Welcome to CS 149

Section 0006
Instructor: Alvin Chao

Introduction

- You can call me:

  - Professor Chao,

  - Mr. Chao

  - Alvin(though not generally practiced in the CS department

  - Not Dr. Chao, I do not have a Doctoral degree, so please don't convey one on me improperly.

  - Unlike the Paul Simon song you cannot call me Al.

Contact Info

- Piazza - post general course / assignment questions here so that peers can answer and I can certify an answer and dont' have to repeat answers to multiple e-mails.

- My JMU e-mail - chaoaj@jmu.edu

- My JMU phone # 540-568-6206

- My offices: ISAT 264(Tue/Thu 9:30-10:30) Massanutten Hall 293 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).

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 Programming Fundamentals

- 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 7 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

- This course assumes you have some background in programming - CS 139 is the other version of this course and is for those who have no background in programming. It is taught at a slower pace.

- 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 20%

    Programming Projects   30%

    Midterm 1   10 %

    Midterm 2   15%

    Final Exam   25%

Hello World- Java Program

A class is a collection of methods

```java
public class Hello {

    public static void main(String[] args) {

        // generate some simple output

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

    }

}
```

This is the main method

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
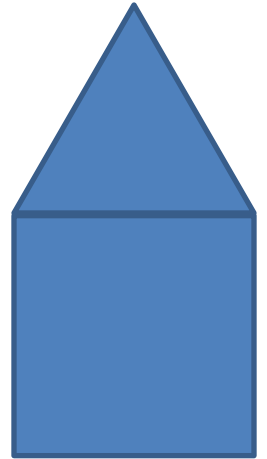
Drawing a House

- 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.
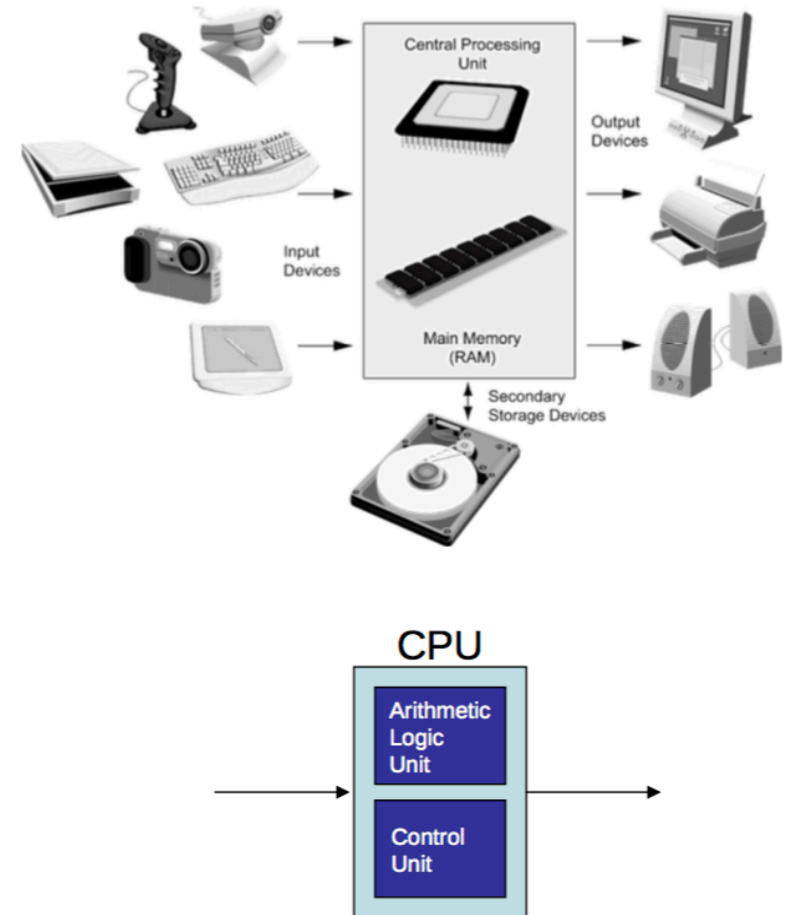
Machine Language

- 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

- Excuting a program:
  - Machine instructions are loaded into RAM from secondary storage
  - Fetch/Decode/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

- Individual Instructions are used to:

  - Perform an arithmetic operation

  - Change the contents of memory

  - Change the next instruction to fetch

    - Jump backwards → iteration

    - Jump forwards → conditional execution

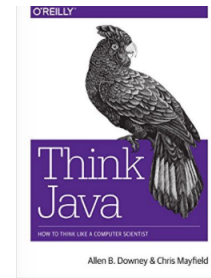 - Generate output

  - Obtain input

Machine Language

- Cons:

  - Hard to work with

  - Not portable – different across platforms(Mac, Windows)

- Pros:

  - Few people write in machine language

  - 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 a complete the Reading Quiz in Canvas

  – Complete Lab 1

- Optional:

  – Install Java (version 7) + jGRASP on your own computer and/or install
    Virtualbox and Linux Mint 18 from the Virtual Machine on your computer.

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