

**Gebze Technical University  
Computer Engineering**

**CSE 222 - 2019 Spring**

# **HOMEWORK 3 REPORT**

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# 1 INTRODUCTION

## 1.1 Problem Definition

Implementing the stack structure mechanism and using it logically.

## 1.2 System Requirements

### Hardware requirements

- 2 GB RAM minimum, 4 GB RAM recommended
- 1.5 GB hard disk space + at least 1 GB for caches
- 1024x768 minimum screen resolution

### Software requirements

- JRE 1.8 is bundled with the IntelliJ IDEA distribution. You do not need to install Java on your computer to run IntelliJ IDEA.
- A standalone JDK is required for Java development.

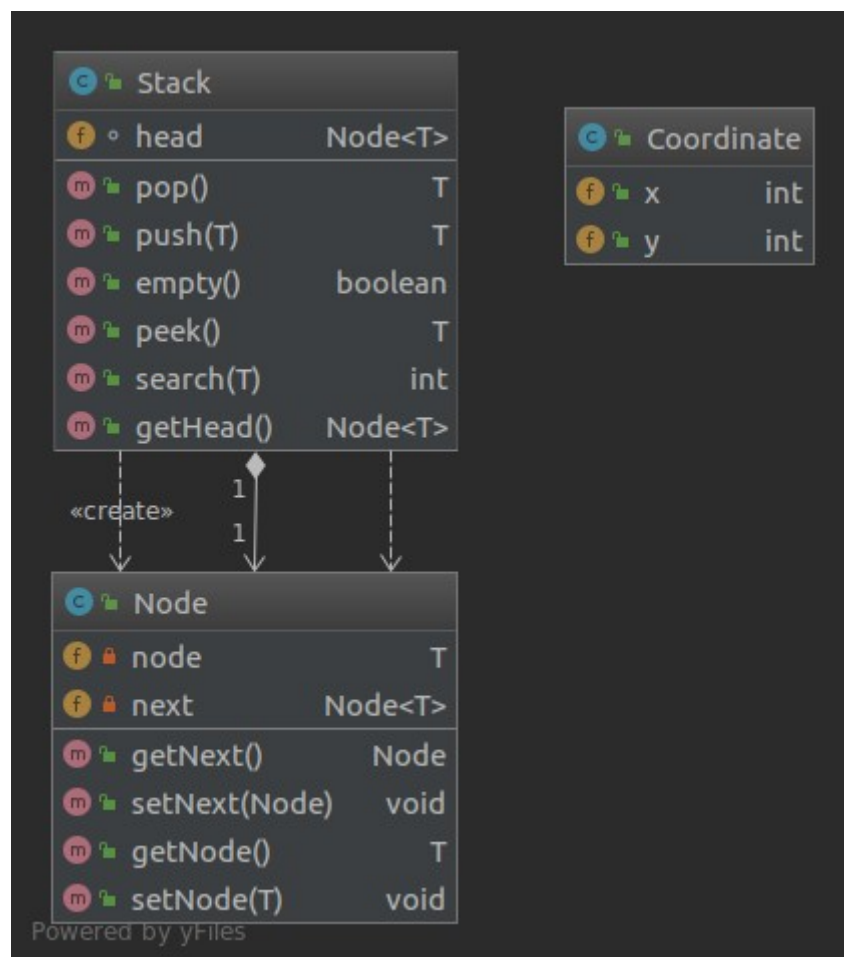
### Linux

- OS Linux (note that a 32-bit JDK is not bundled, so a 64-bit system is recommended)
- KDE, Gnome or Unity desktop environment recommended

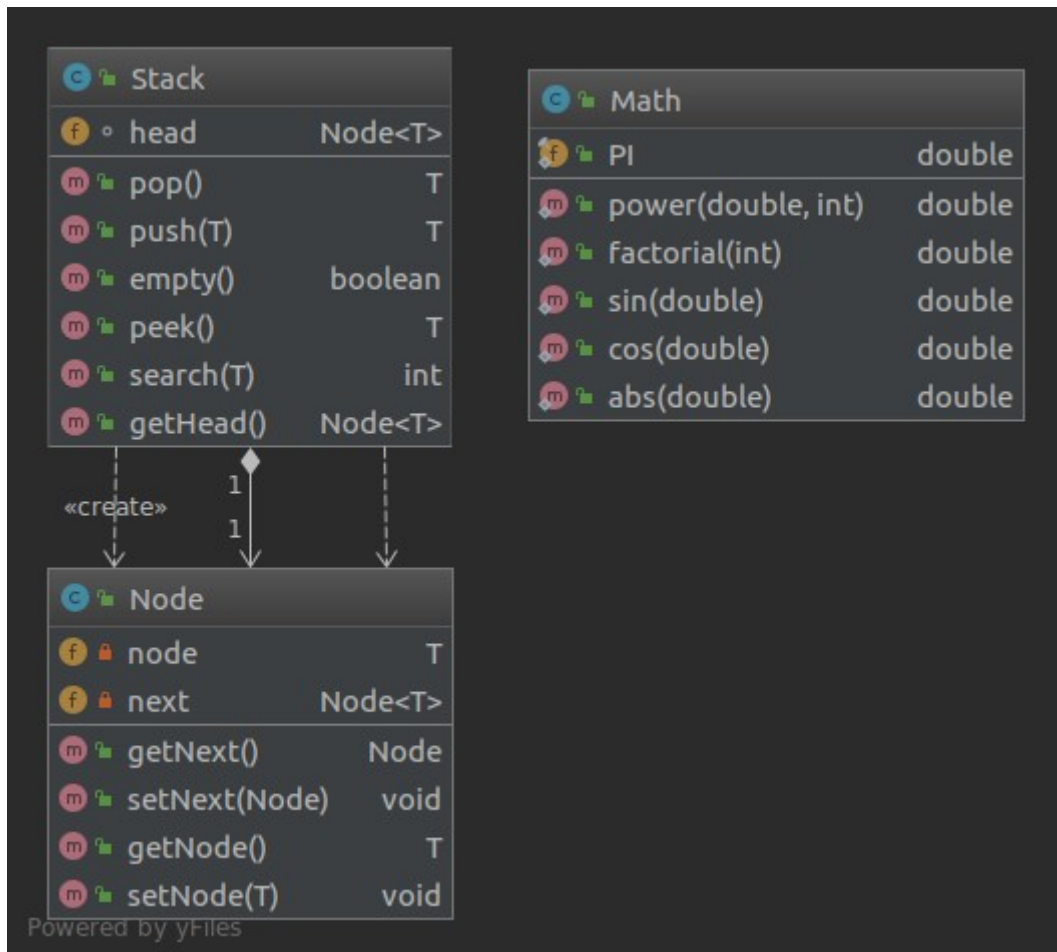
## 2 METHOD

### 2.1 Class Diagrams

#### Part 1



## Part 2



## 2.2 Problem Solution Approach

### Part 1

I traversed the map by the help of stack in this part. While traversing a component, i pushed a white pixel into a temporary stack and passed to the next one from all four ways. I holded the info of the former pixel in the stack to be able to go back and go further from the other ways. After i travelled all the map, i changed them to another value not to recognize them as a white dot again. I did this process repetitively until no more travelled component left. My loop for traversing the 2D array traverse any element at most 2 times, so that my worst case complexity is  $O(n) (2*n)$ .

## Part 2

I converted an infix expression to a postfix notation and i pushed the posfix notation into a stack. I used a helper stach to push them regularly (to obey operator precidence). After I push all the stack to another to be able to reach the postfix notation by right order. After I evaluated the result of this postfix notation by popping one by one.

## 3 RESULT

### 3.1 Test Cases

```
System.out.println("\nMap:\n");
for(int i=1; i<varArr.length-1; ++i) {
    for (int j = 1; j < varArr[0].length-1; ++j)
        System.out.printf("%s ",varArr[i][j]);
    System.out.printf("\n");
}
System.out.printf("\nTotal components: %d\n",totalComponents);
```

```
System.out.printf("\nExpression: ");
for(int i=0; i<expression.length; ++i)
    System.out.printf("%s ",expression[i]);
System.out.printf("\n\nResult: %f\n",result);
```

### 3.2 Running Results

#### Part 1

```
/usr/lib/jvm/java-11-oracle/bin/java
-javaagent:/opt/idea-IU-183.5912.21/lib/idea_rt.jar=34867:/opt/idea-IU-183.5912.21/bin
-Dfile.encoding=UTF-8 -classpath
/home/typoz/IdeaProjects/cse222_hw3_part1/out/production/cse222_hw3_part1 Main /
home/typoz/IdeaProjects/cse222_hw3_part1/src/input.txt
```

Map:

```
0 0 0 0 0 0 0 0 0 0
0 0 1 0 0 0 1 0 0 0
0 1 1 1 1 0 0 1 0 1 0
0 1 1 0 1 0 0 0 0 1 1
0 0 0 1 1 0 0 0 1 1 0
0 0 0 0 0 0 0 0 0 0 0
```

Total components: 4

Process finished with exit code 0

```
/usr/lib/jvm/java-11-oracle/bin/java
-javaagent:/opt/idea-IU-183.5912.21/lib/idea_rt.jar=34631:/opt/idea-IU-183.5912.21/bin
-Dfile.encoding=UTF-8 -classpath
/home/typoz/IdeaProjects/cse222_hw3_part1/out/production/cse222_hw3_part1 Main /
home/typoz/IdeaProjects/cse222_hw3_part1/src/input.txt
```

Map:

[illegible]

Total components: 9

Process finished with exit code 0

## Part 2

```
/usr/lib/jvm/java-11-oracle/bin/java
-javaagent:/opt/idea-IU-183.5912.21/lib/idea_rt.jar=41703:/opt/idea-IU-183.5912.21/bin
-Dfile.encoding=UTF-8 -classpath
/home/typoz/IdeaProjects/cse222_hw3_part2/out/production/cse222_hw3_part2 Main /
home/typoz/IdeaProjects/cse222_hw3_part2/src/input.txt
```

Expression:  $z + 2.5 * (\cos(\text{abs}(z * x)) / \sin(\text{abs}(y * z))) - y * -2$

Result: 6.532692

Process finished with exit code 0

```
/usr/lib/jvm/java-11-oracle/bin/java
-javaagent:/opt/idea-IU-183.5912.21/lib/idea_rt.jar=39861:/opt/idea-IU-183.5912.21/bin
-Dfile.encoding=UTF-8 -classpath
/home/typoz/IdeaProjects/cse222_hw3_part2/out/production/cse222_hw3_part2 Main /
home/typoz/IdeaProjects/cse222_hw3_part2/src/input.txt
```

Expression:  $(w + 4) * (\cos(x) - 77.9)$

Result: -692.149300

Process finished with exit code 0

```
/usr/lib/jvm/java-11-oracle/bin/java
-javaagent:/opt/idea-IU-183.5912.21/lib/idea_rt.jar=45265:/opt/idea-IU-183.5912.21/bin
-Dfile.encoding=UTF-8 -classpath
/home/typoz/IdeaProjects/cse222_hw3_part2/out/production/cse222_hw3_part2 Main /
home/typoz/IdeaProjects/cse222_hw3_part2/src/input.txt
```

Expression:  $(y + \sin(y * z)) + (z * \text{abs}(-10.3))$

Result: 168.543128

Process finished with exit code 0