

### COMPUTER PROGRAMMING LANGUAGES

A Programming Language is software that helps you write instructions for your computer. There are several different programming languages, each with their own pros and cons; it depends on what you want to create and the **Level of Abstraction**.

### HIERARCHY OF PROGRAMMING LANGUAGES

| LANGUAGE LEVEL      |         | DESCRIPTION   | EXAMPLE                         | ABSTRACTION LEVEL              |
|---------------------|---------|---|---------------------------------|--------------------------------|
| High-Level Language | ☺<br>⚙️ | Easiest for Humans; hardest for Computers                   | Videos (FPS)<br>Images (Pixels) | ↑ Greater Level of Abstraction |
| Assembly Language   | ↔️      | Requires work for both the Human and Computer to understand | Colors                          |                                |
| Machine Language    | ☹️ ⚙️   | Easiest for Computers; hardest for Humans                   | Decimals<br>Binary              | ↓ Lower Level of Abstraction   |

### COMPUTERS AND COMPUTATIONAL THINKING

#### COMPUTATIONAL THINKING

🔍 Decomposition: breaking down a large problem into manageable bits for the computer to execute

📋 Recognizing Patterns: insight into solutions and giving context for solving new problems; understanding that the symbols may change, but not the pattern

📉 Abstraction: engaging with information at a lower, more general level where not everything must be understood in order for it to work (see *Abstraction of Code*)

📝 Designing Algorithms: creating a plan of action or list of instructions that a computer can follow and execute

#### DEFINING COMPUTERS

📊 Data: we glean meaning from data

🔄 Process: what we have the computer do when we engage with it

➡️ Output: what the computer figures out and, sometimes, shows us

📁 Storage: a place dedicated to the output either immediately upon completion, or later after conditions are met

### ABSTRACTION OF CODE IMPLEMENTATION

#### LESS ABSTRACT

#### MORE ABSTRACT

Programming Language

Pseudocode Language

Natural Language

actual programming language

practice computing language

human language; discussing how to program

### VARIABLES

#### DEFINITION

can be thought of as a name that refers to a value inside of a program

#### NAMING CONVENTIONS

👍 CAN:

- start with or contain A-Z
- start with or contain a-z
- contain 0-9
- contain "\_"

👎 CANNOT:

- start with 0-9
- contain any symbol other than "\_"
- contain a reserved word
- contain spaces

#### DECLARING VARIABLES

declaring a variable lets the program know what process it can perform on the stored input or value

#### INITIALIZING VARIABLES

the process of assigning a value to the variable once it is declared



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### THREE LANGUAGE CASES

camelCase                      PascalCase

### VARIABLE STRUCTURES

"65 is assigned to the variable score!"

int                      <--                      65



variable type              variable name              assignment operator              value

### TWO TYPES OF CODE

#### COMPILATION CODE

*Compiler*                      *Interpreter*

*Compiled*                      *Interpreted*

changes code to machine readable  
code all at once

changes code one  
command at a time

PRO: Faster                      PRO: Easier to change and  
correct

CON: Harder to find errors and fix              CON: Slower

EXAMPLE: C++                      EXAMPLE: Python

### PROGRAMMING VOCABULARY

#### What is **SYNTAX**?

How you organize your program and what language you use to  
create it

### PROGRAMMING VOCABULARY (cont)

#### What are **KEY** or **RESERVED WORDS**?

Special jargon unique to each language that have specific,  
unalterable purposes

#### What is **DOCUMENTATION**?

Text and information that comes with a program but does not  
affect the running of the program

#### What is **SCOPE**?

How a program is organized and "controlled;" each language  
manages and controls scope differently; this may include  
brackets, white space, or indentation; scope can also refer to  
specific block of code like a loop

#### What is **TESTING** or **UNIT TESTING**?

When you make sure your code (program, software) is behaving  
as intended; using test cases helps determine if each iteration will  
work and won't work

#### What is **EDGE CASING**?

Using the "edges" of the test, like going one above, one below, or  
a combination

#### What is **DEBUGGING**?

A **BUG** is an undesirable behavior in a program, so debugging is  
of identifying and correcting the errors *See Error Types*

#### What are **COMMENTS**?

Notes within a code or program that do not affect the execution  
but may be helpful to the programmer



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### DATA TYPES

#### TEXT

*Character*

a single letter, number, or symbol

set off by ' \_ '

Examples: 'a', '5', '!'

*String*

a combination of characters (number or letter) strung together

set of by " \_ "

Examples: "181240", "Hello!"

#### NUMERIC

*Integer*

integers are always whole numbers

positive, negative, or zero

*Floating Point Data*

a floating decimal value which contains NO fractions

*Reserved Words for Numeric Data*

short (16 bits)

*True/False*

*Boolean*

*Variable*

*Examples*

boolean

check <--false

boolean

check <--true

*data and data format could change depending on the language being used*

### ERROR TYPES



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