Algorithms and Data Structures

Module 1

Assignment 2

Graph traversals implementation

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DFS: explicit stack implementation

```
StackDFS(G)
Select s ∈ V
Push(s)
While (stack is not empty):
    v = Pop()
    if v is unvisited:
        Mark v as 'visited'
        For each u in Adj(v):
            Push(v)
```

BFS: queue-based implementation

```
BFS(G)
Select s ∈ V
Enqueue(s)
While (Queue is not empty):
    v = Dequeue()
    if v is unvisited:
        Mark v as 'visited'
        For each u in Adj(v):
            Enqueue(u)
```

Task

Develop a program that traverses the input graph and outputs DFS/BFS numbers of the vertices.

A DFS/BFS number is the ordinal number of a vertex in order of visiting them.

```
DFS(v)
PreVisit(v)
Mark v as 'visited'
For each u in Adj(v):
    if u is unvisited: DFS(u)
PostVisit(v)
```

Assign to *v* the current number

Task: input

Input file (text format):

- The 1st line: names of vertices, separated by spaces.

E.g.: `a b c d e f g h i j k l m`

NB: Name can be longer than 1 letter!

- Other lines contain edges. Each line describes one edge as two incident vertices separated by space.

E.g., line

```
c f
```

represents edge (c,f).

Task: output

Output file (text format):

For a graph with *n* vertices the output file contains *n* lines.

Each line contains the name of a vertex and its DFS/BFS-number, separated with a space. E.g.:

```
a 9
b 8
c 6
...
```

Individual assignments

Student	Traversal type
Абдалла Ахмед Мохамед Сабер	DFS
Абделсалам Ахмед Мохамед Фарук Сайед	BFS
Ариас Барриос Брайан Эстебан	DFS
Кебир Фуад Нур Эль Ислам	BFS
Миводи Нжи Авау	DFS
Моавенипур Фарбод	BFS
Мохамед Мустафа Нассер Абделвахаб	DFS
Юби Лахдар Назих	BFS
Овоэе Айодеджи Джозеф	DFS

Student	Traversal type
Уки Ономи Годвин	BFS
Фарес Абдеррахман	DFS
Чай Кэсинь	BFS
Чимбо Уататока Джоэль Сесар	DFS
Эльнуби Юссеф Хассан Набави Махмуд	BFS
Диниш Антониу Мадолу	DFS
Ханна Иссам Гергес Макланхи	BFS
Хайр Эхаб Вахиб	DFS
Дехлаги Махди	BFS

If your name is not listed in the table above, please contact me through MS Teams.