COP-4338 Programming III, Summer 2020

Alt. Programming Assignment 3:
Credit: 129 points out of the total 259 points of Zyblabs in PA3

Due Date: July 15 at 11:59 PM

This assignment asks you to implement a queue (FIFO) data structure using two stacks (FILO). To do this, you need to first implement a stack of integers (capacity: 1000) with push and pop operations and then implement a queue using two stacks with enqueue and dequeue operations.

1 Constructing Stack

Stack is a data structure that can be implemented in the following way:

- int stack[1000];
- int top = 0;
- void push(int data){stack[top++] = data;}//adding elements
- int pop(){return stack[−−top];}//removing elements

2 Constructing a Queue

Queue is a data collection in which the entities in the collection are kept in order and the operations on the collection are the addition of entities to the rear terminal position, known as enqueue, and removal of entities from the front terminal position, known as dequeue. This makes the queue a First-In-First-Out (FIFO) data structure.

In this assignment, you need to construct a *queue of integers* by implementing its enqueue and dequeue operations using two stacks in the following way:

- void enqueue (int entity): The enqueue operation can be done by simply pushing the entity in the first stack.
- int dequeue(): In order to implement dequeue operation, you need to pop an integer from the second stack. If the second stack is empty, then you need to first transfer *all* of the entities stored in the first stack to the second one using a sequence of alternating pop and push operations on the first and second stacks respectively (i.e. popping an integer from the first stack and pushing it back to the second one). After emptying the first stack, you simply pop from the second stack to complete the dequeue operation.

3 Submissions

You need to submit a *.zip* file compressing the following files:

- all the .c source file(s) and .h header files related to the implementation of queue and stack
- a readme.txt file explaining the functions you've implemented
- Note that you do not need to submit any main function as I test your program myself.