

PROJECT
ON

PARKING LOT



MANAGEMENT

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INTRODUCTION

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PROJECT TITLE: PARKING LOT MANAGEMENT SYSTEM

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COURSE: PROGRAMMING IN C

UNIVERSITY: UNIVERSITY OF PETROLEUM AND

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SCHOOL: SCHOOL OF COMPUTER SCIENCE (SOCS)

COMPUTER SCIENCE ENGINEERING(B-59)

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REPOSITORY: <https://github.com/swastik292007/parking-lot-management-project>

ABSTRACT

The initiative utilizes the C programming language for managing parking lots. The mechanism stores data on cars arriving and leaving the garage, computes charges for parking spaces, monitors overall earnings, and controls vacant spots. To achieve mastery of fundamental computer science principles including data organization through structures, manipulation via arrays, control flow using functions, storage management by files, and logical decomposition in modules. The mechanism guarantees smooth operation control for car lots while offering an intuitive dashboard access point.



PROBLEM IDENTIFICATION

Operating parking areas independently requires significant effort and increases chances of mistakes. Concerns encompass flawed documentation practices, challenges in monitoring open spots, and errors in calculating earnings. This endeavor aims at creating an automated parking lot management system capable of capturing information about vehicles including their registration numbers, types, and arrival times. Count both occupied spaces and remaining spots in all designated car lots. Permit drivers to depart by removing their vehicles while calculating fees accordingly. Ensure a comprehensive collection of all revenues. Show every car that is currently stationary in your viewfinder. Enhance precision in operations while optimizing resource utilization.



IMPLEMENTATION DETAILS

CODE SNIPPET- ADDING VEHICLE

```
//-----VEHICLE ENTRY-----
void VehicleEntry() {
    if (filledSlots >= totalSlots) {
        printf("\nSORRY! PARKING IS FULL...\n");
        return;
    }

    struct Vehicle v;
    printf("\nEnter Vehicle Number: ");
    scanf("%s", v.number);
    printf("Enter Vehicle Type(Car/Bike/Truck): ");
    scanf("%s", v.type);
    //entering the time of entry (using my laptop's time.)
    time_t t = time(NULL);
    struct tm *tm = localtime(&t);
    sprintf(v.entryTime, "%02d:%02d", tm->tm_hour, tm->tm_min);

    vehicles[filledSlots++] = v; //adding filledslots by one after every parking
    printf("\nVEHICLE PARKED SUCCESSFULLY at %s\n", v.entryTime);
}
```



IMPLEMENTATION DETAILS

CODE SNIPPET-REMOVING VEHICLE

```
81 void VehicleExit() {
82     char num[20];
83     printf("\nEnter Vehicle Number to Exit: ");
84     scanf("%s", num);
85
86     int found = -1;
87     for (int i = 0; i < filledSlots; i++) {
88         if (strcmp(vehicles[i].number, num) == 0) {
89             found = i;
90             break;
91         }
92     }
93
94     if (found == -1) {
95         printf("\nVehicle not found!\n");
96         return;
97     }
98 //ENTERING EXIT TIME AND AND STORING AS VARIABLE NOW.
99 time_t now = time(NULL);
100 struct tm *tm_now = localtime(&now);
101 int exitHour = tm_now->tm_hour;
102 int exitMin = tm_now->tm_min;
103
104 int entryHour, entryMin; //ENTRY TIME
105 sscanf(vehicles[found].entryTime, "%d:%d", &entryHour, &entryMin);
106
107 int hours = exitHour - entryHour; //CALCULATING TIME OF PARKING
108 int minutes = exitMin - entryMin;
109
110 if (minutes < 0) //((BASIC BORROWING OF SUBTRACTION)
111     minutes += 60;
112     hours -= 1;
113 }
114 if (hours < 0) {
115     hours += 24; // handle overnight parking
116 }
```

```
118 // Convert partial hour if needed
119 float totalHours = hours + (minutes / 60.0);
120
121 //CALCULATING FEES
122 float fee = calculateFee(vehicles[found].type, totalHours);
123 printf("\nVehicle Number: %s", vehicles[found].number);
124 printf("\nEntry Time: %s", vehicles[found].entryTime);
125 printf("\nExit Time: %02d:%02d", exitHour, exitMin);
126 printf("\nTotal Parked: %.2f hours", totalHours);
127 printf("\nParking Fee: %.2f Rupees\n", fee);
128
129 totalRevenue+=fee;
130
131 //removing the vehicle from record.
132 for (int i= found; i < filledSlots - 1; i++) {
133     vehicles[i] = vehicles[i+1];
134 }
135 filledSlots--;
136
137 printf("\nVehicle Exit Successful. Thank You!!\n");
138 }
```

IMPLEMENTATION DETAILS

CODE SNIPPET- VIEWING VEHICLES PARKED AND PARKING LOT STATUS

```
140 //-----DISPLAY VEHICLES-----
141 void DisplayVehicles() {
142     if (filledSlots == 0) {
143         printf("\n NO VEHICLE PARKED YET!!!\n");
144         return;
145     }
146
147     printf("\nLIST OF PARKED VEHICLES:\n");
148     printf("\n|xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx|\n");
149     printf(" NUMBER\tTYPE\tENTRY TIME\n");
150     printf("\n|xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx|\n");
151
152     for (int i=0; i<filledSlots; i++) {
153         printf(" %s\t%s\t%s\n", vehicles[i].number, vehicles[i].type, vehicles[i].entryTime);
154     }
155
156     printf("\n|xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx|\n");
157 }
158
159 //-----PARKING LOT STATUS-----
160 void ParkingLotStatus() {
161     printf("\nTotal Slots: %d",totalSlots);
162     printf("\nFilled Slots: %d", filledSlots);
163     printf("\nAvailable Slots: %d\n",totalSlots-filledSlots);
164 }
```



IMPLEMENTATION DETAILS

CODE SNIPPET- SEARCHING AND FEE CALCULATION

```
166 //-----SEARCHING VEHICLE-----
167 void Search() {
168     char num[20];
169     printf("\nEnter Vehicle Number to search: ");
170     scanf("%s",num);
171
172     for (int i = 0; i < filledSlots; i++) {
173         if (strcmp(vehicles[i].number, num) == 0) {
174             printf("\nVehicle Found!\n");
175             printf("Number: %s\nType: %s\nEntry Time: %s\n",
176                   vehicles[i].number, vehicles[i].type, vehicles[i].entryTime);
177             return;
178         }
179     }
180     printf("\nVehicle Not Found!\n");
181 }
182
183 //-----FEE CALCULATION-----
184 float calculateFee(char type[], float hours) {
185     float rate;
186     if (strcmp(type, "Car") == 0 || strcmp(type, "car") == 0)      //20 FOR CAR
187         rate = 20;
188     else if (strcmp(type, "Bike") == 0 || strcmp(type, "bike") == 0) //10 FOR BIKE
189         rate = 10;
190     else
191         rate = 30;                                //30 FOR TRUCK
192     return rate * hours;
193 }
```



IMPLEMENTATION DETAILS

CODE SNIPPET- FILE HANDLING

```
5 //-----FILE HANDLING-----
6 void saveDataToFile() {
7     FILE *fp = fopen("parkingdata.txt", "w");
8     for (int i = 0; i < filledSlots; i++) {
9         fprintf(fp, "%s %s %s\n", vehicles[i].number, vehicles[i].type, vehicles[i].entryTime);
0     }
1     fclose(fp);
2 }
3
4 void loadData() {
5     FILE *fp = fopen("parkingdata.txt", "r");
6     if (fp == NULL) return;
7     while (fscanf(fp, "%s %s %s", vehicles[filledSlots].number, vehicles[filledSlots].type, vehicles[filledSlots].entryTime) != EOF) {
8         filledSlots++;
9     }
0     fclose(fp);
1 }
2
3 //-----RUNNING THE MODULES-----
4 int main() {
5     printf("\n=====WELCOME TO PARKING-LOT-MANAGEMENT SYSTEM=====\\n ");
6     loadData(); // load old records if any
7     menu(); // start the main program
8     saveDataToFile(); // save before exit
9     return 0;
0 }
```



TESTING AND RESULTS

=====WELCOME TO PARKING-LOT-MANAGEMENT SYSTEM=====

1. Vehicle Entry
 2. Vehicle Exit
 3. Display Parked Vehicles status
 4. Parking Lot Status
 5. Search vehicle
 6. EXIT Program
- Enter your choice(1-6): 1

Enter Vehicle Number: HR29AG2267

Enter Vehicle Type(Car/Bike/Truck): CAR

VEHICLE PARKED SUCCESSFULLY at 10:33

1. Vehicle Entry
 2. Vehicle Exit
 3. Display Parked Vehicles status
 4. Parking Lot Status
 5. Search vehicle
 6. EXIT Program
- Enter your choice(1-6): 3

LIST OF PARKED VEHICLES:

NUMBER	TYPE	ENTRY TIME
HR29AG2267	CAR	10:33



1. Vehicle Entry
2. Vehicle Exit
3. Display Parked Vehicles status
4. Parking Lot Status
5. Search vehicle
6. EXIT Program

Enter your choice(1-6): 4

Total Slots: 50

Filled Slots: 1

Available Slots: 49

1. Vehicle Entry
2. Vehicle Exit
3. Display Parked Vehicles status
4. Parking Lot Status
5. Search vehicle
6. EXIT Program

Enter your choice(1-6): 2

Enter Vehicle Number to Exit: HR29AG2267

Vehicle Number: HR29AG2267

Entry Time: 10:33

Exit Time: 10:35

Total Parked: 0.03 hours

Parking Fee: 1.00 Rupees

TESTING AND RESULTS



TESTING AND RESULTS



1. Vehicle Entry
2. Vehicle Exit
3. Display Parked Vehicles status
4. Parking Lot Status
5. Search vehicle
6. EXIT Program

Enter your choice(1-6): 6

Total Revenue Collected: 1.00 Rupees Only.
Thank You for using PARKING-LOT-SYSTEM!!

THANK YOU

