The Art of Programming

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The Story!

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What is Programming?

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A **programming language** is a formal language that specifies a set of instructions that can be used to produce various kinds of output.

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Why?

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Programming is the way that tells a computer what the user (you) want it to do.

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“I think everybody in this country should learn how to program a computer because it teaches you how to think”

Steve Jobs

Things that you can do with programming?

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- Communication between Computers
- Operating Systems
- Solving Problems
- Implementing Algorithms
- Heavy Computation
- Building Web Applications
- Data Science
- Machine Learning
- Artificial Intelligence

The Programming Language!

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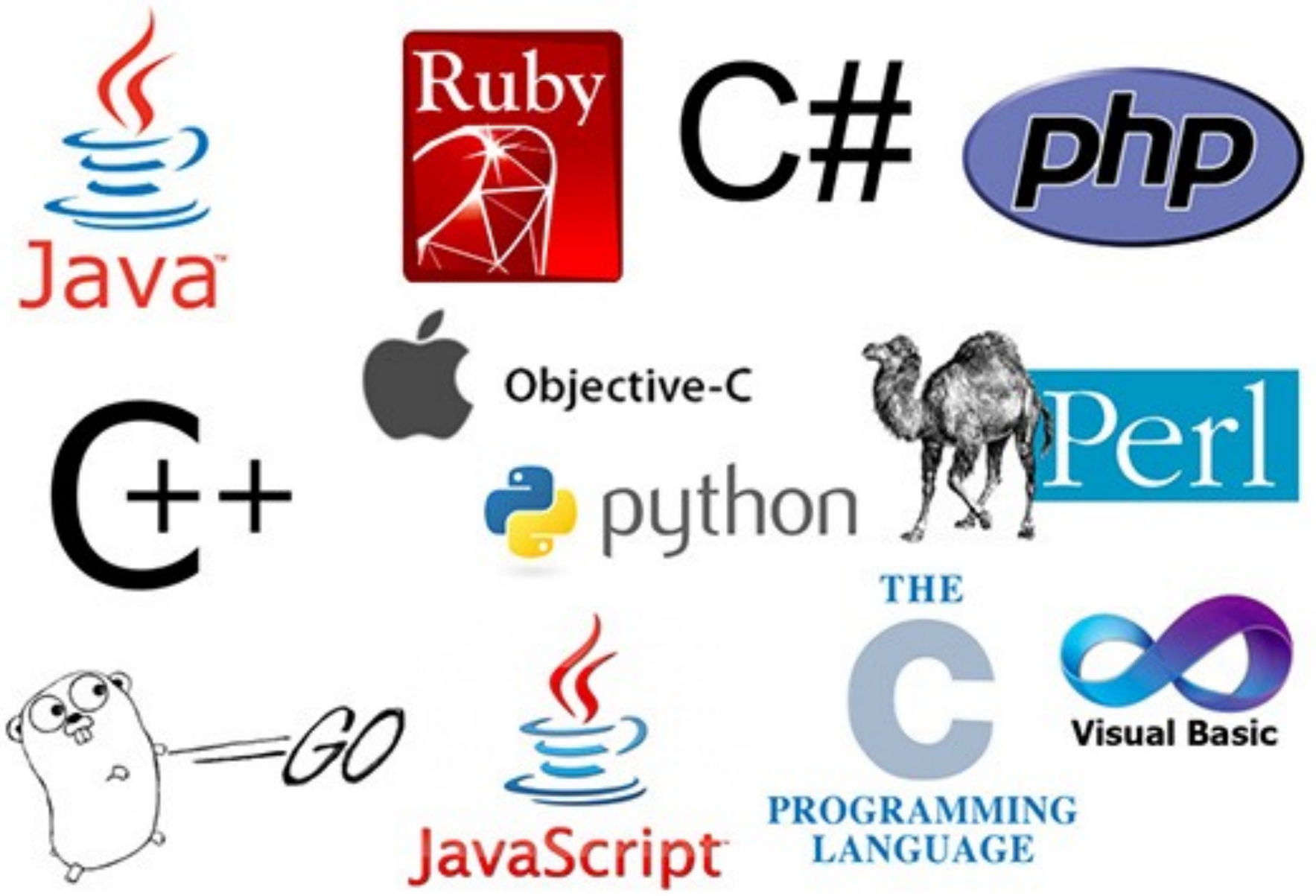

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Choosing the Right Programming Tool

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Use Case, Portability, Efficient, Secure, Comfortable, Community Support.

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Examples!

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Python and Why?

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- Easy to Learn
- Dynamically Interpreted Language
- Less Code is the best code
- Object Oriented
- Open Source
- Easy to Debug
- Vast Community Support
- Thousands Of Libraries

OpenSourced [@]

github.com/python

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Things you can do with Python.

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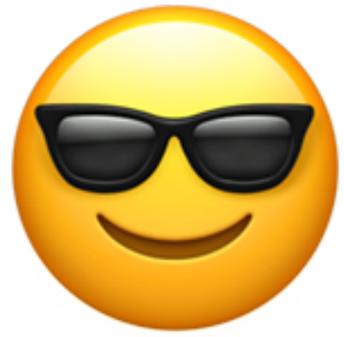
Infinite 

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Mostly Used For

- Understanding Programming
- Problem Solving
- Web Scraping
- Building Softwares
- Building Web Applications 🌐
- Data Science 📊
- Data Visualisation 📈
- Machine Learning 🎰
- Artificial Intelligence 🚗

Python In Action

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Python for Problem Solving

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How many lines do you think will it take to write a simple sorting algorithm in Python compared to C++ ?

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C++ - 103 Lines of Code

Python - 25 Lines of Code

Python reduces Approx. 75%

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Python

```
def mergeSort(alist):
    print("Splitting ",alist)
    if len(alist)>1:
        mid = len(alist)//2
        lefthalf = alist[:mid]
        righthalf = alist[mid:]

        mergeSort(lefthalf)
        mergeSort(righthalf)

        i=0
        j=0
        k=0
        while i < len(lefthalf) and j < len(righthalf):
            if lefthalf[i] < righthalf[j]:
                alist[k]=lefthalf[i]
                i=i+1
            else:
                alist[k]=righthalf[j]
                j=j+1
            k=k+1

        while i < len(lefthalf):
            alist[k]=lefthalf[i]
            i=i+1
            k=k+1

        while j < len(righthalf):
            alist[k]=righthalf[j]
            j=j+1
            k=k+1
    print("Merging ",alist)
```

C++

```
/* C program for Merge Sort */
#include<stdlib.h>
#include<stdio.h>

// Merges two subarrays of arr[].
// First subarray is arr[l..m]
// Second subarray is arr[m+1..r]
void merge(int arr[], int l, int m, int r)
{
    int i, j, k;
    int n1 = m - l + 1;
    int n2 =  r - m;

    /* create temp arrays */
    int L[n1], R[n2];

    /* Copy data to temp arrays L[] and R[] */
    for (i = 0; i < n1; i++)
        L[i] = arr[l + i];
    for (j = 0; j < n2; j++)
        R[j] = arr[m + 1+ j];

    /* Merge the temp arrays back into arr[l..r]*/
    i = 0; // Initial index of first subarray
    j = 0; // Initial index of second subarray
    k = l; // Initial index of merged subarray
    while (i < n1 && j < n2)
    {
        if (L[i] <= R[j])
        {
            arr[k] = L[i];
            i++;
        }
        else
        {
            arr[k] = R[j];
            j++;
        }
        k++;
    }

    /* Copy the remaining elements of L[], if there
       are any */
    while (i < n1)
    {
        arr[k] = L[i];
        i++;
        k++;
    }

    /* Copy the remaining elements of R[], if there
       are any */
    while (j < n2)
    {
        arr[k] = R[j];
        j++;
        k++;
    }
}
```

```
/* l is for left index and r is right index of the
   sub-array of arr to be sorted */
void mergeSort(int arr[], int l, int r)
{
    if (l < r)
    {
        // Same as (l+r)/2, but avoids overflow for
        // large l and h
        int m = l+(r-l)/2;

        // Sort first and second halves
        mergeSort(arr, l, m);
        mergeSort(arr, m+1, r);

        merge(arr, l, m, r);
    }
}

/* UTILITY FUNCTIONS */
/* Function to print an array */
void printArray(int A[], int size)
{
    int i;
    for (i=0; i < size; i++)
        printf("%d ", A[i]);
    printf("\n");
}

/* Driver program to test above functions */
int main()
{
    int arr[] = {12, 11, 13, 5, 6, 7};
    int arr_size = sizeof(arr)/sizeof(arr[0]);

    printf("Given array is \n");
    printArray(arr, arr_size);

    mergeSort(arr, 0, arr_size - 1);

    printf("\nSorted array is \n");
    printArray(arr, arr_size);
    return 0;
}
```

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It’s more simple and easy.

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Still Not Convinced

Don’t worry we got the sort function!

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```
$python
>>> a = [9,4,2,5,6,7]
>>> a.sort()
>>> a
 [2, 4, 5, 6, 7, 9]
```

Next Topics

Python For Web
Python For DataScience
Python for Machine Learning

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Late Enough!

Let’s Get Started with Python.

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