**Analisis Algoritma**

****

**Disusun oleh :**

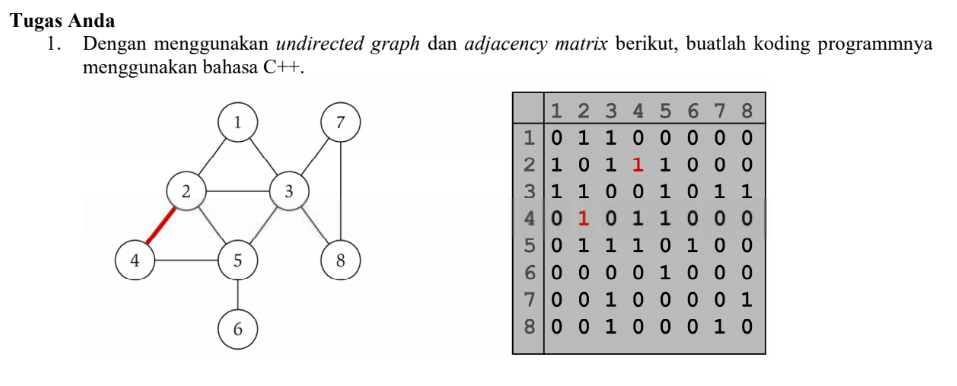
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**FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM**

**UNIVERSITAS PADJADJARAN**

**2020**



/\*

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\*/

#include <iostream>

#include <cstdlib>

using namespace std;

#define MAX 20

/\*

\* Class untuk Adjacency Matrix

\*/

class AdjacencyMatrix

{

private:

int n;

int \*\*adj;

bool \*visited;

public:

AdjacencyMatrix(int n)

{

this->n = n;

visited = new bool [n];

adj = new int\* [n];

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

{

adj[i] = new int [n];

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

{

adj[i][j] = 0;

}

}

}

/\*

\* Menambahkan edge ke graf

\*/

void add\_edge(int origin, int destin)

{

if( origin > n || destin > n || origin < 0 || destin < 0)

{

cout<<"Invalid edge!\n";

}

else

{

adj[origin - 1][destin - 1] = 1;

}

}

/\*

\* Mencetak graf

\*/

void display()

{

int i,j;

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

{

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

cout<<adj[i][j]<<" ";

cout<<endl;

}

}

};

/\*

\* Main

\*/

int main()

{

int nodes, max\_edges, origin, destin;

cout<<"Enter number of nodes: ";

cin>>nodes;

AdjacencyMatrix am(nodes);

max\_edges = nodes \* (nodes - 1);

for (int i = 0; i < max\_edges; i++)

{

cout<<"Enter edge (-1 -1 to exit): ";

cin>>origin>>destin;

if((origin == -1) && (destin == -1))

break;

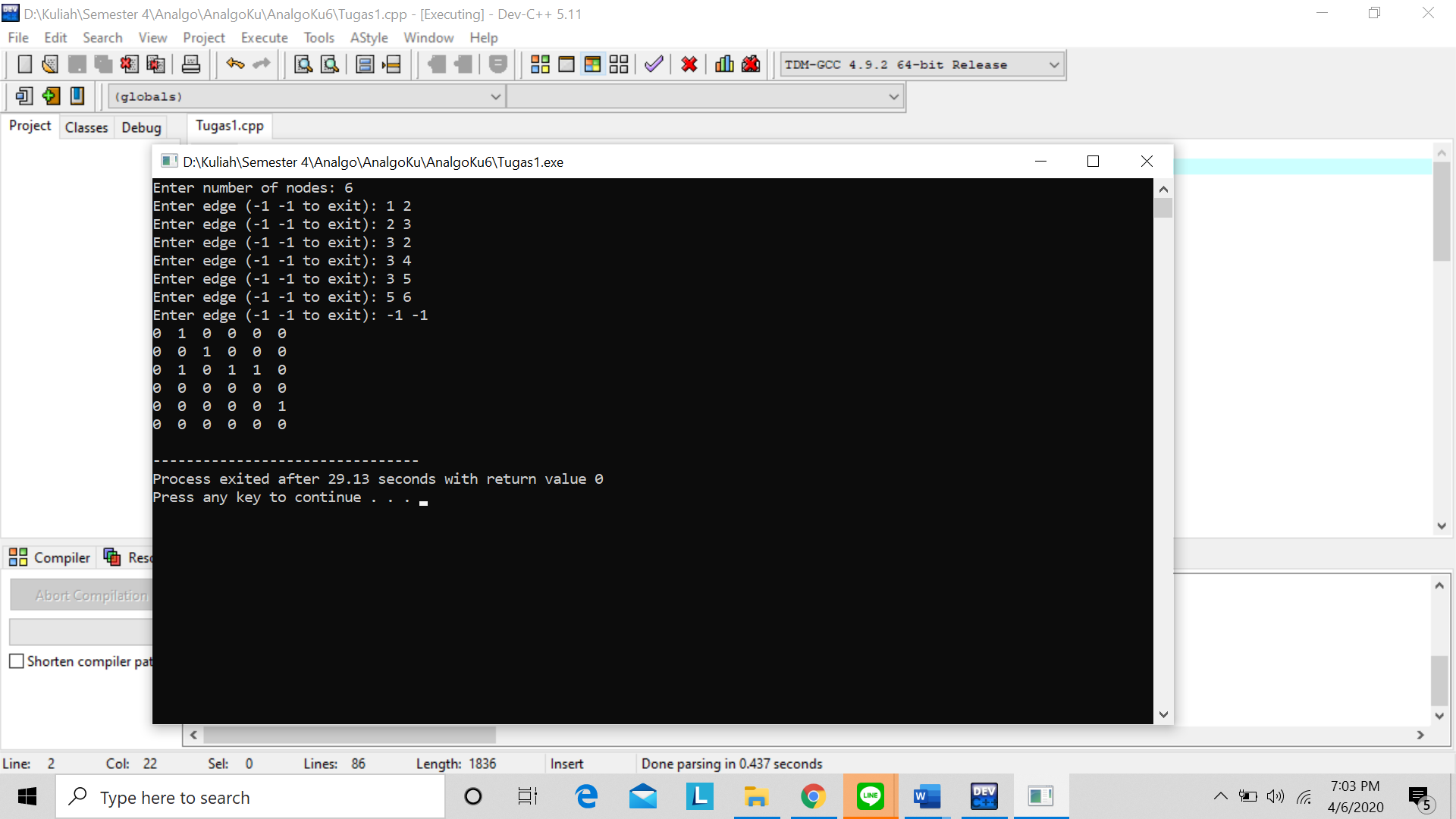
am.add\_edge(origin, destin);

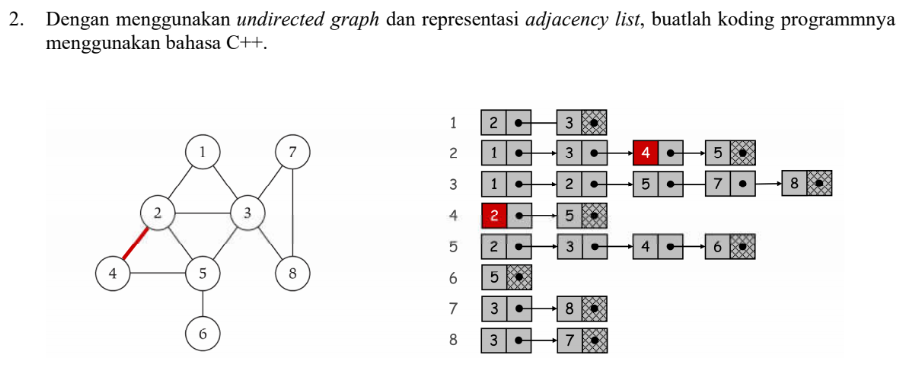
}

am.display();

return 0;

}



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\*/

#include <iostream>

#include <cstdlib>

using namespace std;

/\*

\* Adjacency List Node

\*/

struct AdjListNode

{

int dest;

struct AdjListNode\* next;

};

/\*

\* Adjacency List

\*/

struct AdjList

{

struct AdjListNode \*head;

};

/\*

\* Class Graph

\*/

class Graph

{

private:

int V;

struct AdjList\* array;

public:

Graph(int V)

{

this->V = V;

array = new AdjList [V];

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

array[i].head = NULL;

}

/\*

\* Creating New Adjacency List Node

\*/

AdjListNode\* newAdjListNode(int dest)

{

AdjListNode\* newNode = new AdjListNode;

newNode->dest = dest;

newNode->next = NULL;

return newNode;

}

/\*

\* Adding Edge to Graph

\*/

void addEdge(int src, int dest)

{

AdjListNode\* newNode = newAdjListNode(dest);

newNode->next = array[src].head;

array[src].head = newNode;

newNode = newAdjListNode(src);

newNode->next = array[dest].head;

array[dest].head = newNode;

}

/\*

\* Print the graph

\*/

void printGraph()

{

int v;

for (v = 1; v <= V; ++v)

{

AdjListNode\* pCrawl = array[v].head;

cout<<"\n Adjacency list of vertex "<<v<<"\n head ";

while (pCrawl)

{

cout<<"-> "<<pCrawl->dest;

pCrawl = pCrawl->next;

}

cout<<endl;

}

}

};

/\*

\* Main

\*/

int main()

{

Graph gh(8);

gh.addEdge(1, 2);

gh.addEdge(1, 3);

gh.addEdge(2, 4);

gh.addEdge(2, 5);

gh.addEdge(2, 3);

gh.addEdge(3, 7);

gh.addEdge(3, 8);

gh.addEdge(4, 5);

gh.addEdge(5, 3);

gh.addEdge(5, 6);

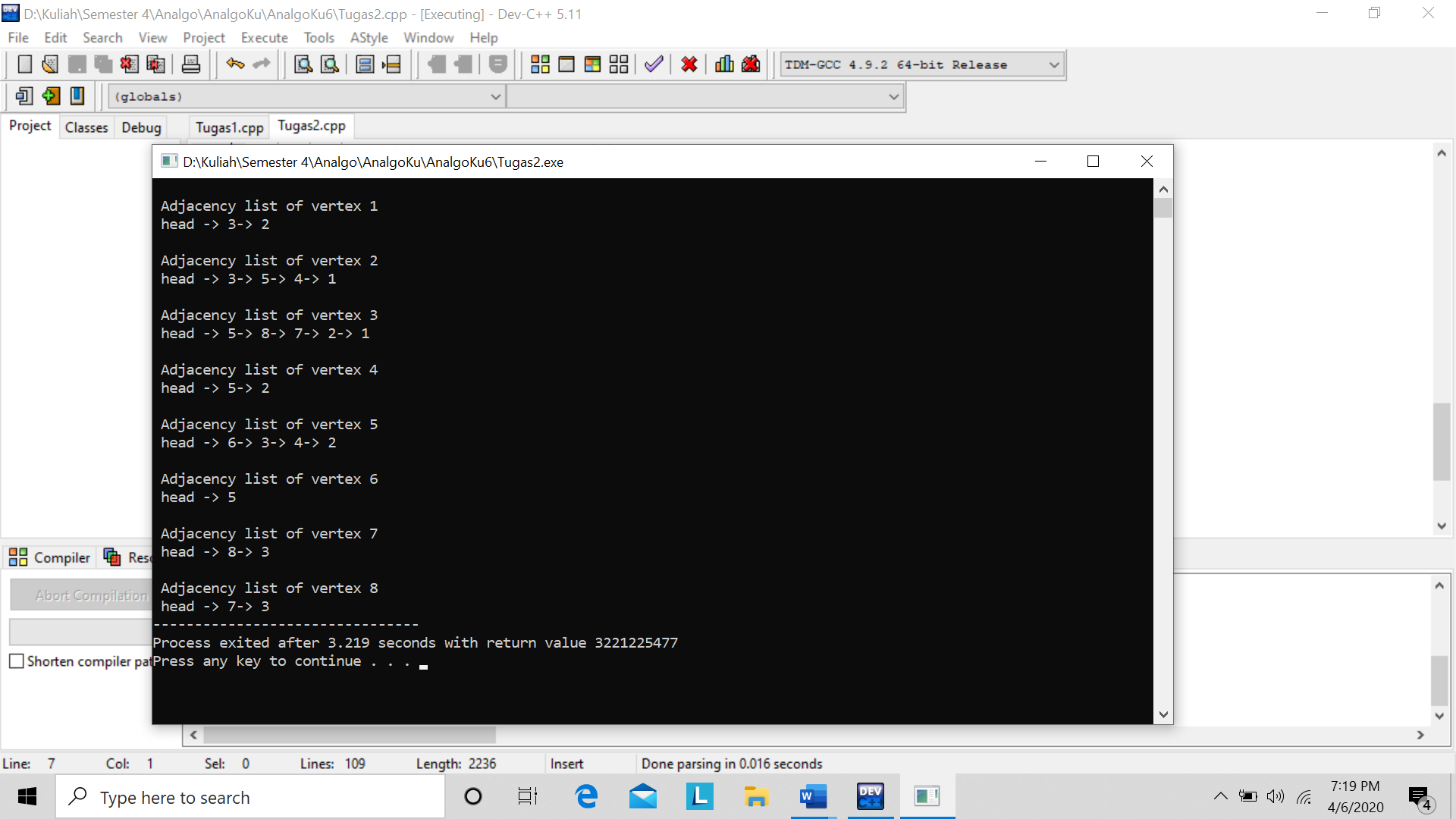
gh.addEdge(7, 8);

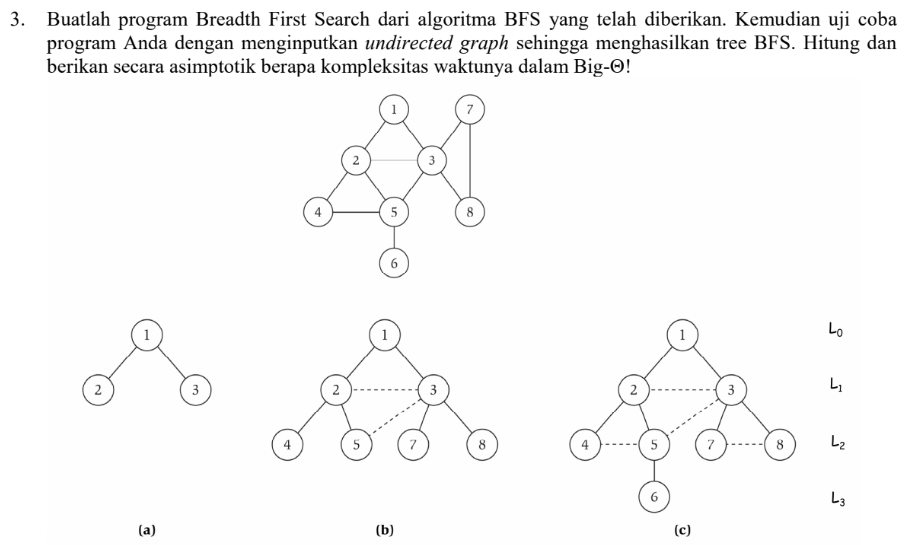
// print the adjacency list representation of the above graph

gh.printGraph();

return 0;

}



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// Program to print BFS traversal from a given

// source vertex. BFS(int s) traverses vertices

// reachable from s.

#include<iostream>

#include <list>

using namespace std;

// This class represents a directed graph using

// adjacency list representation

class Graph

{

int V; // No. of vertices

// Pointer to an array containing adjacency

// lists

list<int> \*adj;

public:

Graph(int V); // Constructor

// function to add an edge to graph

void addEdge(int v, int w);

// prints BFS traversal from a given source s

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); // Add w to v’s list.

}

void Graph::BFS(int s)

{

// Mark all the vertices as not visited

bool \*visited = new bool[V];

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

visited[i] = false;

// Create a queue for BFS

list<int> queue;

// Mark the current node as visited and enqueue it

visited[s] = true;

queue.push\_back(s);

// 'i' will be used to get all adjacent

// vertices of a vertex

list<int>::iterator i;

while(!queue.empty())

{

// Dequeue a vertex from queue and print it

s = queue.front();

cout << s << " ";

queue.pop\_front();

// Get all adjacent vertices of the dequeued

// vertex s. If a adjacent has not been visited,

// then mark it visited and enqueue it

for (i = adj[s].begin(); i != adj[s].end(); ++i)

{

if (!visited[\*i])

{

visited[\*i] = true;

queue.push\_back(\*i);

}

}

}

}

// Driver program to test methods of graph class

int main()

{

// Create a graph given in the above diagram

Graph g(8);

g.addEdge(1, 2);

g.addEdge(1, 3);

g.addEdge(2, 4);

g.addEdge(2, 5);

g.addEdge(2, 3);

g.addEdge(3, 7);

g.addEdge(3, 8);

g.addEdge(4, 5);

g.addEdge(5, 3);

g.addEdge(5, 6);

g.addEdge(7, 8);

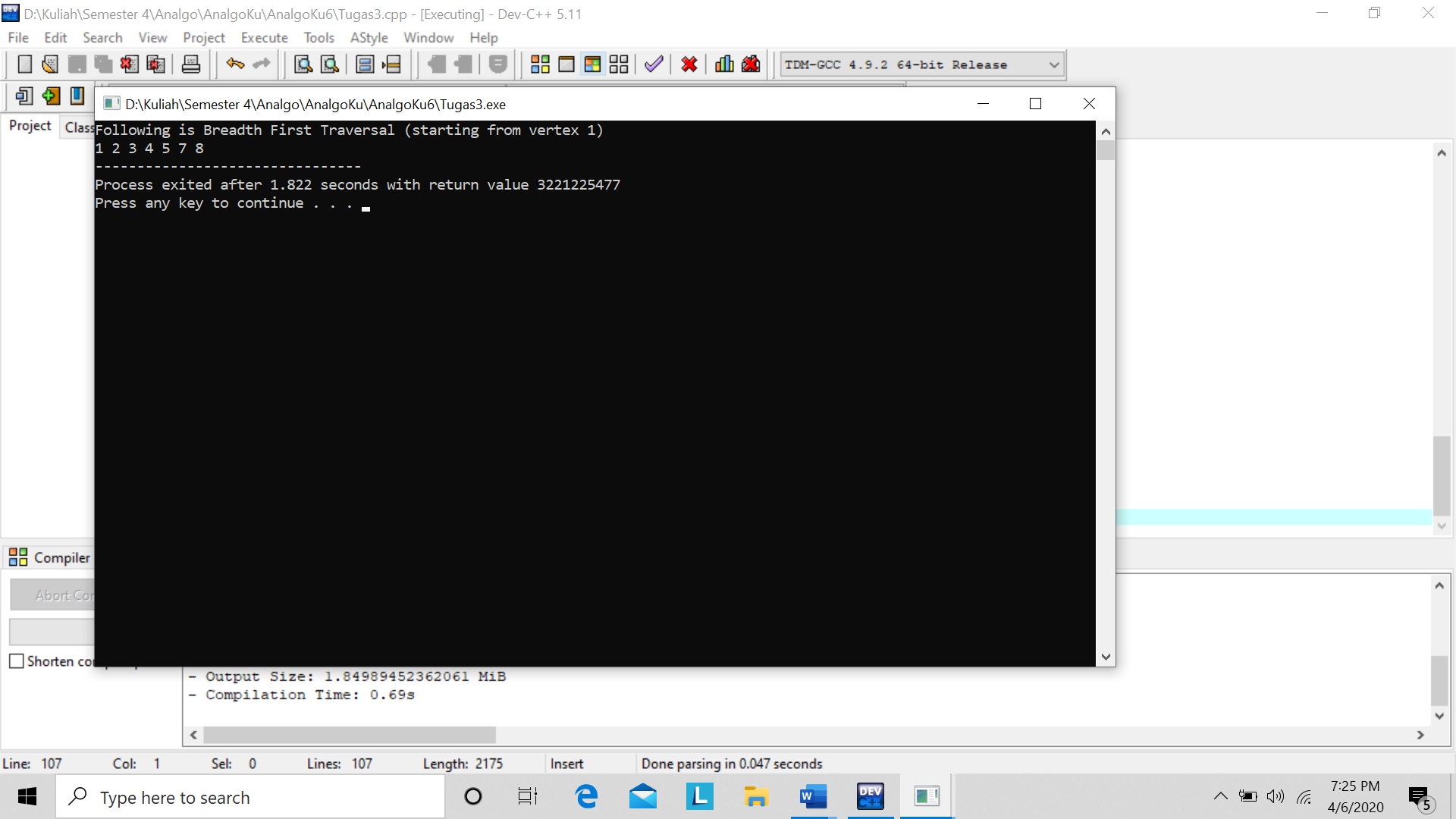
cout << "Following is Breadth First Traversal "

<< "(starting from vertex 1) \n";

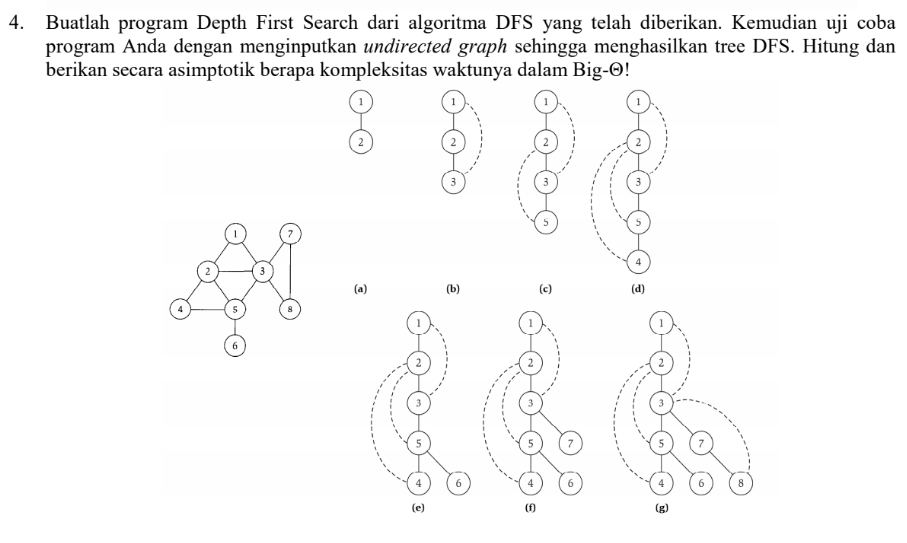
g.BFS(1);

return 0;

}



Kompleksitas ruang algoritma DFS adalah O(bm), karena kita hanya hanya perlu menyimpan satu buah lintasan tunggal dari akar sampai daun, ditambah dengan simpul-simpul saudara kandungnya yang belum dikembangkan.

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#include<iostream>

#include<list>

using namespace std;

// Graph class merepresentasikan graf berarah menggunakan representasi adjacency list

class Graph

{

int V; // No. simpul

// Pointer ke array yang memiliki adjacency lists

list<int> \*adj;

// Fungsi rekursif yang digunakan DFS

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

public:

Graph(int V); // Constructor

// fungsi untuk menambah tepian ke graf

void addEdge(int v, int w);

// DFS traversal dari simpul yang terjangkau dari v

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); // Menambah w ke list v.

}

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

{

// Menandakan node bersangkutan sudah dikunjungi lalu cetak

visited[v] = true;

cout << v << " ";

// Ulang simpul berdekatan ke node ini

list<int>::iterator i;

for (i = adj[v].begin(); i != adj[v].end(); ++i)

if (!visited[\*i])

DFSUtil(\*i, visited);

}

// DFS traversal dari simpul terjangkau dari v.

// Menggunakan rekursif DFSUtil()

void Graph::DFS(int v)

{

// Menandakan semua simpul belum dikunjungi

bool \*visited = new bool[V];

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

visited[i] = false;

// Memanggil fungsi rekursif pembantu untuk mencetak DFS traversal

DFSUtil(v, visited);

}

int main()

{

// Membuat graf di diagram

Graph g(8);

g.addEdge(1, 2);

g.addEdge(1, 3);

g.addEdge(2, 5);

g.addEdge(2, 4);

g.addEdge(5, 6);

g.addEdge(3, 7);

g.addEdge(3, 8);

g.addEdge(7, 8);

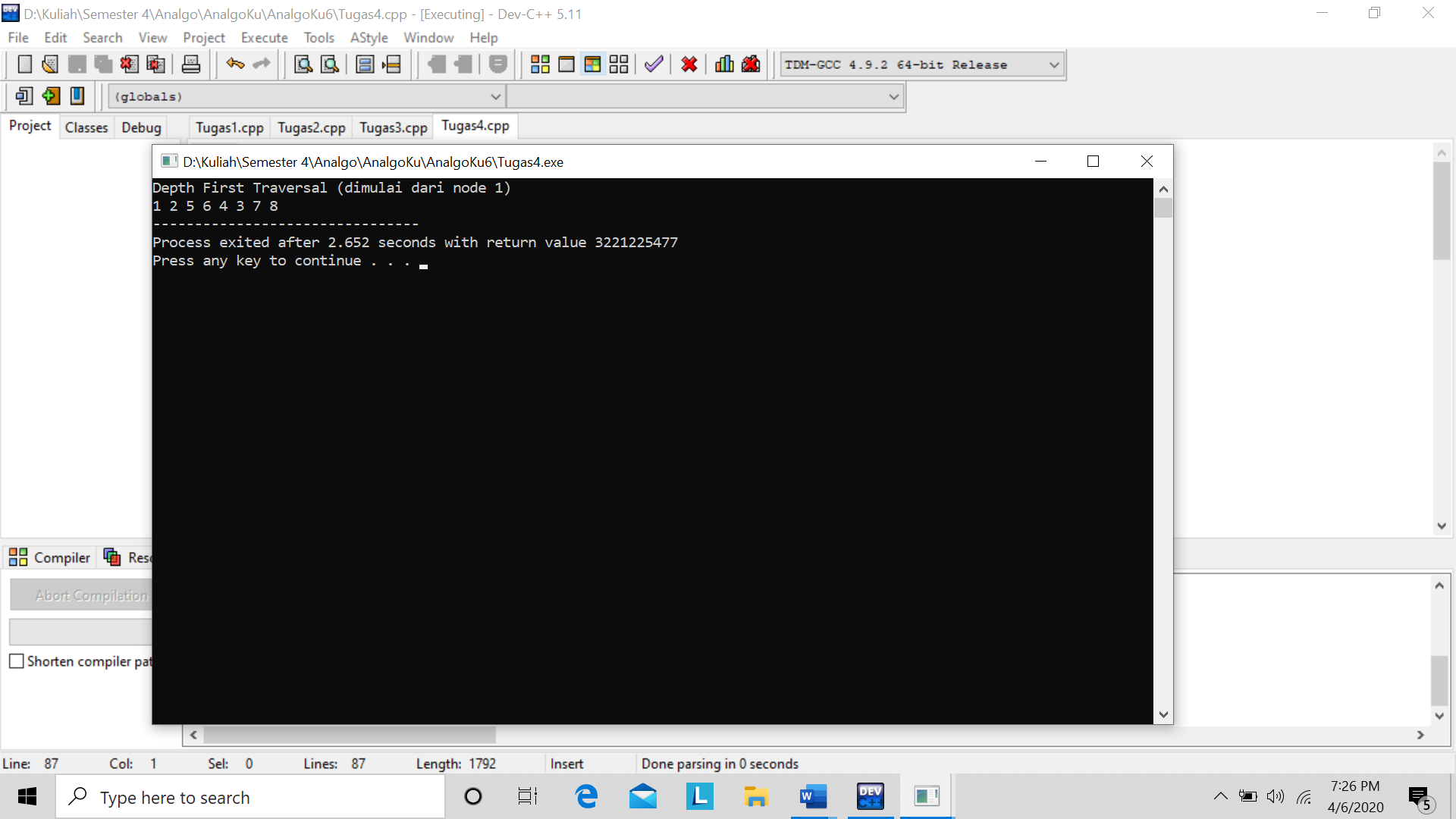
cout << "Depth First Traversal"

" (dimulai dari node 1) \n";

g.DFS(1);

return 0;

}



Kompleksitas ruang algoritma DFS adalah O(bm), karena kita hanya hanya perlu menyimpan satu buah lintasan tunggal dari akar sampai daun, ditambah dengan simpul-simpul saudara kandungnya yang belum dikembangkan.