Depth First Search

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The algorithm

Path traversal

Selects a node, explores branches

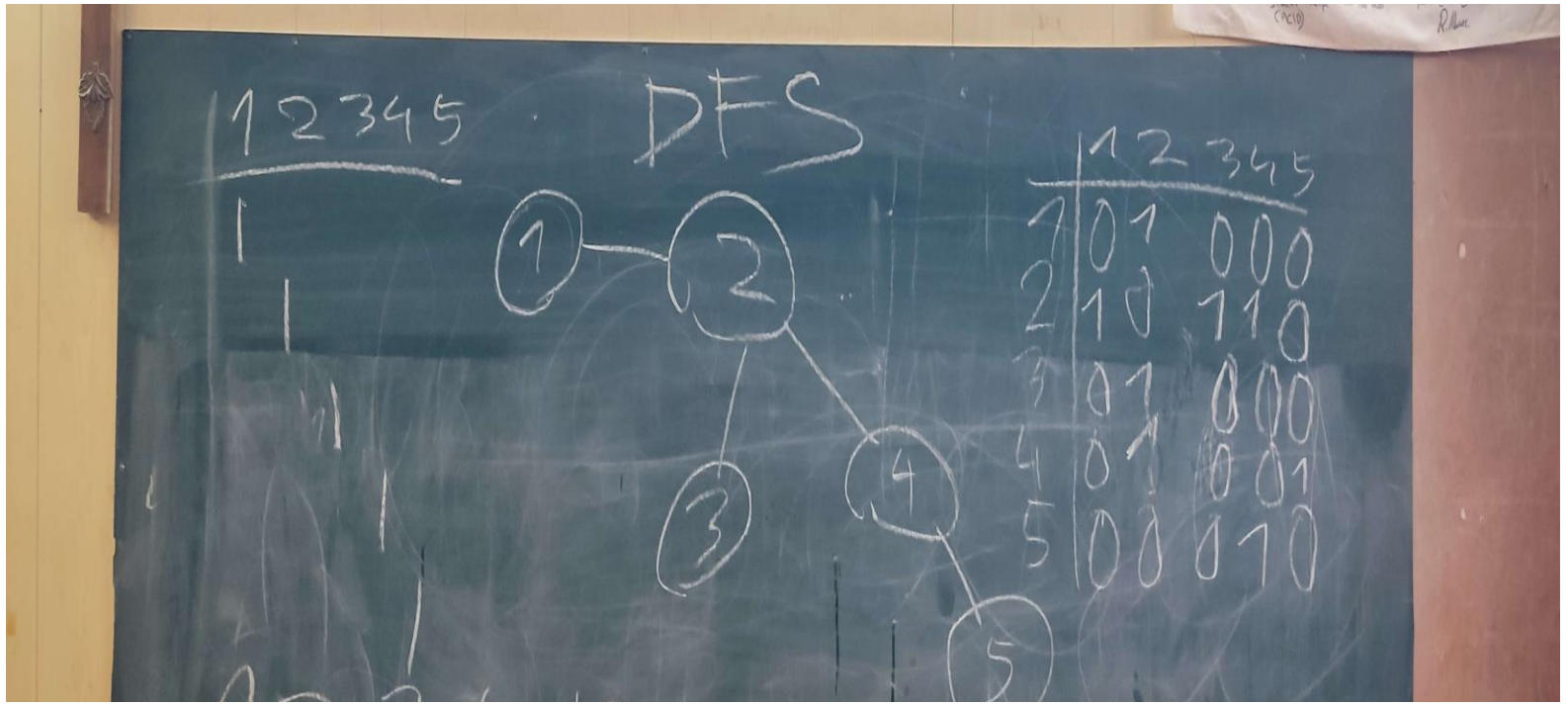
Finds path by exploring deeper before backtracking

Uses

Finding a path between two nodes in a graph.

Identifying cycles or loops in a graph.

Find a spanning tree



Implementation

Graph Data structure

```
public class Graph
{
    private uint _nodes; //number of nodes in the graph
    private List<uint>[] _adjacencyLists; //array of all adjacency lists
```

Algorithm

```
public List<uint> DFS(uint startNode)
{
    list to store return value
    boolean array to store visited nodes
    stack to perform DFS


    Put start node in stack and mark as visited
    while there are nodes in the stack – pop the stack and add all adjacent nodes that have
not                 yet been visited to the stack and mark them as visited.
    popped node go into return value list


    Return return value list
}
```

File IO

Input XML file

Output plaintext

Write XML with XmlWriter

Parse XML using XmlDocument

```xml
<?xml version="1.0" encoding="utf-8"?>
<graph>
  <nodes>5</nodes>
  <adjacencyLists>
    <adjacencyList>
      <edge>1</edge>
      <edge>2</edge>
    </adjacencyList>
    <adjacencyList>
      <edge>0</edge>
      <edge>3</edge>
      <edge>4</edge>
    </adjacencyList>
    <adjacencyList>
      <edge>0</edge>
    </adjacencyList>
    <adjacencyList>
      <edge>1</edge>
    </adjacencyList>
    <adjacencyList>
      <edge>1</edge>
    </adjacencyList>
  </adjacencyLists>
</graph>
```

Challenges

My class cannot be serialized by the included library

Overcame by implementing parsing and writing of XML

Reflection