PROGRAM CODE

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#include <limits.h>
#include <stdio.h>
#include <stdbool.h>

int minDistance(int V, int dist[], bool sptSet[]) {
	int min = INT_MAX, min_index;

	for (int v = 0; v < V; v++)
		if (sptSet[v] == false && dist[v] <= min) {
			min = dist[v];
			min_index = v;
		}

	return min_index;
}

int path(int src, int i, int from[]) {
	int temp = from[i];

	if(temp == src) {
		return i;
	}

	i = from[i];

	while(i != src) {
		temp = i;
		i = from[i];
	}

	return temp;
}

void printSolution(int V, int dist[], int from[], int src) {
	printf("\nFor router %d\n", src + 1);
	printf("\nTo router\tShortest distance\tVia\n");

	for (int i = 0; i < V; i++)
		printf("%d\t\t%d\t\t\t%d\n", i + 1, dist[i], path(src, i, from) +
1);
}

void dijkstra(int V, int costmat[V][V], int src) {
	int dist[V];
	int from[V];

	bool sptSet[V];

	for(int i = 0; i < V; i++) {
		dist[i] = INT_MAX;
		from[i] = i;
		sptSet[i] = false;
	}

	dist[src] = 0;

	for(int count = 0; count < V - 1; count++) {
		int u = minDistance(V, dist, sptSet);

		sptSet[u] = true;
```

```
            for(int v = 0; v < V; v++)
                  if(!sptSet[v] && costmat[u][v] && dist[u] != INT_MAX &&
dist[u] + costmat[u][v] < dist[v]) {
                        from[v] = u;
                        dist[v] = dist[u] + costmat[u][v];
                  }
      }

      printSolution(V, dist, from, src);
}

void main() {
      int nodes;

      printf("Enter the number of nodes: ");
      scanf("%d", &nodes);
      int costmat[nodes][nodes];

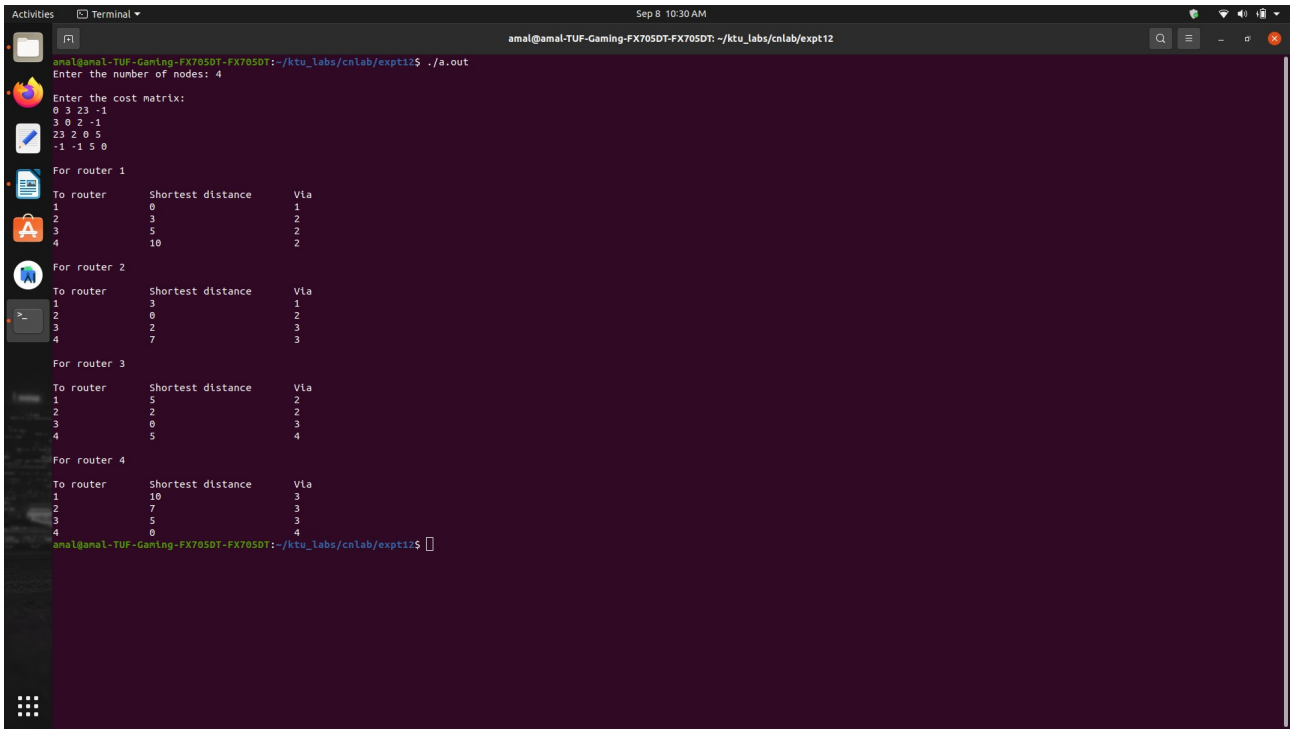
      printf("\nEnter the cost matrix:\n");

      for(int i = 0; i < nodes; i++) {
            for(int j = 0; j < nodes; j++) {
                  scanf("%d", &costmat[i][j]);
                  if(costmat[i][j] == -1)
                        costmat[i][j] = SHRT_MAX;
            }

            costmat[i][i] = 0;
      }

      for(int i = 0; i < nodes; i++)
            dijkstra(nodes, costmat, i);
}
```

OUTPUT


Activities
Terminal
Sep 8 10:30 AM
amal@amal-TUF-Gaming-FX705DT-FX705DT: ~/ktu_labs/cnlab/expt12
amal@amal-TUF-Gaming-FX705DT-FX705DT:~/ktu_labs/cnlab/expt12$ ./a.out
Enter the number of nodes: 4
Enter the cost matrix:
0 3 23 -1
3 0 2 -1
23 2 0 5
-1 -1 5 0
For router 1
To router Shortest distance Via
1 0 1
2 3 2
3 5 2
4 10 2
For router 2
To router Shortest distance Via
1 3 1
2 0 2
3 2 3
4 7 3
For router 3
To router Shortest distance Via
1 5 2
2 2 2
3 0 3
4 5 4
For router 4
To router Shortest distance Via
1 10 3
2 7 3
3 5 3
4 0 4
amal@amal-TUF-Gaming-FX705DT-FX705DT:~/ktu_labs/cnlab/expt12$