



Welcome to CS 149

Introduction to Programming

Section 0010/0011
Instructor: Kevin Molloy



Contact Info

- Piazza - post general course / assignment questions here so that peers can answer and I can certify an answer and don't have to repeat answers to multiple e-mails.
- My JMU e-mail - molloykp@jmu.edu
- Class website: https://w3.cs.jmu.edu/molloykp/teaching/cs149/cs149_2018Fall/
- My offices: ISAT 216(Tue/Thu 10:30-12:00)
Other times by appointment
- I will generally respond to most e-mails within a 1/2 day unless it is after 8pm or a weekend(I may or may not answer e-mails until Monday morning over a weekend).



Class Info

- Please read the syllabus.
- Each class consists of a lecture and a lab component.
- Exams will take 2 classes (1 class for the written and another for programming).
- Assignments will be submitted via Canvas and through Web-Cat.
- Feedback from you



Algorithms

There are many definitions for this term:

- https://en.wikipedia.org/wiki/Algorithm_characterizations

Here is one we will use for this class:

- A series of steps for solving some problem that are detailed and clear enough that anyone following them will produce the correct output, even if they have no understanding of what the steps are supposed to accomplish.



CS149 Introduction to Programming

This class is about programming

Two parts:

- **Algorithm design** – Creating a set of steps for solving some problem
- **Programming** – Translating those steps into a language that a computer can execute

We will be programming in Java. Specifically version 10 of Java.



CS 149 Topics

Common elements of algorithms/programs:

- **Input/Output** Input comes from a user, results are reported to a user
- **Functions/Methods** Named set of instructions
- **Decisions** Some instructions only executed under certain conditions
- **Loops** Repetition of instructions
- **Variables** Named locations for storing values
- **Data Types** Categories of values that algorithms operate on “Card”, “Integer” etc.
- **Operations** Manipulation of values based on their type. E.g. integers may be added together.
- **Arrays** A sequence of related objects



Facts about CS149

- This course does not assume you have any background in programming
- This is not a weed-out course, but a B- or higher is required to move on to CS159.



Grading

See syllabus for full grading details and breakdown, summary:

Labs, Quizzes, Participation	10%
Programming Assignments	10%
Midterm 1	25%
Midterm 2	25%
Final Exam	30%

To receive a letter grade higher than a “C”, You must get a grade of 60% or greater on the final.



Hello World- Java Program

A class is a collection of methods

```
public class Hello {
```

This is the main method

```
public static void main(String[] args) {
```

```
// generate some simple output
```

```
System.out.println("Hello, World!");
```

```
}
```

```
}
```



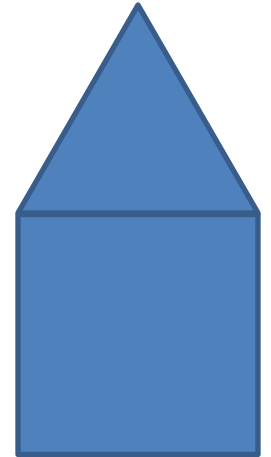
Token = identifier | keyword | separator | operator | literal | comment

1. **Identifiers:** names the programmer chooses
2. **Keywords:** names already in the programming language
3. **Separators** (also known as punctuators): punctuation characters and paired-delimiters
4. **Operators:** symbols that operate on arguments and produce results
5. **Literals** (specified by their **type**)
 - Numeric: **int** and **double**
 - Logical: **boolean**
 - Textual: **char** and **String**
 - Reference: **null**
6. **Comments**

Drawing a house

- Activity:

Describe the 'algorithm' to draw the house shown in the picture to the right





Drawing a House

Drawing a House: (“high level” algorithm)

1. Draw a 2” square.
2. Add a roof by drawing two line segments that begin at the top two corners of the square and meet 1” above square's center.



Drawing a House

Drawing 2" A Square (less abstraction):

1. Place the end of your pencil in the center of a sheet of paper.
2. Draw a 2" line from left to right, parallel with the top edge of the paper
3. Without lifting your pencil, draw a 2" toward the bottom of the paper, parallel with the right edge of the paper.
4. Without lifting your pencil, draw a 2" line from right to left, parallel with the top edge of the paper.
5. Without lifting your pencil, draw a 2" line toward the top of the paper, parallel with the right edge of the paper.



Machine Language

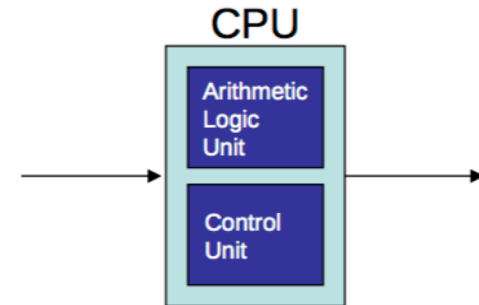
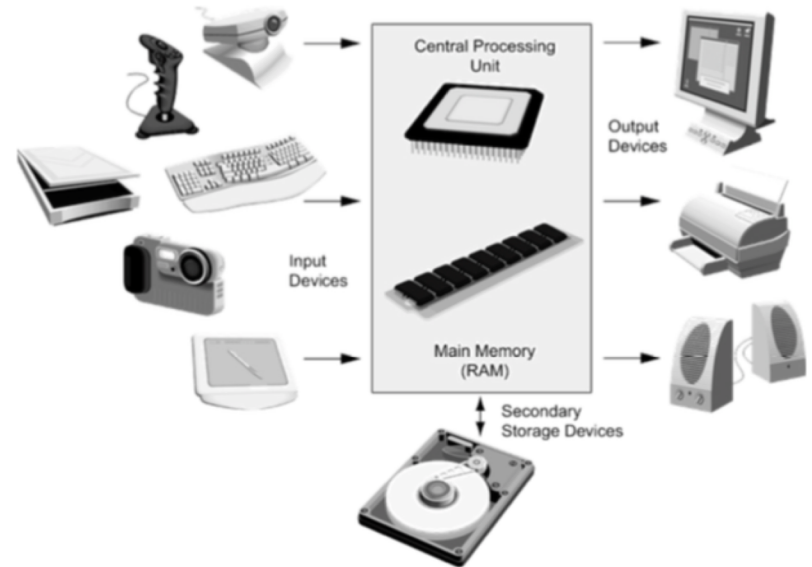
Machine language is the lowest level operations that can be executed by the CPU(Central Processing Unit) of a computer

- Examples:
 - ARM – Probably on your phone(Android)
 - X86 – Probably on your computer

Computer Hardware

Executing a program involves loading the program into RAM (from secondary storage) and consists of 3 cycle process known as fetch, decode, and execute.

- Fetch – instruction pulled from RAM to the CPU (Control Unit)
- Decode - Based on the instruction, the appropriate switches are ipped to perform the desired operation (Control Unit)
- Execute – The operation is CPU performed (ALU)





Machine Language

Examples of individual machine Instructions are:

- Perform an arithmetic operation
- Change the contents of memory
- Change the next instruction to fetch
 - Jump backwards → iteration
 - Jump forwards → conditional execution
- Generate output
- Obtain input



Machine Language

Cons:

- Hard to work with
- Not portable – different across platforms (different CPU can have different instruction sets) and operating systems (Mac, Windows)

Pros:

- Few people *need* write in machine language (so odds are, you will not need to do this)
- We program in Java, C, C++, Python, Ruby, Go, php, Perl, etc...

To Do's

ASAP: Take the Course Intro Survey if you haven't already

By Thursday's class:

- Acquire the book (free pdf download online) and read Chapter 1 Thinking in Java.
- Complete the Reading Quiz in Canvas
- Complete Lab 1

Optional:

- Install Java (version 10) + jGRASP on your own computer and/or install Virtualbox and Linux Mint 19 from the Virtual Machine on your computer.

