

Project 5 Basic Operations on Graph

I. Experiment Objectives:

- (1) Grasp the basic methods to represent a graph
- (2) Grasp the BFS method to traverse a graph

II. Experiment Contents:

ADT of Graph:

Structure **Undirected Graph** is an object composed of a nonempty set of vertices and a set of undirected edges, where each edge is a pair of vertices

Functions: for all $graph \in Graph$, v , $v1$ and $v2 \in Vertices$

Graph Create(), return an empty graph

Graph InsertVertex(Graph, v), return a graph with v inserted. v has no incident edge.

Graph InsertEdge(Graph, v1, v2), return a graph with new edge between $v1$ and $v2$

Graph DeleteVertex(Graph, v), return a graph in which v and all edges incident to it are removed

Graph DeleteEdge(Graph, v1, v2), return a graph in which the edge $(v1, v2)$ is removed

Boolean IsEmpty(Graph), if the graph is empty return TRUE else return FALSE

Finish the following tasks:

- (1) Use both **adjacency matrix** and **adjacency list** to represent graphs and define the corresponding abstract data type.
- (2) Realize all the above functions for the two graph ADTs.
- (3) Base on the input, generate objects to represent the graph.
- (4) Traverse the graph in BFS manner.

Input

The input consists of several test cases. Each test case contains two lines.

The first line contains the vertex set V . The second line contains edge set E .

A single 0 indicate the end of the input.

Output

The output is the BFS of the graph.

Sample input

A, B, C, D, E, F, G

A, B, A, C, A, D, B, D, B, E, C, F, C, D, D, E, D, F, D, G, 0

Sample output

ABCDEFG