Ex 12: BFS AND DFS

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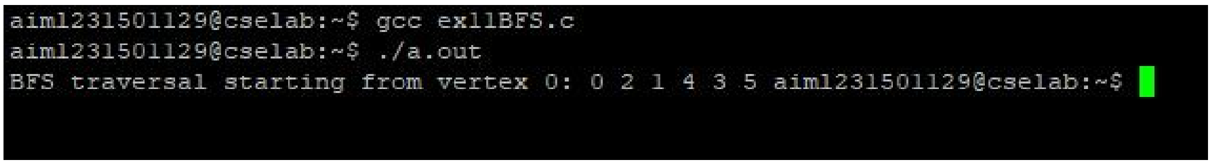
BREATH FIRST SEARCH:

PROGRAM:

```
#include <stdio.h>

#include <stdlib.h>

struct node {

   int vertex;

   struct node* next;

};

struct adj_list {

   struct node* head;

};

struct graph {

   int num_vertices;

   struct adj_list* adj_lists;

   int* visited;

};

struct node* new_node(int vertex) {

   struct node* new_node = (struct node*)malloc(sizeof(struct node));

new_node->vertex = vertex;

new_node->next = NULL;

   return new_node;

}

struct graph* create_graph(int n) {
```

```c
    struct graph* graph = (struct graph*)malloc(sizeof(struct graph));
    graph->num_vertices = n;
    graph->adj_lists = (struct adj_list*)malloc(n * sizeof(struct adj_list));
    graph->visited = (int*)malloc(n * sizeof(int));

    int i;
    for (i = 0; i< n; i++) {
        graph->adj_lists[i].head = NULL;
        graph->visited[i] = 0;
    }

    return graph;
}
void add_edge(struct graph* graph, int src, int dest) {
    struct node* new_node1 = new_node(dest);
    new_node1->next = graph->adj_lists[src].head;
    graph->adj_lists[src].head = new_node1;
    struct node* new_node2 = new_node(src);
    new_node2->next = graph->adj_lists[dest].head;
    graph->adj_lists[dest].head = new_node2;
}
void bfs(struct graph* graph, int v) {
    int queue[1000];
    int front = -1;
    int rear = -1;
    graph->visited[v] = 1;
    queue[++rear] = v;
    while (front != rear) {
        int current_vertex = queue[++front];
printf("%d ", current_vertex);
        struct node* temp = graph->adj_lists[current_vertex].head;
        while (temp != NULL) {
            int adj_vertex = temp->vertex;
            if (graph->visited[adj_vertex] == 0) {
                graph->visited[adj_vertex] = 1;
                queue[++rear] = adj_vertex;
            }

            temp = temp->next;
        }
    }
}

int main() {
    struct graph* graph = create_graph(6);



add_edge(graph, 0, 1);
add_edge(graph, 0, 2);
add_edge(graph, 1, 3);
add_edge(graph, 1, 4);
add_edge(graph, 2, 4);
add_edge(graph, 3, 4);
add_edge(graph, 3, 5);
add_edge(graph, 4,5);


printf("BFS traversal starting from vertex 0: ");

bfs(graph, 0);


   return 0;

}
```

OUTPUT:



```
aiml231501129@cselab:~$ gcc ex11BFS.c
aiml231501129@cselab:~$ ./a.out
BFS traversal starting from vertex 0: 0 2 1 4 3 5 aiml231501129@cselab:~$ 
```

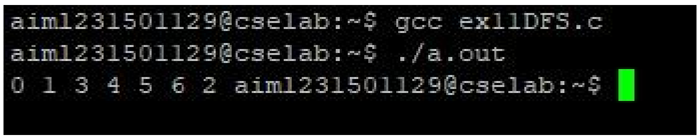
DEPTH FIRST SEARCH:

PROGRAM:

```
#include <stdio.h>

#include <stdlib.h>

int vis[100];

struct Graph {

   int V;

   int E;

   int** Adj;

};

struct Graph* adjMatrix()

{

   struct Graph* G = (struct Graph*)

      malloc(sizeof(struct Graph));

   if (!G) {
      printf("Memory Error\n");
      return NULL;
   }
   G->V = 7;
   G->E = 7;

   G->Adj = (int**)malloc((G->V) * sizeof(int*));
   for (int k = 0; k < G->V; k++) {
      G->Adj[k] = (int*)malloc((G->V) * sizeof(int));
   }

   for (int u = 0; u < G->V; u++) {
      for (int v = 0; v < G->V; v++) {
          G->Adj[u][v] = 0;
      }
   }
   G->Adj[0][1] = G->Adj[1][0] = 1;
   G->Adj[0][2] = G->Adj[2][0] = 1;
   G->Adj[1][3] = G->Adj[3][1] = 1;
   G->Adj[1][4] = G->Adj[4][1] = 1;
   G->Adj[1][5] = G->Adj[5][1] = 1;
   G->Adj[1][6] = G->Adj[6][1] = 1;
   G->Adj[6][2] = G->Adj[2][6] = 1;

   return G;
}
void DFS(struct Graph* G, int u)
```

```
{
    vis[u] = 1;
    printf("%d ", u);
    for (int v = 0; v < G->V; v++) {
        if (!vis[v] && G->Adj[u][v]) {
            DFS(G, v);
        }
    }
}
void DFStraversal(struct Graph* G)
{
    for (int i = 0; i < 100; i++) {
        vis[i] = 0;
    }
    for (int i = 0; i < G->V; i++) {
        if (!vis[i]) {
            DFS(G, i);
        }
    }
}
void main()
{
    struct Graph* G;
    G = adjMatrix();
    DFStraversal(G);
}
```

OUTPUT:



```
aiml231501129@cselab:~$ gcc ex11DFS.c
aiml231501129@cselab:~$ ./a.out
0 1 3 4 5 6 2 aiml231501129@cselab:~$
```