1.00 Tutorial 3

Methods, Scope, Classes, Objects

1

Things to be discussed….

- Methods, Scope
- Classes & Objects
- Problem Set 3 discussion

2

Pass by copy/value

- In Java, method arguments are passed by copying them (also called pass by value

3

Pass by copy/value

- What does the following code fragment print?

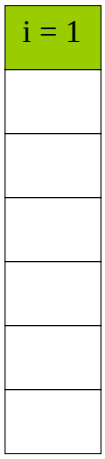
```
class Tutorial3 {
   public static void main(String[] args)
   {
        int i = 1;
        System.out.println("i = " + i);
        increment(i);
        System.out.println("i = " + i);
   }

   public static void increment(int i) {
        i = i + 1;
        System.out.println("i = " + i);
   }
}
```

4

So, What is going on? The memory stack

i = 1 in main()

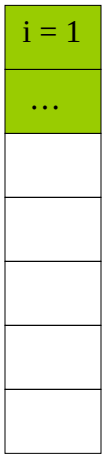


5

So, What is going on? The memory stack

i = 1 in main()

increment(i) is called



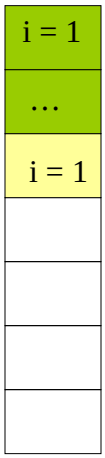
6

So, What is going on? The memory stack

i = 1 in main()

increment(i) is called

i = 1 in increment()
the value of i in main
is copied to the variable i in increment
the original is unchanged



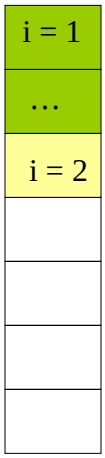
7

So, What is going on? The memory stack

i = 1 in main()

increment(i) is called

now i inside increment()
is incremented

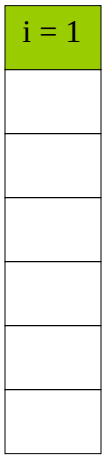


8

So, What is going on? The memory stack

i is still 1 in main()

increment returns void and
i inside increment() does not exist anymore



9

A Simple Class

```
public class Capacitor {
  private double capacitance;
  public double getCapacitance()
      { return capacitance; }
  public void setCapacitance(double c)
      { capacitance = c; }
  public Capacitor(double c) {
      capacitance = c;
  }
}
```

10

Object creation: how to call the constructor

```
/* declare variable */
Capacitor cp;
/* call constructor */
cp = new Capacitor(0.001);
```

11

Question

What is the difference between:

- an object and an object reference?

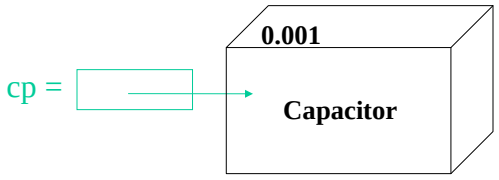
12

Object reference and Object

```
Capacitor cp;  // Object Reference
```

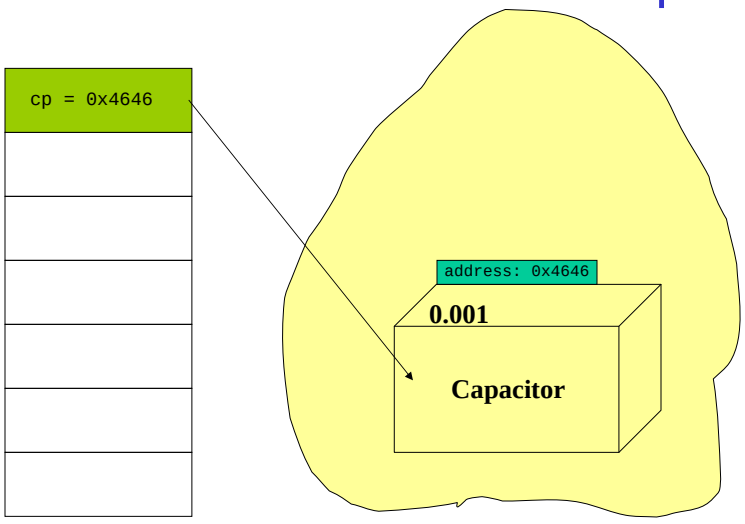
cp =

```
Capacitor cp = new Capacitor(0.001);
```



13

The Stack & The Heap



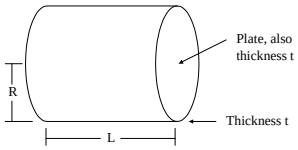
14

Problem Set 3: Aim

Aim is to find the cost C and other tank parameters given tank volume V

- Volume V is user input.
- Variables are R and L.
- For a given V, search for a combination of R and L that will give the minimum cost C.

All Equations are provided !



Tank dimensions

15

Problem Set 3: Suggested Implementation

- Two java classes required
  - **Tank.java**
    - This implements the Tank and stores its data members and the static variables.
    - Has the required `getter` and `setter` methods.
    - Has a `computeCost()` method which computes the minimum cost (eq 2 and strategy outlined in Pset) and updates tank variables.
  - **TankTest.java**
    - This contains the `main()` method.
    - Accepts user input for tank (max 3 tanks) and creates `Tank` object
    - Uses the methods of the `Tank` class to compute cost etc
    - Prints out the result on the screen.

You are free to choose your own implementation provided it fulfills the requirements of the PSet.

16