Report

Car Rental Management System: Implement a C program for a car rental service that keeps track of available cars, rental records, and customer details. Users should be able to rent or return cars, check availability, and generate invoices. The file-based storage should maintain rental history.

Project Id:47

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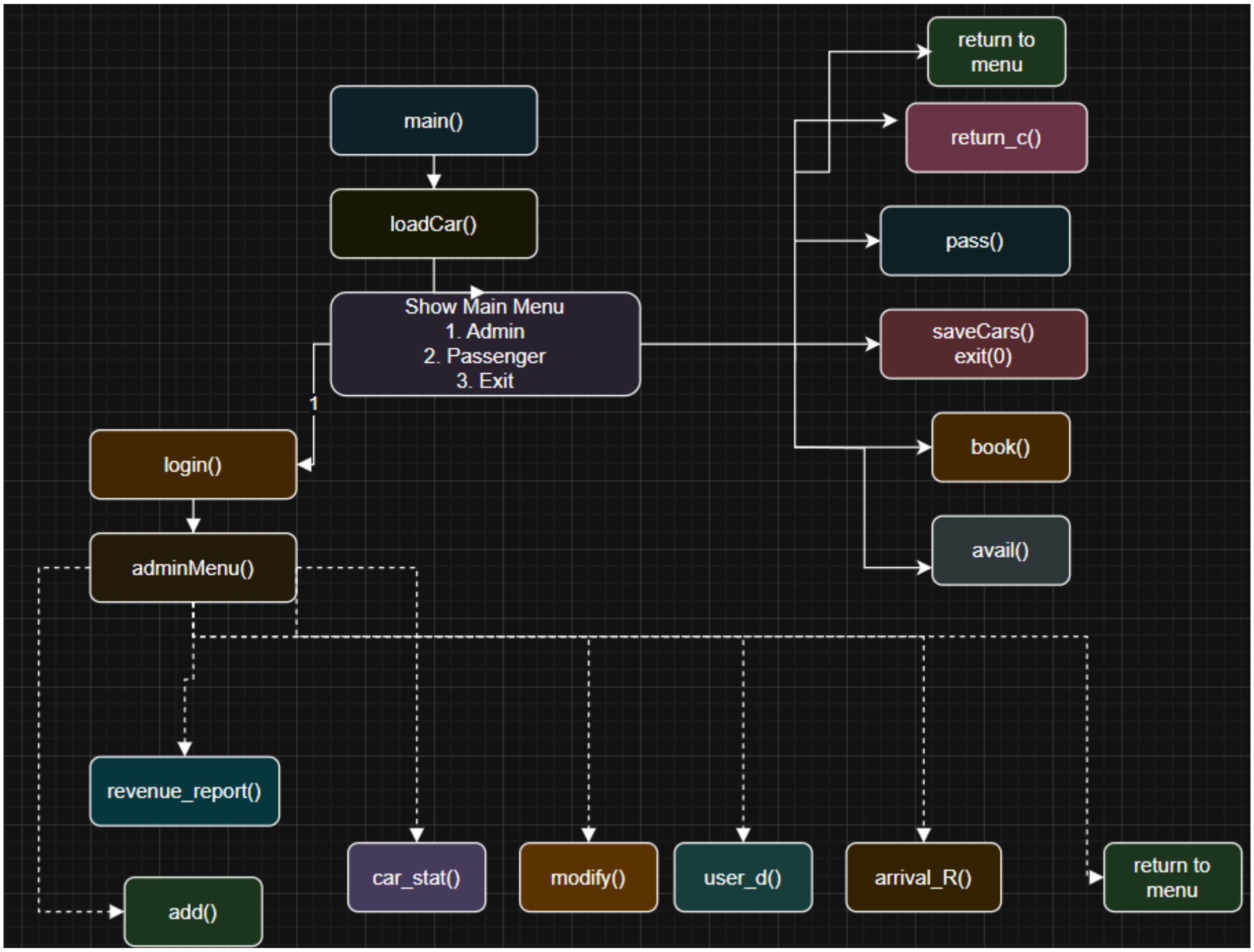
Section:C-2

- Problem Description:

Car Rental Management System is a program/code to streamline the operations of car rental services. In real life, this system plays a crucial role in automating the process of managing car rentals, handling customer details, and maintaining an organized record of available cars. It allows users to check the availability of vehicles, rent cars, return them, and generate invoices for the rentals. This system keeps track of rental history, ensuring that the rental business has an accurate record of past transactions, which can be important for auditing, customer service, and maintaining inventory. By storing car rental data in files, the system ensures that the history is preserved even after the program ends or the system restarts. In practical terms, the Car Rental Management System ensures that: -->User can easily rent or return cars, knowing the status of available vehicles and also can manage car availability, view rental records, and generate invoices -->The business can track rental trends, vehicle usage, and revenue efficiently. This system improves the efficiency of a car rental service, reduces human error, and enhances customer satisfaction, which ultimately leads to better management and business growth.

Flow-Diagram :



Module Description

The Car Rental System project is implemented as a modular C program, with each module (function) responsible for a specific aspect of the system. Below is an overview of the main modules, as referenced in the header section of the code.

1. Header Files and Constants

- Header files included:

- `<stdio.h>`: Standard Input/Output operations.
- `<stdlib.h>`: Standard library functions, memory allocation, process control.
- `<string.h>`: String handling functions.
- `<conio.h>`: Console input/output (for functions like `getch()`).
- `<time.h>`: Date and time functions.
- `"functions.h"`: Custom header file containing function prototypes and data structures for the project.

- Constant arrays:

- `companies[]`: List of car companies.
- `tataCars[]`, `hondaCars[]`, `hyundaiCars[]`, `kiaCars[]`, `marutiCars[]`: Arrays of car models for each company.

- Admin credentials:

- `ADMIN_NAME`, `ADMIN_PASS`: Hard-coded admin username and password.

2. Global Variables

- static Car cars[MAX_CARS];`: Array to store car records.

- static int carCount;`: Tracks the number of cars loaded/stored.

3. Utility Functions

- clearScreen()`: Clears the console window for a clean user interface.

- flushInput()`: Clears stray characters from the input buffer.

- getStringInput(prompt, buffer, size)`: Prompts the user for input, stores result in buffer, and removes newlines.

4. File Handling Functions

- saveUserDetails(name, phone, aadhar)`: Appends user details to a file.

- loadCar()`: Loads car records from the file into the cars array.

- saveCars()`: Saves all car records back to the file (overwrites).

- saveNewCar(newCar)`: Appends a new car record to the file.

5. Date and Validation Functions

- isLeap(year)`: Checks if a year is a leap year.

- getMonthDays(month, year)`: Returns the number of days in a given month (handles leap years).

- isDateInRange(d, start, end)`: Checks if a given date is within a specified range.

6. Admin Functions

- login(): Handles admin authentication.

- adminMenu()`: Displays the admin menu and routes to admin functionalities.

- add()`: Allows admin to add a new car to the system.

- revenue_report()`: Generates and displays the revenue report for a given period.

- modify()`: Allows admin to modify or (optionally) delete car records.

- car_stat()`: Displays the status of all cars, including booking information.

- user_d()`: Searches and displays user details by phone number.

- arrival_R()`: Shows the arrival/return status of all bookings.

7. Passenger/User Functions

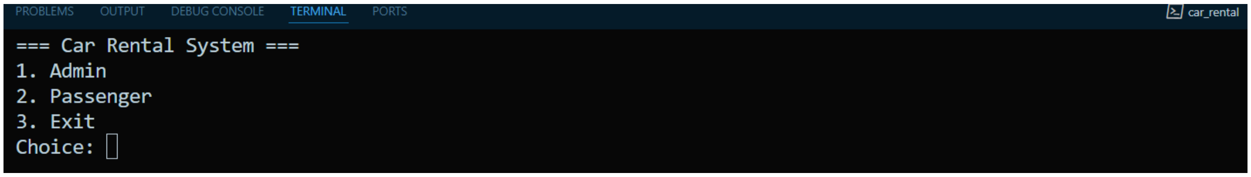
- pass(): Displays the passenger menu and routes to booking, returning, and checking availability.
- book(): Allows a user to book a car, inputting all required details.
- return_c(): Handles the process of returning a car and updating the booking record.
- avail(): Lists all cars currently available for booking.

Each of these modules supports a specific feature of the Car Rental System, making the project organized, maintainable, and easy to extend. The modular approach ensures clear separation of concerns, with file operations, user interfaces, business logic, and data validation all handled in their respective sections.

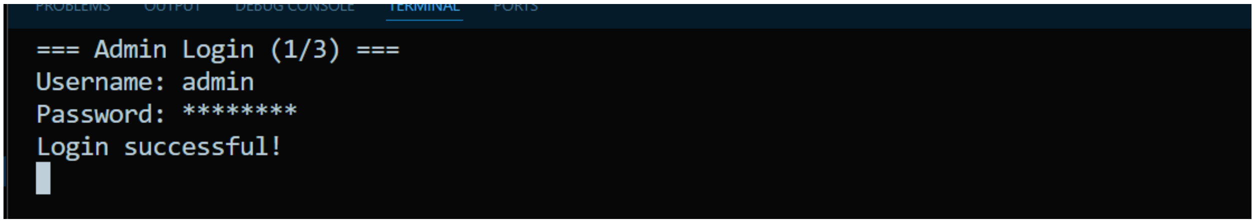
Platform used :

visual studio code (version 1.86)

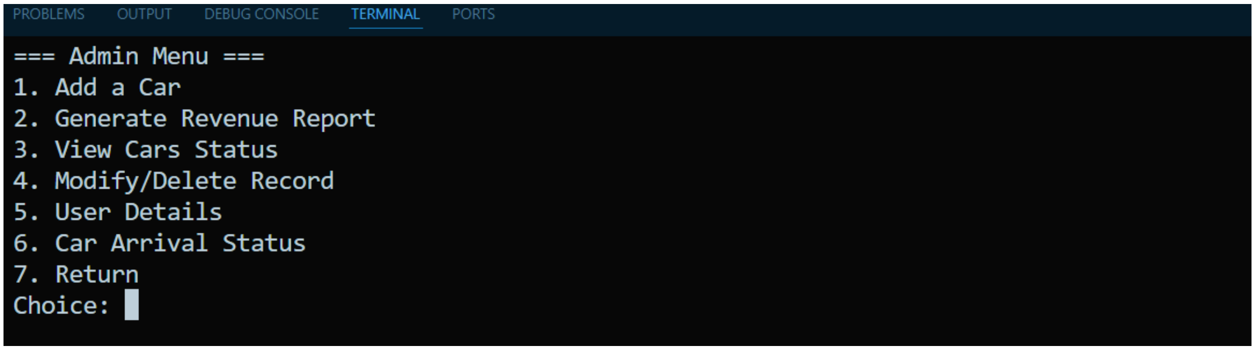
Output



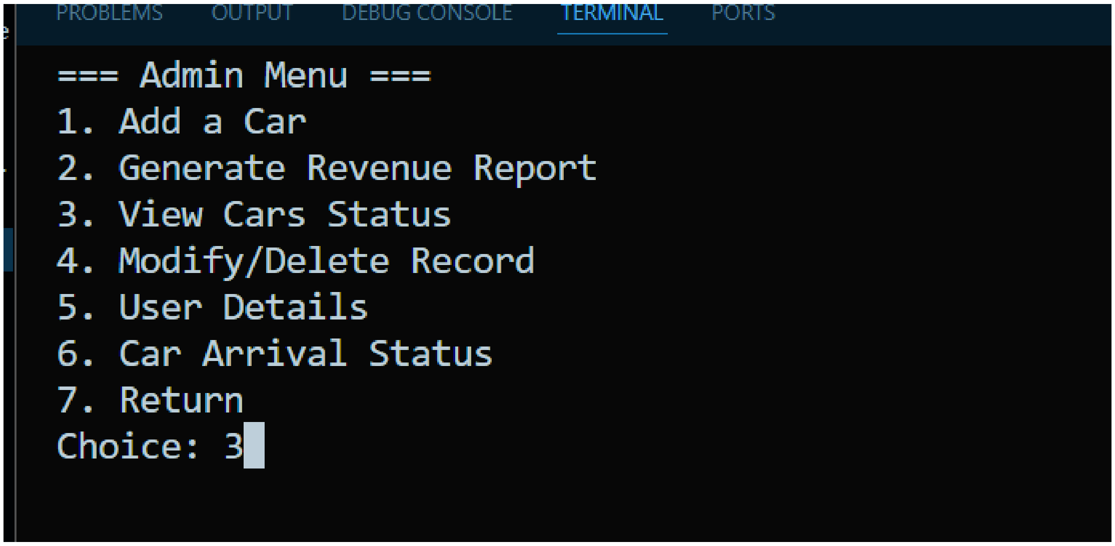
```
=== Car Rental System ===
1. Admin
2. Passenger
3. Exit
Choice:
```



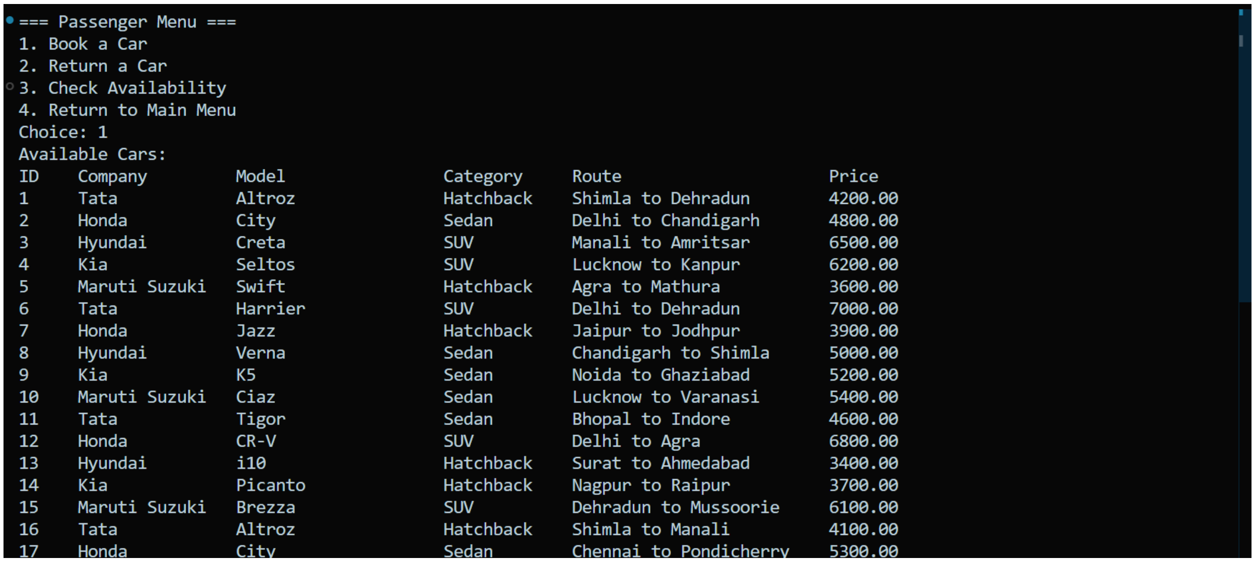
```
=== Admin Login (1/3) ===
Username: admin
Password: ********
Login successful!
```



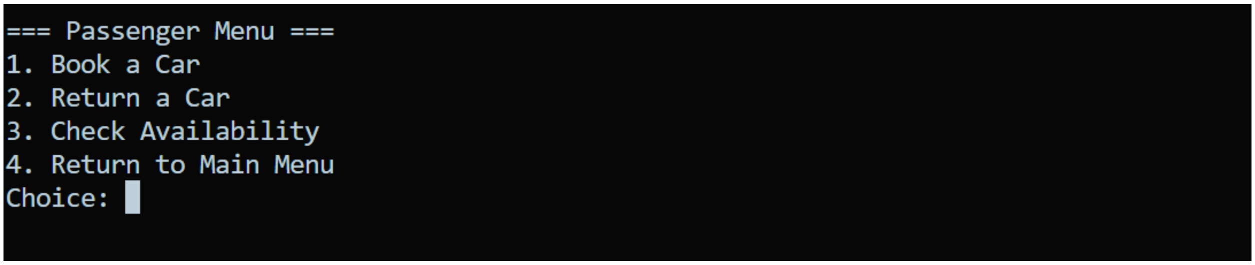
```
=== Admin Menu ===
1. Add a Car
2. Generate Revenue Report
3. View Cars Status
4. Modify/Delete Record
5. User Details
6. Car Arrival Status
7. Return
Choice:
```



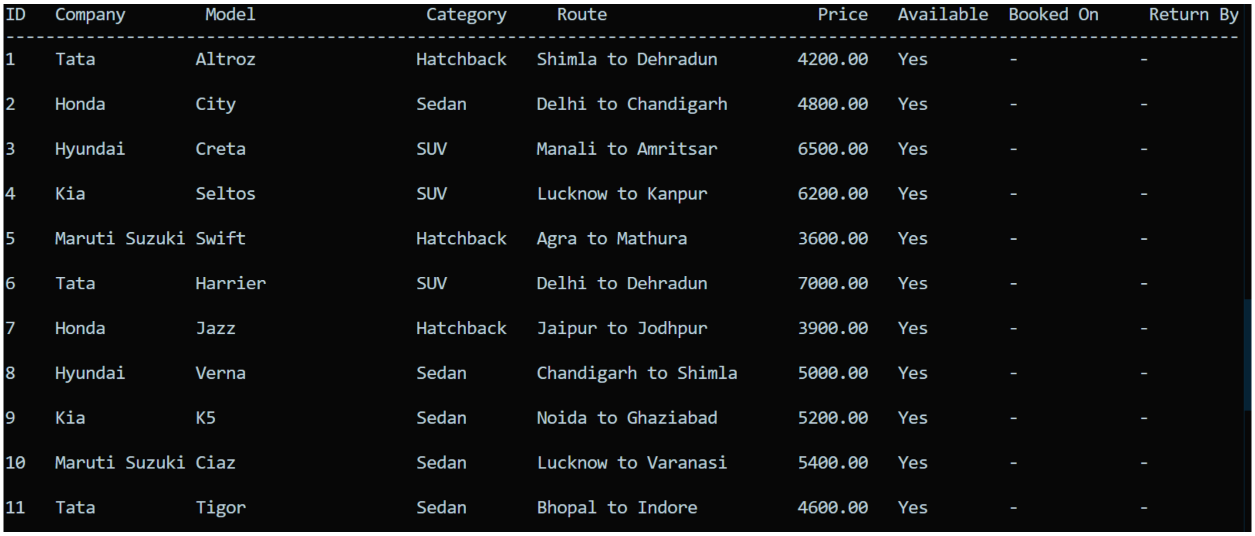
```
=== Admin Menu ===
1. Add a Car
2. Generate Revenue Report
3. View Cars Status
4. Modify/Delete Record
5. User Details
6. Car Arrival Status
7. Return
Choice: 3
```



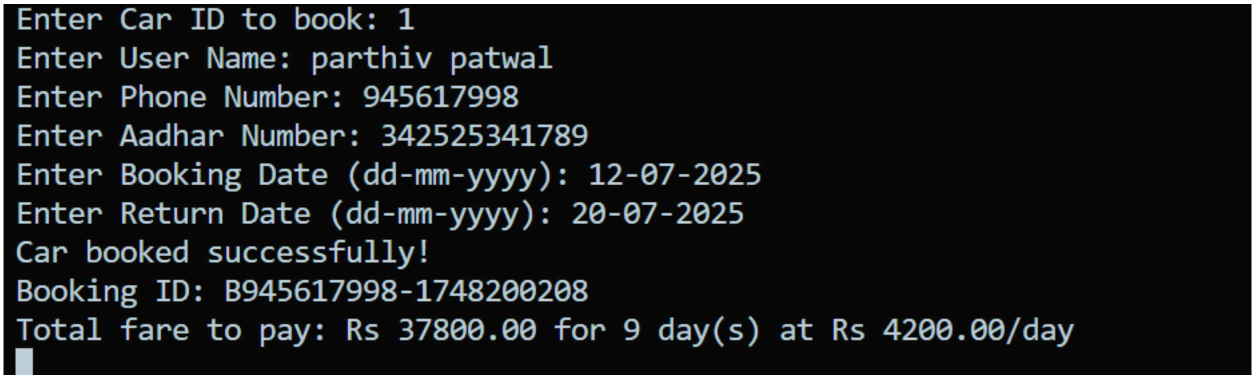
```
=== Passenger Menu ===
1. Book a Car
2. Return a Car
3. Check Availability
4. Return to Main Menu
Choice: 1
Available Cars:
ID   Company        Model              Category    Route                    Price
1    Tata           Altroz             Hatchback   Shimla to Dehradun       4200.00
2    Honda          City               Sedan       Delhi to Chandigarh      4800.00
3    Hyundai        Creta              SUV         Manali to Amritsar       6500.00
4    Kia            Seltos             SUV         Lucknow to Kanpur        6200.00
5    Maruti Suzuki  Swift              Hatchback   Agra to Mathura          3600.00
6    Tata           Harrier            SUV         Delhi to Dehradun        7000.00
7    Honda          Jazz               Hatchback   Jaipur to Jodhpur        3900.00
8    Hyundai        Verna              Sedan       Chandigarh to Shimla     5000.00
9    Kia            K5                 Sedan       Noida to Ghaziabad       5200.00
10   Maruti Suzuki  Ciaz               Sedan       Lucknow to Varanasi      5400.00
11   Tata           Tigor              Sedan       Bhopal to Indore         4600.00
12   Honda          CR-V               SUV         Delhi to Agra            6800.00
13   Hyundai        i10                Hatchback   Surat to Ahmedabad       3400.00
14   Kia            Picanto            Hatchback   Nagpur to Raipur         3700.00
15   Maruti Suzuki  Brezza             SUV         Dehradun to Mussoorie    6100.00
16   Tata           Altroz             Hatchback   Shimla to Manali         4100.00
17   Honda          City               Sedan       Chennai to Pondicherry   5300.00
```



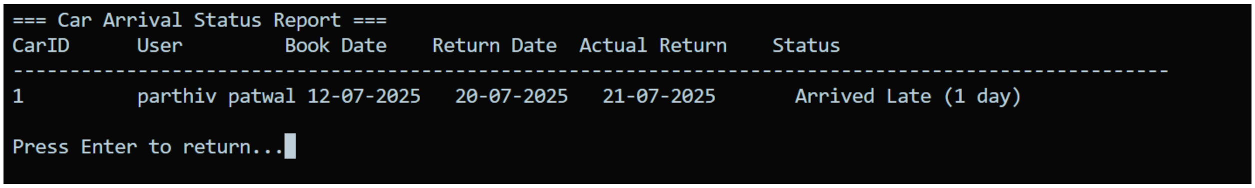
```
=== Passenger Menu ===
1. Book a Car
2. Return a Car
3. Check Availability
4. Return to Main Menu
Choice: 
```



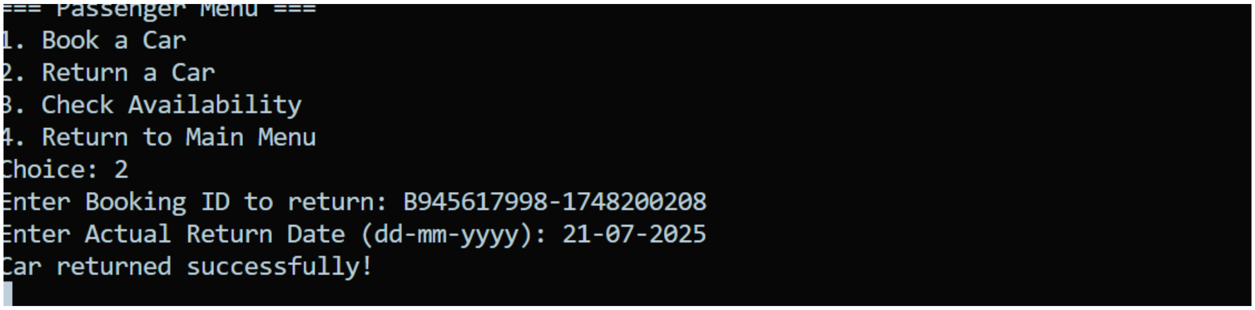
```
ID  Company        Model                Category    Route                 Price    Available  Booked On     Return By
--------------------------------------------------------------------------------------------------------------------
1   Tata           Altroz               Hatchback   Shimla to Dehradun    4200.00   Yes        -             -

2   Honda          City                 Sedan       Delhi to Chandigarh   4800.00   Yes        -             -

3   Hyundai        Creta                SUV         Manali to Amritsar    6500.00   Yes        -             -

4   Kia            Seltos               SUV         Lucknow to Kanpur     6200.00   Yes        -             -

5   Maruti Suzuki  Swift                Hatchback   Agra to Mathura       3600.00   Yes        -             -

6   Tata           Harrier              SUV         Delhi to Dehradun     7000.00   Yes        -             -

7   Honda          Jazz                 Hatchback   Jaipur to Jodhpur     3900.00   Yes        -             -

8   Hyundai        Verna                Sedan       Chandigarh to Shimla  5000.00   Yes        -             -

9   Kia            K5                   Sedan       Noida to Ghaziabad    5200.00   Yes        -             -

10  Maruti Suzuki  Ciaz                 Sedan       Lucknow to Varanasi   5400.00   Yes        -             -

11  Tata           Tigor                Sedan       Bhopal to Indore      4600.00   Yes        -             -
```



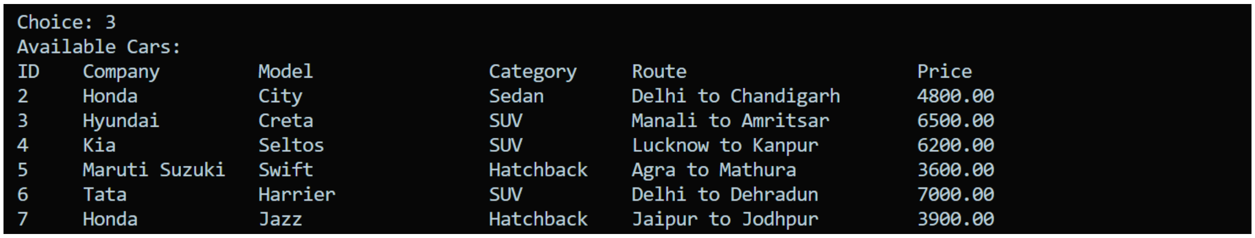
```
Enter Car ID to book: 1
Enter User Name: parthiv patwal
Enter Phone Number: 945617998
Enter Aadhar Number: 342525341789
Enter Booking Date (dd-mm-yyyy): 12-07-2025
Enter Return Date (dd-mm-yyyy): 20-07-2025
Car booked successfully!
Booking ID: B945617998-1748200208
Total fare to pay: Rs 37800.00 for 9 day(s) at Rs 4200.00/day
```



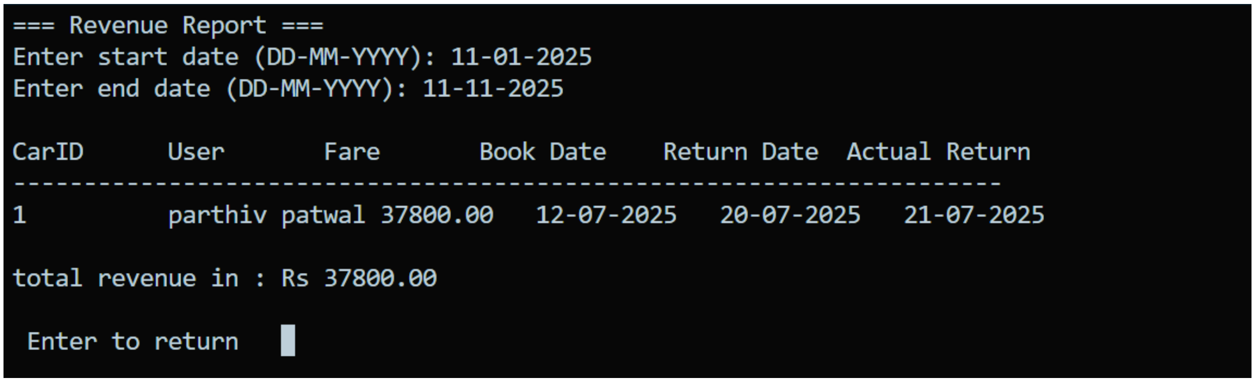
```
=== Car Arrival Status Report ===
CarID      User          Book Date     Return Date  Actual Return     Status
-----------------------------------------------------------------------------------------------------
1          parthiv patwal 12-07-2025   20-07-2025   21-07-2025       Arrived Late (1 day)

Press Enter to return...
```



```
=== Passenger Menu ===
1. Book a Car
2. Return a Car
3. Check Availability
4. Return to Main Menu
Choice: 2
Enter Booking ID to return: B945617998-1748200208
Enter Actual Return Date (dd-mm-yyyy): 21-07-2025
Car returned successfully!
```



```
Choice: 3
Available Cars:
ID     Company         Model                Category     Route                    Price
2      Honda           City                 Sedan        Delhi to Chandigarh      4800.00
3      Hyundai         Creta                SUV          Manali to Amritsar       6500.00
4      Kia             Seltos               SUV          Lucknow to Kanpur        6200.00
5      Maruti Suzuki   Swift                Hatchback    Agra to Mathura          3600.00
6      Tata            Harrier              SUV          Delhi to Dehradun        7000.00
7      Honda           Jazz                 Hatchback    Jaipur to Jodhpur        3900.00
```



```
=== Revenue Report ===
Enter start date (DD-MM-YYYY): 11-01-2025
Enter end date (DD-MM-YYYY): 11-11-2025

CarID      User        Fare        Book Date     Return Date  Actual Return
---------------------------------------------------------------------
1          parthiv patwal 37800.00   12-07-2025   20-07-2025   21-07-2025

total revenue in : Rs 37800.00

 Enter to return
```

Conclusion and Future Scope

Conclusion

The Car Rental System project demonstrates how modular C programming and file-based data management can be effectively combined to create a functional, menu-driven application for real-world use. The system enables both administrators and users to efficiently manage car bookings, returns, availability checks, and revenue reporting. With features like secure admin login, structured car and user data storage, and clear separation between user and admin functionalities, the project serves as a solid foundation for small-scale rental operations. Its modular design ensures scalability and maintainability, making it easier to add new features or modify existing ones.

Future Scope

While the current implementation fulfills basic requirements, there is significant scope for future development:

- **Database Integration:** Migrating from file-based storage to a robust database (such as MySQL or SQLite) for enhanced data security, integrity, and scalability.

- **Graphical User Interface (GUI):** Developing a GUI for better usability, possibly using frameworks like Qt or JavaFX, or moving to a web-based or mobile application.

- **Online Booking and Payment:** Enabling users to book cars and pay online, integrating with payment gateways.

- **Real-time Availability:** Implementing real-time car availability status using networked solutions and handling concurrent bookings.

- **GPS Tracking:** Integrating GPS tracking for fleet management and real-time location updates.

- **Cloud Deployment: Deploying the system on the cloud for high availability and remote access.

By implementing these features, the Car Rental System can evolve into a fully-fledged, enterprise-level solution capable of serving a larger customer base and adapting to new business requirements and technological trends.

Reference

1. **Book** : Reeema Thareja
2. **Online** : https://youtu.be/irqbmMNs2Bo?si=xKfbk8UgtQ_BfyiQ
3. **Online** : https://youtu.be/lYrli0EwTKw?si=2NfsxbQRUaREbyF5