Water Jug Problem

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Problem Statement

There are two jugs of volume
A litre and **B** litre
Now, we have to trace a proper path to get
x litre of water in jug **A**
We have unlimited supply of water.

Solution Approach

- So, I have divided the execution in two major steps:
  - Creation of graph
  - Tracing the path for the graph

- Before going any further let's understand the data structure which we are using over here.
 - Each node in the generating tree is a list which consist of following values.

  [ID , parent_ID , Water in A , Water in B]

Step 1
Graph Creation

- First of all initial node [0,'null', 0, 0] is added to the graph.
- Then, taking the state (0, 0) as the initial state, all the procedures of class make_states.py is called with the help of a local object and the return states are saved as the child node of the initial node.
- Repeating second step by making all the child as initial node, a full graph is generated.
- In this program I have limited generations to 256 iterations which do generates ~1481 states.

Generated Graph
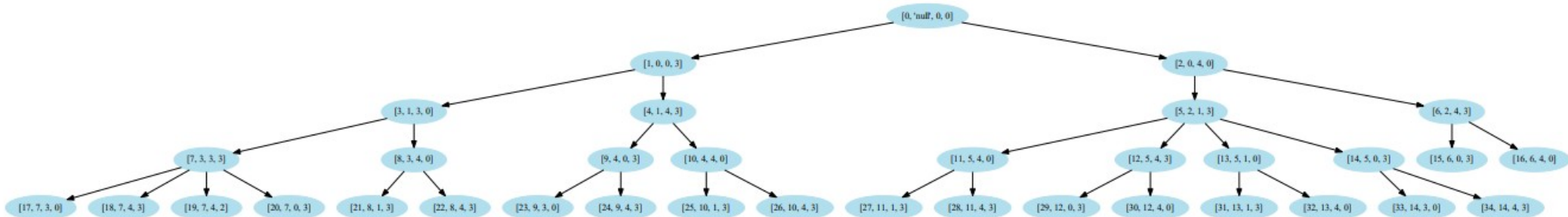
Generated Sub-Graph for 34 nodes

Step 2
Tracing the path

- Graph is traversed index wise till the node wanted is reached.

- Now, when the desired node is reached, this node is backtracked to the initial node or root node and the path followed while backtracking is printed.

- For every instance of the desired node this path is printed.

Sample Traced Path

- (2 , 0)<-(0 , 2)<-(4 , 2)<-(3 , 3)<-(3 , 0)<-(0 , 3)<-(0 , 0)
- (2 , 3)<-(2 , 0)<-(0 , 2)<-(4 , 2)<-(3 , 3)<-(3 , 0)<-(0 , 3)<-(0 , 0)
- (2 , 0)<-(0 , 2)<-(4 , 2)<-(3 , 3)<-(3 , 0)<-(3 , 3)<-(3 , 0)<-(0 , 3)<-(0 , 0)
- (2 , 0)<-(0 , 2)<-(4 , 2)<-(3 , 3)<-(4 , 2)<-(3 , 3)<-(3 , 0)<-(0 , 3)<-(0 , 0)
- (2 , 0)<-(2 , 3)<-(2 , 0)<-(0 , 2)<-(4 , 2)<-(3 , 3)<-(3 , 0)<-(0 , 3)<-(0 , 0)
- (2 , 0)<-(0 , 2)<-(4 , 2)<-(0 , 2)<-(4 , 2)<-(3 , 3)<-(3 , 0)<-(0 , 3)<-(0 , 0)
- (2 , 0)<-(0 , 2)<-(4 , 2)<-(3 , 3)<-(3 , 0)<-(0 , 3)<-(4 , 3)<-(0 , 3)<-(0 , 0)
- (2 , 0)<-(0 , 2)<-(4 , 2)<-(3 , 3)<-(3 , 0)<-(0 , 3)<-(1 , 3)<-(4 , 0)<-(0 , 0)
- (2 , 0)<-(0 , 2)<-(4 , 2)<-(3 , 3)<-(3 , 0)<-(0 , 3)<-(4 , 3)<-(4 , 0)<-(0 , 0)
- (2 , 3)<-(2 , 0)<-(0 , 2)<-(4 , 2)<-(3 , 3)<-(3 , 0)<-(3 , 3)<-(3 , 0)<-(0 , 3)<-(0 , 0)
- (2 , 3)<-(2 , 0)<-(0 , 2)<-(4 , 2)<-(3 , 3)<-(4 , 2)<-(3 , 3)<-(3 , 0)<-(0 , 3)<-(0 , 0)
- Total No of States = 1481 And A=2 are 11

For more insights...

Thank You