CSE 11
Accelerated Intro to Programming
Lecture 1

Greg Miranda, Summer 1 2021

This lecture is being recorded

Fair Notice of Class Recording Announcement

- Each class online lecture for CSE 11, including this one, will be recorded and made available to students asynchronously.

About Me and My Family :)

Full name: Gregory Miranda

Preferred name: Greg

Preferred pronouns: he/him/his

Personal webpage:

https://gregmiranda.com

UCSDCSE
Computer Science and Engineering

Education

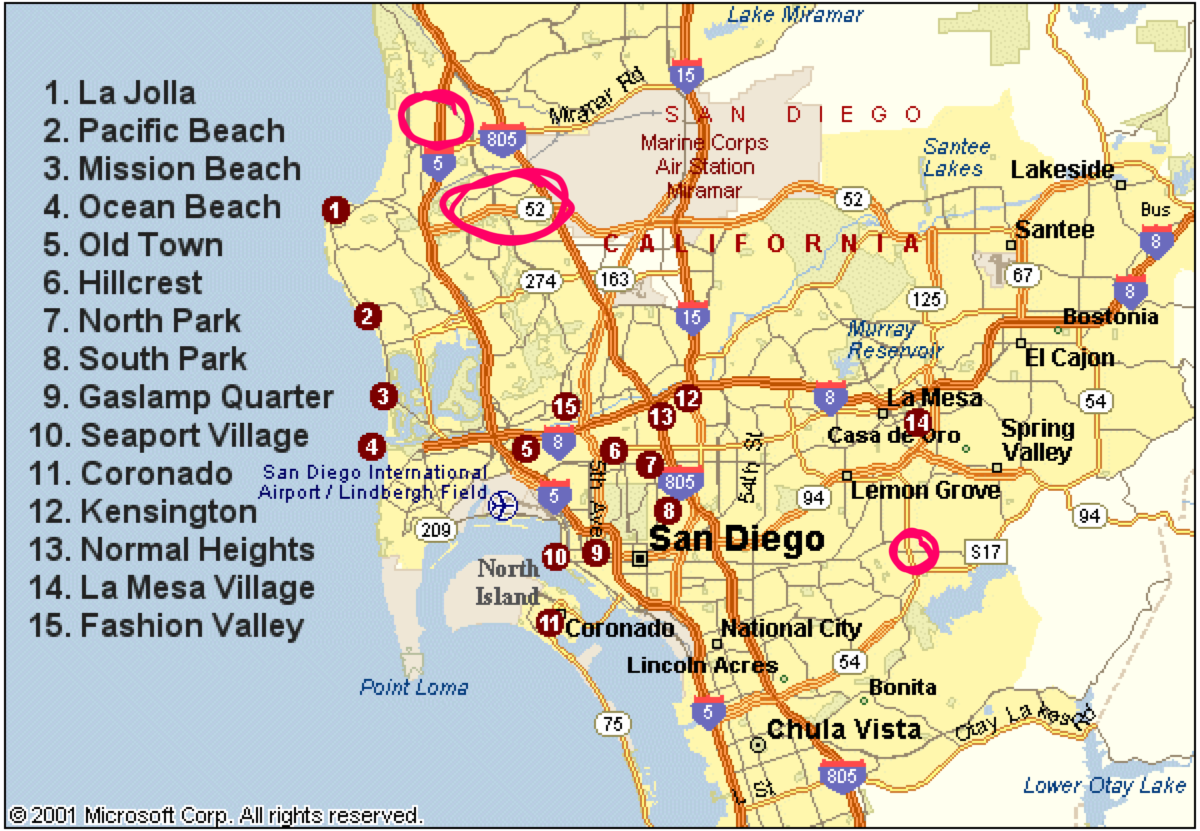
UAT

M.S. in Technology (Artificial Life Programming)

B.S. in Computer Engineering

UCSD

Where am I from



Teaching Experience

UCSD

- CSE 3 – Fluency in Information Technology
- CSE 5A – Introduction to Computer Science (C)
- CSE 8B – Introduction to Programming and Computational Problem-Solving II
- CSE 11 – Introduction to Programming and Computational Problem-Solving: Accelerated Pace
- CSE 12 – Basic Data Structures and Object-Oriented Design

Other universities

- Game Programming, Game Design, Web Programming

Fun things!

Announcements

- Discussion starts today @ 2pm
- PA0.5 released yesterday – due Thursday
- PA1 released today – due Thursday

Coding Experience

- How much coding experience?
  - 9 A – No coding
  - 10 B – A little bit of coding
  - 12 C – Some coding
  - 3 D – Lots of coding

Coding Experience

- Languages – ~~Select All~~ Select Best
  - 8 A – Java
  - 7 B – C++
  - 8 C – Python
  - 2 D – JavaScript or other scripting language
  - 2 E – Other compiled language (ex: C)

Topics

- Syllabus
  - https://ucsd-cse11-su121.github.io/
- Canvas
- Questions?

Experimenting with running Java Programs

- How to edit Code?
  - Text Editor → notepad++, sublime, Visual Studio Code
  - Integrated Development Environment (IDE) → Eclipse, IntelliJ, BlueJ
- How to run Code?
  - Command Line
    - Mac/Linux
    - Windows

javac → compile

java → run

compile

mac

```
javac -cp tester.jar *.java
java -classpath tester.jar:. tester.Main Example1Lecture
```

Windows

```
javac -cp tester.jar *.java
java -classpath tester.jar;. tester.Main Example1Lecture
```

```
class Examples1Lecture {
  int theNumberFive = 2 + 3;
}
```

field exp

- Fields → member variables
- Arithmetic Expression
- Output
- Java / Programming Languages
  - Simplest thing you can do with them: calculators
- More Examples

Compiler Errors

Errors / Error Messages

- Big part of programming
  - Understanding when you made a mistake
  - How to fix the mistake
- Possible mistakes
  - Invalid command
    - Expect that that class is defined in a file with the same name .java
    - Class can’t be found – typo in the name or a has mismatch with the name of the class
  - Name of field doesn’t match value
    - Pick meaningful names

- Possible mistakes (cont.)
  - Could leave off or forget int
    - Syntax error
  - Error messages do not always match what's wrong
    - Use context of program to figure out what happened
  - Other errors we can get
    - When running programs – practice trying to break them a little bit
      - Remove =
      - Remove ;
      - Remove { or }
- Going to be a lot of times where you make a mistake
  - Typo
  - Copy/paste incorrectly
  - Accidently delete something
  - Or just make a mistake
- Need to practice fixing error messages
  - Use the context of the program to understand the error message
- Errors are a normal part of programming

Arithmetic in Java

```
class Examples1Lecture {
  int x = 2 + (9 * 3);
  int y = 10 / 3;
}
```

→ $\boxed{29}$ 33

→ $\boxed{3}$ 3.333 3 1/3

- What's would happen here?
  - What is the value of x?
  - What is the value of y?
  - What about y = 11 / 3; ? → 11/3 → $\boxed{3}$ 3.6667 3 2/3
- Using parenthesis

→ truncation

int → whole #

- Order of operations & parenthesizing
  - In many ways Java acts like arithmetic
  - But in other ways, Java does not
    - Division has truncation behavior we do not see in math classes
      - Very common in programming
    - Multiplication & division before addition & subtraction

* /

left to right

+ −

left to right

y = 11/3;

field

exp

New Example

- Create a new file

```
class Examples2 {
  int rate = 20;
}
```

- class – will talk about more later
  - For now: describes a group of fields
- Problem:
  - Calculate the pay you would receive at a certain hourly rate given a number of hours
    - New field: # of hours worked
  - Calculate total pay using Java as a calculator

- Calculate total pay (cont.)
  - Can we use these fields in another calculation?
  - Why is it useful to do this with fields instead of writing this directly?
    - What if:
      - Use same hourly rate, but a number of different weeks to calculate?
    - What if:
      - We want to change the hourly rate?
    - Change once, changes all values
      - Many times, you will have one field whose value can be used in many places
        - Configure how the program works
    - Changing the value in one spot can affect many other places in the program
      - Powerful concept in programming:
        - Define a value in one place
        - Change it by editing the program
        - Watch its changes be reflected in all the other places next time it’s run

- Using this.hourlyRate
  - Call that a field look-up or a field access
    - Looking up the current value of a field that has been defined before

this.hourlyRate

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Text

- Integers (int) – common kind of data programmers work with
- New kind of data – also really common – text

step

  - Examples: usernames, passwords, email, names, addresses
  - Data type for text - String
- Previous examples - had int as the type
  - int numberOfStaff = 14;
- Now – using String as the type
  - String name = “Greg Miranda”; //String value, string literal
- String className = 11;
  - What happens? Does it work?
- String className = “11”;
  - What happens? Does it work? Is it text or a number?

Types

- int – integer type – integer literal
- String – text type – string literal (written in double quotes)
- Java will enforce that we always
  - store string values in String typed fields
  - numeric values in numeric typed fields
- Programmer’s job to get this right
  - Java will give an error message if we don’t

String

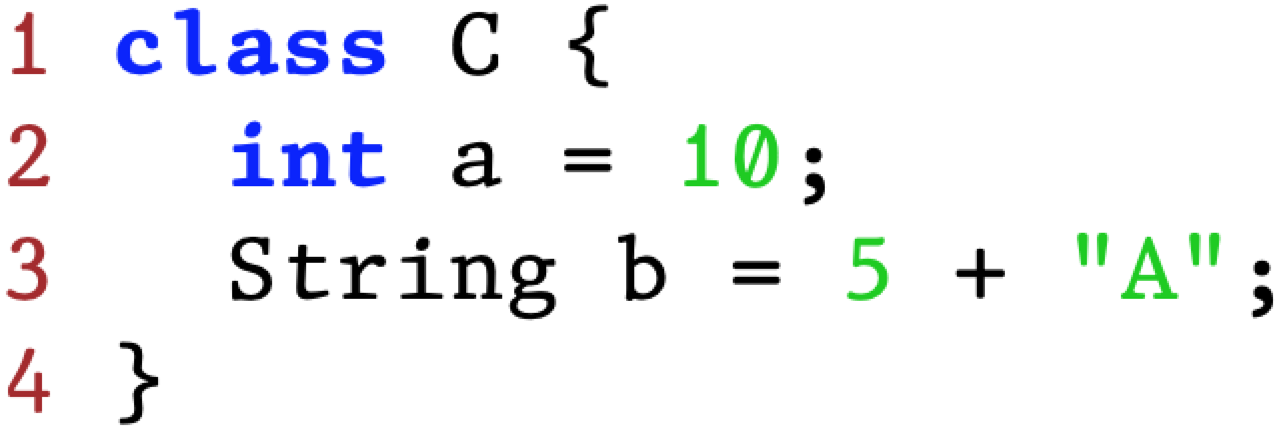
- We learned we can store Strings values in fields
  - What else can we do with them?
    - Can we add Strings together, like integers?
      - String fullName = “Greg” + “Miranda”;
        - Will this work?
    - Can we multiply Strings by a number?
      - String str = this.firstname * 2;
    - What about Divide? Subtract?
    - What about +? Can we add a String and a number?
      - String str = this.firstname + 2;
        - What’s going to happen if we try this?
          - Compiler error?
          - Works? If it works, what does it store in the str field?

- We can + other things besides numbers to Strings and get similar behavior
    - More on this in upcoming weeks
- Adding Strings and numbers
    - Can be convenient
        - Can turn a number into text
    - Can also be confusing
        - String className = "11" + 200;
        - int klassName = 11 + "200";
            - Error
        - String klassName = 11 + "200";
    - Java does do this automatic conversion of Strings and numbers
        - Be careful in your own code

Vocabulary

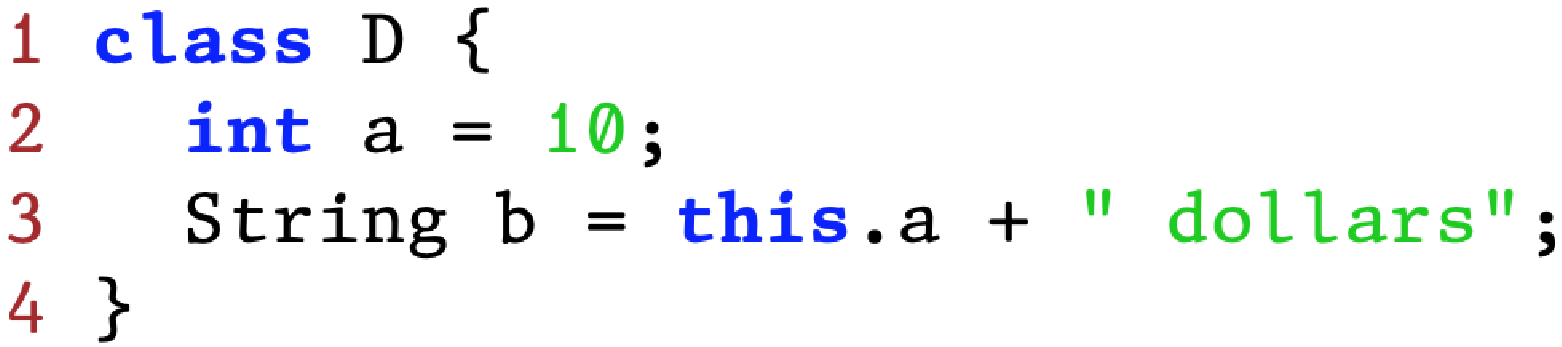
```
class Example {
  int x = 3 + 2;
  int y = this.x * 4;
}
```

How many field definitions are in this class?



```
class C {
    int a = 10;
    String b = 5 + "A";
}
```

How many field definitions are in this class?



```java
class D {
    int a = 10;
    String b = this.a + " dollars";
}
```

Do you think there's a limit on how many field definitions can be in a class?

Program Steps

```
class Example {
  int x = 3 + 2;
  int y = this.x * 4;
}
```

Expressions

- int x = 3 + 2;
    - 3 + 2
        - Arithmetic expression
        - Binary operator expression
- int y = this.x * 4;
    - this.x
        - Field access expression
    - this.x * 4
        - Arithmetic expression where the left-hand operand is a field access expression

Methods

- New class – MethodExample
- In programming, we often want to describe a computation once
  - Then reuse it on different numbers, or different values
  - Write once, use it over and over again
- Example:
  - Take two numbers and add up their squares
    - int sos1 = 3 * 3 + 5 * 5;
    - int sos2 = 4 * 4 + 7 * 7;

- Define a method to do the same thing

```
int sumSquares(int n, int m) {
  return n * n + m * m;
}
```

- Vocabulary:
  - Method definition
  - Parameters
  - Method body
    - return keyword

- Running it…
  - Method definition doesn’t change what prints out or any of the fields
  - Run command – only prints out the values of the fields
- Can use sumSquares() to do the calculation
  - int ans1 = this.sumSquares(3, 5);
  - int ans2 = this.sumSquares(4, 7);
- Vocabulary:
  - Called the method
  - Arguments

- Methods: one of the building blocks for building programs
  - Not just useful for arithmetic
  - Useful for many more things
- Why do we care about methods?
  - Methods give us a centralized place to write a calculation
    - Change in one place, every place that uses the method will see that update
  - As program gets large:
    - Might have 100s of places where we want to use a formula or calculation
      - Update them all by changing one place
  - Methods are self documenting – with meaningful names

```
class MethodExample {

  int sumSquares(int n, int m) {

    return n * n + m * m;

  }

  int ans1 = this.sumSquares(3, 5);

  int ans2 = this.sumSquares(4, 7);
}
```

Method definition

```
class MethodExample {
  int sumSquares(int n, int m) {
     return n * n + m * m;
  }
  int ans1 = this.sumSquares(3, 5);
  int ans2 = this.sumSquares(4, 7);
}
```