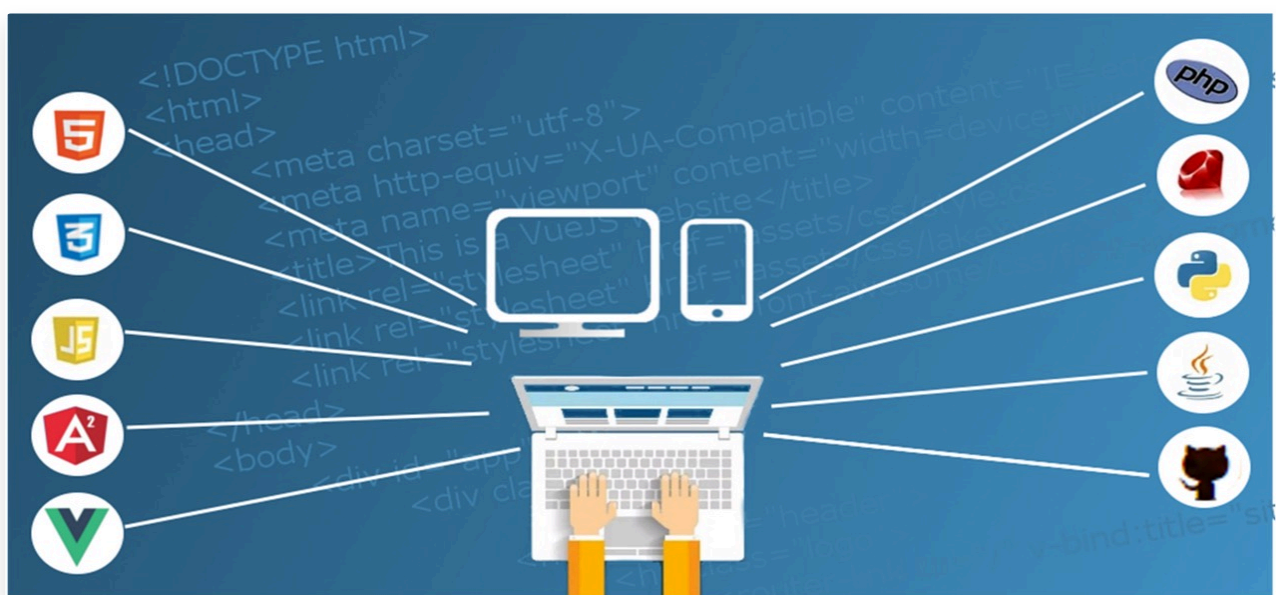


# Programming Languages

## Textbook

# Programming Languages



Computer scientists use different languages to make computer programs, apps, websites, games, and software. These computer languages are similar to spoken languages such as Korean or Swahili. They have rules and patterns that help the language work.

Learning how to speak a foreign language takes practice. Imagine you're learning Korean. You'd get better faster if you practice speaking it. If you're not scared of being told when you're wrong by someone who knows Korean well, you'll get even better. The more you speak in Korean, the better you'll be at it.

Learning computer languages is similar. Look for opportunities to use the programming language. Go to people who know more than you for advice, and don't worry if they correct your code. Be patient. Learning languages takes time and practice.

## Which Language is the Most Useful?

Korean is most useful when visiting Korea and Swahili is most useful when visiting countries like Kenya. Programming languages are similar. Certain programming languages are more useful than others, depending on the situation. We will explore 4 different languages in this lesson, although in reality there are over 700 programming languages.

## Which Language Should I Learn?

The language you should learn depends on what you want to do with it. Certain languages are better than others at building websites, while others still are better for building games.

The truth is that it doesn't really matter what language you learn.

The important thing is to learn the logic of programming languages. Most languages operate in similar ways, so if you learn one language, it will be easy to tweak some of the syntax to use another language.

So don't stress about any particular language, just enjoy learning how one language works and others will come more easily.

## HTML, CSS, JavaScript, and Python

Many programs use several languages in order to work the way we want them to. Some of the more common languages are [HTML](#), [CSS](#), [JavaScript](#), and [Python](#). We will explore these languages in this lesson.

## What is HTML?

HTML stands for Hyper Text Markup Language and is the standard language used to build websites. A markup language is used to format content into a visual page. Almost every website is built using HTML.

HTML is considered a foundation language for all who want to learn computer programming. No matter what field of computer science you are interested in, learning HTML is an important step. The concepts learned in HTML help set you up for success in your computer science journey.

## HTML & CSS

[HTML](#) -- Hyper Text Markup Language creates the content of a website.

[CSS](#) -- Cascading Style Sheets gives the content styling.

HTML & CSS are languages used together to create and style content on a website. The actual material you see on the webpage is created using HTML. The way the material looks is determined by CSS.

Websites almost always use both HTML and CSS languages.

Let's say you are adding a button to a website. HTML will place the button on the page and determine what the button says. CSS will determine the color and shape of the button. Without CSS, websites would just be black and white without any font or styling. Websites without CSS are difficult to navigate.

# JavaScript & Python in Websites



[JavaScript](#) and [Python](#) are common languages used to make websites work. While HTML and CSS are used to create something like a button on the page, JavaScript and Python are used to make the button work. JavaScript and Python establish website functionality. Websites usually use either JavaScript or Python, but not necessarily both.

## JavaScript

[JavaScript](#) is commonly used for the functionality of webpages. JavaScript can update and change HTML & CSS content and styling. As the user clicks on various parts of a website, JavaScript determines what will happen and what will display next. Some examples of JavaScript are using a search bar, watching a video, or following a link on a page. Companies such as Paypal, Netflix, Groupon, Uber, Facebook, and Google are built using JavaScript.

Note--JavaScript is a different language from Java. Both languages are used for a variety of programs, but are completely different languages.

Discussion Question: If JavaScript is better at giving websites functionality, what kinds of apps or programs would be built easier with JavaScript?

## Python

[Python](#) is a newer language that is growing in popularity and is widely used in the industry. Companies such as Google, YouTube, Reddit, Dropbox, Instagram, and Spotify are built using the Python language. It is popular because of its straightforward, readable syntax. It also has extensive accessibility to outside libraries which saves time. It's a popular language among beginners and experts alike. Python is used for other software more commonly than JavaScript and is generally good at dealing with large data sets.

Python is also popular because its syntax is similar to spoken English. English speakers tend to quickly understand the flow of Python.

Discussion Question: If Python is better at dealing with large sets of numbers, what kinds of apps or programs would be built easier with Python?

# Upper Level vs Lower Level Languages

HTML, CSS, JavaScript, and Python are all considered [upper level languages](#).

## Binary

Binary is the lowest (simplest) form of computer language. It uses a series of 0's and 1's to communicate information.

## Lower Level Languages (Assembly Languages)

[Lower level languages](#) work closer with binary values and are harder for the programmer to read. Upper level languages use abstraction to represent binary exchanges with words or symbols that are easier to read.

Examples of lower level languages include **C and C++**. These languages make up most of Microsoft software.

# Interpreted Language vs Compiled Languages

Let's explore these two types of languages for a moment

In a [compiled language](#), the computer understands the exact code. Examples of compiled languages: C, C++, Rust, Go

In an [interpreted language](#), the code needs to be translated into something the computer can understand. Interpreted languages need to be translated. Examples of interpreted languages: Python, JavaScript, Ruby

For example—let's say you were trying to make curry, but the recipe was in Thai and looked like this: สูตรแกงที่ฉันชอบที่สุดในโลก. You would need to translate the recipe before you could use it, just like interpreted coding languages.

## Advantages and Disadvantages of Each

Advantages of a compiled language:

- Faster

Disadvantages of a compiled language:

- Additional time needed to complete the entire compilation step before testing
- Platform dependence of the generated binary code

Advantages of an interpreted language:

- More Flexible

Disadvantages of an interpreted language:

- Slower

# Typed Vs. Untyped Languages

Untyped languages are programming languages that do not make you define the type of a variable.

JavaScript and Python are untyped language. This means that the variable can hold a value of any data type.

Java, C, and C++ are example of typed programming languages. This means that a variable type is declared when the variable is created.

# Innovations

The purpose of computing innovations is to solve problems or to pursue interests through creative expression. An understanding of the purpose of a computing innovation provides developers with an improved ability to develop that computing innovation. HTML, CSS, JavaScript and Python are used to create computer innovations that improve lives.

## Summary

Learning programming languages is similar to learning spoken languages. There are hundreds of different kinds of programming languages and each has a time and a place where they are best used. It doesn't matter which programming language you choose to learn, as the principles apply across languages. [HTML](#) is the language that puts content on a website. [CSS](#) is the language that styles websites. [JavaScript](#) is the language commonly used to make websites functional. [Python](#) is a language commonly used for other software.

## CSTA Standards

3B-AP-24 Compare multiple programming languages and discuss how their features make them suitable for solving different types of problems.

## Questions (3)

**1. True or False: Java is an abbreviation for JavaScript. They are the same language.**

MULTIPLE CHOICE

Choose the correct answer:

- A. True
- B. False

**2. Which of the following is considered a lower level language?**

MULTIPLE CHOICE

Choose the correct answer:

- A. HTML
- B. JavaScript
- C. Python
- D. C++

**3. In which kind of language does the code needs to be translated into something the computer can understand?**

MULTIPLE CHOICE

Choose the correct answer:

- A. compiled language
- B. interpreted language

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## Answer Keys & Solutions

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### Questions

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**1. True or False: Java is an abbreviation for JavaScript. They are the same language.**

MULTIPLE CHOICE

**Correct Answer:**

A. True

✗ Incorrect

B. False

✓ Correct

**Explanation:**

Java and JavaScript are completely different languages.

**2. Which of the following is considered a lower level language?**

MULTIPLE CHOICE

**Correct Answer:**

A. HTML

✗ Incorrect

B. JavaScript

✗ Incorrect

C. Python

✗ Incorrect

D. C++

✓ Correct

**Explanation:**

The languages that Skill Struck teaches are considered High Level Languages.

**3. In which kind of language does the code needs to be translated into something the computer can understand?**

MULTIPLE CHOICE

**Correct Answer:**

A. compiled language

✗ Incorrect

B. interpreted language

✓ Correct

**Explanation:**

These languages need to be translated for the computer to understand.