



### 1.)AIM:

- a.)To implement BFS and DFS for a given graph.
- b.)To check if the graph is strongly connected.
- c.)To print pre and post visited times.

### **THEORY:**

Traversing the graph means examining all the nodes and vertices of the graph. There are two standard methods by using which, we can traverse the graphs.

- o Breadth First Search

- o Depth First Search

**Breadth first search:** Breadth first search is a graph traversal algorithm that starts traversing the graph from root node and explores all the neighboring nodes. Then, it selects the nearest node and explore all the unexplored nodes. The algorithm explores all neighbours of all the nodes and ensures that each node is visited exactly once and no node is visited twice.

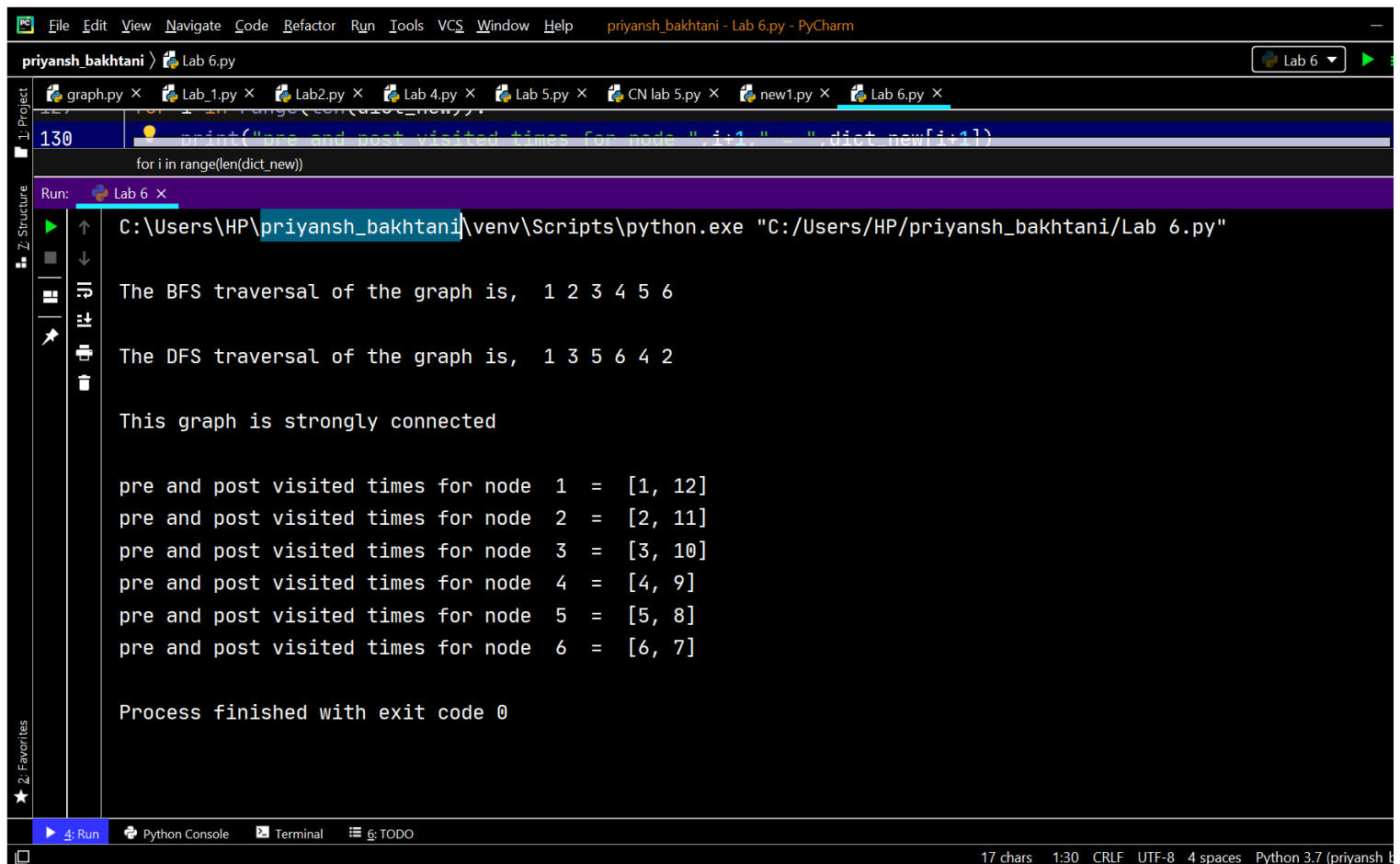
**Depth first search:** Depth first search (DFS) algorithm starts with the initial node of the graph G, and then goes to deeper and deeper until we find the goal node or the node which has no children. The algorithm, then backtracks from the dead end towards the most recent node that is yet to be completely unexplored. The data structure which is being used in DFS is stack.

## Conditon for a strongly connected graph:

we can just do a BFS and DFS starting from any vertex. If BFS or DFS visits all vertices, then the given undirected graph is connected.

## Pre and post visited order in a graph:

Pre-visit and Post-visit numbers are the extra information that can be stored while running a DFS on a graph and which turns out to be really useful. Pre-visit number tells the time at which the node gets into the recursion stack and Post-visit number tells the time at which the node comes out from recursion stack of DFS.



```
File Edit View Navigate Code Refactor Run Tools VCS Window Help priyansh_bakhtani - Lab 6.py - PyCharm
priyansh_bakhtani > Lab 6.py
graph.py x Lab_1.py x Lab_2.py x Lab_4.py x Lab_5.py x CN lab 5.py x new1.py x Lab 6.py x
130 print("pre and post visited times for node ",i+1," = ",dict_new[i+1])
    for i in range(len(dict_new))

Run: Lab 6 x
C:\Users\HP\priyansh_bakhtani\venv\Scripts\python.exe "C:/Users/HP/priyansh_bakhtani/Lab 6.py"

The BFS traversal of the graph is, 1 2 3 4 5 6

The DFS traversal of the graph is, 1 3 5 6 4 2

This graph is strongly connected

pre and post visited times for node 1 = [1, 12]
pre and post visited times for node 2 = [2, 11]
pre and post visited times for node 3 = [3, 10]
pre and post visited times for node 4 = [4, 9]
pre and post visited times for node 5 = [5, 8]
pre and post visited times for node 6 = [6, 7]

Process finished with exit code 0

4: Run Python Console Terminal TODO
17 chars 1:30 CRLF UTF-8 4 spaces Python 3.7 (priyansh_b)
```

Conclusion: Hence the DFS and BFS traversal was successfully implemented along with pre and post visited times.