VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

19BIT0292

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DIGITAL ASSIGNMENT-4

DATA STRUCTURES AND ALGORITHMS LABORATORY

CSE2011

L57+L58

Q1) Consider the following Graph G= (V, E). Write an algorithm to implement the depth first search for the given graph and implement the same in C language. Print the results of DFS and also the adjacency matrix obtained. Calculate time complexity of algorithm developed.

CODE

```
#include<stdio.h>
#define MAX 10
int graph[MAX][MAX],v[MAX],n;
void DFS(int i)
{
   printf("\n%c",i+'A');
   v[i]=1;

   for(int j=0;j<n;j++)
     if(!v[j] && graph[i][j]==1)
         DFS(j);
}

void print_adj()
{
   printf("\nThe adjecency matrix of the graph is:-\n");
   for(int i=0;i<n;i++)
   {
     for(int j=0;j<n;j++)
     printf("%d ",graph[i][j]);
     printf("\n");
   }
}

void take_input()
{
   for(int i=0;i<n;i++)
   {
      int k;
      printf("Enter the number nodes connected with %c:
",i+'A');
```

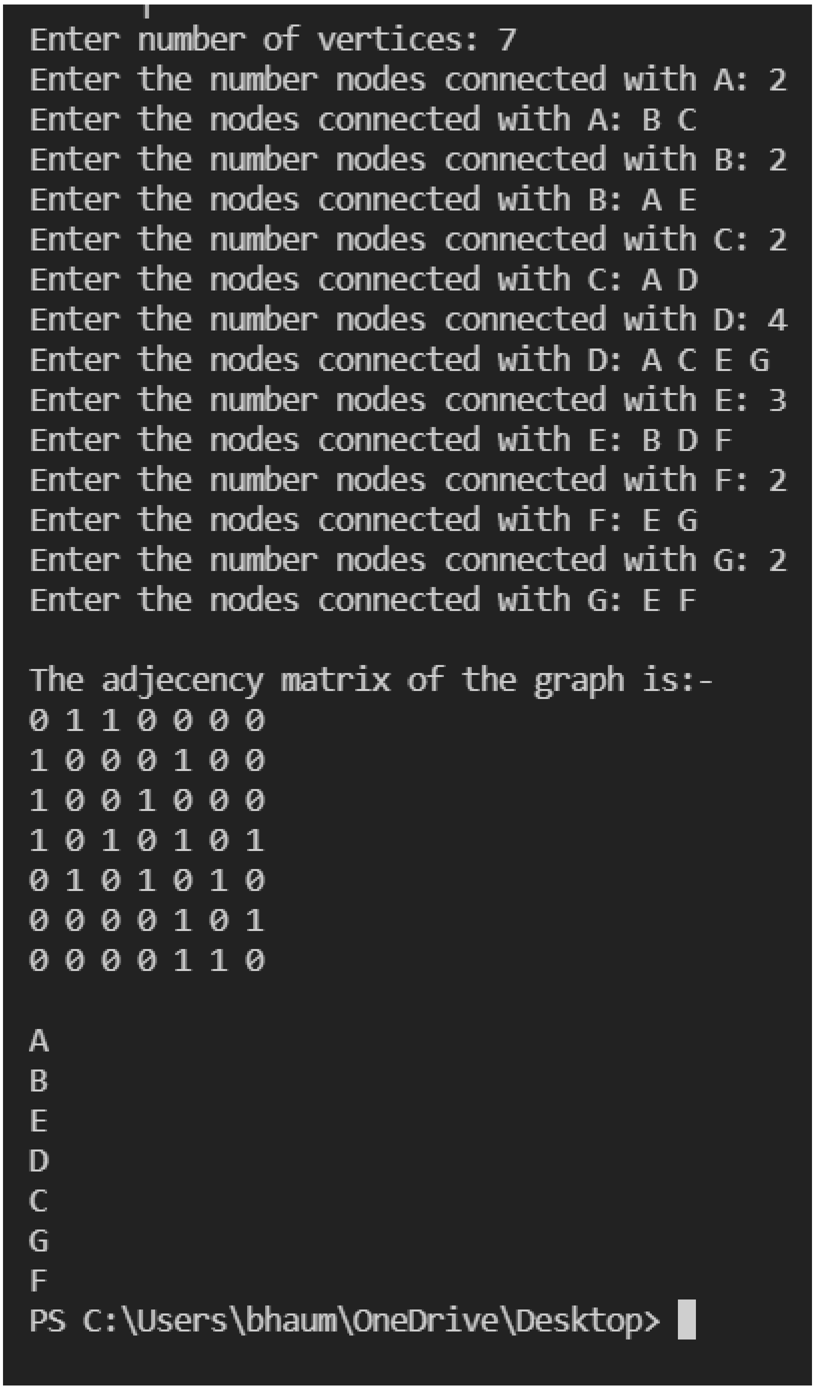
```
        scanf("%d",&k);
        printf("Enter the nodes connected with %c: ",i+'A');

        for(int j=0;j<k;j++)
        {
            char node;
            scanf("%c",&node);
            scanf("%c",&node);
            graph[i][node-'A']=1;
        }
    }
}
main()
{
    printf("Enter number of vertices: ");
    scanf("%d",&n);
    take_input();
    print_adj();
    for(int i=0;i<n;i++)
        v[i]=0;
    DFS(0);
}
```

The time complexity of the algorithm is **O(n+e)** where v is the number of vertices and e is the number of edges.

If we consider the printing of adjacency matrix as the part of the problem then it can be **O(n^n)** because we are iterating to all the arrays in graph, which has total number of element equal to the number of vertices in the graph.

OUTPUT



```
Enter number of vertices: 7
Enter the number nodes connected with A: 2
Enter the nodes connected with A: B C
Enter the number nodes connected with B: 2
Enter the nodes connected with B: A E
Enter the number nodes connected with C: 2
Enter the nodes connected with C: A D
Enter the number nodes connected with D: 4
Enter the nodes connected with D: A C E G
Enter the number nodes connected with E: 3
Enter the nodes connected with E: B D F
Enter the number nodes connected with F: 2
Enter the nodes connected with F: E G
Enter the number nodes connected with G: 2
Enter the nodes connected with G: E F

The adjecency matrix of the graph is:-
0 1 1 0 0 0 0
1 0 0 0 1 0 0
1 0 0 1 0 0 0
1 0 1 0 1 0 1
0 1 0 1 0 1 0
0 0 0 0 1 0 1
0 0 0 0 1 1 0

A
B
E
D
C
G
F
PS C:\Users\bhaum\OneDrive\Desktop> 
```