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Roll Number: SYCOC303 Division: C

PRN Number: 122B2B303 Batch: C4

Name: VINAYAK MADAN SHETE

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Problem Statement:

- **Write a C++ program for the implementation of BFS and DFS for a given graph.**

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INPUT:

```
/*
 *     ====================================
 *            Program Name: BFS_DFS.cpp
 *     Created on: December 15, 2022
 *       Author: Vinayak Shete
 *  ====================================
 */

#include<iostream>
#include<queue>
#include<stack>
using namespace std;

class Graph
{
    int adjacency[10][10];
    int v;
    int visited_array[10];

       public:
              //using constructor for storing intitial values in the matrix
       Graph(int n)
       {
```

```
		v=n;
	for(int i=0; i<v; i++)
	{
	for(int j=0; j<v; j++)
	{
		adjacency[i][j]=0;
	}
	}
	for(int i=0; i<v; i++)
	{
	visited_array[i]=0;
	}
}

	//function for adding an edge
void add_edge(int v1, int v2)
{
	adjacency[v1][v2]=1;
	adjacency[v2][v1]=1;
}

	//function for displaying the graph in the form of adjacency matrix
void display()
{
	cout<<"\n======\nEdges in the graoh are: \n";
	for(int i=0; i<v; i++)
	{
	for(int j=0; j<v; j++)
	{
		if(adjacency[i][j]==1)
		{
			cout<<"("<<i<<","<<j<<")"<<" ";
		}
	}
	}
}
```

```
//BFS Traversal of a graph
void bfs(int val)
{
	queue<int> q;
	int visited[v]={0};
	q.push(val);
	visited[val]=1;
	while(!q.empty())
		{
	int temp=q.front();
	q.pop();
	cout<<temp<<" ";
	for(int i=0; i<v; i++)
	{
		if(adjacency[temp][i]==1 && visited[i]==0)
		{
			q.push(i);
			visited[i]=1;
		}
	}
	}
}

//DFS Traversal of a graph
void dfs(int val)
{
	stack <int> s;
		for(int i=0; i<v; i++)
	{
	visited_array[i]=0;
	}
	s.push(val);
	while(!s.empty())
	{
	int v1=s.top();
	s.pop();
	if(visited_array[v1]==0)
```

```
		{
			cout<<v1<<" ";
			visited_array[v1]=1;
		}

		for(int i=0; i<v; i++)
		{
			if(adjacency[v1][i]==1 && visited_array[i]==0)
			s.push(i);
		}
		}
	}
};

int main()
{
	int vert,ch,doch,src,dest;
	cout<<"\n=======WELCOME======";
	cout<<"\nHow many vertices you want in the GRAPH?-->";
	cin>>vert;
    Graph g(vert);
    cout<<"\nThe graph with vertices 0 to "<<vert-1<<" has been created!\n====";
    do
    {
	cout<<"\n1.Add Edge\t\t2.Display\n3.BFS Traversal\t\t4.DFS
Traversal\t\t5.EXIT";
	cout<<"\nEnter your proper choice:";
	cin>>ch;
	switch(ch)
	{
		case 1:
			cout<<"\nEnter the source:";
			cin>>src;
			cout<<"\nEnter the destination:";
			cin>>dest;
			g.add_edge(src,dest);
			break;
```

```
            case 2:
                  g.display();
                  break;

            case 3:
                  cout<<"\nBFS Traversal of the graph is: ";
                  g.bfs(1);
                  break;

            case 4:
                  cout<<"\nDFS Traversal of the graph is: ";
                  g.dfs(1);
                  break;

            case 5:
                  goto exit;
                  break;

            default:
                  cout<<"\nPlease enter correct choice!";
                  break;
            }
                  cout<<"\n=======\nDo you want to continue?[1 for YES || 0 for No]-
->";
      cin>>doch;
      }while(doch==1);
      exit:
            cout<<"\n================THANK YOU!================";
   return 0;
}
```

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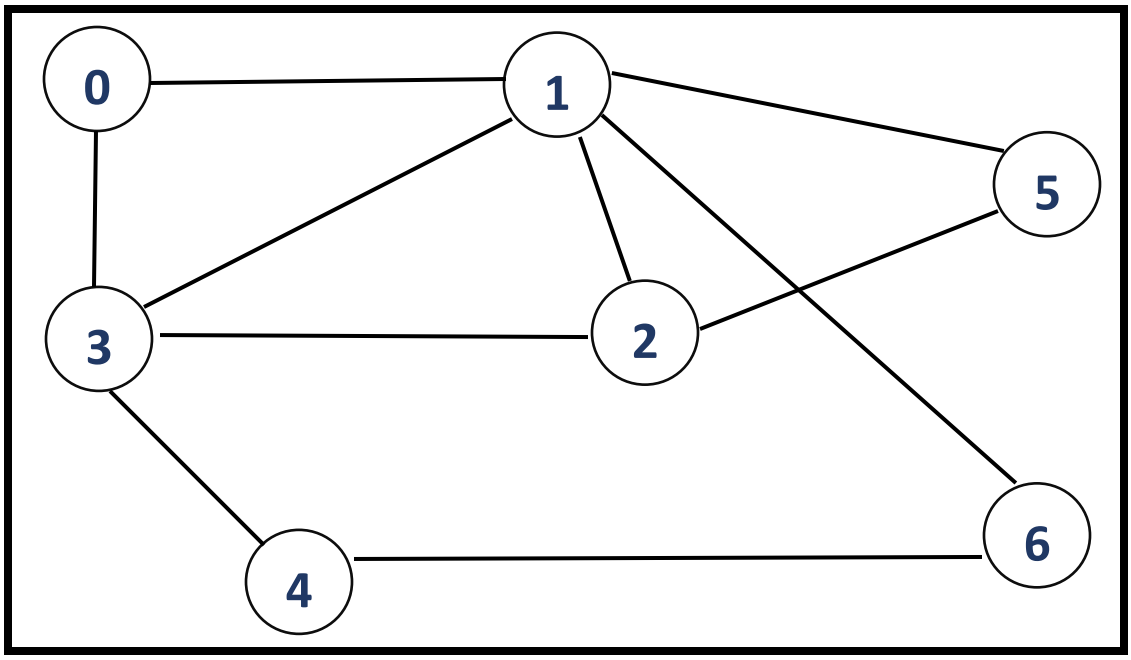
OUTPUT:

```
=======WELCOME======
How many vertices you want in the GRAPH?-->7

The graph with vertices 0 to 6 has been created!
====
1.Add Edge              2.Display
3.BFS Traversal         4.DFS Traversal         5.EXIT
Enter your proper choice:
```



Designing the Graph as shown in the above figure.

Adding Edges:

```
1.Add Edge              2.Display
3.BFS Traversal         4.DFS Traversal         5.EXIT
Enter your proper choice:1

Enter the source:1

Enter the destination:3

=======
Do you want to continue?[1 for YES || 0 for No]-->1

1.Add Edge              2.Display
3.BFS Traversal         4.DFS Traversal         5.EXIT
Enter your proper choice:1

Enter the source:1

Enter the destination:5

=======
Do you want to continue?[1 for YES || 0 for No]-->1

1.Add Edge              2.Display
3.BFS Traversal         4.DFS Traversal         5.EXIT
Enter your proper choice:1

Enter the source:1

Enter the destination:6

=======
Do you want to continue?[1 for YES || 0 for No]-->1

1.Add Edge              2.Display
3.BFS Traversal         4.DFS Traversal         5.EXIT
Enter your proper choice:1

Enter the source:2

Enter the destination:3

=======
```

```
1.Add Edge              2.Display
3.BFS Traversal         4.DFS Traversal         5.EXIT
Enter your proper choice:1

Enter the source:2

Enter the destination:5

=======
Do you want to continue?[1 for YES || 0 for No]-->1

1.Add Edge              2.Display
3.BFS Traversal         4.DFS Traversal         5.EXIT
Enter your proper choice:1

Enter the source:2

Enter the destination:4

=======
Do you want to continue?[1 for YES || 0 for No]-->1

1.Add Edge              2.Display
3.BFS Traversal         4.DFS Traversal         5.EXIT
Enter your proper choice:1

Enter the source:3

Enter the destination:4

=======
Do you want to continue?[1 for YES || 0 for No]-->1

1.Add Edge              2.Display
3.BFS Traversal         4.DFS Traversal         5.EXIT
Enter your proper choice:1

Enter the source:4

Enter the destination:6
```

Dsiplaying the edges:

```
=======
Do you want to continue?[1 for YES || 0 for No]-->1

1.Add Edge              2.Display
3.BFS Traversal         4.DFS Traversal         5.EXIT
Enter your proper choice:2

======
Edges in the graoh are:
(0,1) (0,3) (1,0) (1,2) (1,3) (1,5) (1,6) (2,1) (2,3) (2,4) (2,5) (3,0) (3,1) (3,2) (3,4) (4,2) (4,3) (4,6) (5,1) (5,2) (6,1) (6,4)
=======
Do you want to continue?[1 for YES || 0 for No]-->
```

BFS Traversal:

```
=======
Do you want to continue?[1 for YES || 0 for No]-->1

1.Add Edge              2.Display
3.BFS Traversal         4.DFS Traversal         5.EXIT
Enter your proper choice:3

BFS Traversal of the graph is: 1 0 2 3 5 6 4
=======
Do you want to continue?[1 for YES || 0 for No]-->1
```

DFS Traversal:

```
1.Add Edge              2.Display
3.BFS Traversal         4.DFS Traversal         5.EXIT
Enter your proper choice:4

DFS Traversal of the graph is: 1 6 4 3 2 5 0
=======
Do you want to continue?[1 for YES || 0 for No]-->5

================THANK YOU!================
--------------------------------
Process exited after 762.3 seconds with return value 0
Press any key to continue . . .
```

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