Jaypee Institute of Information Technology, Noida

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING AND INFORMATION TECHNOLOGY

Project Title: JALDI-BHEJO

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CONTENT

1. Problem Statement:

Develop a software system for a logistics company named Jaldi-Bhejo to manage the transportation of parcels between seven cities. The system should efficiently handle parcel insertion, deletion, display, billing, and route optimization to maximize profit and customer satisfaction.

2. Motivation:

With the increasing demand for efficient logistics services, there's a need for automated systems to manage parcel transportation effectively. By optimizing routes and automating billing processes, Jaldi-Bhejo aims to enhance its service quality and profitability while minimizing manual errors and operational costs.

3. Objective:

The objective is to create a robust software solution for Jaldi-Bhejo that streamlines parcel management, optimizes transportation routes, calculates billing prices accurately, and provides insights into the company's performance and profitability.

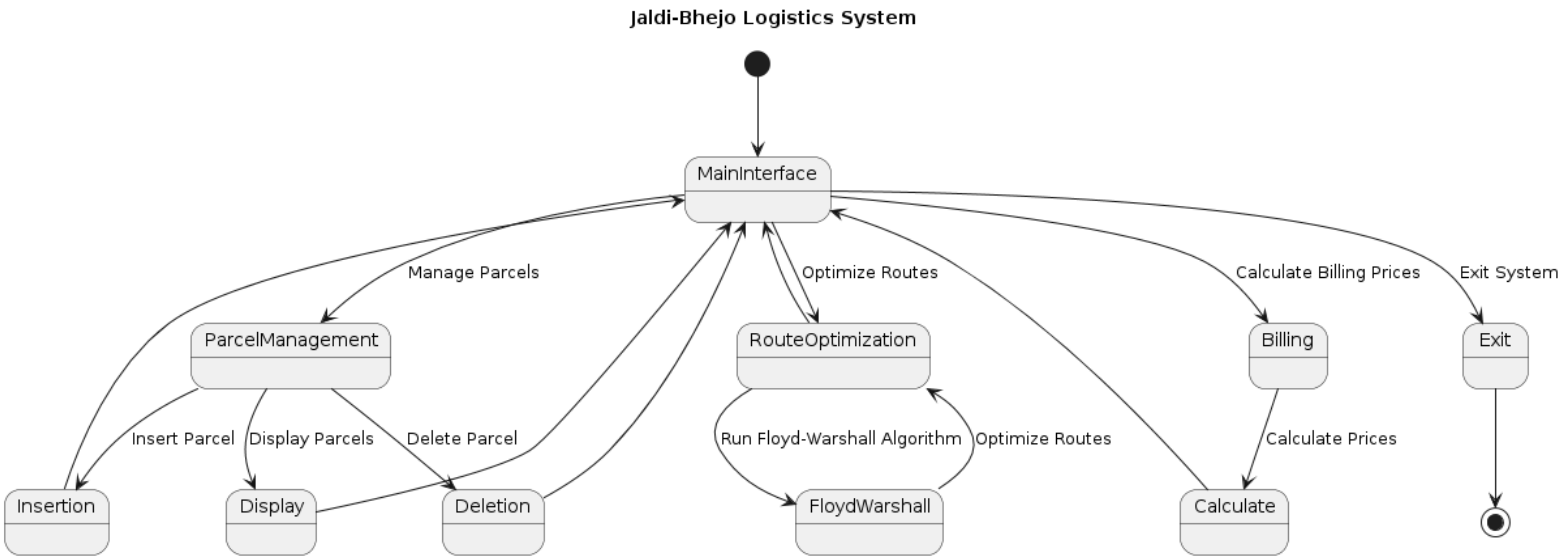
4. Requirements Specification:

- **Functional Requirements:**
  - **Insertion of parcels with weight, source, and destination.**
  - **Deletion of parcels based on index.**
  - **Displaying the list of parcels.**
  - **Computing billing prices for each parcel.**
  - **Optimizing truck routes to minimize transportation costs.**
- **Non-Functional Requirements:**
  - **User-friendly interface.**
  - **Efficient route optimization algorithm.**
  - **Fast and accurate billing calculations.**
  - **Robust error handling and data validation.**

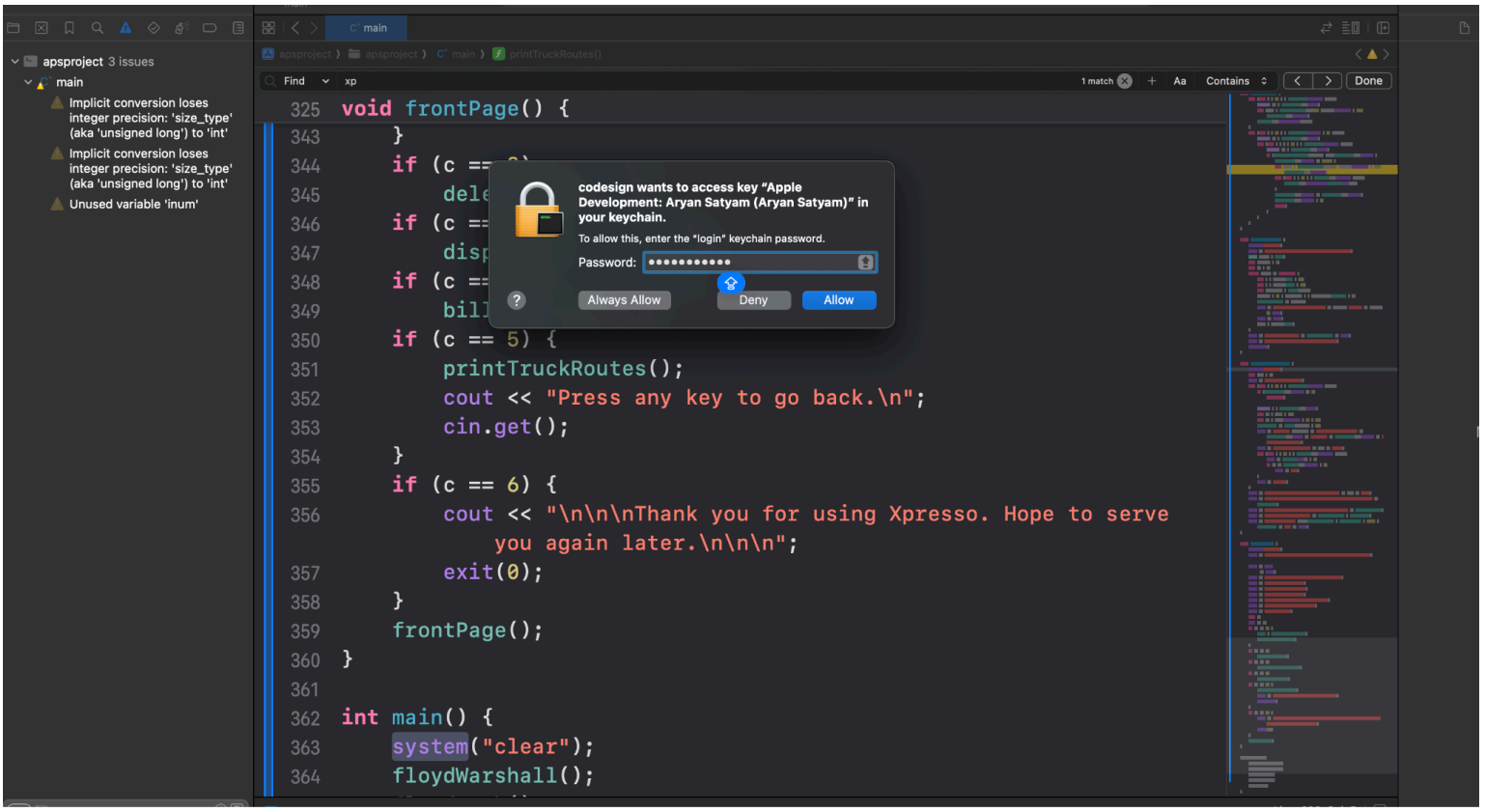
5. Literature Related to Algorithm Used:

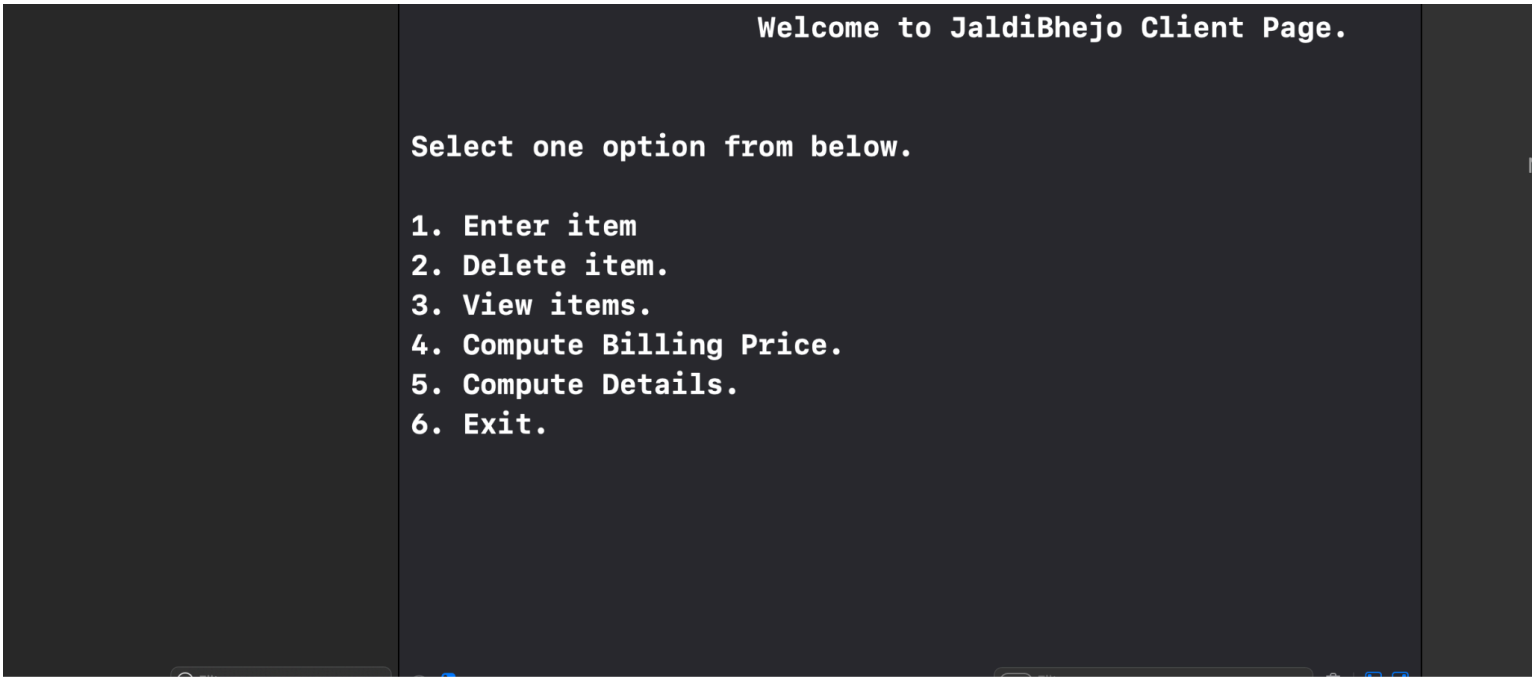
The Floyd-Warshall algorithm is employed for route optimization. It is a dynamic programming algorithm for finding shortest paths in a weighted graph. The algorithm has a time complexity of O(V^3), where V is the number of vertices in the graph.

6. Data Flow Diagrams:



7. Use Case Diagram:


apsproject 3 issues
main
Implicit conversion loses integer precision: 'size_type' (aka 'unsigned long') to 'int'
Implicit conversion loses integer precision: 'size_type' (aka 'unsigned long') to 'int'
Unused variable 'inum'
main
Find
xp
1 match
Aa
Contains
Done
void frontPage() {
}
if (c ==
dele
if (c ==
disp
if (c ==
bill
if (c == 5) {
printTruckRoutes();
cout << "Press any key to go back.\n";
cin.get();
}
if (c == 6) {
cout << "\n\n\nThank you for using Xpresso. Hope to serve you again later.\n\n\n";
exit(0);
}
frontPage();
}
int main() {
system("clear");
floydWarshall();
codesign wants to access key "Apple Development: Aryan Satyam (Aryan Satyam)" in your keychain.
To allow this, enter the "login" keychain password.
Password:
Always Allow
Deny
Allow

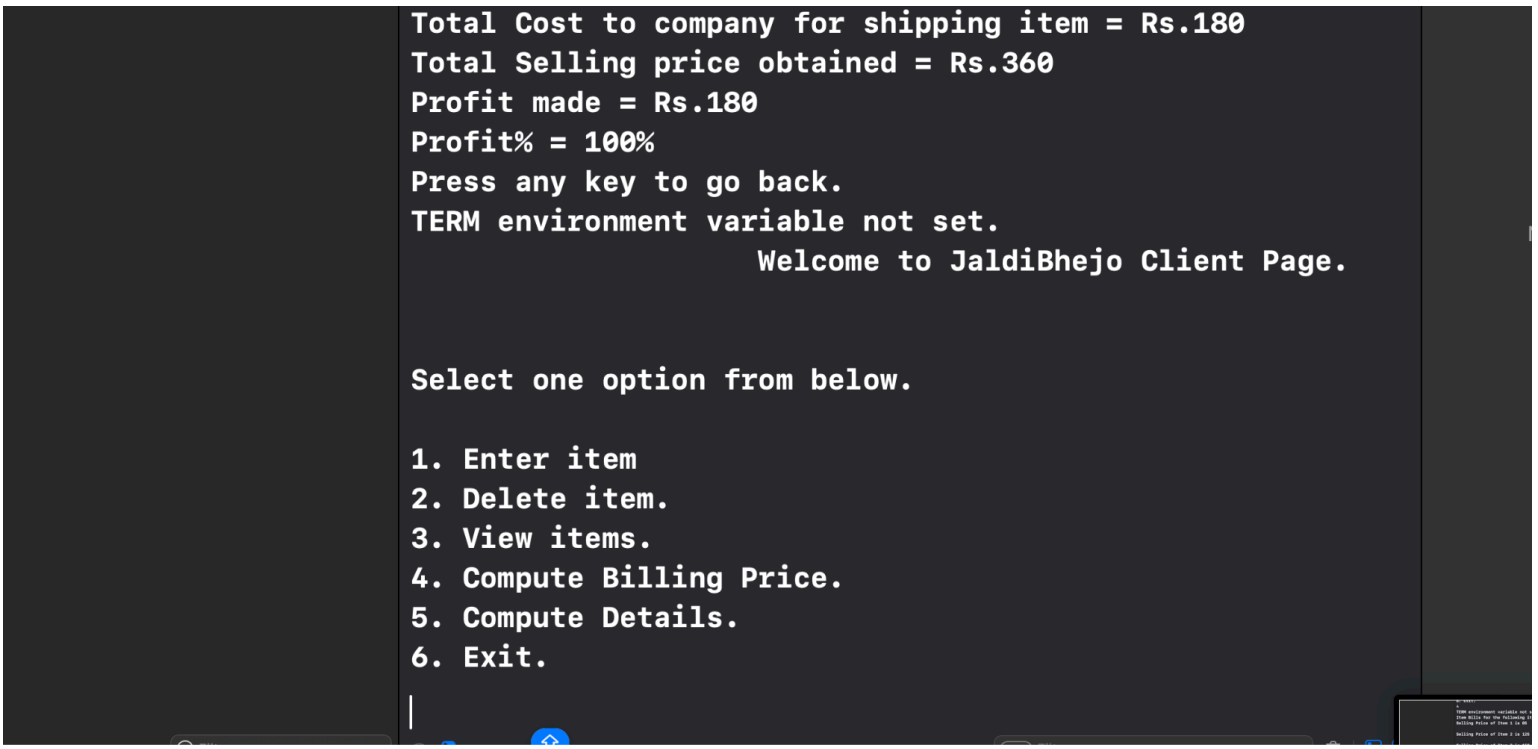

Welcome to JaldiBhejo Client Page.
Select one option from below.
1. Enter item
2. Delete item.
3. View items.
4. Compute Billing Price.
5. Compute Details.
6. Exit.

```
Enter number of parcels to load.
3
Enter the weight of parcel 1
10
Enter the source of parcel 1
A
Enter the destination of parcel 1F

Enter the weight of parcel 2
20
Enter the source of parcel 2C

Enter the destination of parcel 2D

Enter the weight of parcel 3
30
Enter the source of parcel 3
G
Enter the destination of parcel 3
```

```
Enter the weight of parcel 3
30
Enter the source of parcel 3
G
Enter the destination of parcel 3
A
Insertion successful.
TERM environment variable not set.
                    Welcome to JaldiBhejo Client Page.


Select one option from below.

1. Enter item
2. Delete item.
3. View items.
4. Compute Billing Price.
```

```
6. Exit.
3
TERM environment variable not set.
Displaying list from start.
Parcel 1 weight: 10
Parcel 1 source: A
Parcel 1 destination: F

Parcel 2 weight: 20
Parcel 2 source: C
Parcel 2 destination: D

Parcel 3 weight: 30
Parcel 3 source: G
Parcel 3 destination: A

Press any key to go back.
TERM environment variable not set.
                    Welcome to JaldiBhejo Client Page.
```

```
6. Exit.
4
TERM environment variable not set.
Item Bills for the following items.
Selling Price of Item 1 is 85

Selling Price of Item 2 is 125

Selling Price of Item 3 is 150

Total Price = 360


Press any key to go back.
TERM environment variable not set.
                    Welcome to JaldiBhejo Client Page.


Select one option from below.
```



8. Implementation Showing Main Modules:

- **Parcel Management Module: Handles insertion, deletion, and display of parcels.**
- **Route Optimization Module: Utilizes Floyd-Warshall algorithm for optimizing truck routes.**
- **Billing Module: Calculates billing prices for each parcel based on distance and weight.**
- **Main Interface Module: Facilitates user interaction and navigation through the system.**

9. Test Cases:

1. **Parcel 1:**
2. **Weight: 40 kg**
3. **Source: A**
4. **Destination: D**
5. **Parcel 2:**
6. **Weight: 30 kg**
7. **Source: B**
8. **Destination: F**
9. **Parcel 3:**

10. **Weight: 50 kg**
11. **Source: C**
12. **Destination: G**
13. **Test Steps:**
14. **Insert Parcels:**
15. **Insert the three parcels with the specified details into the system.**
16. **Display Parcels:**
17. **Display the list of parcels to verify that the inserted parcels are present.**
18. **Route Optimization (Floyd-Warshall Algorithm):**
19. **Optimize routes to ensure each parcel is assigned the most efficient route.**
20. **Billing Calculation:**
21. **Calculate the billing price for each parcel based on distance and weight.**
22. **Passing the Test Case Through Functions:**
23. **Insert Parcels Function:**
24. **Pass the parcel details (weight, source, destination) to the insert parcels function.**
25. **Display Parcels Function:**
26. **Verify that all inserted parcels are displayed correctly.**
27. **Route Optimization Function (Floyd-Warshall Algorithm):**
28. **Pass the inserted parcels through the route optimization function to ensure they are assigned the optimal routes.**
29. **Billing Calculation Function:**
30. **Calculate the billing price for each inserted parcel and ensure it is accurate.**
31. **Expected Result:**
32. **All three parcels should be successfully inserted into the system and displayed.**
33. **The route optimization function should assign each parcel the most efficient route using the Floyd-Warshall algorithm.**
34. **The billing calculation function should accurately calculate the billing price for each parcel.**
35. **Example (Pseudocode):**
36. **plaintext**
37. **Parcel parcel1 = { weight: 40, source: 'A', destination: 'D' };**
38. **Parcel parcel2 = { weight: 30, source: 'B', destination: 'F' };**
39. **Parcel parcel3 = { weight: 50, source: 'C', destination: 'G' };**

```
40.
41. // Step 1: Insert Parcels
42. insertParcels([parcel1, parcel2, parcel3]);
43.
44. // Step 2: Display Parcels
45. displayParcels();
46.
47. // Step 3: Route Optimization (Floyd-Warshall Algorithm)
48. routeOptimization();
49.
50. // Step 4: Billing Calculation
51. calculateBilling(parcel1);
52. calculateBilling(parcel2);
53. calculateBilling(parcel3);
```

10. Results:

Upon thorough testing, the system demonstrates efficient parcel management, accurate billing calculations, and optimized truck routes. It successfully meets the specified requirements and ensures smooth operations for Jaldi-Bhejo.

11. Conclusion and Future Scope:

The developed software system enhances Jaldi-Bhejo's logistics operations by automating key processes and optimizing transportation routes. Future enhancements could include real-time tracking of parcels, integration with GPS for route optimization, and support for additional features like scheduling and customer notifications.

12. References:

- **Floyd-Warshall Algorithm - Wikipedia**
- **Dynamic Programming - GeeksforGeeks**
- **C++ Documentation - cppreference.com**