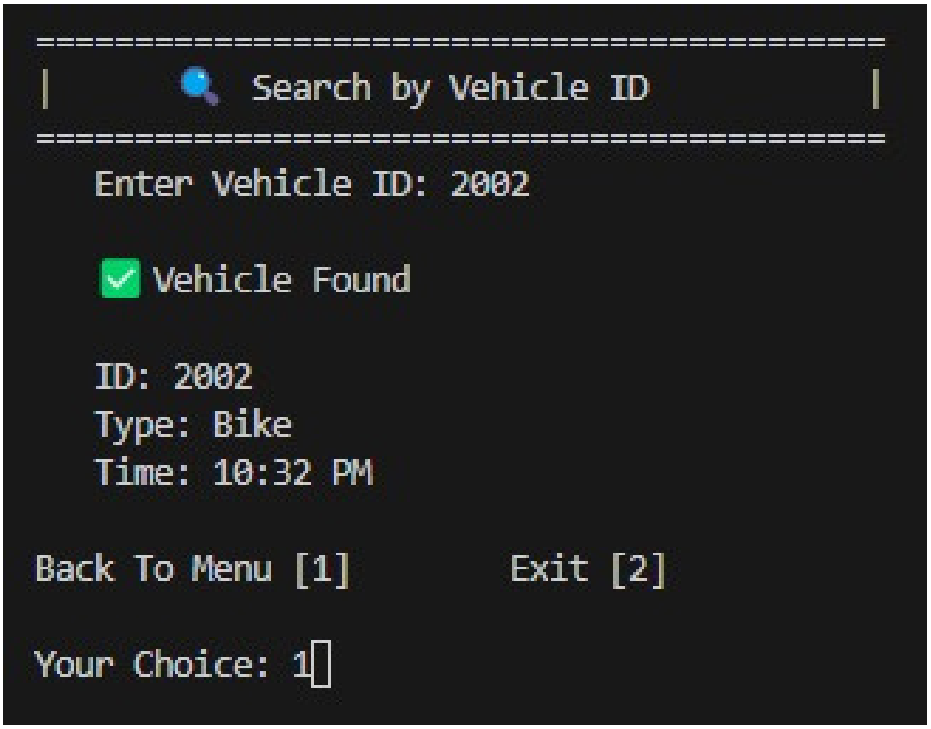
- Display All Vehicles



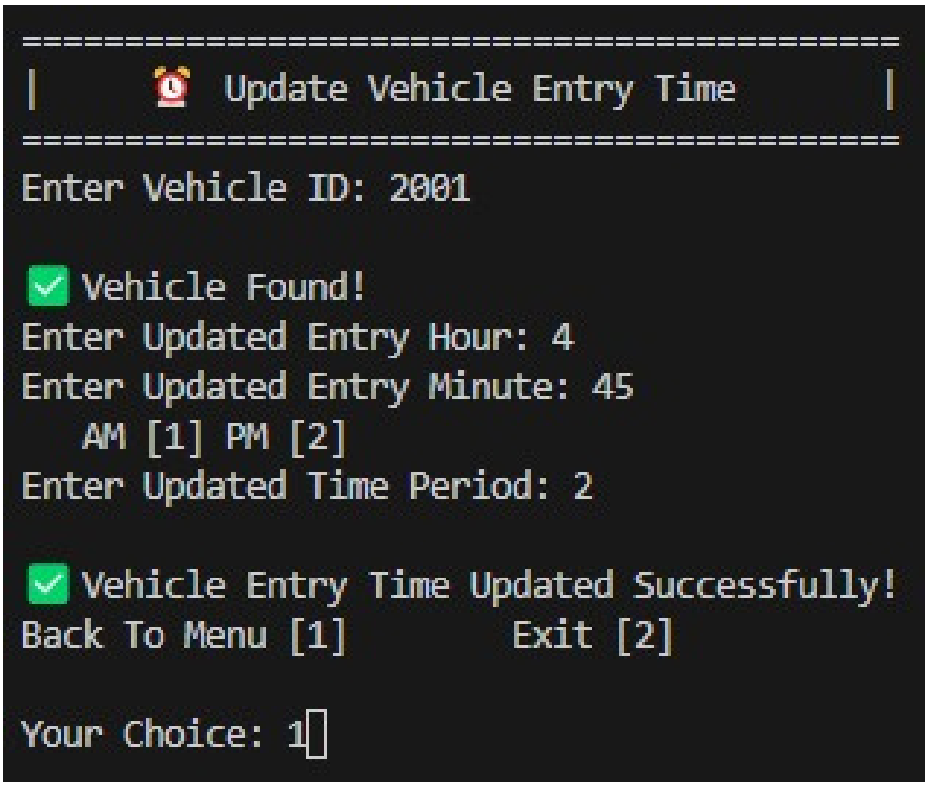
- Remove a Vehicle



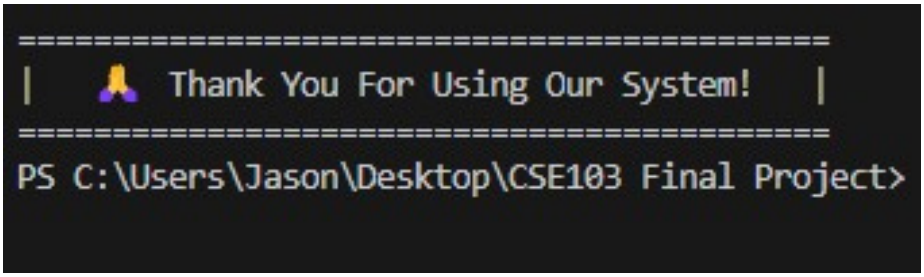
- Search a Vehicle



- Update Entry Time



- Exit



Conclusion

The development of this Vehicle Management System (VHS) has been an eye-opener as it allows us to dive deep into key C programming concepts and use them to solve real-world problems. This project successfully fulfilled the requirements provided and will be able to efficiently input vehicle data and record it. This project demonstrates how core programming concepts in C can be applied to create practical applications that solve everyday organizational challenges.