Data Structure 2019
Lab 05

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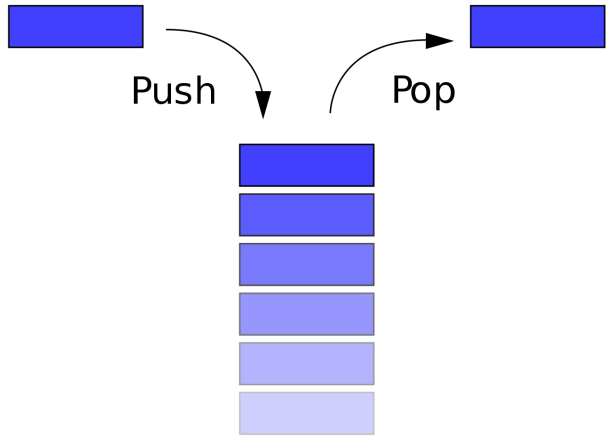
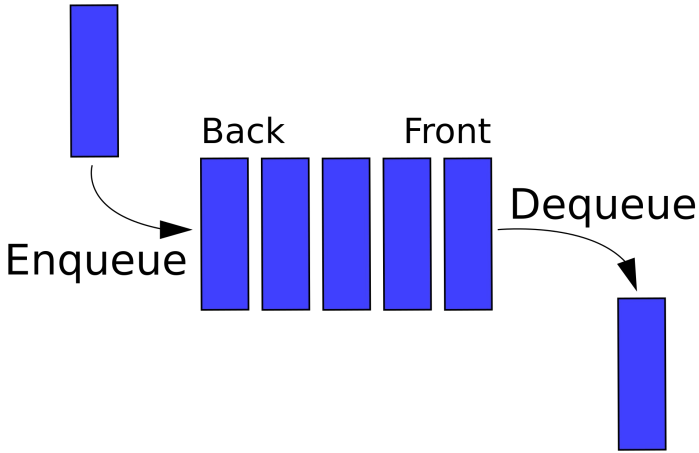
Stack

- A basic data structure that implements the LIFO logic
- LIFO (Last In, First out)
- Two most basic operations:
  - Inserting an item into the stack (push)
  - Deleting an item from the stack (pop)



Queue

- A basic data structure that implements the FIFO logic
- FIFO (First In, First out)
- Two most basic operations:
  - Inserting an item into the queue (enqueue)
  - Deleting an item from the stack (dequeue)



Today’s Task 1: Tower of Hanoi

void towersOfHanoi(int n, int x, int y, int z)

* n number of disks
* x source tower
* y destination tower
* z intermediate tower */

Example:

towersOfHanoi(3, 1, 2, 3);

Console output:

Move top disk from tower 1 to top of tower 2
Move top disk from tower 1 to top of tower 3
Move top disk from tower 2 to top of tower 3
Move top disk from tower 1 to top of tower 2
Move top disk from tower 3 to top of tower 1
Move top disk from tower 3 to top of tower 2
Move top disk from tower 1 to top of tower 2

Today’s Task 2: Parenthesis Matching

void printMatchedPairs(String expr)

* output the matched parenthesis pairs in the string expr

Example:

String keyboard = "(d+(a+b)*c*(d+e)-f))(()";
printMatchedPairs(keyboard);

Console output:

3 7
11 15
0 18
No match for right parenthesis at 19
21 22
No match for left parenthesis at 20

Today’s Task 3: Queue using 2 Stacks

```
public class Queue {

        private Stack<Integer> s1 = new ..
        private Stack<Integer> s1 = new ..

        public void enQueue(int x){

        }

        public int deQueue(){

        }

}
```

Example:

```
Queue q = new Queue();
q.enQueue(1055);
q.enQueue(100);
q.enQueue(1000);
System.out.println(q.deQueue());
System.out.println(q.deQueue());
System.out.println(q.deQueue());
System.out.println(q.deQueue());
```

Console output:

1055
100
1000
Error

Note:

- Lab5.java contains the main function. Do not change this file. Lab5 should compile and run.

- Submit a zipped file of Lab5.java, TowersOfHanoi.java, ParenthesisMatching.java, and Queue.java.

- Name your zip file: “{LastName}-{studentID}” e.g. “Lee-201211111”