Welcome to CMSC 105!

CMSC 105 Elementary Programming

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Acknowledgement: These slides are adapted from slides provided with "Introduction to Programming Using Python, Liang (Pearson 2013)" and slides shared by Dr. Jory Denny and Dr. Shweta Ware

Outline

- Introductions
- Syllabus
- What is Computer Science and Computing?
- Introduction to Python Programming

Dr. David Balash

Faculty page: https://cs.richmond.edu/faculty/dbalash

Homepage: https://davidbalash.github.io

Professor Balash

"Ba-lish"

He/Him

- BS in computer engineering Iowa State
- Two-decade career as a software engineer
- MS and PhD in computer science from GW
- Research: Computer S&P

Dr. David Balash

Things I like

- Education/Learning
- Hiking
- Cycling
- Guitars
- Board games
- Programming
- Cats

Assignment 1

Task: Create a personal introduction slide and post it to the introductions channel on the course Slack workspace

Due: Friday

Points: 5

Be Creative

Name

Photo

Pronunciation

Pronouns

Personal Introduction

Classroom Meet and Greet

1. Introduce yourself to a person near you

2. Introduce yourself to a different person near you

- Potential conversation topics:
  - What are some of the things that you like?
  - Who are your favorite pets?
  - Why do you want to take this class?

Student Introductions

- Name
- Pronouns (optional)
- Major
- Class year
- Favorite snack food

Syllabus

- https://cmsc105-f24.github.io
- Schedule
- Course outline
- Assignments and grading
- Policies

I hope you enjoy this class!

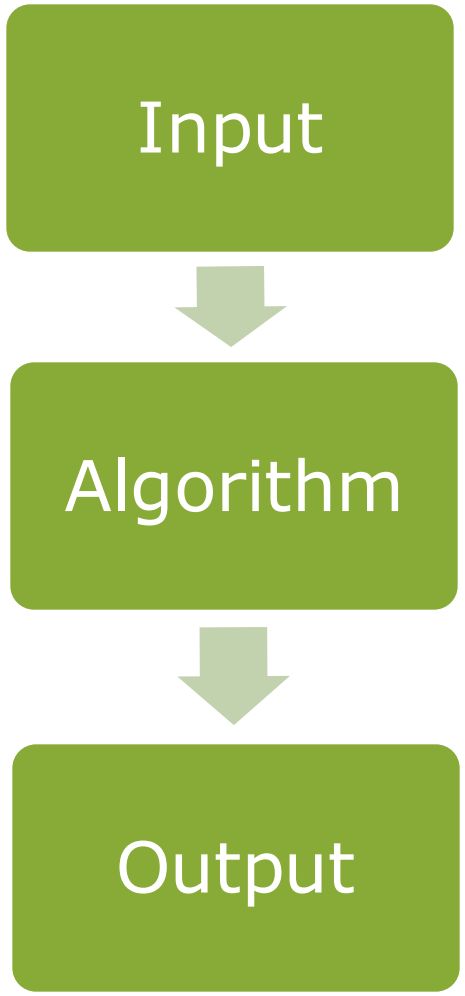
What is Computer Science and Computing?

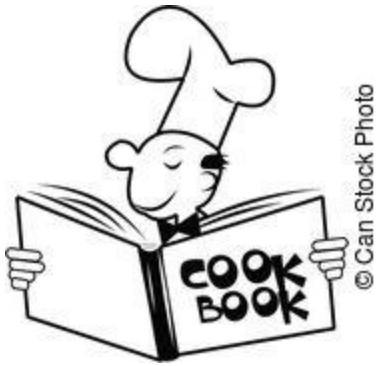
Computer Science

- **Your thoughts?**
- Google: “The study of the principles and use of computers”
- Wikipedia: “The scientific and practical approach to computation and its applications”
- Dictionary.com: “The science that deals with the theory and methods of processing information in digital computers, the design of computer hardware and software, and the applications of computers”
- Edsgar Dijkstra: “Computer Science is no more about computers than astronomy is about telescopes”

Computer Science

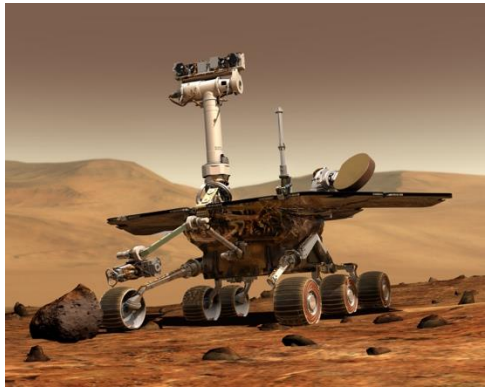
- Study of algorithms
- Study of computing tools
- It is not just:
  - Programming
  - Microsoft office
  - Typing
  - Electronics
  - Etc.





Programming

- Even though computer science is not about the computer, we still need to tell the computer what to do!



- We do this through **programming**, or the act of writing a **computer program**, known as **software** – its just instructions to the computer

- Programming allows us to push the boundaries of science, view imaginary worlds, and improve our daily lives!

Programming

The Recipe-Cook-Dish Analogy

Program = Recipe

Laptop = Cook

Results = Dish

(the program's output)

A Brief Note on Programming Languages

- Machine code – 0's and 1's…or simple commands. It is the set of primitive instructions built into the computer's architecture or circuits. Extremely tedious and error prone

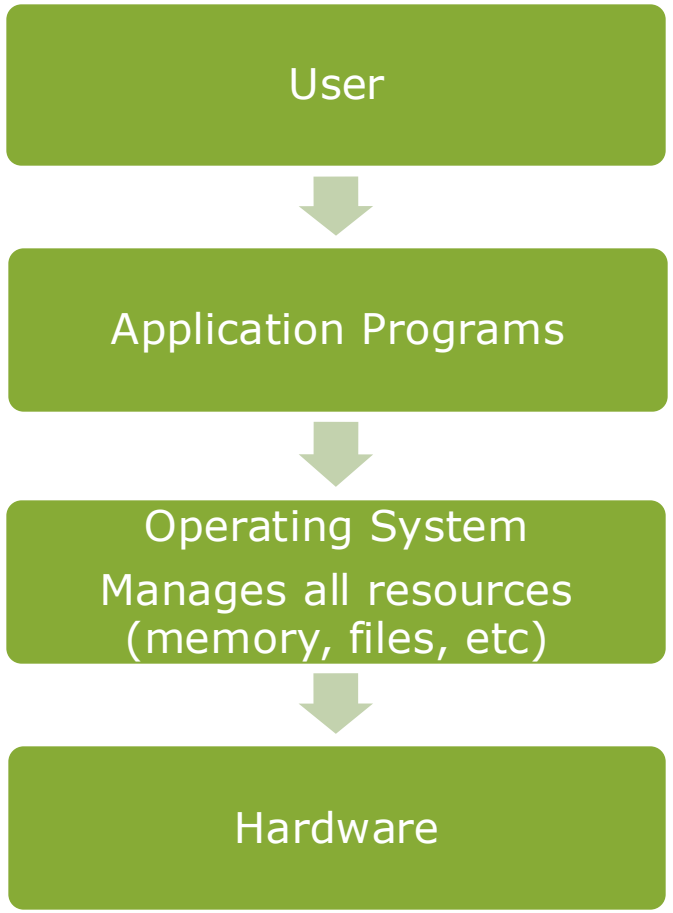
- Assembly code – simple commands (ADD ra rb rc) to make programming easier to understand. An assembler translates the commands to machine code. Extremely tedious but less error prone.

- High level languages – English-like commands that allow programming to be less tedious, less error prone, and much more expressive! Examples: Java, C++, Matlab, etc

- Why we don't use Natural language (English) – Its ambiguous…which vs which or break vs break or run vs run…ah the madness!!!!

Computer Organization

A Software Perspective

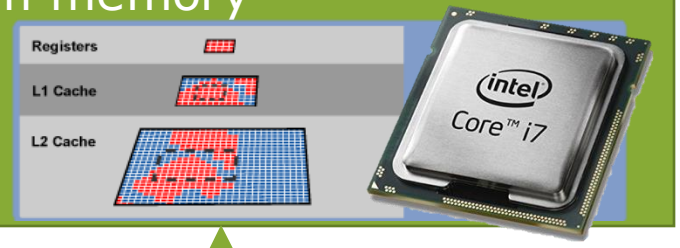


Computer Organization

A Hardware Perspective

Input
- Files
- Keyboard
- Mouse
- Etc.

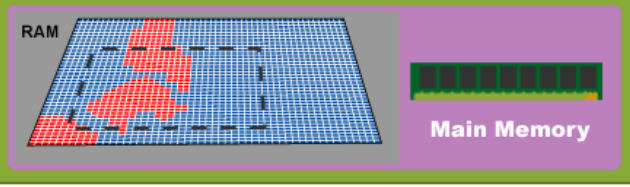
Central Processing Unit (CPU)
- Processes commands as 0's and 1's
- Performs arithmetic
- Requests (reads) and writes to/from memory



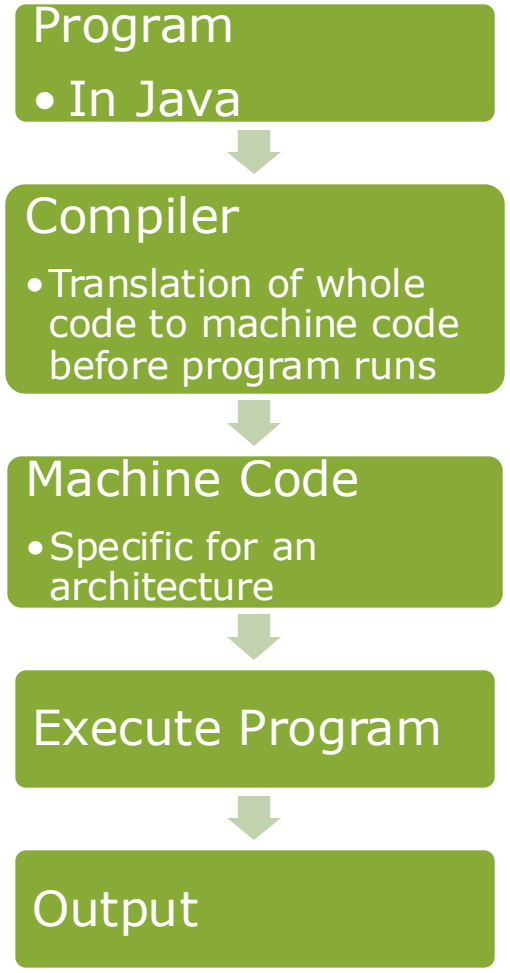
Output
- Monitor
- Printer
- Projector
- Etc

Bus

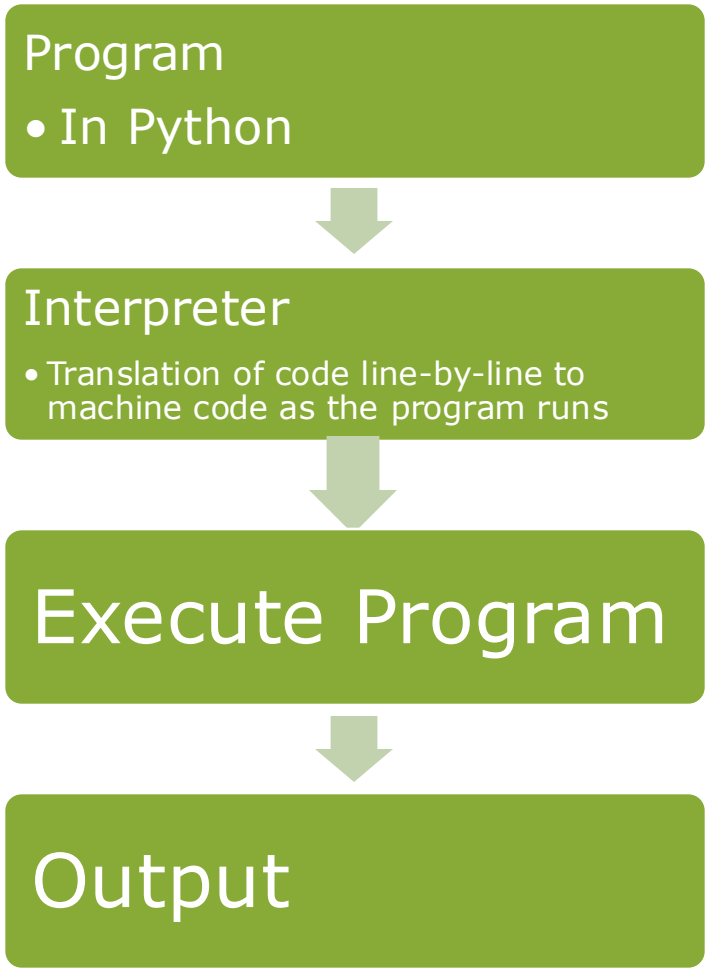
Memory
- Data encoded as 0s and 1s
- Cache
- Random Access Memory (RAM)
- Hard drive



Compiling a High-Level Program



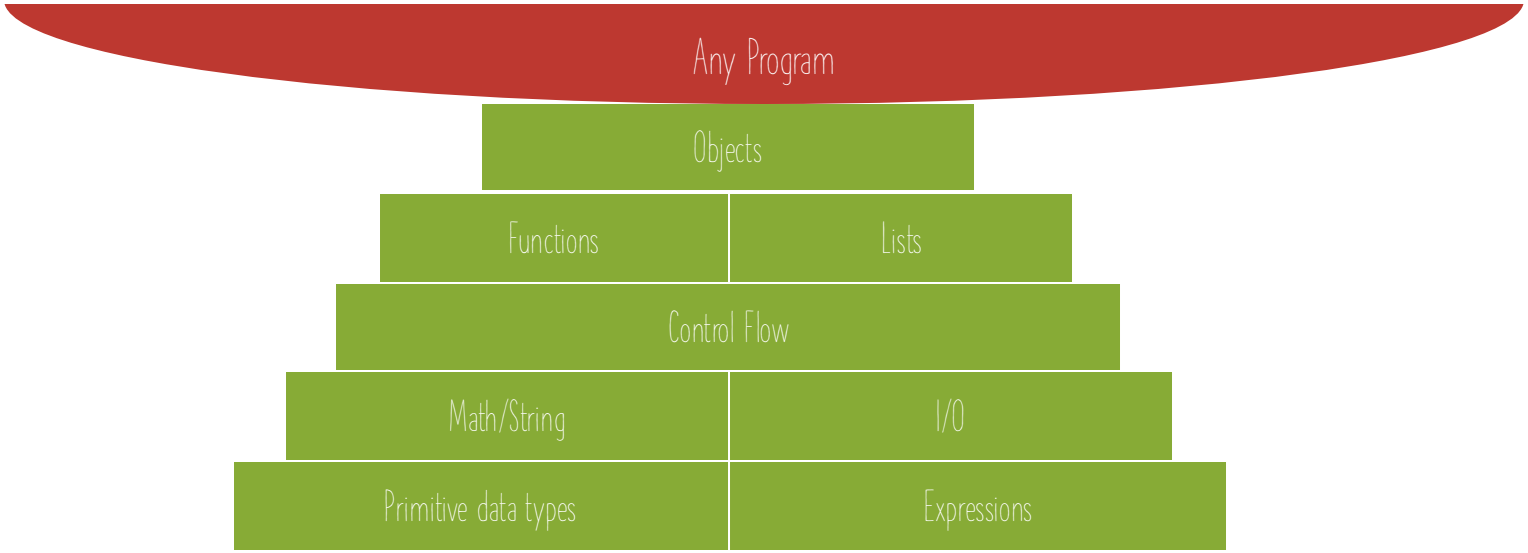
Using a compiler



Using an interpreter

How Do We Program the Computer?

- We will use **Python**
  - NOTE – This is an arbitrary choice. All languages build on the same basic building blocks discussed in the course. So Python is merely the vessel to our exploration of computing!
- Major concepts:



Why Python?

- Python
  - Widely used.
  - Widely available.
  - Embraces full set of modern abstractions.
  - Variety of automatic checks for mistakes in programs.
- Our study will
  - Use a minimal subset of Python.
  - Develop general programming skills that are applicable to many languages.
  - **IT IS NOT ABOUT THE LANGUAGE**!!!

" There are only two kinds of programming languages: those people always [gripe] about and those nobody uses."

– Bjarne Stroustrup

Python2 vs Python3

- We will specifically use Python3 in this class. Please install the latest Python version from this link.
- Many resources online teach/use Python2
- Python3 is not backwards compatible, so be careful with using online resources

Next Topic

Introduction to Programming

Thank you!
Questions?