

# Kruskal's Algo

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File Edit Selection View Go Run Terminal Help Kruskhals-Algo.cpp - DAA-practical - Visual Studio Code
Kruskhals-Algo.cpp x
Practical-4 > C++ Kruskhals-Algo.cpp > main()
1 #include<bits/stdc++.h>
2 using namespace std;
3 struct node {
4     int u;
5     int v;
6     int wt;
7     node(int first, int second, int weight) {
8         u = first;
9         v = second;
10        wt = weight;
11    }
12 };
13
14 bool comp(node a, node b) {
15     return a.wt < b.wt;
16 }
17
18 int findPar(int u, vector<int> &parent) {
19     if(u == parent[u]) return u;
20     return parent[u] = findPar(parent[u], parent);
21 }
22
```

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Practical-4 > C++ Kruskhals-Algo.cpp > main()
23 void unionn(int u, int v, vector<int> &parent, vector<int> &rank) {
24     u = findPar(u, parent);
25     v = findPar(v, parent);
26     if(rank[u] < rank[v]) {
27         parent[u] = v;
28     }
29     else if(rank[v] < rank[u]) {
30         parent[v] = u;
31     }
32     else {
33         parent[v] = u;
34         rank[u]++;
35     }
36 }
37 int main(){
38     int N=5,m=6;
39     vector<node> edges;
40     edges.push_back(node(0,1,2));
41     edges.push_back(node(0,3,6));
42     edges.push_back(node(1,0,2));
43     edges.push_back(node(1,2,3));
44     edges.push_back(node(1,3,8));

```

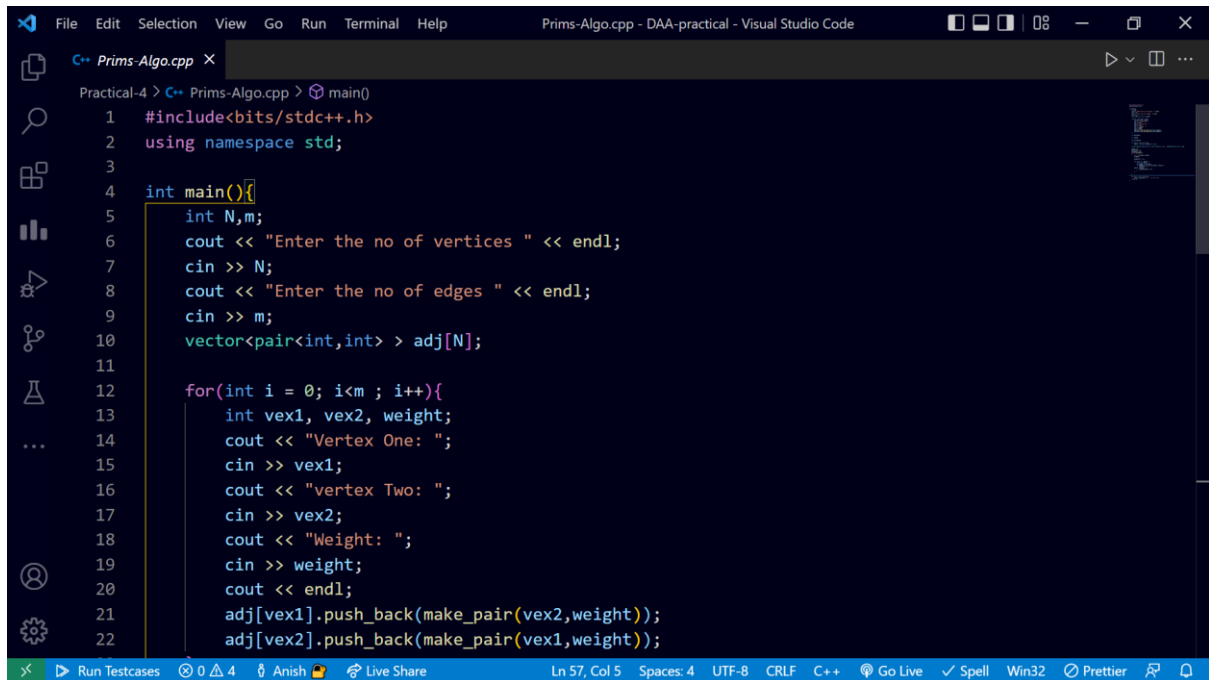
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Practical-4 > C++ Kruskhals-Algo.cpp > main()
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41     edges.push_back(node(0,3,6));
42     edges.push_back(node(1,0,2));
43     edges.push_back(node(1,2,3));
44     edges.push_back(node(1,3,8));
45     edges.push_back(node(1,4,5));
46     edges.push_back(node(2,1,3));
47     edges.push_back(node(2,4,7));
48     edges.push_back(node(3,0,6));
49     edges.push_back(node(3,1,8));
50     edges.push_back(node(4,1,5));
51     edges.push_back(node(4,2,7));
52     sort(edges.begin(), edges.end(), comp);
53
54     vector<int> parent(N);
55     for(int i = 0;i<N;i++)
56     |     parent[i] = i;
57     vector<int> rank(N, 0);
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```

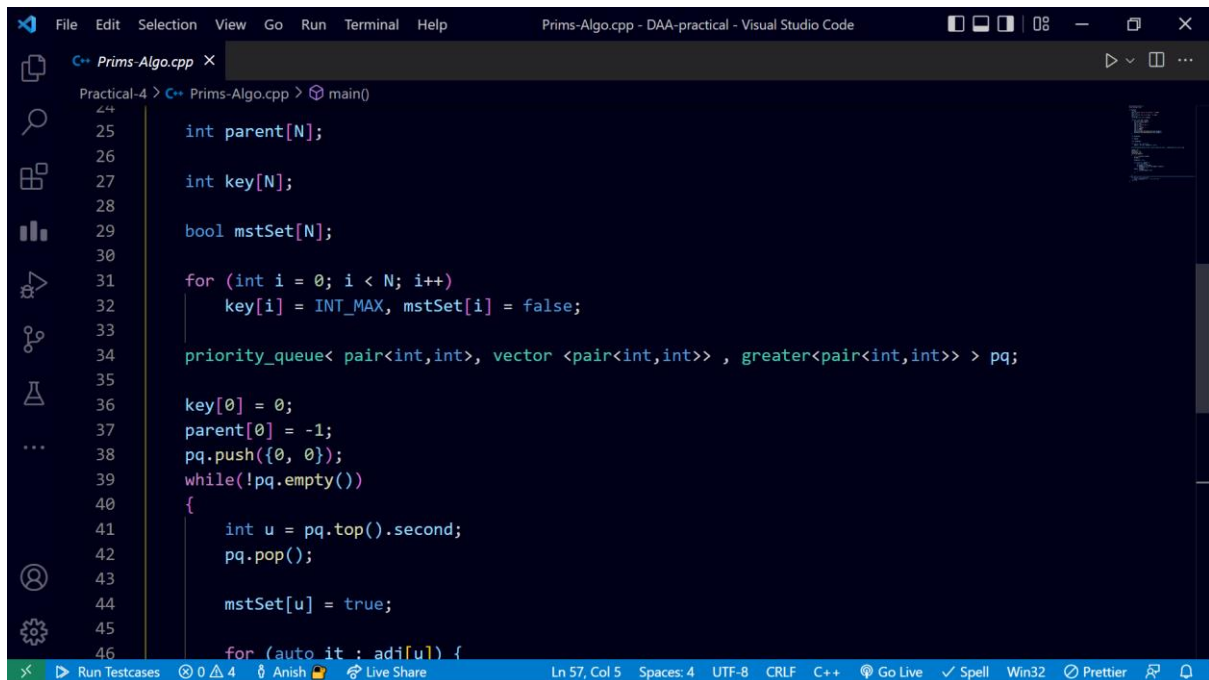
The screenshot shows the Visual Studio Code interface with a terminal window open. The terminal displays the output of a C++ program that implements Kruskal's Algorithm. The program calculates the minimum cost of a spanning tree for a graph with 4 nodes and 5 edges. The output shows the minimum cost is 16, followed by the edges included in the spanning tree: 0 - 1, 1 - 2, 1 - 4, and 0 - 3.

```
PS E:\College-Work\Sixth-Semester\DAA-practical\Practical-4> cd "e:\College-Work\Sixth-Semester\DAA-practical\Practical-4\" ; if ($?) { g++ Kruskhals-Algo.cpp -o Kruskhals-Algo } ; if ($?) { .\Kruskhals-Algo }
Min cost
16
0 - 1
1 - 2
1 - 4
0 - 3
PS E:\College-Work\Sixth-Semester\DAA-practical\Practical-4> |
```

# Prims Algo



```
Prims-Algo.cpp X
Practical-4 > C++ Prims-Algo.cpp > main()
1  #include<bits/stdc++.h>
2  using namespace std;
3
4  int main(){
5      int N,m;
6      cout << "Enter the no of vertices " << endl;
7      cin >> N;
8      cout << "Enter the no of edges " << endl;
9      cin >> m;
10     vector<pair<int,int> > adj[N];
11
12     for(int i = 0; i<m ; i++){
13         int vex1, vex2, weight;
14         cout << "Vertex One: ";
15         cin >> vex1;
16         cout << "vertex Two: ";
17         cin >> vex2;
18         cout << "Weight: ";
19         cin >> weight;
20         cout << endl;
21         adj[vex1].push_back(make_pair(vex2,weight));
22         adj[vex2].push_back(make_pair(vex1,weight));
23     }
24 }
```



```
Prims-Algo.cpp X
Practical-4 > C++ Prims-Algo.cpp > main()
25     int parent[N];
26
27     int key[N];
28
29     bool mstSet[N];
30
31     for (int i = 0; i < N; i++)
32         key[i] = INT_MAX, mstSet[i] = false;
33
34     priority_queue< pair<int,int>, vector <pair<int,int>> , greater<pair<int,int>>> > pq;
35
36     key[0] = 0;
37     parent[0] = -1;
38     pq.push({0, 0});
39     while(!pq.empty())
40     {
41         int u = pq.top().second;
42         pq.pop();
43
44         mstSet[u] = true;
45
46         for (auto it : adj[u]) {
```

The screenshot shows the Visual Studio Code editor with a C++ file named `Prims-Algo.cpp`. The code implements Prim's algorithm to find the Minimum Spanning Tree (MST) of a weighted undirected graph. The algorithm uses a priority queue (`pq`) to select the minimum weight edge that does not create a cycle. The `parent` array stores the parent of each vertex in the MST.

```
39 while(!pq.empty())
40 {
41     int u = pq.top().second;
42     pq.pop();
43
44     mstSet[u] = true;
45
46     for (auto it : adj[u]) {
47         int v = it.first;
48         int weight = it.second;
49         if (mstSet[v] == false && weight < key[v]) {
50             parent[v] = u;
51             key[v] = weight;
52             pq.push({key[v], v});
53         }
54     }
55 }
56
57
58 for (int i = 1; i < N; i++)
59     cout << parent[i] << " - " << i << " \n";
60 return 0;
```

The screenshot shows the terminal window of Visual Studio Code. The user has compiled and executed the `Prims-Algo.cpp` program. The program prompts the user to enter the number of vertices and edges, and then the weights of the edges. The output shows the parent of each vertex in the MST.

```
PS E:\College-Work\Sixth-Semester\DAA-practical\Practical-4> cd "E:\College-Work\Sixth-Semester\DAA-practical\Practical-4\" ; if ($?) {
  g++ Prims-Algo.cpp -o Prims-Algo } ; if ($?) { .\Prims-Algo }
Enter the no of vertices
5
Enter the no of edges
6
Vertex One: 1
vertex Two: 0
Weight: 4

Vertex One: 1
vertex Two: 2
Weight: 7

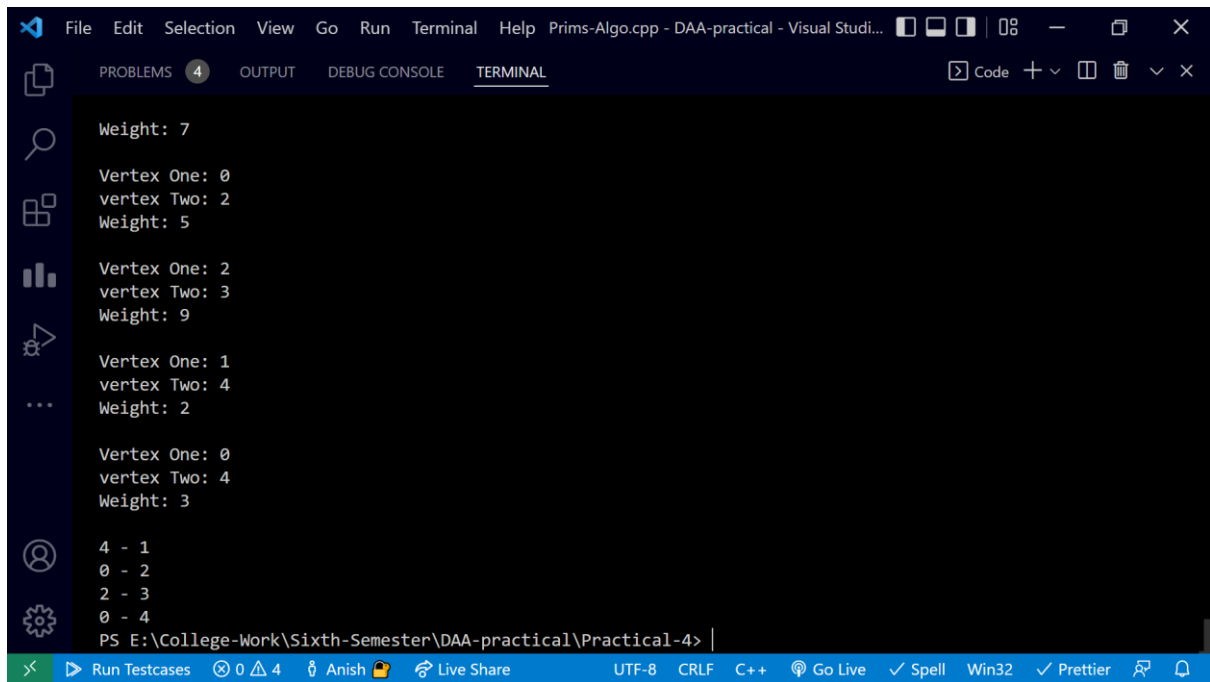
Vertex One: 0
vertex Two: 2
Weight: 5

...

Vertex One: 2
vertex Two: 3
Weight: 9

Vertex One: 1
vertex Two: 4
Weight: 2

Vertex One: 0
vertex Two: 4
Weight: 3
```



```
Weight: 7
Vertex One: 0
vertex Two: 2
Weight: 5

Vertex One: 2
vertex Two: 3
Weight: 9

Vertex One: 1
vertex Two: 4
Weight: 2

Vertex One: 0
vertex Two: 4
Weight: 3

4 - 1
0 - 2
2 - 3
0 - 4
PS E:\College-Work\Sixth-Semester\DAA-practical\Practical-4>
```