LEC 10

CSE 122

Introduction to Objects

Questions during Class?

Raise hand or send here

sli.do #cse122

BEFORE WE START

Talk to your neighbors:

Best places to study on campus?

Instructor: Ido Avnon

TAs: Abby Williams
Chloë Mi Cartier
Connor Sun
Cynthia Pan
Katharine Zhang
Marcus Sanches
Rohini Arangam

Lecture Outline

- Announcements
- C2 Overview
- OOP Review
- Example
- Abstraction

Announcements

- Programming Assignment 2 (P2) due **Saturday!**
- Culminating Project 2(C2) out later today!
- Quiz 1 Yesterday… how did it go?

Lecture Outline

- Announcements
- **C2 Overview**
- OOP Review
- Example
- Abstraction

Lecture Outline

- Announcements
- C2 Overview
- **OOP Review**
- Example
- Abstraction

Object Oriented Programming (OOP)

- **Procedural programming**: Programs that perform their behavior as a series of steps to be carried out
  - Classes that do things

- **Object-oriented programming (OOP):** Programs that perform their behavior as interactions between objects
  - Classes that represent things
  - We're going to start writing our own objects!

Classes & Objects

- **Classes** can define the template for an object
  - Like the blueprint for a house!
    "What does it mean to be this thing?"

- **Objects** are the actual instances of the class
  - Like the actual house built from the blueprint!
    "It is an example of this thing!"

We create a new instance of a class with the new keyword

e.g., `Scanner console = new Scanner(System.in);`

State & Behavior

- **Objects** can tie related *state* and *behavior* together

- **State** is defined by the object's *fields* or *instance variables*
  - *Scanner's state may include what it's scanning, where it is in the input, etc.*

- **Behavior** is defined by the object's *instance methods*
  - *Scanner's behavior includes "getting the next token and returning it as an `int`", "returning whether there is a next token or not", etc.*

slido

Please download and install the Slido app on all computers you use

What could be the possible state of a "Human" class?

ⓘ Start presenting to display the poll results on this slide.

slido

Please download and install the Slido app on all computers you use

What could be the possible behavior of a "Human" class?

ⓘ Start presenting to display the poll results on this slide.

Lecture Outline

- Announcements
- C2 Overview
- OOP Review
- **Example**
- Abstraction

Representing a Coordinate Point

How would we do this given what we knew last week?

Maybe `int x`, `int y`?

Maybe `int[]`?

Representing a point

`int x, int y`

- Easy to mix up x, y
- Just two random `ints` floating around – easy to make mis

Let's make a class instead!

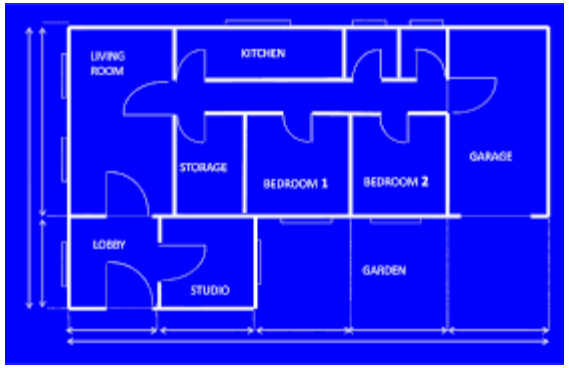
`int[`

- Not really what an array is for
- Again, just two `ints` – just have to "trust" that we'll remember to treat it like a point

Instance Variables

- Fields are also referred to as **instance variables**

- Fields are defined in a class
- Each instance of the class has their own copy of the fields
  - Hence *instance* variable! It's a variable tied to a specific instance of the class!



Instance Variables in Java

```
public class MyObject {
    // fields
    type1 fieldName1;
    type2 fieldName2;
    ...
}
```

Instance Methods

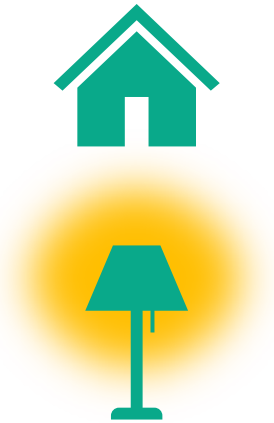
- **Instance methods** are defined in a class
- Calling an instance method on a particular *instance* of the class will have effects on <u>that</u> instance

Instance Methods

- **Instance methods** are defined in a class
- Calling an instance method on a particular *instance* of the class will have effects on <u>that</u> instance

Instance Methods

- **Instance methods** are defined in a class
- Calling an instance method on a particular *instance* of the class will have effects on <u>that</u> instance



Instance Methods in Java

```
public class MyObject {


    // instance methods
    public returnType methodName(...) {
        ...
    }
}
```

Syntax

```
public class MyObject {
    // fields
    type1 fieldName1;
    type2 fieldName2;
    ...

    // instance methods
    public returnType methodName(...) {
        ...
    }
}
```

Lecture Outline

- Announcements
- SearchEngine Recap
- OOP Review
- Example
- **Abstraction**

Abstraction

The separation of ideas from details, meaning that we can <u>use</u> something without knowing exactly <u>how</u> it works.

You were able use the `Scanner` class without understanding how it works internally!

Client v. Implementor

We have been the clients of many objects this quarter!

Now we will become the implementors of our own objects!