**Modern Operating System and Computer Networks**

**Lab-3**

**Assignment-2**

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* **Simulation of Distance Vector Routing using the Bellman-Ford Algorithm in C++.**

Enter the number of nodes: 4

Enter the cost matrix (Enter 100 for INF):

0 2 5 1

2 0 3 2

5 3 0 3

1 2 3 0

#include <iostream>

using namespace std;

#define MAX 10

#define INF 100 // Large value representing no direct connection

int main() {

int cost[MAX][MAX];

int dist[MAX][MAX];

int via[MAX][MAX];

int n;

cout<< "Enter the number of nodes: ";

cin>> n;

cout<< "\nEnter the cost matrix (Enter 100 for INF):\n";

for (int i = 0; i< n; i++) {

for (int j = 0; j < n; j++) {

cin>> cost[i][j];

cost[i][j] = (cost[i][j] == 100) ?INF : cost[i][j];

dist[i][j] = cost[i][j];

via[i][j] = j;

}

}

// Bellman-Ford Update Rule

for (int k = 0; k < n; k++) { // Intermediate node

for (int i = 0; i< n; i++) { // Source node

for (int j = 0; j < n; j++) { // Destination node

if (dist[i][j] > cost[i][k] + dist[k][j]) {

dist[i][j] = cost[i][k] + dist[k][j];

via[i][j] = k; // Update via node

}

}

}

}

// Display Final Routing Tables

cout<< "\n--- Final Distance Vector Tables ---\n";

for (int i = 0; i< n; i++) {

cout<< "\nRouter " <<i + 1 << " Table:\n";

cout<< "Destination\tNext Hop\tDistance\n";

for (int j = 0; j < n; j++) {

if (i != j)

cout<< j + 1 << "\t\t" << via[i][j] + 1 << "\t\t" <<dist[i][j] <<endl;

}

}

return 0;

}

Output:

Final Distance Vector Tables

Router 1 Table:

Destination Next Hop Distance

2 2 2

3 4 4

4 4 1

Router 2 Table:

Destination Next Hop Distance

1 1 2

3 3 3

4 4 2

Router 3 Table:

Destination Next Hop Distance

1 4 4

2 2 3

4 4 3

Router 4 Table:

Destination Next Hop Distance

1 1 1

2 2 2

3 3 3