CSC 1012 – Introduction to Computer Programming

Logistics Management System

This is a menu-driven Logistics Management System using the C programming language. This program can manage cities, distances, vehicles, and delivery requests. It calculates delivery costs, time, and profit. It also includes features like data storage, reports, and calculations for the shortest routes.

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GitHub Link : https://github.com/ravishan21-tech/logistic-management-system

Implemented Features

City Management

- ✓ Store up to 30 cities with unique names
- ✓ Add, rename, and remove cities
- ✓ Display the list of all cities

Distance Management

- ✓ Store distances between cities in a 2D array
- ✓ Allow editing distances between any two cities
- ✓ Keep distance symmetrical
- ✓ Prevent distance from city → itself (set as 0)

Vehicle Management

- ✓ Three fixed vehicle types: Van, Truck, and Lorry

Delivery Handling

- ✓ Input delivery request
- ✓ Validate inputs and calculate cost, time, and profit

Reports

- ✓ Display total deliveries, total distance, average time, revenue, and profit

File Handling

- ✓ Save and load city-distances and delivery-cost data using text files

Main Functions in the Project

Function Name	Purpose	Location
manageCities()	Adding, renaming, and removing cities.	city_management.c
manageDistances()	Manage distances between cities.	distance_management.c
showVehicles()	Display all vehicle details.	vehical_management.c
manageDeliveries()	Handle new delivery requests and calculations.	delivery_management.c
calculateDelivery()	Calculate cost, fuel, and time for a delivery.	delivery_management.c
findShortestPath()	Find the shortest route between two cities.	delivery_management.c
showReport()	Display total deliveries, distance, and profits.	performance_report.c
saveData()	Save cities and deliveries to files.	file_handling.c
loadData()	Load data from saved files.	file_handling.c

Calculations Used

• Distance D (from distance matrix)

• Weight W (kg)

• Rate per km R (from vehicle type)

• Vehicle speed S (km/h)

• Efficiency E (km/l)

• Fuel price F (e.g., 310 LKR per liter)

Delivery Cost: $\boldsymbol{Cost} = \boldsymbol{D} \times \boldsymbol{R} \times (\mathbf{1} + \boldsymbol{W}\ \boldsymbol{x}\ \mathbf{1}\ \mathbf{10000})$

Estimated Delivery Time (hours): $\boldsymbol{Time} = \boldsymbol{D}\ \boldsymbol{S}$

Fuel Consumption: $\boldsymbol{FuelUsed} = \boldsymbol{D}\ \boldsymbol{E}$

Fuel Cost: $\boldsymbol{FuelCost} = \boldsymbol{FuelUsed} \times \boldsymbol{F}$

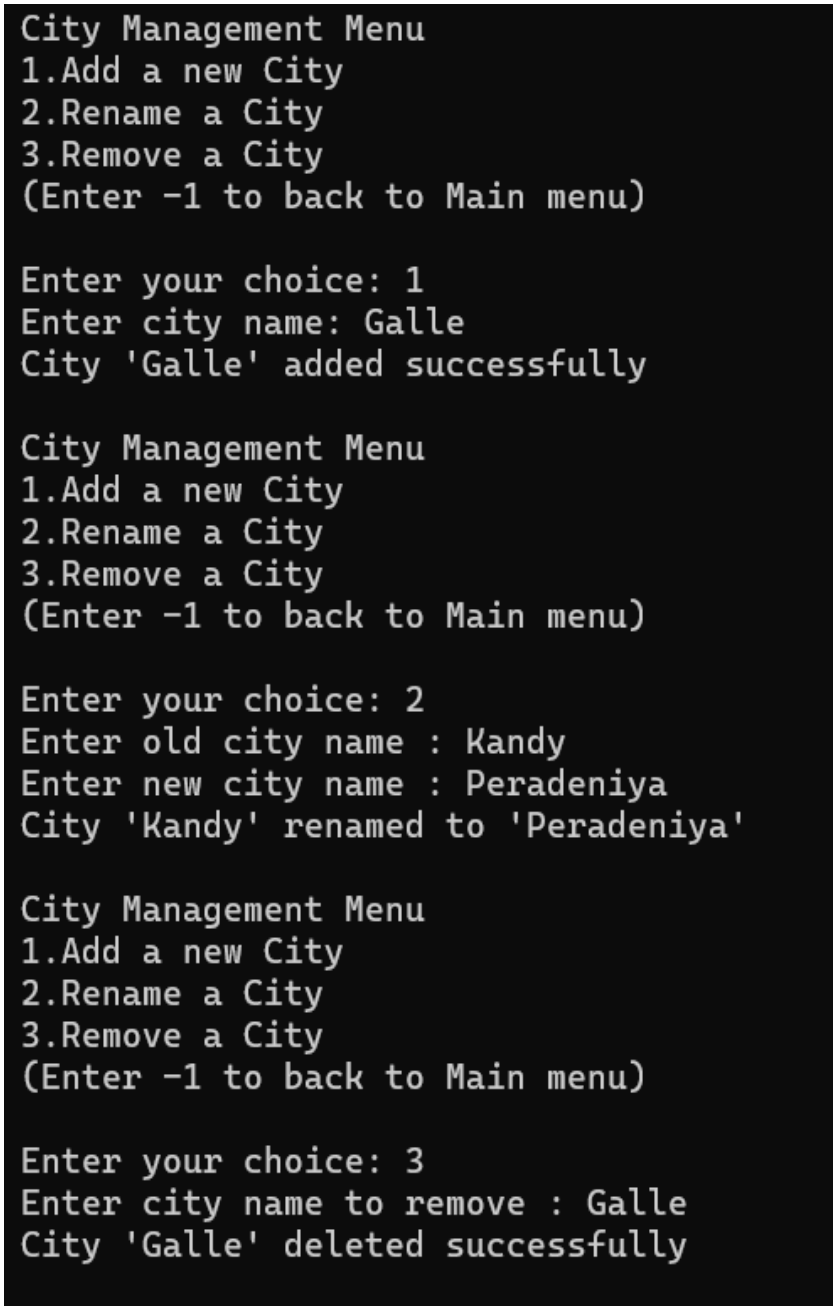
Total Operational Cost: $\boldsymbol{TotalCost} = \mathbf{Delivery}\boldsymbol{Cost} + \boldsymbol{FuelCost}$

Profit Calculation: $\boldsymbol{Profit} = (\boldsymbol{Cost} \times \mathbf{0.25})$

Final Charge to Customer: $\boldsymbol{CustomerCharge} = \boldsymbol{TotalCost} + \boldsymbol{Profit}$

Sample Output

City Management



Distance Management

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LOGISTICS MANAGEMENT SYSTEM
===========================
1.City Management
2.Distance Management
3.Vehicle Management
4.Delivery Request Handling
5.Reports
(Enter -1 for Exit)
---------------------------
Enter your choice: 2

Distance Management Menu
1.Add a new distance
2.View distances
(Enter -1 to back to Main menu)

Enter your choice: 1
Index   City
 1      Colombo
 2      Peradeniya
Enter city 1 index : 1
Enter city 2 index : 2
Distance(km) : 144
Distance between Colombo and Peradeniya set to 144 km
Do you want to add new distance? (y/n) : n

Distance Management Menu
1.Add a new distance
2.View distances
(Enter -1 to back to Main menu)

Enter your choice: 2

                Colombo Peradeniya
Colombo              0     144
Peradeniya         144       0
```

Delivery Request Management and Performance report

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Enter your choice: 4

DELIVERY REQUEST
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Index   City
 1      Colombo
 2      Peradeniya
Enter current city index: 1
Enter destination city index: 2
Enter weight (kg): 2000

1. Van (capacity 1000 kg)
2. Truck (capacity 5000 kg)
3. Lorry (capacity 10000 kg)

Enter vehicle type (1-3) : 2

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DELIVERY COST ESTIMATION
-----------------------------------------------------
From: Colombo
To: Peradeniya
Distance: 144 km
Vehicle: Truck
Weight: 2000.00 kg
-----------------------------------------------------
Base Cost: 144 x 40 x (1 + 2000/10000) = 6912.00 LKR
Fuel Used: 24.00 L
Fuel Cost: 7440.00 LKR
Operational Cost: 14352.00 LKR
Profit: 3588.00 LKR
Customer Charge: 17940.00 LKR
Estimated Time: 2.88 hours
=====================================================
```

```
==========================================================
DELIVERY COST ESTIMATION
----------------------------------------------------------
From: Peradeniya
To: Colombo
Distance: 144 km
Vehicle: Truck
Weight: 2000.00 kg
----------------------------------------------------------
Base Cost: 144 x 40 x (1 + 2000/10000) = 6912.00 LKR
Fuel Used: 24.00 L
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Operational Cost: 14352.00 LKR
Profit: 3588.00 LKR
Customer Charge: 17940.00 LKR
Estimated Time: 2.88 hours
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LOGISTICS MANAGEMENT SYSTEM
============================
1.City Management
2.Distance Management
3.Vehicle Management
4.Delivery Request Handling
5.Reports
(Enter -1 for Exit)
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Enter your choice: 5

========== PERFORMANCE REPORT ==========
Total Deliveries: 2
Total Distance Covered: 288 km
Average Delivery Time: 2.88 hours
Total Revenue: 35880.00 LKR
Longest Route: 144 km
Shortest Route: 144 km
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