VARDHAMAN
COLLEGE OF ENGINEERING

Team ID-2025-26/VCE/CSE/A/01

CAR RENTAL MANAGEMENT SYSTEM

Programming for Problem Solving Laboratory

Subject Code: A9502

Course End Project

CERTIFICATE OF COMPLETION

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This is to certify that the Course End Project titled "**Car Rental Management System**" is carried out by Mr.Prashanth, Roll Number 25881A05DL towards **A9502 – Programming for Problem Solving Laboratory** course and submitted to Department of Computer Science and Engineering, in partial fulfilment of the requirements for the award of degree of Bachelor of Technology in Department of Computer Science and Engineering during the Academic year 2025-26.

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Our Team

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Introduction

Car rental systems are critical for modern transportation businesses requiring efficient vehicle inventory management, customer booking processing, and revenue optimization through dynamic pricing. Traditional manual systems suffer from data loss, booking conflicts, and pricing inconsistencies. This project addresses these challenges through a robust C-based solution leveraging structures for entity modeling, unions for flexible rental plans, and file operations for data persistence.

Objectives

- Implement structures for comprehensive vehicle and customer data management.
- Utilize unions for memory-efficient storage of diverse rental plan configurations.
- Develop core functions for booking creation, vehicle return processing, and auto mated billing. • Ensure data persistence through robust file handling operations. • Calculate dynamic rental charges based on vehicle type, rental duration, and plan discounts

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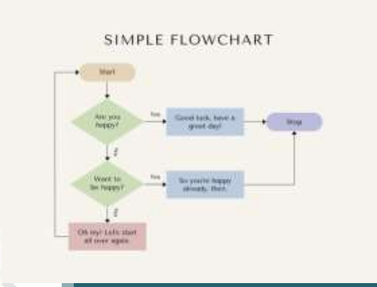
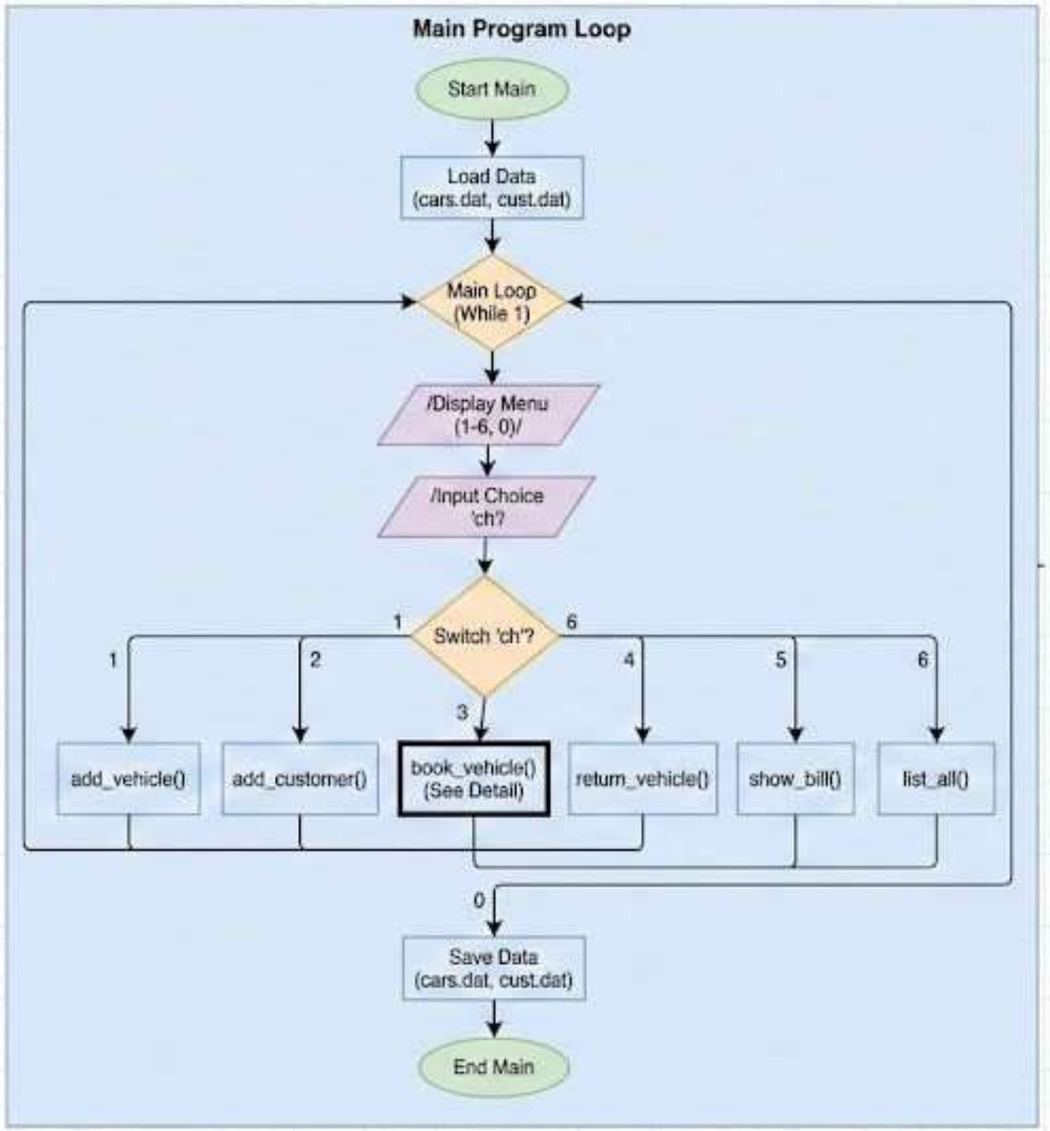
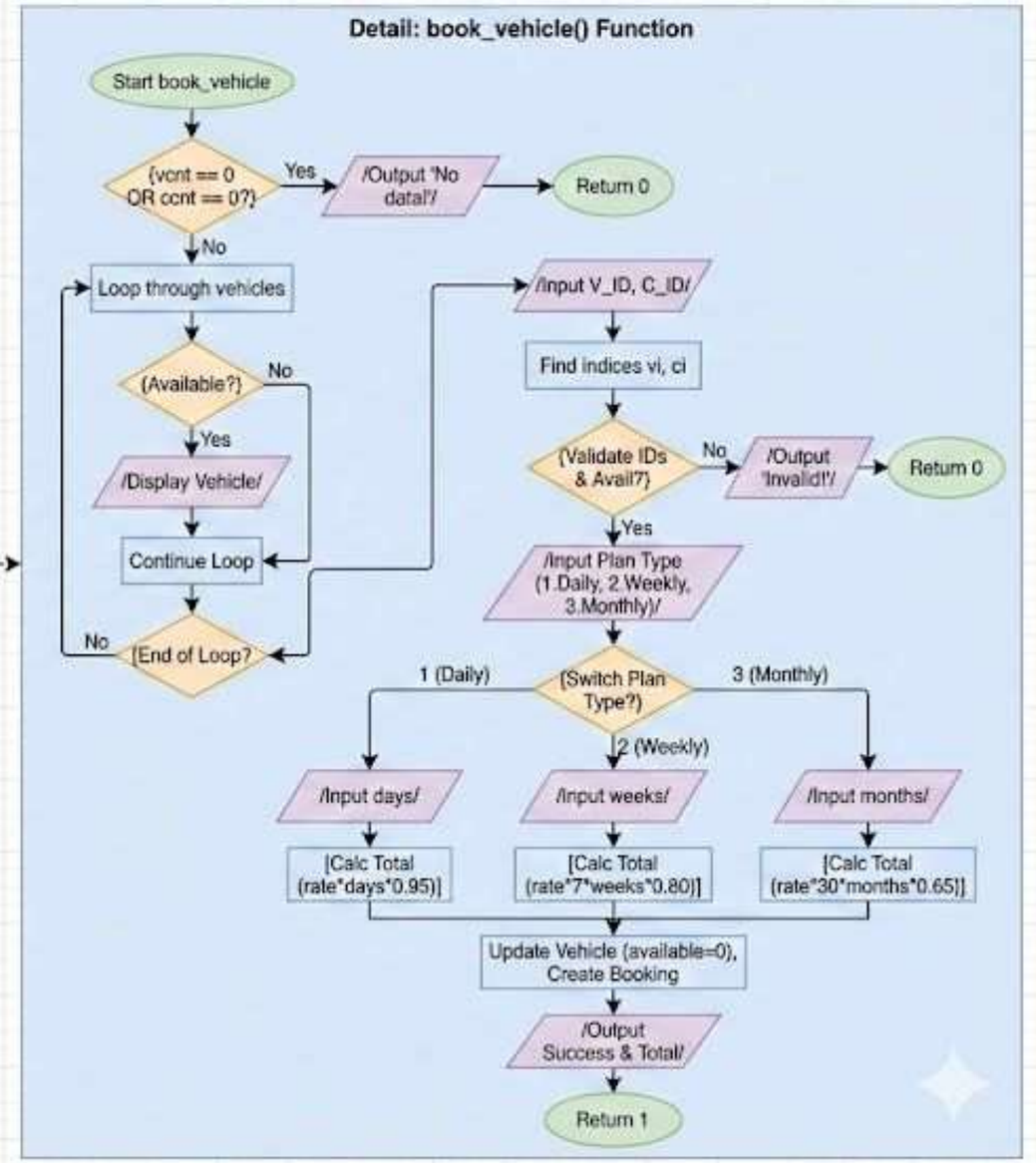
Flowchart







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Code

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

#define MAX_VEH 50
#define MAX_CUST 50
#define MAX_BOOK 100

// Vehicle Structure
typedef struct {
    int id;
    char model[30];
    float rate;
    int available;
} Vehicle;

// Customer Structure
typedef struct {
    int id;
    char name[50];
    char phone[15];
} Customer;
```

Code

```
// Rental Plan UNION
typedef union {
    struct { int days; } daily;
    struct { int weeks; } weekly;
    struct { int months; } monthly;
} Plan;

// Booking Structure
typedef struct {
    int bid, vid, cid;
    Plan plan;
    float total;
    int active;
} Booking;

Vehicle vehicles[MAX_VEH];
Customer customers[MAX_CUST];
```

Code

```
Booking bookings[MAX_BOOK];

int vcnt = 0, ccnt = 0, bcnt = 0;

// Function Declarations
void load();
void save();
int add_vehicle();
int add_customer();
int book_vehicle();
void return_vehicle();
void show_bill();
void list_all();

int main() {
    load();
    int ch;

    printf("\n=== CAR RENTAL SYSTEM ===\n");
    while (1) {
        printf("\n1.Add Vehicle 2.Add Customer 3.Book 4.Return 5.Bill 6.List 0.Exit\n");
        scanf("%d", &ch);
```

Code

```
 switch (ch) {
        case 1: add_vehicle(); break;
        case 2: add_customer(); break;
        case 3: book_vehicle(); break;
        case 4: return_vehicle(); break;
        case 5: show_bill(); break;
        case 6: list_all(); break;
        case 0: save(); return 0;
        default: printf("Invalid choice!\n");
      }
   }
}

// Load Data
void load() {
   FILE *f = fopen("cars.dat", "rb");
   if (f) {
      fread(&vcnt, sizeof(int), 1, f);
```

Code

```
 fread(vehicles, sizeof(Vehicle), vcnt, f);
        fclose(f);
    }

    f = fopen("cust.dat", "rb");
    if (f) {
        fread(&ccnt, sizeof(int), 1, f);
        fread(customers, sizeof(Customer), ccnt, f);
        fclose(f);
    }
}

// Save Data
void save() {
    FILE *f = fopen("cars.dat", "wb");
    fwrite(&vcnt, sizeof(int), 1, f);
    fwrite(vehicles, sizeof(Vehicle), vcnt, f);
    fclose(f);
```

Code

```
 f = fopen("cust.dat", "wb");
    fwrite(&ccnt, sizeof(int), 1, f);
    fwrite(customers, sizeof(Customer), ccnt, f);
    fclose(f);
}

// Add Vehicle
int add_vehicle() {
    if (vcnt >= MAX_VEH) {
        printf("Vehicle list full!\n");
        return 0;
    }

    Vehicle *v = &vehicles[vcnt];
    v->id = vcnt + 1;
    v->available = 1;

    printf("Model: ");
    scanf("%s", v->model);
    printf("Daily Rate: ");
    scanf("%f", &v->rate);
```

Code

```
vcnt++;
    printf("Vehicle Added!\n");
    return 1;
}

// Add Customer
int add_customer() {
    if (ccnt >= MAX_CUST) {
        printf("Customer list full!\n");
        return 0;
    }

    Customer *c = &customers[ccnt];
    c->id = ccnt + 1;

    printf("Name: ");
    scanf("%s", c->name);
    printf("Phone: ");
    scanf("%s", c->phone);

    ccnt++;
```

Code

```
 printf("Customer Added!\n");
   return 1;
}

// Book Vehicle
int book_vehicle() {
   int vid, cid, type;
   int vi = -1, ci = -1;

   printf("Vehicle ID: ");
   scanf("%d", &vid);
   printf("Customer ID: ");
   scanf("%d", &cid);

   for (int i = 0; i < vcnt; i++)
      if (vehicles[i].id == vid && vehicles[i].available) vi = i;

   for (int i = 0; i < ccnt; i++)
      if (customers[i].id == cid) ci = i;

   if (vi < 0 || ci < 0) {
      printf("Invalid booking!\n");
      return 0;
   }
```

Code

```
Booking *b = &bookings[bcnt];
  b->bid = bcnt + 1;
  b->vid = vid;
  b->cid = cid;
  b->active = 1;

  printf("Plan 1.Daily 2.Weekly 3.Monthly: ");
  scanf("%d", &type);

  if (type == 1) {
     scanf("%d", &b->plan.daily.days);
     b->total = vehicles[vi].rate * b->plan.daily.days * 0.95;
  } else if (type == 2) {
     scanf("%d", &b->plan.weekly.weeks);
     b->total = vehicles[vi].rate * 7 * b->plan.weekly.weeks * 0.8;
  } else if (type == 3) {
     scanf("%d", &b->plan.monthly.months);
     b->total = vehicles[vi].rate * 30 * b->plan.monthly.months * 0.65;
  } else {
     printf("Invalid plan!\n");
     return 0;
  }
```

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Code

```
 vehicles[vi].available = 0;
    bcnt++;
    printf("Booking Successful! Total: Rs%.2f\n", b->total);
    return 1;
}

// Return Vehicle
void return_vehicle() {
    int bid;
    printf("Booking ID: ");
    scanf("%d", &bid);

    for (int i = 0; i < bcnt; i++) {
        if (bookings[i].bid == bid && bookings[i].active) {
            bookings[i].active = 0;

            for (int j = 0; j < vcnt; j++)
                if (vehicles[j].id == bookings[i].vid)
                    vehicles[j].available = 1;

            printf("Returned! Bill: Rs%.2f\n", bookings[i].total);
            return;
        }
```

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Code

```
    }
    printf("Booking not found!\n");
}

// Show Bill
void show_bill() {
    int bid;
    printf("Booking ID: ");
    scanf("%d", &bid);

    for (int i = 0; i < bcnt; i++) {
        if (bookings[i].bid == bid) {
            printf("Total Amount: Rs%.2f\n", bookings[i].total);
            return;
        }
    }
    printf("Not found!\n");
}
```

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Code

```
// List All Data
void list_all() {
    printf("\nVehicles:\n");
    for (int i = 0; i < vcnt; i++)
        printf("%d %s [%s]\n", vehicles[i].id, vehicles[i].model,
            vehicles[i].available ? "Free" : "Rented");

    printf("\nCustomers:\n");
    for (int i = 0; i < ccnt; i++)
        printf("%d %s\n", customers[i].id, customers[i].name);
}
```

Results

Input-1:

```
217  }
218
219  // Show Bill
220  void show_bill() {
221      int bid;
222      printf("Booking ID: ");
223      scanf("%d", &bid);
224
225      for (int i = 0; i < bcnt; i++) {
226          if (bookings[i].bid == bid) {
227              printf("Total Amount: Rs%.2f\n", bookings[i].total);
228              return;
229          }
230      }
231      printf("Not found!\n");
232  }
233
```

input

```
== CAR RENTAL SYSTEM ===

.Add Vehicle 2.Add Customer 3.Book 4.Return 5.Bill 6.List 0.Exit
```

Results

Output 1:

```
217 }
218
219 // Show Bill
220 void show_bill() {
221     int bid;
222     printf("Booking ID: ");
223     scanf("%d", &bid);
224
225     for (int i = 0; i < bcnt; i++) {
226         if (bookings[i].bid == bid) {
227             printf("Total Amount: Rs%.2f\n", bookings[i].total);
228             return;
229         }
230     }
231     printf("Not found!\n");
232 }
233
```

input

```
=== CAR RENTAL SYSTEM ===

1.Add Vehicle 2.Add Customer 3.Book 4.Return 5.Bill 6.List 0.Exit
1
Model: 2025
Daily Rate: 500
Vehicle Added!

1.Add Vehicle 2.Add Customer 3.Book 4.Return 5.Bill 6.List 0.Exit
```

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Results

Input-2

main.c

```
217 }
218
219 // Show Bill
220 void show_bill() {
221     int bid;
222     printf("Booking ID: ");
223     scanf("%d", &bid);
224
225     for (int i = 0; i < bcnt; i++) {
226         if (bookings[i].bid == bid) {
227             printf("Total Amount: Rs%.2f\n", bookings[i].total);
228             return;
229         }
230     }
231     printf("Not found!\n");
232 }
233
234 // List All Data
235 void list_all() {
236     printf("\nVehicles:\n");
237     for (int i = 0; i < vcnt; i++)
```

input

```
=== CAR RENTAL SYSTEM ===

1.Add Vehicle 2.Add Customer 3.Book 4.Return 5.Bill 6.List 0.Exit
2
```

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Results

out[put 2:

```
217 }
218
219 // Show Bill
220 void show_bill() {
221     int bid;
222     printf("Booking ID: ");
223     scanf("%d", &bid);
224
225     for (int i = 0; i < bcnt; i++) {
226         if (bookings[i].bid == bid) {
227             printf("Total Amount: Rs%.2f\n", bookings[i].total);
228             return;
229         }
230     }
231     printf("Not found!\n");
232 }
233
234 // List All Data
235 void list_all() {
236     printf("\nVehicles:\n");
237     for (int i = 0; i < vcnt; i++)
```

input

```
1.Add Vehicle 2.Add Customer 3.Book 4.Return 5.Bill 6.List 0.Exit
2
Name: prashanth
Phone: 9133728466
Customer Added!

1.Add Vehicle 2.Add Customer 3.Book 4.Return 5.Bill 6.List 0.Exit
```

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References

[1] K. L. S. Mann, The C Programming Language, 2nd Edition, Prentice Hall, 1988.

[2] GCC Documentation– File I/O Operations, https://gcc.gnu.org.

[3] Reema Thareja, Data Structures Using C, Oxford University Press