Programming Language

Learning Python

What is a Language?

- A **language** is a structured system of communication.
- Language, in a broader sense, is the method of communication that involves the use of – particularly human – languages.

Ref: https://en.wikipedia.org/wiki/Language

Speaking Bonobo

Bonobos have an impressive vocabulary, especially when it comes to snacks

Sue Savage-Rumbaugh (with Kanzi in 2003) says her bonobos can communicate with her and each other using more than 348 symbols. (Great Ape Trust of Iowa)

By Paul Raffaele

https://www.smithsonianmag.com/science-nature/speaking-bonobo-134931541/

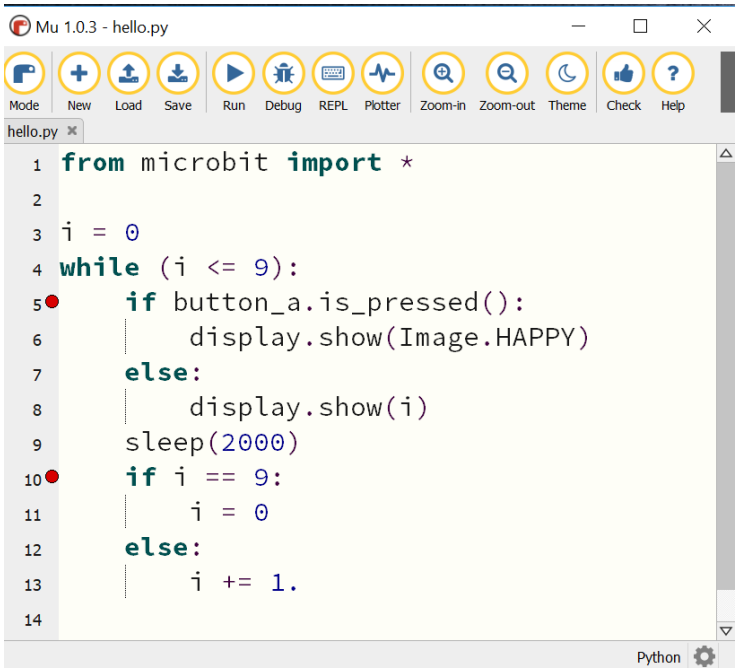
What is a programming language?

- It is a formal language comprising a set of instructions that produce various kinds of output.

- They are used in computer programming to implement algorithms.

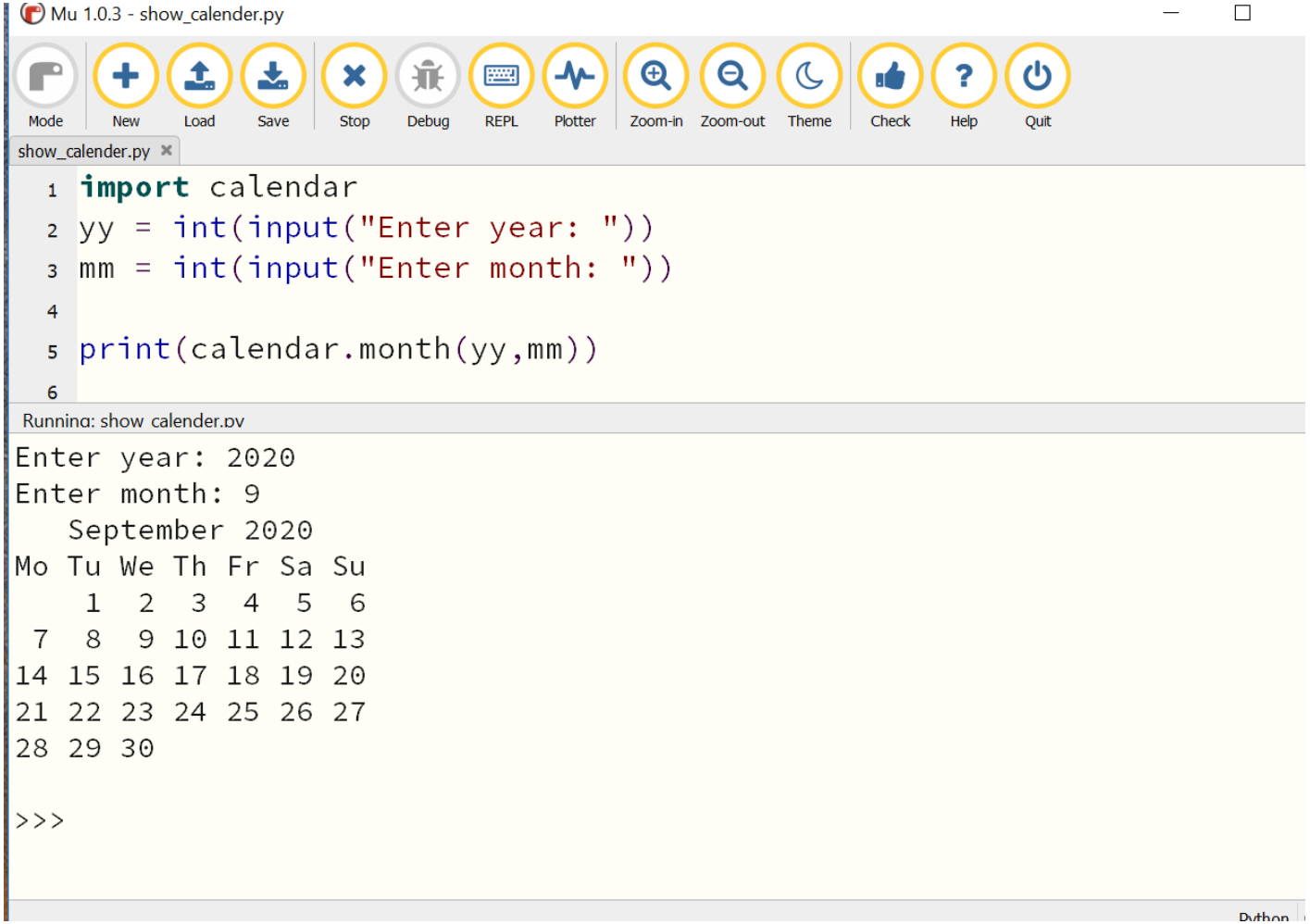
- Most programming languages consist of instructions for computers.

- The description of a programming language is usually split into the two components of syntax (form) and semantics (meaning).



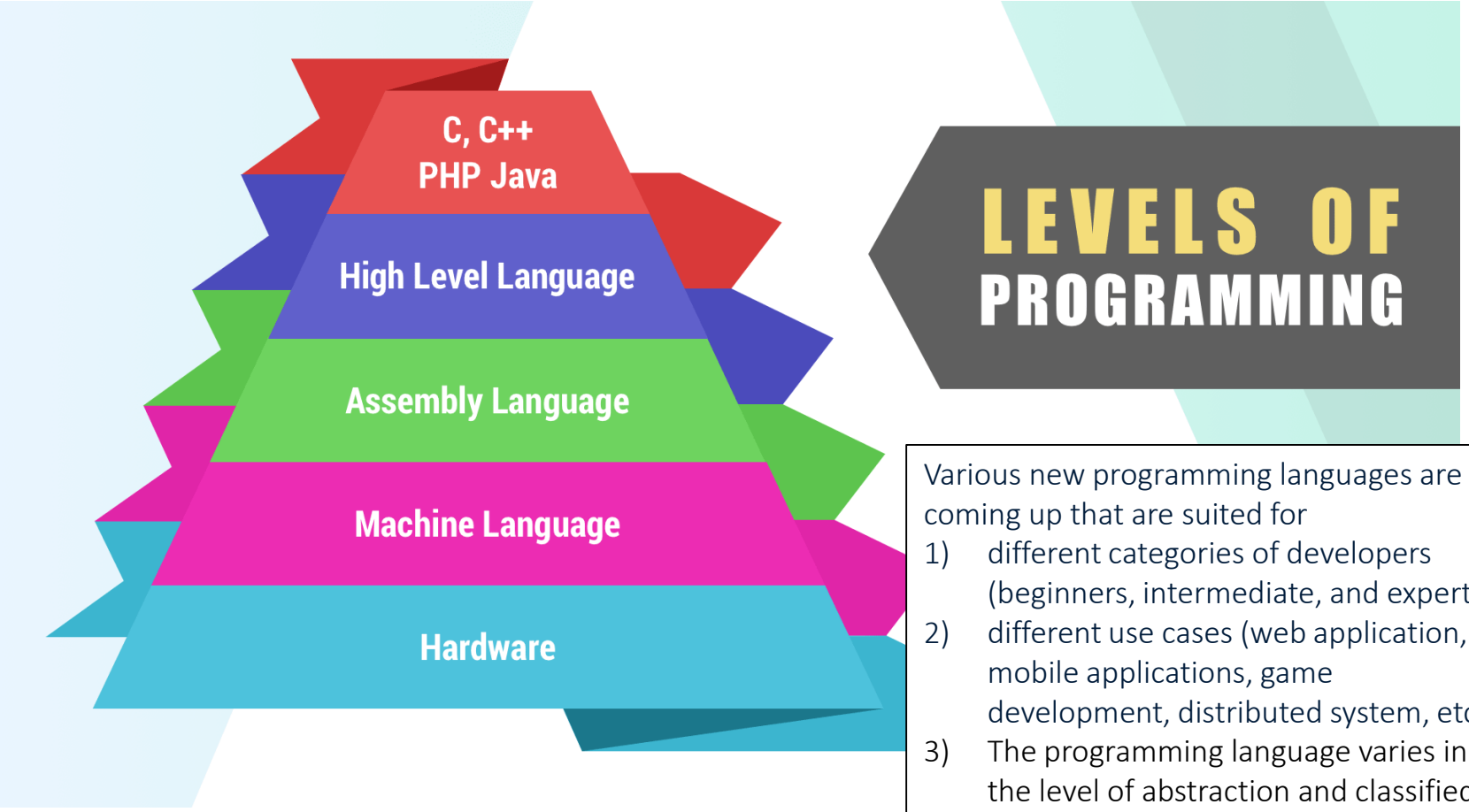
https://en.wikipedia.org/wiki/Programming_language

A Python Example on Mu Python Editor



https://www.javatpoint.com/python-display-calendar

What programming language should I leant?



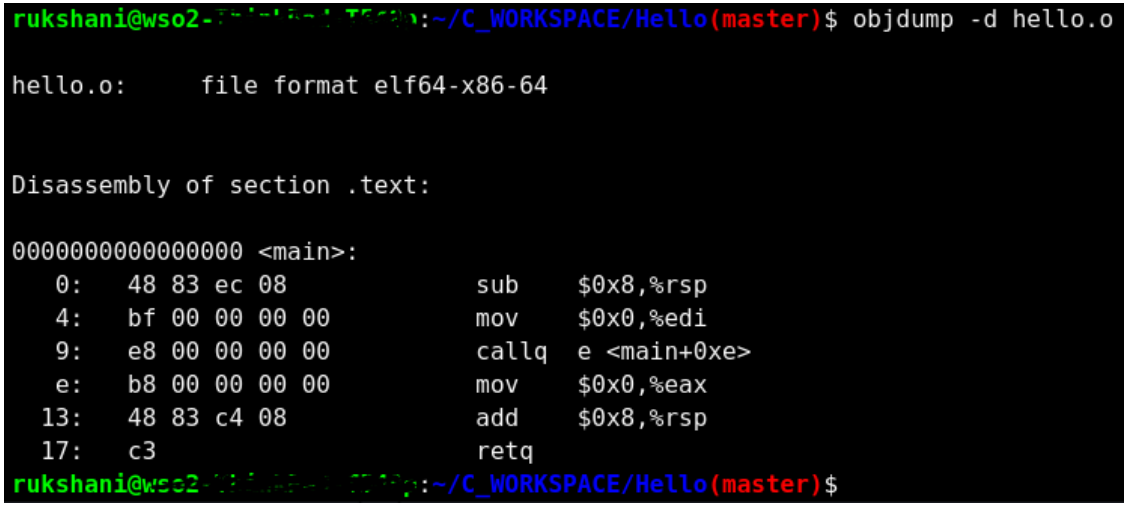
Various new programming languages are coming up that are suited for

1) different categories of developers (beginners, intermediate, and experts)
2) different use cases (web application, mobile applications, game development, distributed system, etc).
3) The programming language varies in the level of abstraction and classified into two categories:
   ➔ *Low-Level and High-level Language*

https://hackr.io/blog/best-programming-languages-to-learn-2020-jobs-future

Low-Level Language

- Low-level languages provide abstraction from the hardware and are represented in the binary form i.e. 0 or 1 which are the machine instructions.
- Low-level languages are further classified as machine-level language & assembly level language.
- Samples of machine codes and assembly codes



- Students of all EE majors will require to take a EE2004 Microcomputer Systems at year 2.

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High Level Language

- High-level language allows us to write programs that are independent of the type of computer.
- The high-level languages are named as high-level because they are close to human languages and can be understood easily, however it requires attention to the logic of the problem.
- The language needs a compiler to translate a high-level language into a low-level language.
- Further, the high-level languages provide the advantages such as **easy to learn** and **machine-independent**.

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Low-level Vs High-Level Language

Parameters	Low-Level Language	High-Level Language
Level of Understanding	It is machine friendly i.e. easily understood by computers.	It is user friendly, as it is written in simple English.
Time of Execution	Takes time to execute.	Executes at a faster pace.
Tool Required	It requires the assembler to convert assembly code to machine code.	It requires the compiler to convert the high-level language to machine instructions.
Portability	It is not portable.	It is portable.
Memory Efficiency	It is memory efficient.	It is less memory efficient.
Debugging and Maintenance	Not easy	Easy

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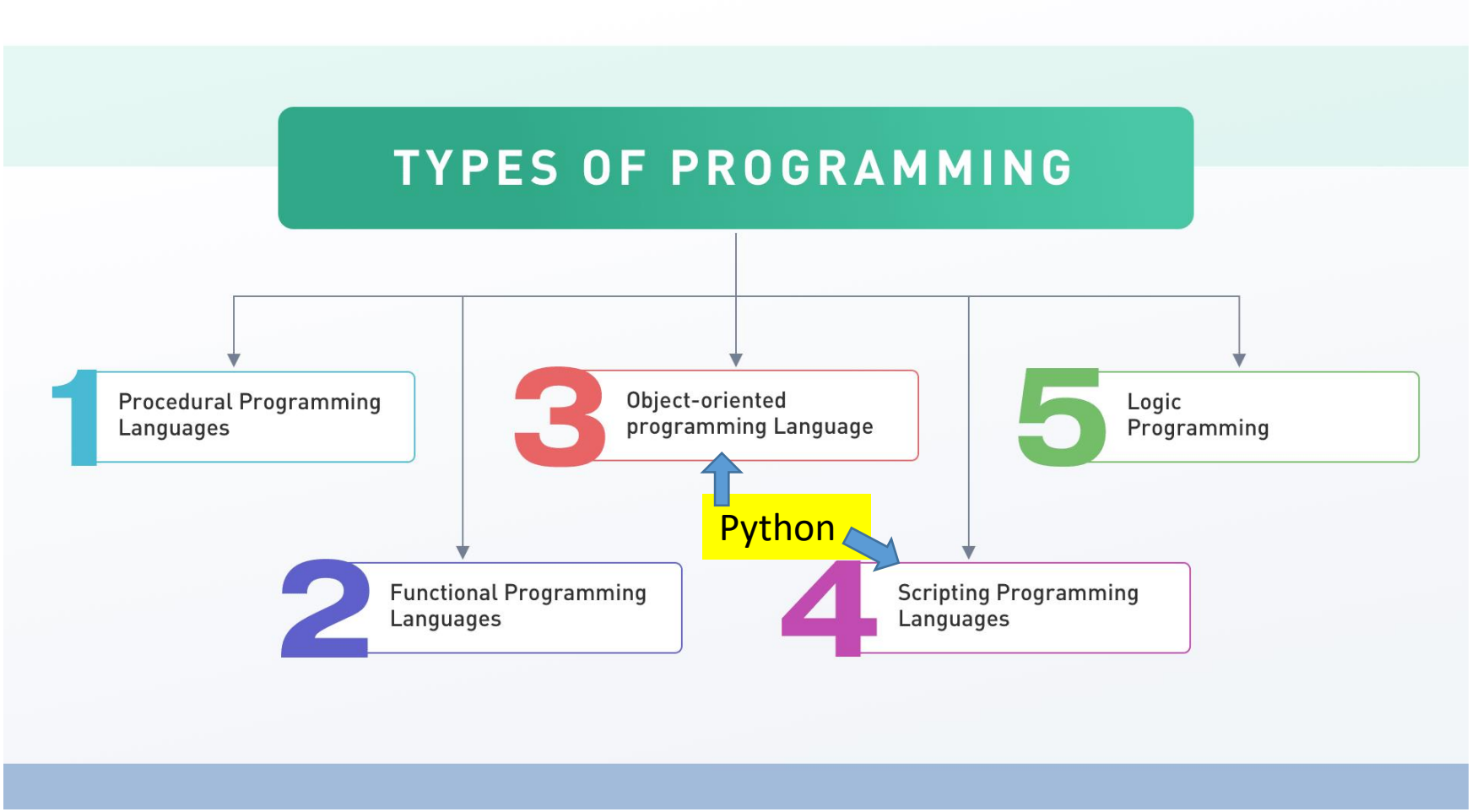
Type of Programming



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Top Programming Languages 2020

- According to IEEE SPECTRUM posted on 22 July 2020
  - https://spectrum.ieee.org/at-work/tech-careers/top-programming-language-2020?referrer=%2F
  - https://hackr.io/blog/best-programming-languages-to-learn-2020-jobs-future
- Python ranks NO. 1
- In GE1354, python will be used as the programing language

Rank	Language	Type	Score
1	Python		100.0
2	Java		95.3
3	C		94.6
4	C++		87.0
5	JavaScript		79.5
6	R		78.6
7	Arduino		73.2
8	Go		73.1
9	Swift		70.5
10	Matlab		68.4

Important Tips to Learn Programming

- **Pick up the right platform** for a programming language according to various applications
  - Mu python editor ➔ python and MicroBit
- **Study the basic code structures** required for a platform/language
  - What are the common instructions we need to use and why?
- **Find a good reference source** with all syntax of programming codes and its functions, libraries, tutorial examples
- **Start from simple codes**, then gradually increasing its complexity according to various requirements
  - Try understand each line which you wrote
  - Avoid direct coping from other people's code with understanding the meaning behind
- Remember the golden rule: *garbage-in and garbage-out*
- **Be patient to debug** (this is a process you can't avoid and relate on others)
  - If possible, use debugging tools to help

Start with Mu Python Editors

- Download of Mu Software
  - https://codewith.mu/en/download
    - Overview : https://codewith.mu/en/tutorials/
- For Mu, we can choose at which platform the python language is going to support
  - Standard python 3
    - https://codewith.mu/en/tutorials/1.0/python
  - BBC MicroBit python (with command for hardware control)
    - Mircrohttps://codewith.mu/en/tutorials/1.0/microbit
    - https://microbit-micropython.readthedocs.io/en/latest/tutorials/introduction.html
- General Python Tutorial (please do not install any python from the link here)
  - https://www.javatpoint.com/python-tutorial

Demonstration