TSN2201 – Computer Networks

Lecture Section: TC01

Tutorial Section: TT03

Assignment: Network topology filtering

Question 5.1: Write a program that will list all network configurations which has a max degree of 2. (Where the max number of links connected to one node is 2)

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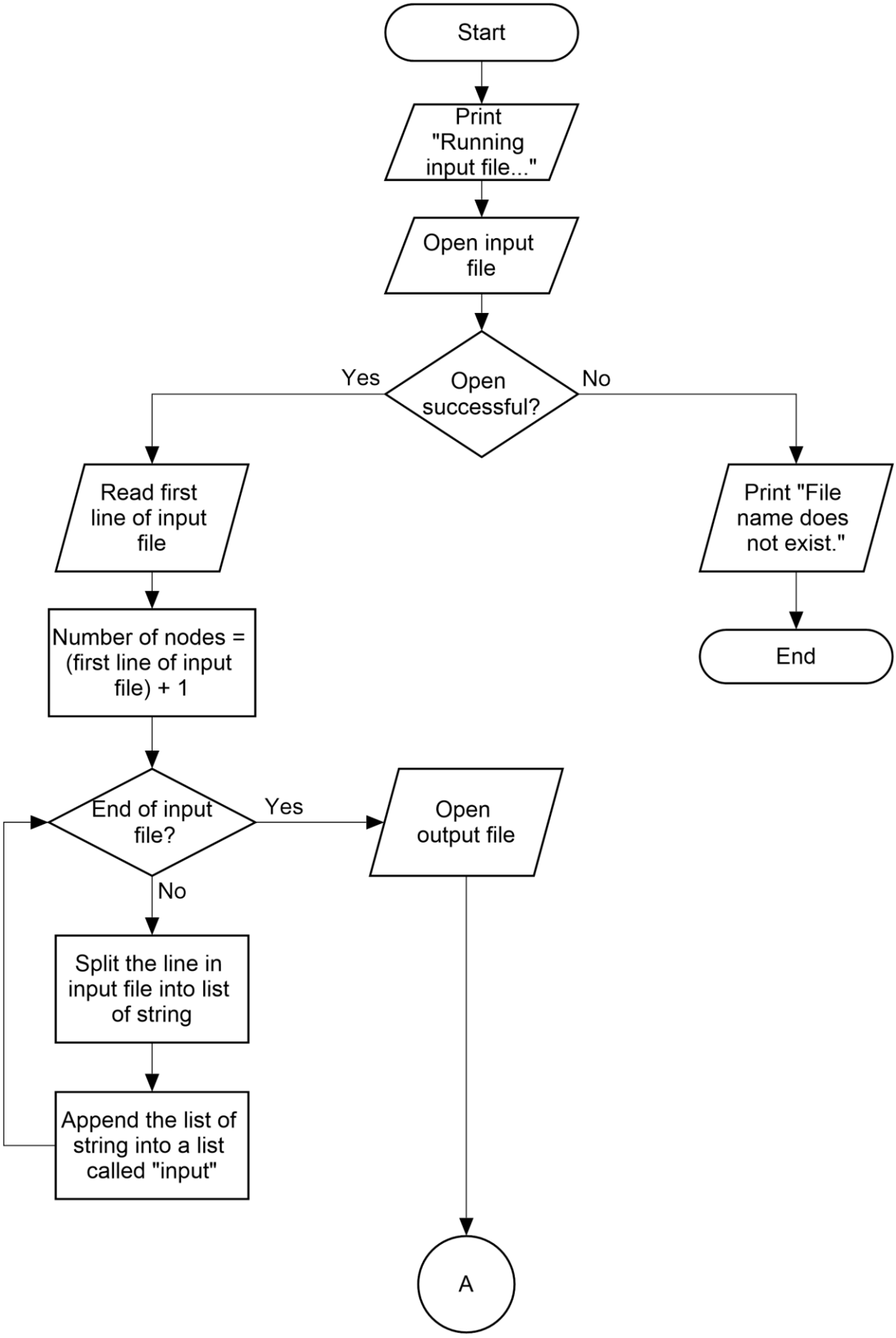
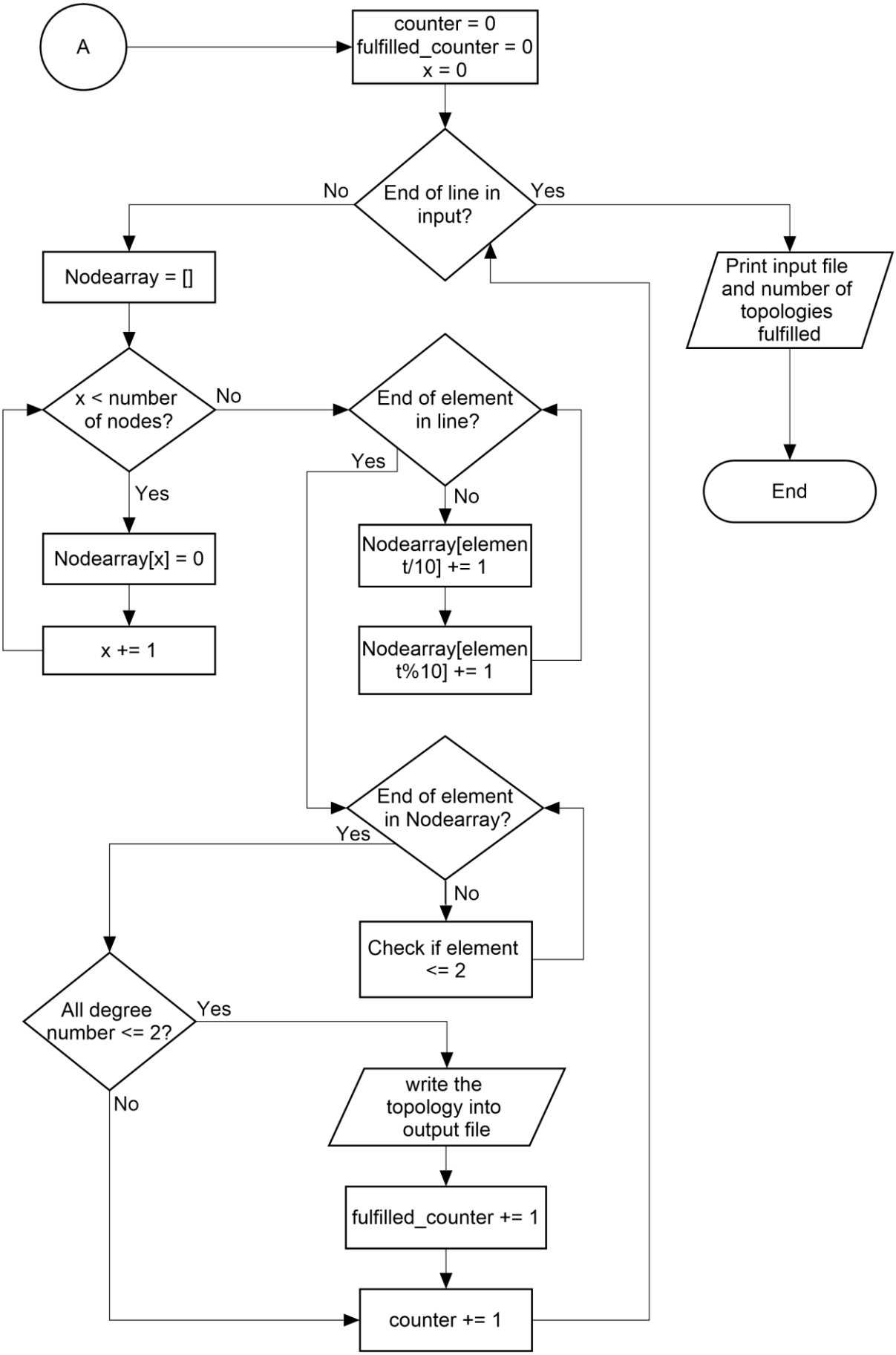
Flow chart of the algorithm




A
counter = 0
fulfilled_counter = 0
x = 0
End of line in input?
No
Yes
Nodearray = []
Print input file and number of topologies fulfilled
x < number of nodes?
No
End of element in line?
Yes
Yes
No
End
Nodearray[x] = 0
Nodearray[element/10] += 1
x += 1
Nodearray[element%10] += 1
End of element in Nodearray?
Yes
No
Check if element <= 2
All degree number <= 2?
Yes
No
write the topology into output file
fulfilled_counter += 1
counter += 1

Program Source Code (Python 2.7):

```
def getFulfilledTopology(files):

    try:
        #Open input file
        with open(files, "r") as file:
            nodes = int(file.read(1)) + 1
            next(file)
            input = [line.split() for line in file]
    except:
        print "File name '" + files + "' does not exist."
        return

    #Open output file
    outputFile = open(files + "_output.txt", "w")

    counter = 0
    fulfilled_counter = 0

    #Get the degree of each node
    for line in input:
        Nodearray = [0 for x in range(nodes)]
        for integer in line:
            Nodearray[int(integer) / 10] += 1
            Nodearray[int(integer) % 10] += 1
        #Get the topology with max degree of 2
        if all(element <= 2 for element in Nodearray):
            #Write the topology with max degree of 2 into the output file
            outputFile.write(' '.join(input[counter]) + "\n")
            fulfilled_counter += 1
        counter += 1

    print "Input file: " + files + "\nNumber of network topologies with max
degree of 2:",
    print str(fulfilled_counter) + "\n"

    outputFile.close()

print "Running input file...\n"
getFulfilledTopology("5node6link.txt")
getFulfilledTopology("6node7link.txt")
getFulfilledTopology("6node8link.txt")
getFulfilledTopology("7node6link.txt")
print "**The output files are available in the project folder."
```