CSE 121 Lesson 12:

More Arrays, Reference Semantics

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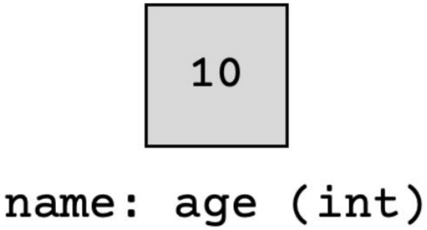
Reminders & Announcements

- C2* (the old C3) was released on Wednesday, due next **Tuesday**
- R5 released yesterday, due next Thursday (8/8)
- Quiz 2 next Thursday in section
  - topics: everything up until Arrays on Wednesday (i.e. not today's material)
  - Quiz 1 grades will be released on Monday
- In the future: Final Exam (Friday, 8/16 **in lecture**)
  - more logistical details coming soon!
- Final Reflection Assignment due 8/16 @ 11:59 pm

(PCM) Value Semantics vs. Reference Semantics

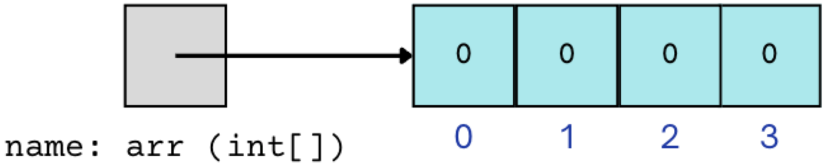
- Applies when working with primitive types
- Variables/parameters hold a *copy* of the actual value

```
age = 10;
```



- Applies when working with objects
- Variables/parameters hold a *reference* to the object

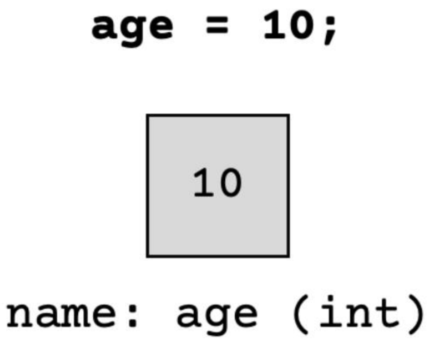
```
int[] arr = new int[4];
```

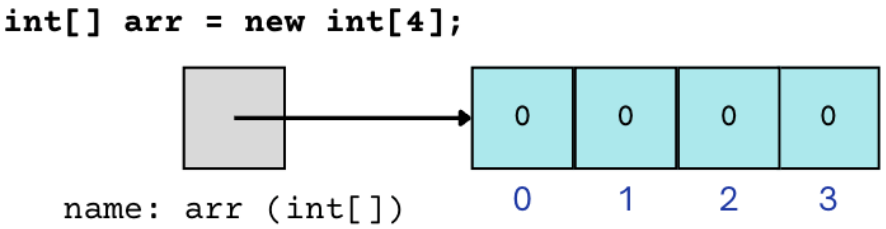


(PCM) Value Semantics vs. Reference Semantics

```
int a = 3;
int b = a;
a = 99;
```

```
int[] list1 = {4, 8, 15, 16, 23};
int[] list2 = list1;
list1[1] = 99;
```





Reference Semantics are a walk in the park!

(PCM) Value Semantics vs. Reference Semantics

```
boolean test = true;
flipValue(test);
public static void flipValue(boolean b) {
  b = !b;
}
```

```
boolean[] tests =
  {true, true, false, true, false, false};
flipValues(tests);
public static void flipValues(boolean[] b) {
  for (int i = 0; i < b.length; i++) {
    b[i] = !b[i];
  }
}
```

(PCM) `null`

The *absence* of a reference!

- Sort of like a "zero-equivalent" for references!
- Default value for “object types” (e.g. Random, Turtle, Scanner…)

`NullPointerException`s are an error that happen when you ask `null` to “do something”

- call `.toUpperCase() on null`? **`NullPointerException!`**
- get `.nextInt() from null?` **`NullPointerException!`**
- many, many more

(PCM) avoiding NullPointerException

```
if (strs[i] != null) {
  System.out.println(strs[i].toUpperCase());
} else {
  System.out.println("element " + i + " is
null.");
}
```