Welcome to
Computing Science

Poll: What language do you speak other than English, if any?

Imagine giving directions to use an elevator; can be done in many languages.

Today's Topics

What is Computing Science?

A Little History

Your First Program

What is Computing Science?

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CS is problem solving

Using 2 components:

- A Way of *Thinking* – **Algorithms**
- A Way of *Communicating* – **Programming / Code**

In this class, we will design our algorithms in English, and translate them into the Python programming language. This will allow us to communicate with computers to solve our problem.

What are algorithms?

A list of steps to follow to complete a task!

E.g. Cookie Recipes

They have ingredients as input and have steps to produce an output, i.e. cookies. There are many different recipes to achieve a similar result.

E.g. IKEA Instructions

If you can write clear, step-by-step instructions (e.g. to build a chair), you've got great potential in being a computing scientist.
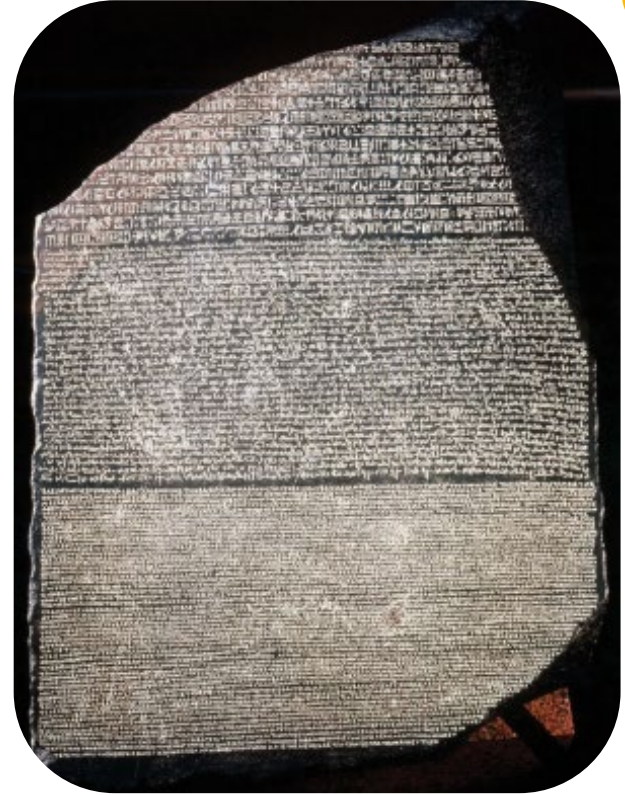
Optimize for different things

You may want to make instructions to do it fast, or idiot-proof, or minimize the space needed, etc.

Algorithms answer "how".

What are **programming** languages?

Python, c++, Javascript, etc are all names of programming languages. Just like English, Japanese, Spanish. They are used to communicate meaning, and have different grammars, syntax and vocabulary to do it.

https://runestone.academy/runestone/books/published/thinkcspy/GeneralIntro/FormalandNaturalLanguages.html

Devising a Process

Image by Ahmed akacha on Pexels

Reunite Families

- Imagine you are an **aid worker** in a small city during an earthquake.

- Most of the town is destroyed, but the **open-air stadium** is still standing.

- Survivors are being directed to the stadium which is big enough to hold all the survivors.

- In a group of 3-4:
  devise a protocol by which survivors may be reunited with their nuclear family before they are able to move to some red-cross tents.

- Aid workers have a bull-horn to talk to many people at once.

- Also have pen/paper, and other resources. No cell phones.

- Think about handling many people efficiently.

What is **programming**?

Programming is the process of breaking a large, complex task into smaller and smaller subtasks until the subtasks are simple enough to be performed with sequences of basic constructs, including:

- Input
- Output
- Conditions (aka rules, such as find maximum)
- Repetition
- Math or logic

https://runestone.academy/runestone/books/published/thinkcspy/GeneralIntro/MoreAboutPrograms.html

The first
programmer

In 1842, Lady Ada Lovelace wrote the first computer program for Charles Babbage's Analytical Engine (1837).

Today's Topics

What is Computing Science?

Your First Program

Homework

Text Editor
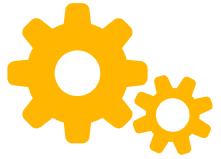
I suggest you use VS Code to write your programs.

This Integrated Development Environment (**IDE**) is a **plain text editors** with **syntax highlighting** to make it easier to edit. Text editors that automatically capitalize for English words, for example, are horrible for coding!

Experienced Python programmers use an IDE or text editor (e.g. Atom, VS Code, vim, IDLE) + Python running on their computer.

Coding offline with VS Code

VS Code is free for Windows, Mac, Linux

Where you write your code

Your CMPT120 folder and python files

Your program's output.

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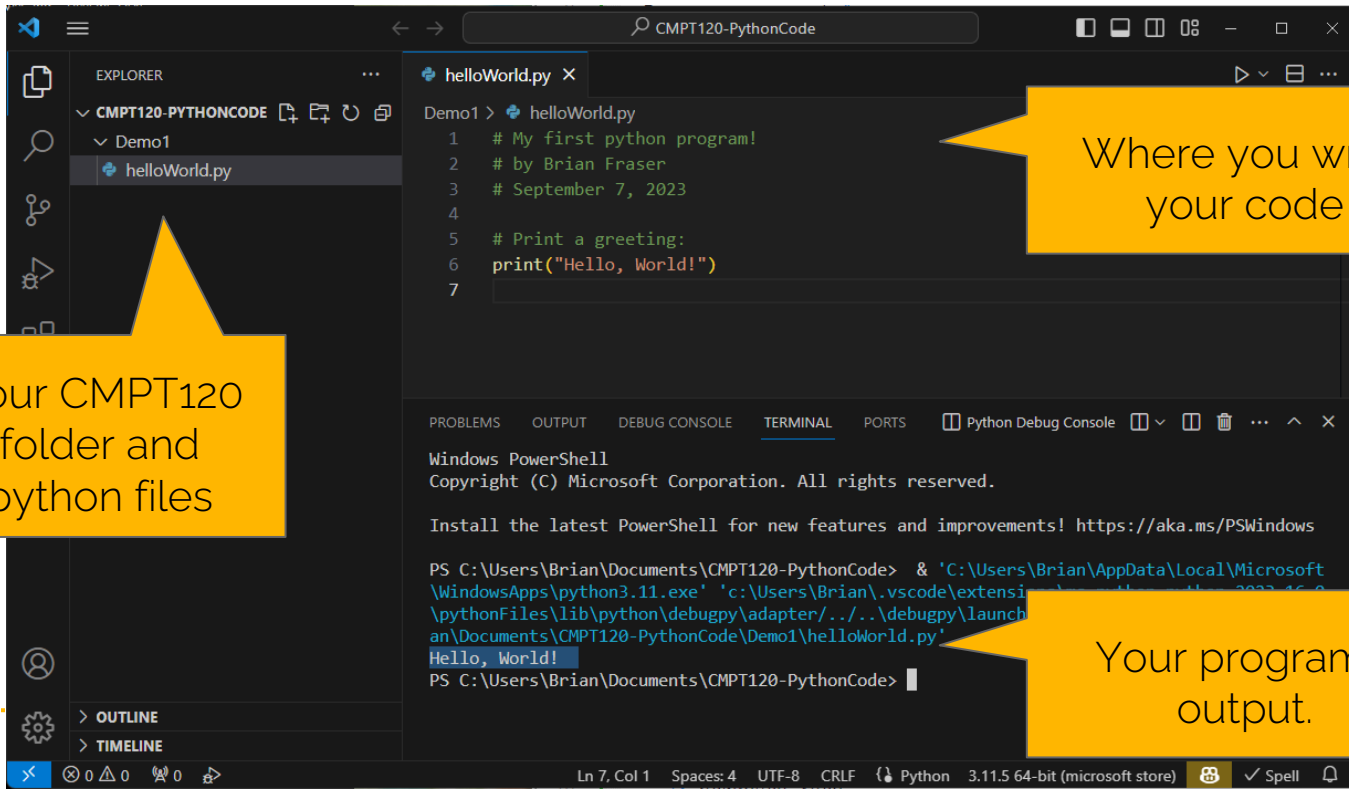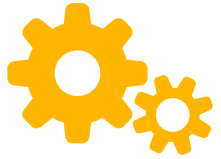
Why write and run code on your computer? *(not online)*

- In **future CMPT courses**, you'll write and run code on your PC
- In **industry**, you'll write and run your code on your PC
- It's **easier to manage big projects** on your PC

- Don't want your code to be **public**
- Don't want your **data** (images, files, etc.) to be **public**
- Don't want to send your code/data to a **foreign server**

Coding in your browser

Runs straight in your browser!
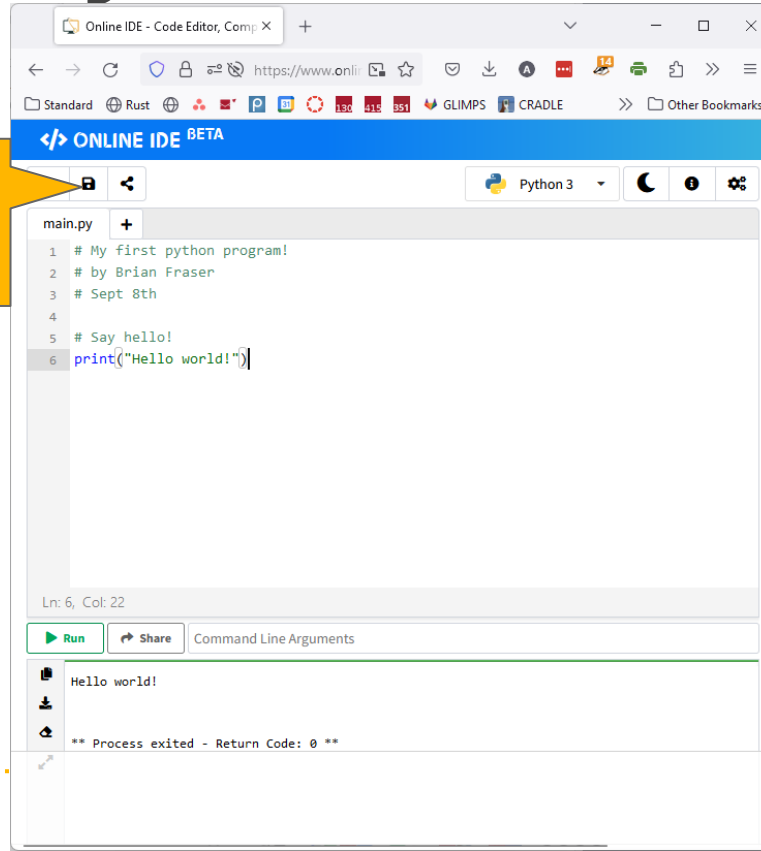
Where you write your code

Your program's output.

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Coding in your browser

Save your program to your computer

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Try it!

Header and Algorithm
in English Comments

Write your 1) **header** block with a title, author and date 2) general **description** of what you're trying to do 3) **algorithm steps**. All lines should be preceded by a #

Code

Translate your algorithm into Python using a new addition to our vocabulary, **print**. Note the **parentheses** and **quotation marks**. These are necessary.

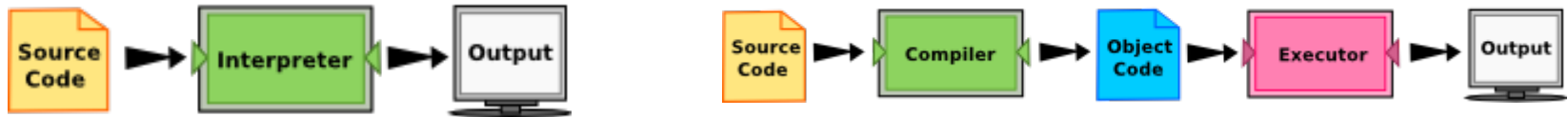# **Python** is interpreted

Nigel Howard

Translates to machine code while running.

E.g. Python, Javascript

A **compiler** translates everything into machine/object code, *then* you execute that.
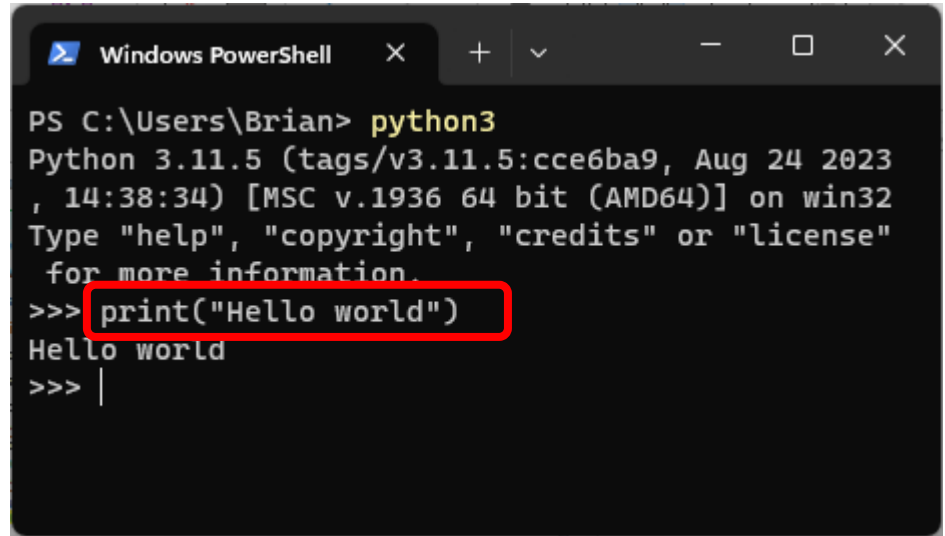
E.g. C, C++, Java

Interpreted vs. Compiled Programming Languages

Python **Interpreter**

- Interactively type a line of python code and run it
- Can test out a line of code
- BUT awkward to work with
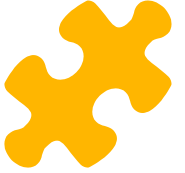
- **So, use the IDE!**

Interactive Readings check

How would you print the following to the screen?

```
"Hey, World!" they exclaimed.
>
```

Interactive Readings check

How would you print the following to the screen?

```
This message will span
several lines
of the text.
>
```

Reminders

- Remember to do your **Week 2 interactive readings** before next class (posted by end of today)
- Work on
  - Installing VS Code + Python
  - Assignment 1 (Part 1)
    - 2 paragraphs on CS faculty at SFU, OR
    - 2 paragraphs on an interesting algorithm
- Next week
  - **Lab 1**
  - **Assignment 1 (part 2) posted;** 2 weeks to complete
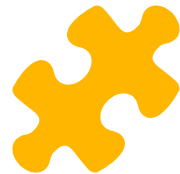
Today's **Review**

1. What are the 2 components of computing science we'll study in this class?
2. What is an example of an algorithm?
3. What is the name of the programming language we'll use in this course? Is it compiled or interpreted?
4. Where can we practice coding online? Offline?
5. What goes into the header of a program?
6. Bonus: What does learning a programming language have in common with learning a natural language?