NATIONAL TAIWAN UNIVERSITY, DEPARTMENT OF ELECTRONIC ENGINEERING

Data Structure, Spring 2020 Assignment #1

1 PROBLEM STATEMENT

After lectures on stacks and queues, Prof.Wu believes that all of you are interested in this topic and has a strong desire to implement it in code.

Thus, this programming assignment asks you to read in a series of commands e.x. (PUSH 10, PUSH 9, POP, PUSH8, ...), and execute it using stack and queue. We have written a code template for you, and you should fill in the `TODO` in our templates.

However, since you've learned the importance of time complexity, you should be able to implement stacks and queues with O(1). Thus, in this homework, you should use **linked lists** to implement stacks and queues. The class **node()** is written for you.

Notice: You **shouldn't** use len() function in your codes. Please use python3.6 to run.

2 INPUT/OUTPUT SPECIFICATION

2.1 Input Format

Inputs are a series of commands separated by newlines. The following is an example:

```
PUSH 10
PUSH 9
POP
PUSH 8
PUSH 7
PUSH 6
POP
POP
```

2.2 Output Format

You should print out your stack or queue of each execution process. Below is an example of executing the above input using queue.

```
>> Node(00010)
>> Node(00010) >> Node(00009)
>> Node(00009)
>> Node(00009) >> Node(00008)
>> Node(00009) >> Node(00008) >> Node(00007)
>> Node(00009) >> Node(00008) >> Node(00007) >> Node(00006)
>> Node(00008) >> Node(00007) >> Node(00006)
>> Node(00007) >> Node(00006)
```

3 Command-Line Arguments

You should follow the command-line arguments as the example below:

```
python3 main.py --structure queue
 --input./input --output ./output
```

4 Submission

Please put main.py and struct.py into a directory named **studentID** and compress the directory into studentID.zip. Finally, upload studentID.zip to ceiba. The homework is due on **4/9**, at **4:00 am**.

5 EVALUATION

You should call the class *node()* when storing your data structure. When testing your codes, in class node, the function **__repr__**() will be overloaded. But the constructor, which is **__init__**(), would be the same as the sample code.

If you do not use **linked lists** when storing your data structure, you will get **no points** for this homework. We will test the time complexity of your code and check if it is O(1).

We will run your file main.py using our own datasets. If your output is correct, you will get full scores.

Good Luck!