Graph Adjacent Node

```
#include <iostream>
using namespace std;

struct adjNode {
    int val, cost;
    adjNode* next;
};

struct graphEdge {
    int start_ver, end_ver, weight;
};
class DiaGraph{

    adjNode* getAdjListNode(int value, int weight, adjNode*
head)   {
        adjNode* newNode = new adjNode;
        newNode->val = value;
        newNode->cost = weight;

        newNode->next = head;
        return newNode;
    }
    int N;
public:
    adjNode **head;

    DiaGraph(graphEdge edges[], int n, int N)  {

        head = new adjNode*[N]();
        this->N = N;

        for (int i = 0; i < N; ++i)
            head[i] = nullptr;

        for (unsigned i = 0; i < n; i++)  {
```

```
            int start_ver = edges[i].start_ver;
            int end_ver = edges[i].end_ver;
            int weight = edges[i].weight;

            adjNode* newNode = getAdjListNode(end_ver, weigh
t, head[start_ver]);


            head[start_ver] = newNode;
             }
    }

     ~DiaGraph() {
    for (int i = 0; i < N; i++)
        delete[] head[i];
        delete[] head;
     }
};

void display_AdjList(adjNode* ptr, int i)
{
    while (ptr != nullptr) {
        cout << "(" << i << ", " << ptr->val
            << ", " << ptr->cost << ") ";
        ptr = ptr->next;
    }
    cout << endl;
}

int main()
{

    graphEdge edges[] = {

        {0,1,2},{0,2,4},{1,4,3},{2,3,2},{3,1,4},{4,3,3}
    };
    int N = 6;
```

```
    int n = sizeof(edges)/sizeof(edges[0]);

    DiaGraph diagraph(edges, n, N);

    cout<<"Graph adjacency list "<<endl<<"(start_vertex, end
_vertex, weight):"<<endl;
    for (int i = 0; i < N; i++)
    {

        display_AdjList(diagraph.head[i], i);
    }
    return 0;
}
```

Output:

```
E:\PRADIP\DataStructureInC++>cd "e:\PRADIP\DataStructureInC++\" && g++ graphAd
jacentNode.c++ -o graphAdjacentNode && "e:\PRADIP\DataStructureInC++\"graphAdj
acentNode
Graph adjacency list
(start_vertex, end_vertex, weight):
(0, 2, 4) (0, 1, 2)
(1, 4, 3)
(2, 3, 2)
(3, 1, 4)
(4, 3, 3)


E:\PRADIP\DataStructureInC++>
```

Ln 3, Col 1 Spaces: 4 UTF-8 CRLF C++ Win32

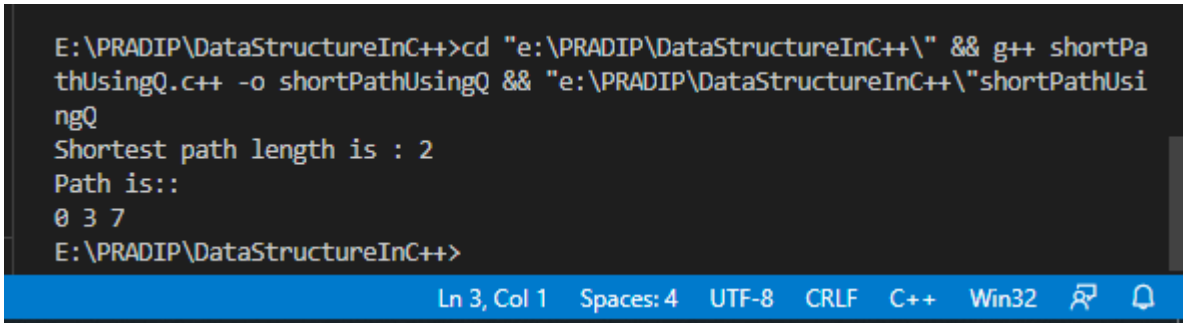
Unweighted Graph Shortest path

```
#include <bits/stdc++.h>
using namespace std;

void add_edge(vector<int> adj[], int src, int dest)
{
    adj[src].push_back(dest);
    adj[dest].push_back(src);
}


bool BFS(vector<int> adj[], int src, int dest, int v,
         int pred[], int dist[])
{

    list<int> queue;


    bool visited[v];


    for (int i = 0; i < v; i++) {
        visited[i] = false;
        dist[i] = INT_MAX;
        pred[i] = -1;
    }


    visited[src] = true;
    dist[src] = 0;
    queue.push_back(src);


    while (!queue.empty()) {
        int u = queue.front();
```

```
        queue.pop_front();
        for (int i = 0; i < adj[u].size(); i++) {
            if (visited[adj[u][i]] == false) {
                visited[adj[u][i]] = true;
                dist[adj[u][i]] = dist[u] + 1;
                pred[adj[u][i]] = u;
                queue.push_back(adj[u][i]);


                if (adj[u][i] == dest)
                    return true;
            }
        }
    }

    return false;
}


void printShortestDistance(vector<int> adj[], int s,
                           int dest, int v)
{

    int pred[v], dist[v];

    if (BFS(adj, s, dest, v, pred, dist) == false) {
        cout << "Given source and destination"
             << " are not connected";
        return;
    }


    vector<int> path;
    int crawl = dest;
    path.push_back(crawl);
    while (pred[crawl] != -1) {
        path.push_back(pred[crawl]);
        crawl = pred[crawl];
```

```
    }


    cout << "Shortest path length is : "
         << dist[dest];


    cout << "\nPath is::\n";
    for (int i = path.size() - 1; i >= 0; i--)
        cout << path[i] << " ";
}


int main()
{

    int v = 8;


    vector<int> adj[v];


    add_edge(adj, 0, 1);
    add_edge(adj, 0, 3);
    add_edge(adj, 1, 2);
    add_edge(adj, 3, 4);
    add_edge(adj, 3, 7);
    add_edge(adj, 4, 5);
    add_edge(adj, 4, 6);
    add_edge(adj, 4, 7);
    add_edge(adj, 5, 6);
    add_edge(adj, 6, 7);
    int source = 0, dest = 7;
    printShortestDistance(adj, source, dest, v);
    return 0;
}
```

Output:


E:\PRADIP\DataStructureInC++>cd "e:\PRADIP\DataStructureInC++\" && g++ shortPathUsingQ.c++ -o shortPathUsingQ && "e:\PRADIP\DataStructureInC++\"shortPathUsingQ
Shortest path length is : 2
Path is::
0 3 7
E:\PRADIP\DataStructureInC++>
Ln 3, Col 1
Spaces: 4
UTF-8
CRLF
C++
Win32

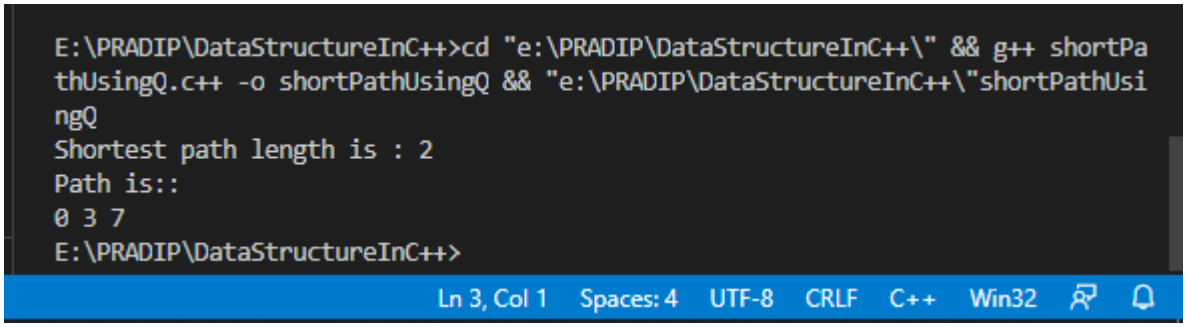
Unweighted Graph Shortest path using Queue

```
#include <iostream>
using namespace std;

void add_edge(vector<int> adj[], int src, int dest)
{
    adj[src].push_back(dest);
    adj[dest].push_back(src);
}


bool BFS(vector<int> adj[], int src, int dest, int v,
         int pred[], int dist[])
{

    list<int> queue;


    bool visited[v];


    for (int i = 0; i < v; i++) {
        visited[i] = false;
        dist[i] = INT_MAX;
        pred[i] = -1;
    }


    visited[src] = true;
    dist[src] = 0;
    queue.push_back(src);


    while (!queue.empty()) {
        int u = queue.front();
```

```
        queue.pop_front();
        for (int i = 0; i < adj[u].size(); i++) {
            if (visited[adj[u][i]] == false) {
                visited[adj[u][i]] = true;
                dist[adj[u][i]] = dist[u] + 1;
                pred[adj[u][i]] = u;
                queue.push_back(adj[u][i]);


                if (adj[u][i] == dest)
                    return true;
            }
        }
    }

    return false;
}


void printShortestDistance(vector<int> adj[], int s,
                           int dest, int v)
{

    int pred[v], dist[v];

    if (BFS(adj, s, dest, v, pred, dist) == false) {
        cout << "Given source and destination"
             << " are not connected";
        return;
    }


    vector<int> path;
    int crawl = dest;
    path.push_back(crawl);
    while (pred[crawl] != -1) {
        path.push_back(pred[crawl]);
        crawl = pred[crawl];
```

```
    }


    cout << "Shortest path length is : "
         << dist[dest];


    cout << "\nPath is::\n";
    for (int i = path.size() - 1; i >= 0; i--)
        cout << path[i] << " ";
}


int main()
{

    int v = 8;


    vector<int> adj[v];


    add_edge(adj, 0, 1);
    add_edge(adj, 0, 3);
    add_edge(adj, 1, 2);
    add_edge(adj, 3, 4);
    add_edge(adj, 3, 7);
    add_edge(adj, 4, 5);
    add_edge(adj, 4, 6);
    add_edge(adj, 4, 7);
    add_edge(adj, 5, 6);
    add_edge(adj, 6, 7);
    int source = 0, dest = 7;
    printShortestDistance(adj, source, dest, v);
    return 0;
}
```

Output:


E:\PRADIP\DataStructureInC++>cd "e:\PRADIP\DataStructureInC++\" && g++ shortPathUsingQ.c++ -o shortPathUsingQ && "e:\PRADIP\DataStructureInC++\"shortPathUsingQ
Shortest path length is : 2
Path is::
0 3 7
E:\PRADIP\DataStructureInC++>
Ln 3, Col 1
Spaces: 4
UTF-8
CRLF
C++
Win32

Dijkstra's Weighted Graph Shortest Path

```c
#include <limits.h>
#include <stdio.h>


#define V 9


int minDistance(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;
}


void printSolution(int dist[])
{
    printf("Vertex \t\t Distance from Source\n");
    for (int i = 0; i < V; i++)
        printf("%d \t\t %d\n", i, dist[i]);
}


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


    bool sptSet[V];
```

```
    for (int i = 0; i < V; i++)
        dist[i] = INT_MAX, sptSet[i] = false;


    dist[src] = 0;


    for (int count = 0; count < V - 1; count++) {

        int u = minDistance(dist, sptSet);


        sptSet[u] = true;


        for (int v = 0; v < V; v++)


            if (!sptSet[v] && graph[u][v] && dist[u] != INT_
MAX
                && dist[u] + graph[u][v] < dist[v])
                dist[v] = dist[u] + graph[u][v];
    }


    printSolution(dist);
}


int main()
{

    int graph[V][V] = { { 0, 4, 0, 0, 0, 0, 0, 8, 0 },
                        { 4, 0, 8, 0, 0, 0, 0, 11, 0 },
                        { 0, 8, 0, 7, 0, 4, 0, 0, 2 },
                        { 0, 0, 7, 0, 9, 14, 0, 0, 0 },
                        { 0, 0, 0, 9, 0, 10, 0, 0, 0 },
                        { 0, 0, 4, 14, 10, 0, 2, 0, 0 },
```

```
                        { 0, 0, 0, 0, 0, 2, 0, 1, 6 },
                        { 8, 11, 0, 0, 0, 0, 1, 0, 7 },
                        { 0, 0, 2, 0, 0, 0, 6, 7, 0 } };

    dijkstra(graph, 0);

    return 0;
}
```

Output:

```
E:\PRADIP\DataStructureInC++>cd "e:\PRADIP\DataStructureInC++\" && g++ dijkstr
a.c++ -o dijkstra && "e:\PRADIP\DataStructureInC++\"dijkstra
Vertex          Distance from Source
0               0
1               4
2               12
3               19
4               21
5               11
6               9
7               8
8               14

E:\PRADIP\DataStructureInC++>
```

Ln 4, Col 1 Spaces: 4 UTF-8 CRLF C++ Win32

Priority Queue using Min Heap

```cpp
#include <iostream>
using namespace std;


int main ()
{

    priority_queue <int> pq;
    pq.push(5);
    pq.push(1);
    pq.push(10);
    pq.push(30);
    pq.push(20);


    while (pq.empty() == false)
    {
        cout << pq.top() << " ";
        pq.pop();
    }

    return 0;
}
```

Output:

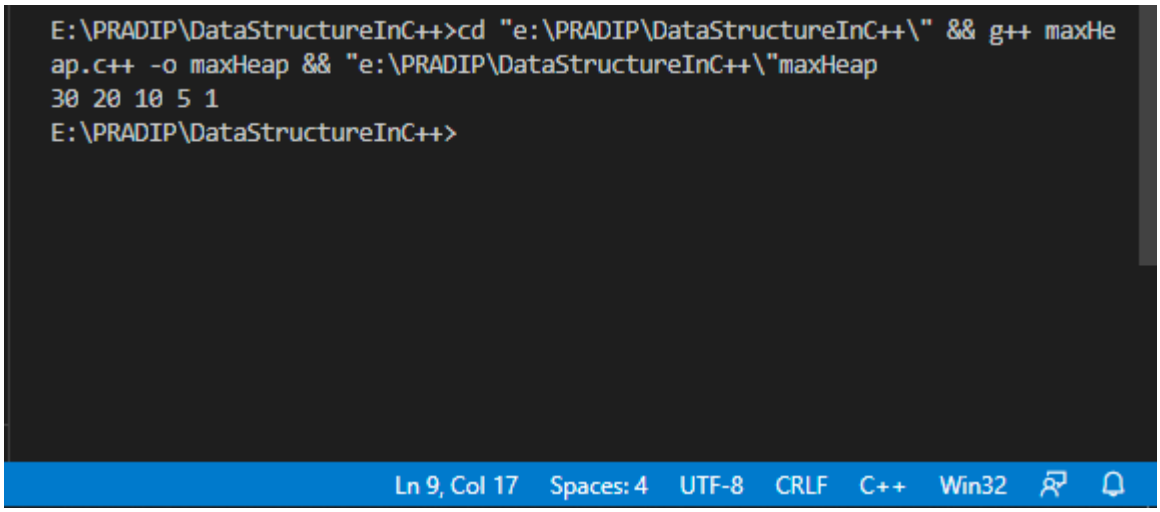
```
E:\PRADIP\DataStructureInC++>cd "e:\PRADIP\DataStructureInC++\" && g++ priorit
yQUsingMinHeap.c++ -o priorityQUsingMinHeap && "e:\PRADIP\DataStructureInC++\"
priorityQUsingMinHeap
30 20 10 5 1
E:\PRADIP\DataStructureInC++>
```

Ln 4, Col 1 Spaces: 4 UTF-8 CRLF C++ Win32

Max Heap

```cpp
#include <iostream>
using namespace std;

int main ()
{

    priority_queue <int> pq;
    pq.push(5);
    pq.push(1);
    pq.push(10);
    pq.push(30);
    pq.push(20);


    while (pq.empty() == false)
    {
        cout << pq.top() << " ";
        pq.pop();
    }

    return 0;
}
```

Output:

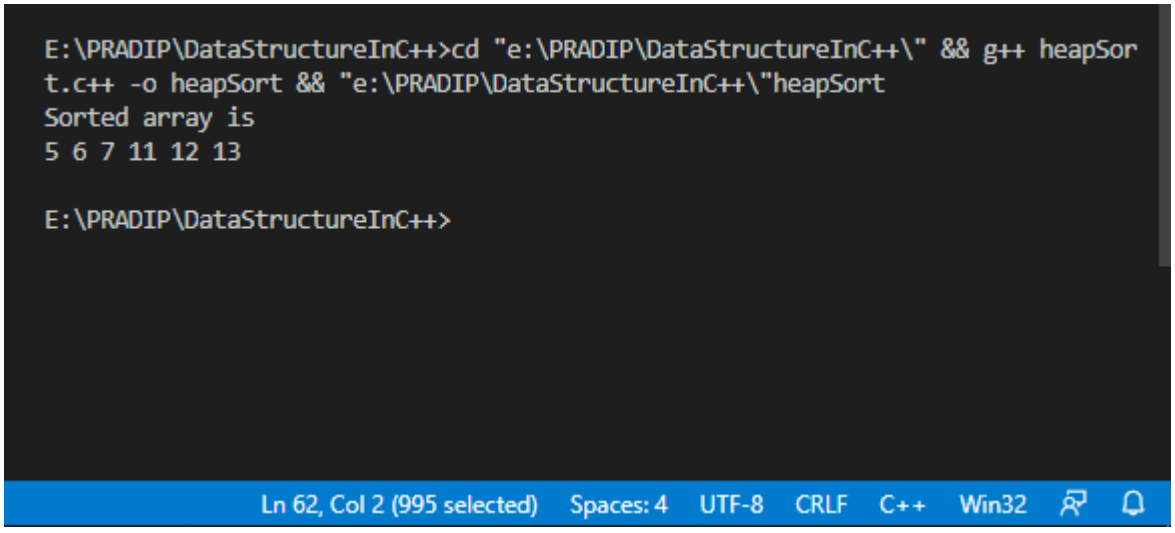


Heap sort

```cpp
#include <iostream>

using namespace std;


void heapify(int arr[], int n, int i)
{
    int largest = i;
    int l = 2 * i + 1;
    int r = 2 * i + 2;


    if (l < n && arr[l] > arr[largest])
        largest = l;


    if (r < n && arr[r] > arr[largest])
        largest = r;


    if (largest != i) {
        swap(arr[i], arr[largest]);


        heapify(arr, n, largest);
    }
}


void heapSort(int arr[], int n)
{

    for (int i = n / 2 - 1; i >= 0; i--)
        heapify(arr, n, i);
```

```
    for (int i = n - 1; i > 0; i--) {

        swap(arr[0], arr[i]);
        heapify(arr, i, 0);
    }
}


void printArray(int arr[], int n)
{
    for (int i = 0; i < n; ++i)
        cout << arr[i] << " ";
    cout << "\n";
}


int main()
{
    int arr[] = { 12, 11, 13, 5, 6, 7 };
    int n = sizeof(arr) / sizeof(arr[0]);

    heapSort(arr, n);

    cout << "Sorted array is \n";
    printArray(arr, n);
}
```

Output:

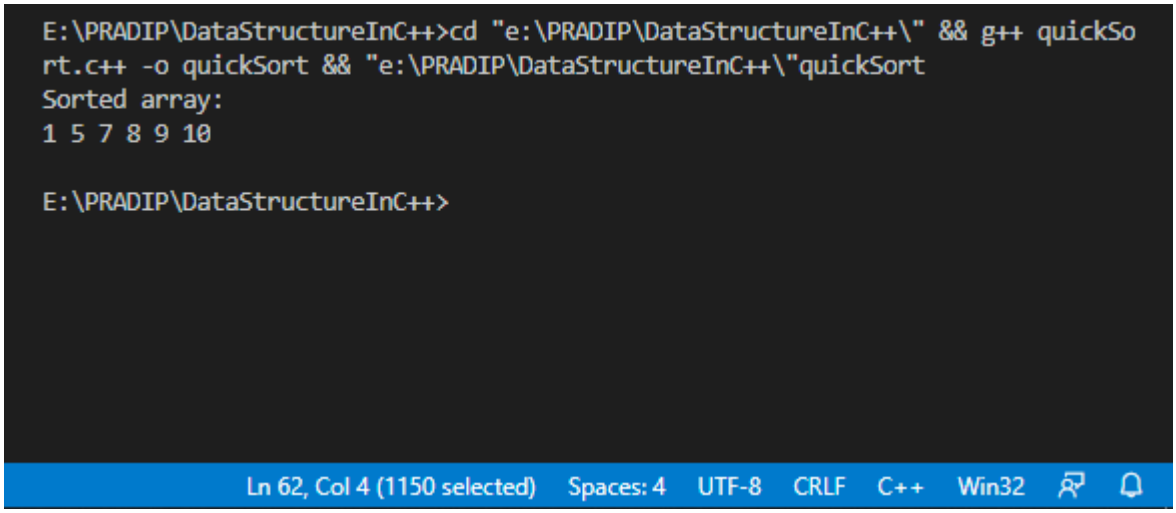

E:\PRADIP\DataStructureInC++>cd "e:\PRADIP\DataStructureInC++\" && g++ heapSor
t.c++ -o heapSort && "e:\PRADIP\DataStructureInC++\"heapSort
Sorted array is
5 6 7 11 12 13
E:\PRADIP\DataStructureInC++>
Ln 62, Col 2 (995 selected)
Spaces: 4
UTF-8
CRLF
C++
Win32

Quick Sort

```
#include <iostream>
using namespace std;


void swap(int* a, int* b)
{
    int t = *a;
    *a = *b;
    *b = t;
}


int partition (int arr[], int low, int high)
{
    int pivot = arr[high];
    int i = (low - 1);

    for (int j = low; j <= high - 1; j++)
    {

        if (arr[j] < pivot)
        {
            i++;
            swap(&arr[i], &arr[j]);
        }
    }
    swap(&arr[i + 1], &arr[high]);
    return (i + 1);
}


void quickSort(int arr[], int low, int high)
{
    if (low < high)
    {
```

```
        int pi = partition(arr, low, high);

        quickSort(arr, low, pi - 1);
        quickSort(arr, pi + 1, high);
    }
}


void printArray(int arr[], int size)
{
    int i;
    for (i = 0; i < size; i++)
        cout << arr[i] << " ";
    cout << endl;
}


int main()
{
    int arr[] = {10, 7, 8, 9, 1, 5};
    int n = sizeof(arr) / sizeof(arr[0]);
    quickSort(arr, 0, n - 1);
    cout << "Sorted array: \n";
    printArray(arr, n);
    return 0;
}
```

Output:


E:\PRADIP\DataStructureInC++>cd "e:\PRADIP\DataStructureInC++\" && g++ quickSo
rt.c++ -o quickSort && "e:\PRADIP\DataStructureInC++\"quickSort
Sorted array:
1 5 7 8 9 10
E:\PRADIP\DataStructureInC++>
Ln 62, Col 4 (1150 selected)
Spaces: 4
UTF-8
CRLF
C++
Win32

Radix Sort

```
#include <iostream>
using namespace std;


int getMax(int arr[], int n)
{
    int mx = arr[0];
    for (int i = 1; i < n; i++)
        if (arr[i] > mx)
            mx = arr[i];
    return mx;
}


void countSort(int arr[], int n, int exp)
{
    int output[n];
    int i, count[10] = { 0 };


    for (i = 0; i < n; i++)
        count[(arr[i] / exp) % 10]++;


    for (i = 1; i < 10; i++)
        count[i] += count[i - 1];


    for (i = n - 1; i >= 0; i--) {
        output[count[(arr[i] / exp) % 10] - 1] = arr[i];
        count[(arr[i] / exp) % 10]--;
    }

    for (i = 0; i < n; i++)
        arr[i] = output[i];
```

```
}



void radixsort(int arr[], int n)
{

    int m = getMax(arr, n);


    for (int exp = 1; m / exp > 0; exp *= 10)
        countSort(arr, n, exp);
}


void print(int arr[], int n)
{
    for (int i = 0; i < n; i++)
        cout << arr[i] << " ";
}


int main()
{
    int arr[] = { 170, 45, 75, 90, 802, 24, 2, 66 };
    int n = sizeof(arr) / sizeof(arr[0]);


      radixsort(arr, n);
    print(arr, n);
    return 0;
}
```

Output:

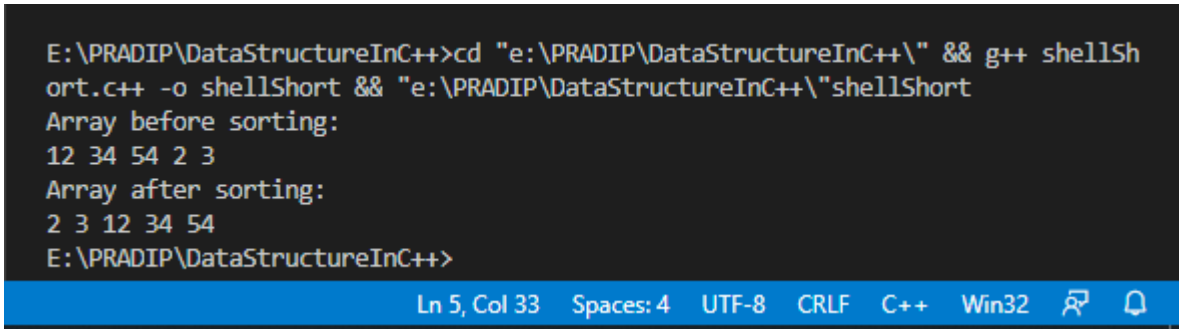
```
E:\PRADIP\DataStructureInC++>cd "e:\PRADIP\DataStructureInC++\" && g++ radixSo
rt.c++ -o radixSort && "e:\PRADIP\DataStructureInC++\"radixSort
2 24 45 66 75 90 170 802
```

Shell sort

```
#include  <iostream>
using namespace std;


int shellSort(int arr[], int n)
{

    for (int gap = n/2; gap > 0; gap /= 2)
    {

        for (int i = gap; i < n; i += 1)
        {

            int temp = arr[i];


            int j;
            for (j = i; j >= gap && arr[j - gap] > temp; j -
= gap)
                arr[j] = arr[j - gap];


            arr[j] = temp;
        }
    }
    return 0;
}

void printArray(int arr[], int n)
{
    for (int i=0; i<n; i++)
        cout << arr[i] << " ";
}

int main()
```

```
{
    int arr[] = {12, 34, 54, 2, 3}, i;
    int n = sizeof(arr)/sizeof(arr[0]);

    cout << "Array before sorting: \n";
    printArray(arr, n);

    shellSort(arr, n);

    cout << "\nArray after sorting: \n";
    printArray(arr, n);

    return 0;
}
```

Output:



Merge sort

```cpp
#include <iostream>
using namespace std;


void merge(int arr[], int l, int m, int r)
{
    int n1 = m - l + 1;
    int n2 = r - m;


    int L[n1], R[n2];


    for (int i = 0; i < n1; i++)
        L[i] = arr[l + i];
    for (int j = 0; j < n2; j++)
        R[j] = arr[m + 1 + j];


    int i = 0;


    int j = 0;


    int k = l;

    while (i < n1 && j < n2) {
        if (L[i] <= R[j]) {
            arr[k] = L[i];
            i++;
        }
        else {
            arr[k] = R[j];
            j++;
```

```
        }
        k++;
    }


    while (i < n1) {
        arr[k] = L[i];
        i++;
        k++;
    }


    while (j < n2) {
        arr[k] = R[j];
        j++;
        k++;
    }
}


void mergeSort(int arr[],int l,int r){
    if(l>=r){
        return;
    }
    int m = (l+r-1)/2;
    mergeSort(arr,l,m);
    mergeSort(arr,m+1,r);
    merge(arr,l,m,r);
}


void printArray(int A[], int size)
{
    for (int i = 0; i < size; i++)
        cout << A[i] << " ";
}
```

```
int main()
{
    int arr[] = { 12, 11, 13, 5, 6, 7 };
    int arr_size = sizeof(arr) / sizeof(arr[0]);

    cout << "Given array is \n";
    printArray(arr, arr_size);

    mergeSort(arr, 0, arr_size - 1);

    cout << "\nSorted array is \n";
    printArray(arr, arr_size);
    return 0;
}
```

Output:

```
E:\PRADIP\DataStructureInC++>cd "e:\PRADIP\DataStructureInC++\" && g++ margeSo
rt.c++ -o margeSort && "e:\PRADIP\DataStructureInC++\"margeSort
Given array is
12 11 13 5 6 7
Sorted array is
5 6 7 11 12 13
E:\PRADIP\DataStructureInC++>
```

Ln 59, Col 6 Spaces: 4 UTF-8 CRLF C++ Win32

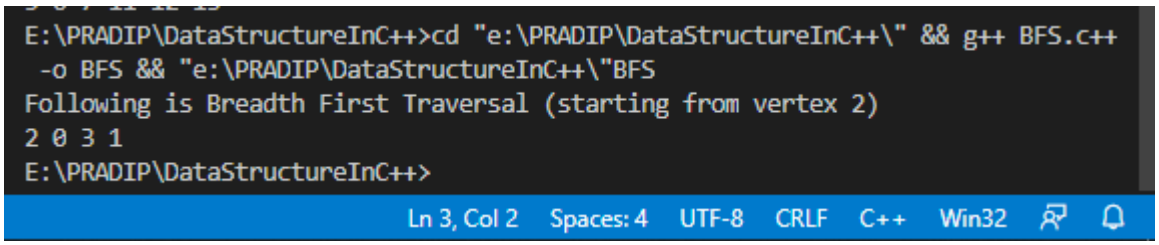
BFS

```
#include<iostream>
#include <list>

using namespace std;



class Graph
{
    int V;


    list<int> *adj;
public:
    Graph(int V);


    void addEdge(int v, int w);


    void BFS(int s);
};

Graph::Graph(int V)
{
    this->V = V;
    adj = new list<int>[V];
}

void Graph::addEdge(int v, int w)
{
    adj[v].push_back(w);
}

void Graph::BFS(int s)
{
```

```
    bool *visited = new bool[V];
    for(int i = 0; i < V; i++)
        visited[i] = false;


    list<int> queue;


    visited[s] = true;
    queue.push_back(s);


    list<int>::iterator i;

    while(!queue.empty())
    {

        s = queue.front();
        cout << s << " ";
        queue.pop_front();


        for (i = adj[s].begin(); i != adj[s].end(); ++i)
        {
            if (!visited[*i])
            {
                visited[*i] = true;
                queue.push_back(*i);
            }
        }
    }
}


int main()
{
```

```
    Graph g(4);
    g.addEdge(0, 1);
    g.addEdge(0, 2);
    g.addEdge(1, 2);
    g.addEdge(2, 0);
    g.addEdge(2, 3);
    g.addEdge(3, 3);

    cout << "Following is Breadth First Traversal "
         << "(starting from vertex 2) \n";
    g.BFS(2);

    return 0;
}
```

Output:



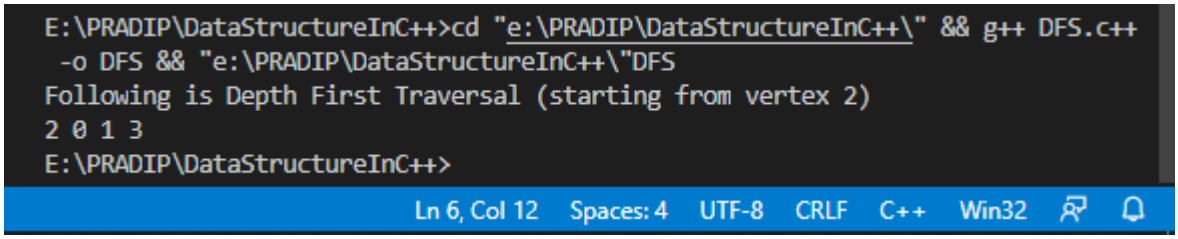
DFS

```
#include <iostream>
using namespace std;


class Graph {
    int V;


    list<int>* adj;


    void DFSUtil(int v, bool visited[]);

public:
    Graph(int V);

    void addEdge(int v, int w);


    void DFS(int v);
};

Graph::Graph(int V)
{
    this->V = V;
    adj = new list<int>[V];
}

void Graph::addEdge(int v, int w)
{
    adj[v].push_back(w);
}

void Graph::DFSUtil(int v, bool visited[])
{
```

```
    visited[v] = true;
    cout << v << " ";


    list<int>::iterator i;
    for (i = adj[v].begin(); i != adj[v].end(); ++i)
        if (!visited[*i])
            DFSUtil(*i, visited);
}


void Graph::DFS(int v)
{

    bool* visited = new bool[V];
    for (int i = 0; i < V; i++)
        visited[i] = false;


    DFSUtil(v, visited);
}


int main()
{

    Graph g(4);
    g.addEdge(0, 1);
    g.addEdge(0, 2);
    g.addEdge(1, 2);
    g.addEdge(2, 0);
    g.addEdge(2, 3);
    g.addEdge(3, 3);

    cout << "Following is Depth First Traversal"
            " (starting from vertex 2) \n";
    g.DFS(2);
```

```
    return 0;
}
```

Output:



Kruskals

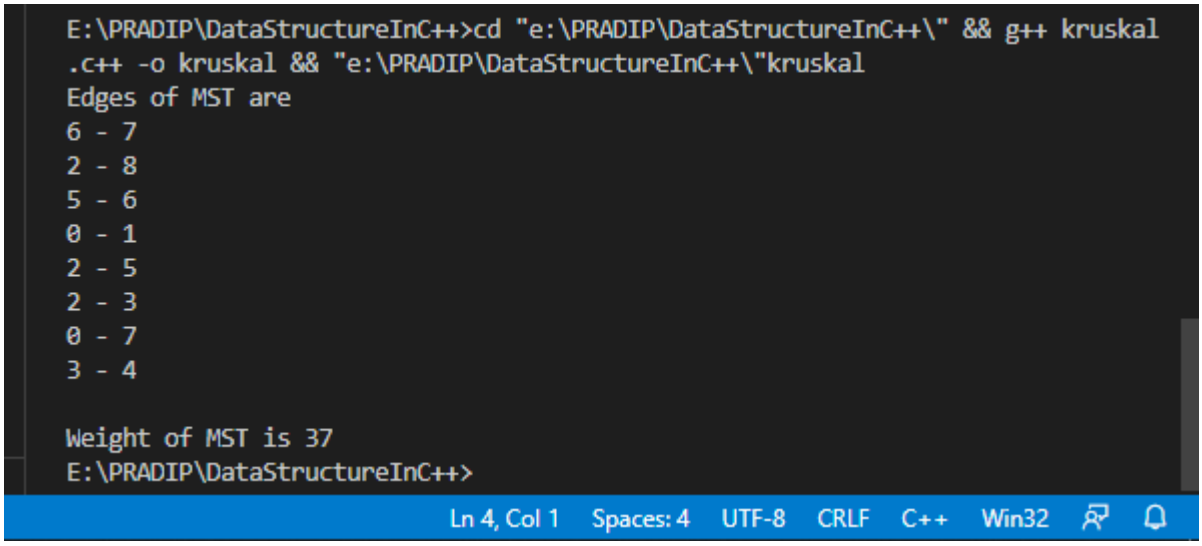
```
#include <iostream>
using namespace std;


typedef  pair<int, int> iPair;


struct Graph
{
    int V, E;
    vector< pair<int, iPair> > edges;


    Graph(int V, int E)
    {
        this->V = V;
        this->E = E;
    }

    void addEdge(int u, int v, int w)
    {
        edges.push_back({w, {u, v}});
    }


    int kruskalMST();
};


struct DisjointSets
{
    int *parent, *rnk;
    int n;
```

```
    DisjointSets(int n)
    {

        this->n = n;
        parent = new int[n+1];
        rnk = new int[n+1];


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


            parent[i] = i;
        }
    }

    int find(int u)
    {

        if (u != parent[u])
            parent[u] = find(parent[u]);
        return parent[u];
    }


    void merge(int x, int y)
    {
        x = find(x), y = find(y);


        if (rnk[x] > rnk[y])
            parent[y] = x;
        else
            parent[x] = y;

        if (rnk[x] == rnk[y])
            rnk[y]++;
```

```
    }
};



int Graph::kruskalMST()
{
    int mst_wt = 0;

    sort(edges.begin(), edges.end());


    DisjointSets ds(V);


    vector< pair<int, iPair> >::iterator it;
    for (it=edges.begin(); it!=edges.end(); it++)
    {
        int u = it->second.first;
        int v = it->second.second;

        int set_u = ds.find(u);
        int set_v = ds.find(v);


        if (set_u != set_v)
        {

            cout << u << " - " << v << endl;


            mst_wt += it->first;


            ds.merge(set_u, set_v);
        }
    }
```

```
    return mst_wt;
}


int main()
{

    int V = 9, E = 14;
    Graph g(V, E);


    g.addEdge(0, 1, 4);
    g.addEdge(0, 7, 8);
    g.addEdge(1, 2, 8);
    g.addEdge(1, 7, 11);
    g.addEdge(2, 3, 7);
    g.addEdge(2, 8, 2);
    g.addEdge(2, 5, 4);
    g.addEdge(3, 4, 9);
    g.addEdge(3, 5, 14);
    g.addEdge(4, 5, 10);
    g.addEdge(5, 6, 2);
    g.addEdge(6, 7, 1);
    g.addEdge(6, 8, 6);
    g.addEdge(7, 8, 7);

    cout << "Edges of MST are \n";
    int mst_wt = g.kruskalMST();

    cout << "\nWeight of MST is " << mst_wt;

    return 0;
}
```

Output:


E:\PRADIP\DataStructureInC++>cd "e:\PRADIP\DataStructureInC++\" && g++ kruskal
.c++ -o kruskal && "e:\PRADIP\DataStructureInC++\"kruskal
Edges of MST are
6 - 7
2 - 8
5 - 6
0 - 1
2 - 5
2 - 3
0 - 7
3 - 4
Weight of MST is 37
E:\PRADIP\DataStructureInC++>
Ln 4, Col 1
Spaces: 4
UTF-8
CRLF
C++
Win32

Prim's Algo

```
#include <bits/stdc++.h>
using namespace std;


#define V 5


int minKey(int key[], bool mstSet[])
{

    int min = INT_MAX, min_index;

    for (int v = 0; v < V; v++)
        if (mstSet[v] == false && key[v] < min)
            min = key[v], min_index = v;

    return min_index;
}


void printMST(int parent[], int graph[V][V])
{
    cout<<"Edge \tWeight\n";
    for (int i = 1; i < V; i++)
        cout<<parent[i]<<" - "<<i<<" \t"<<graph[i][parent[i]
]<<" \n";
}


void primMST(int graph[V][V])
{

    int parent[V];
```

```
    int key[V];


    bool mstSet[V];


    for (int i = 0; i < V; i++)
        key[i] = INT_MAX, mstSet[i] = false;


    key[0] = 0;
    parent[0] = -1;


    for (int count = 0; count < V - 1; count++)
    {

        int u = minKey(key, mstSet);

        mstSet[u] = true;


        for (int v = 0; v < V; v++)


            if (graph[u][v] && mstSet[v] == false && graph[u
][v] < key[v])
                parent[v] = u, key[v] = graph[u][v];
    }


    printMST(parent, graph);
}


int main()
{
```

```
    int graph[V][V] = { { 0, 2, 0, 6, 0 },
                        { 2, 0, 3, 8, 5 },
                        { 0, 3, 0, 0, 7 },
                        { 6, 8, 0, 0, 9 },
                        { 0, 5, 7, 9, 0 } };


    primMST(graph);

    return 0;
}
```

Output: