

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	☺ ⚙️	Easiest for Humans; hardest for Computers	Videos (FPS) 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 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

Programming Language

actual programming language

PSEUDOCODE

Pseudocode Language

practice computing language

MORE ABSTRACT

Natural 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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