COL719: Synthesis of Digital Systems
Assignment 1: Graph Traversal

Submission Deadline: 16 August 2018 (11:55 PM)

Graph Library Setup

Boost C++ library provides tools to work with graph data structure.
Please follow the instructions given at the following link to download and install the boost library on your system:
For linux users-
https://www.boost.org/doc/libs/1_67_0/more/getting_started/unix-variants.html
For windows users-
https://www.boost.org/doc/libs/1_67_0/more/getting_started/windows.html

You can also get started with the following youtube video which introduces the usage of Boost.Graph library.
https://www.youtube.com/watch?v=uYvBH7TZlFk

Is a given netlist combinational?

Given a netlist of gates, write a C++ program (using the Boost Graph Library) to report whether it represents a combinational circuit or sequential. If it is sequential, we expect a cycle/loop of edges.

You are permitted to search for algorithms that would help you solve the problem. However, the implementation must be strictly original.

Assume that the netlist is given in a file with the following format:
N (the number of nodes)
S1 D1 (Output of gate S1 is connected to the input of gate D1)
S2 D2 (Output of gate S2 is connected to the input of gate D2)
…

For example:
3
1 2
1 3
2 3
Refers to a circuit with 3 gates. The output of Gate 1 is connected to the inputs of Gates 2 and 3. The output of Gate 2 also forms another input to Gate 3. There is a combinational circuit.