

# CS151 Intro to Data Structures

Java Basics

# Data Structures

What you'll learn:

1. Data Structures
2. Programming and Debugging Skills
3. Designing Complex Programs

# Today

## Part 1:

- Administrative info
- Syllabus
- Tips for Success

## Part 2:

- Java Basics
- Exercises: in class coding
  - Ex 1: classes, arrays, loops
  - Ex 2: input / output, exceptions

## Lab:

- Review Java Basics
- Exceptions
- Input / Output

# Administrivia

- Course website
  - [BMC-CS-151.github.io](https://BMC-CS-151.github.io)
    - Assignments and lab instructions, syllabus
    - Recordings!
    - Code from lecture
- Piazza:
  - Asynchronous communication
  - Can post anonymously (anonymous just to classmates)
  - Answer your peers questions!
    - Counts for participation grade
- Gradescope:
  - Entry code **VWYG3K**
  - Submit all assignments
  - Can request re-grade requests
  - WHAT YOU SEE IS WHAT YOU GET
- Optional Textbook
- 2.7 GPA requirement for CS Major

# Schedule

- Lecture Mon and Wednesday
- Homeworks due on Fridays
  - Two late days allowed
  - After two days, the submission window will be closed.
- Lab Park 230/W 2:40pm-4:00pm
- Midterm: Oct 22 (Wed after Fall break)
- Final Exam: Date TBD

# Syllabus

- Homeworks: 40%
- Midterm: 25%
- Final: 25%
- Labs: 5%
- Participation: 5%

# Labs

- Practice what we learned in lecture
- Will sometimes be a start to your HW
- Should be shorter than HWs
- Submission:
  - Get checked off manually
    - this means TA or Prof will have a conversation with you and assign points when you've finished
  - Autograde: some assignments will be graded automatically by pre written test cases on gradescope

# Homeworks

- All submitted on Gradescope and autograded
- Longer assignments



# Average Workload

(reported by past students)

HW0: 6 hours

HW1: 11 hours

HW2: 19 hours

HW3: 7 hours

HW4: 6 hours

HW5: 13 hours

HW6: 16 hours

HW7: 20 hours

HW8: 15 hours

# How to succeed

## 1. DO YOUR HOMEWORK

### 1. Start early

### 1. Ask for help

- a. Piazza
- b. TA and Professor office hours

# Tips for Success

- Get things working in the smallest case and continue to
- Iterate on assignment until the deadline
- Compile early and often
- Prioritize homeworks
- START EARLY
- How to use AI effectively
  - high level planning vs low level implementation

# Prerequisites

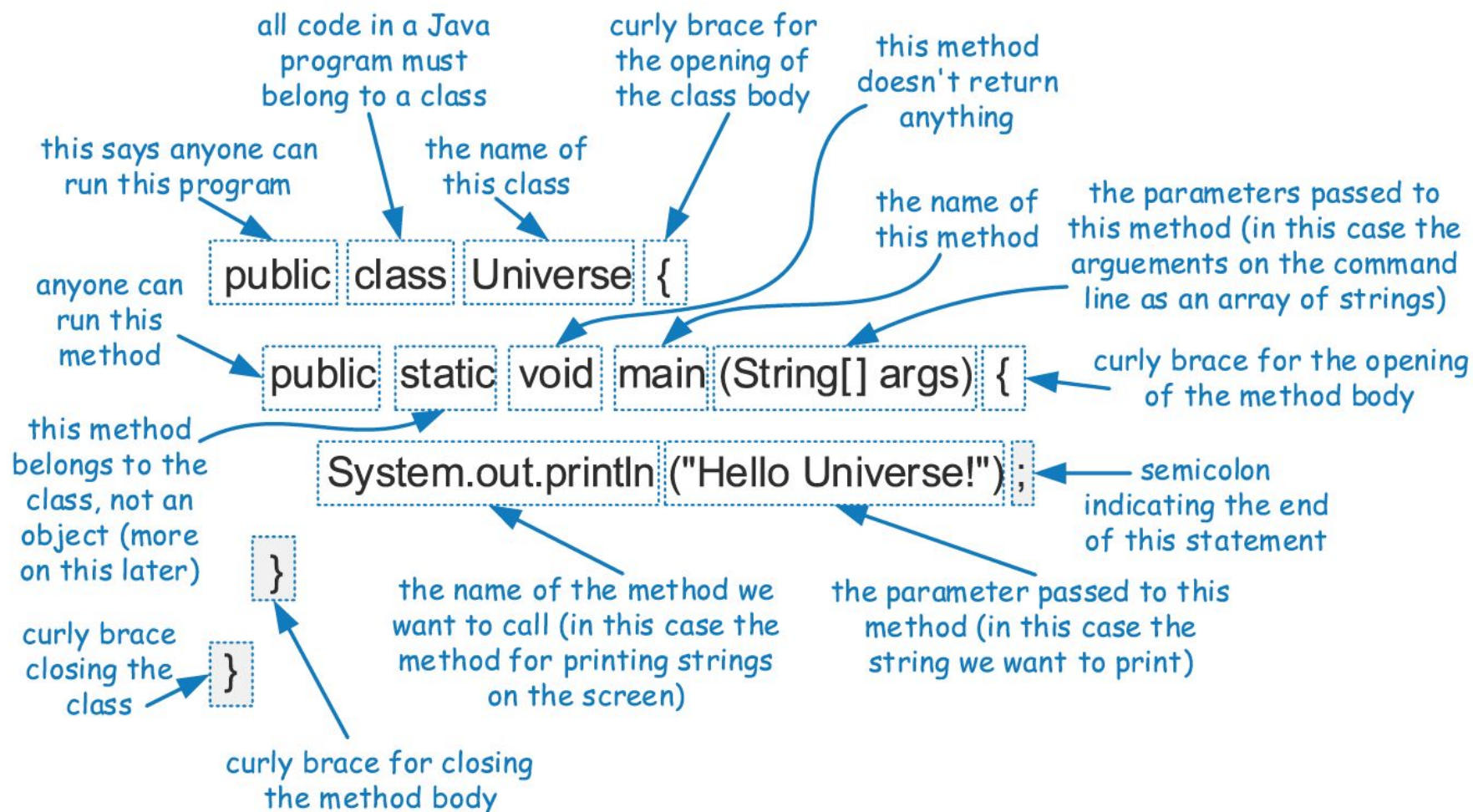
- Comfortable in command line and vim
  - If you're not - complete Lab0
- Java
  - basic syntax - we'll review some today

# Your Environment

- CS server account
  - Make sure you can log in
  - Email David Diaz if encountering issues (ddiaz1@brynmawr.edu)
- Lab00: ideally completed already, getting up and running with vim and linux
- Software: vim, Java, or just ssh

# Part 2: Java Basics and CS1 Review

# An Example Program



# Java: A compiled language

- Java program in .java (source code)
- Compiler create .class file (byte code)
- Java Virtual Machine (JVM) execute the code



# Java Basics

- Name of main class and file must agree
  - `class Driver <--> Driver.java`
- Compilation
  - `javac Driver.java`
- Execution
  - `java Driver`

# Components of a Java Program

- Statements are placed in *methods*, that belong to class definitions.
- The static method named `main` is the first method to be executed when running a Java program.
- Any set of statements between the braces `{` and `}` define a program block.

# Base/Primitive Types

- Variables must have types
  - base type
- Types define memory used to store the data
- Primitives:

<b>boolean</b>	a boolean value: true or false
<b>char</b>	16-bit Unicode character
<b>byte</b>	8-bit signed two's complement integer
<b>short</b>	16-bit signed two's complement integer
<b>int</b>	32-bit signed two's complement integer
<b>long</b>	64-bit signed two's complement integer
<b>float</b>	32-bit floating-point number (IEEE 754-1985)
<b>double</b>	64-bit floating-point number (IEEE 754-1985)

```
boolean flag = true;
boolean verbose, debug;
char grade = 'A';
byte b = 12;
short s = 24;
int i, j, k = 257;
long l = 890L;
float pi = 3.1416F;
double e = 2.71828, a = 6.022e23;
```

# Type Casting

- **Let's look at some code**

# CS1 Review Topics

1. Classes - accessors, constructors, this keyword, new keyword, toString, object equality
2. Arrays - initialization, default values, searching through an array
3. Command Line Arguments
4. Scanner - reading from user input and reading from a file
5. Exceptions

# Exercise 1 -

Part a: Create a College class with:

name,

number of students,

year founded

Part b: In the main, create 3 colleges and put them in an array

Part c: Take a college name as input and print the year it was founded

# Exercise 1 -

What is a class?

What is an object?

What is a primitive? How is it different from an object?

What are access modifiers?

# Access Control Modifiers

- `public`:
  - designates that all classes may access
- `private`:
  - designates that access is granted only to code within that class.
- `protected`:
  - child classes may access
- `static`
  - associates a variable/method with the class as a whole, rather than with each individual instance of that class



# Exercise 2 - count words in a file

Part a: Read in a filename from command line

Part b: Count the number of words in the file

# Exceptions – way to deal with unexpected events during execution

- Unexpected events:
  - unavailable resource
  - unexpected input
  - NPE
  - AOB

# How do we deal with exceptions?

```
try {  
    guardedBody  
} catch (exceptionType1 variable1) {  
    remedyBody1  
} catch (exceptionType2 variable2) {  
    remedyBody2  
} ...  
...
```

# Summary

- Lab 1 today
  - Not autograded
  - Due next Friday (Sep 12)
- HW0 Released
  - Due next Friday (Sep 12)
- Join Piazza and Gradescope
- Office Hours poll on piazza