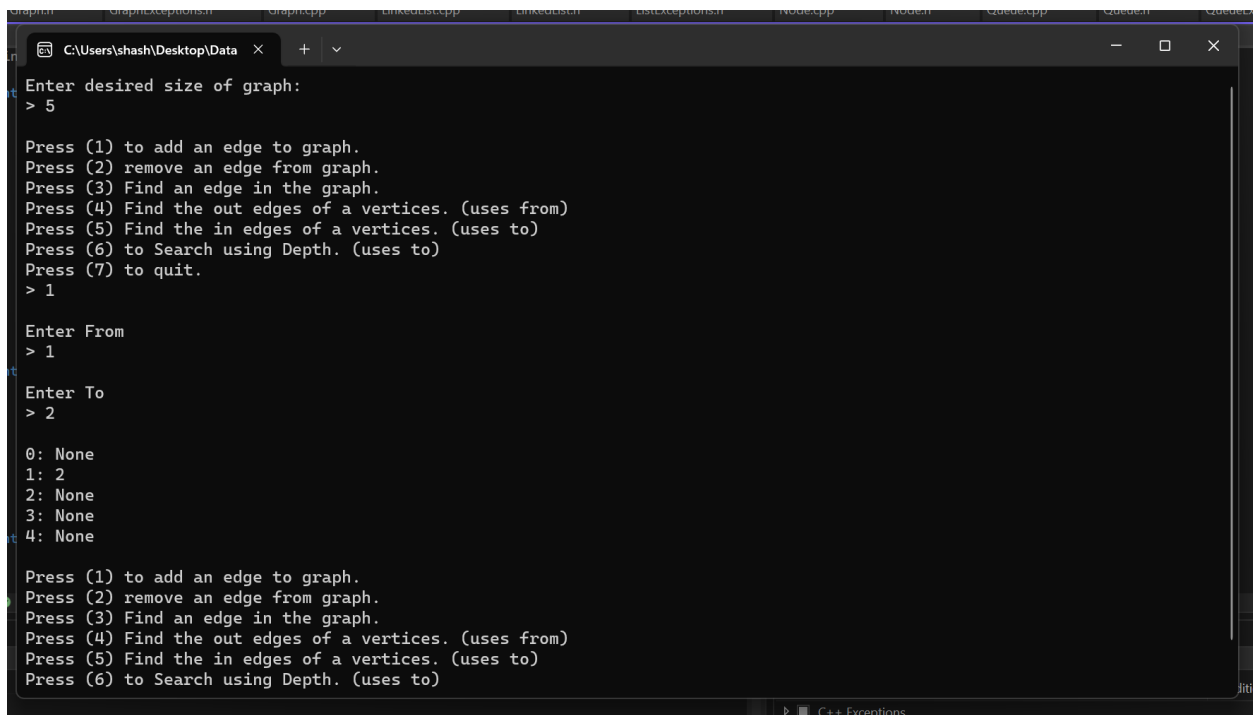**Lab 10 Report:**

Objectives of this Lab:

This lab mainly focuses on creation of graphs which is a complex data structure used in software development for many purposes. We also created a depth first search algorithm to search through all the nodes in the graph. The algorithm and data structure used in this assignment is widely used by software developers and is fundamental knowledge.

The initial task involved creating a graph class equipped with fundamental methods for managing vertices and edges. These included operations such as adding and removing vertices and edges, checking for edge existence, and retrieving out and in edges. The subsequent task focused on crafting a testing program to thoroughly assess the functionality of the graph class. This program prompted users to execute various operations, covering both positive and negative scenarios to ensure the accuracy of the class.

Task 3 expanded the graph class by introducing a depthFirstSearch() function, enabling a depth-first search across all nodes in the graph. The test program designed in Task 2 was modified to validate the correct implementation of the depth-first search.

Output:

C:\Users\shash\Desktop\Data

```
Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
Press (7) to quit.
> 1

Enter From
> 0

Enter To
> 4

0: 4
1: 2
2: None
3: None
4: None

Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
Press (7) to quit.
> 1
```

C++ Exceptions

Normal   No Spacing   Heading 1   Heading 2   Title

C:\Users\shash\Desktop\Data

```
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
Press (7) to quit.
> 1

Enter From
> 2

Enter To
> 3

0: 4
1: 2
2: 3
3: None
4: None

Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
Press (7) to quit.
> 2

Enter From
> 0

Enter To
```

```
Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
Press (7) to quit.
> 2

Enter From
> 0

Enter To
> 4

0: None
1: 2
2: 3
3: None
4: None

Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
Press (7) to quit.
>
```

```
Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
Press (7) to quit.
> 3

Enter From
> 1

Enter To
> 2

Found!

0: None
1: 2
2: 3
3: None
4: None

Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
```

```
Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
Press (7) to quit.
> 4

Enter From
> 1

Enter To
> 2

2

0: None
1: 2
2: 3
3: None
4: None

Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
```

```
Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
Press (7) to quit.
> 5

Enter From
> 1

Enter To
> 3

2

0: None
1: 2
2: 3
3: None
4: None

Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
```

```
Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
Press (7) to quit.
> 6

Enter From
> 0

Enter To
> 4

Found!

0: 1
1: 2
2: 3
3: 4
4: 2

Press (1) to add an edge to graph.
Press (2) remove an edge from graph.
Press (3) Find an edge in the graph.
Press (4) Find the out edges of a vertices. (uses from)
Press (5) Find the in edges of a vertices. (uses to)
Press (6) to Search using Depth. (uses to)
```