Introduction to Programming in Python

Presented by: Iwan Sandjaja

Outline

- **Who am I?**
  E1, 10,000, Metta and Tucker.
- **Why Python?**
  Easy, Fun, and Powerful
- **Three programming principles**
  Sequential, Looping, and Branching
- **Examples and Analysis**
  Provide a problem, two solutions, and its performance analysis
- **Questions and Answers**
  Your turn now!

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Iwan (E1) Sandjaja, Metta, and Tucker.

I came from Surabaya, East Java to Waco, Texas nine years ago.

My name means 10.000 in Chinese. 10.000 is magic number for mastery.

I love to read, swim, and practice Aikido.

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  Provide a simple unifying message for what is to come
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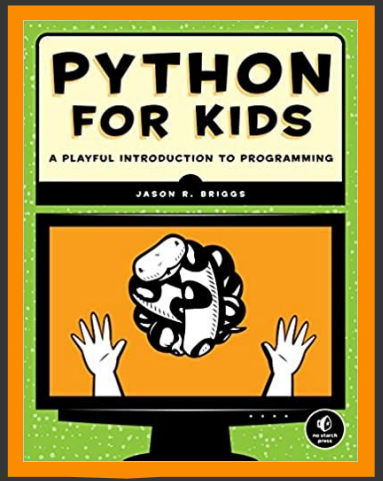
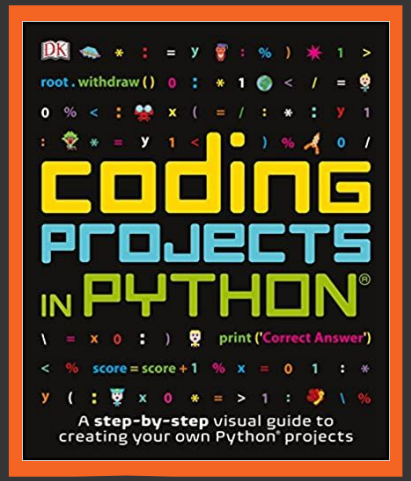
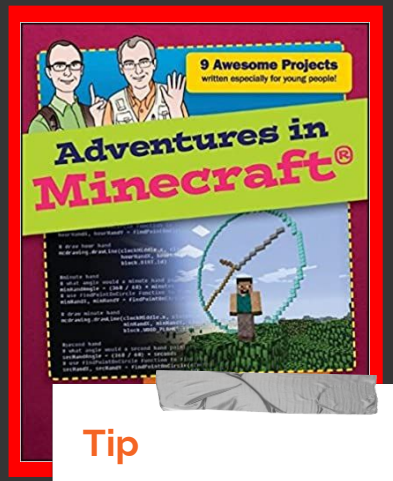
Python is beginner friendly







Tip

If an elementary school student can do it, you can do it too.

Python is Powerful

- **Multiple programming paradigms**
  Imperative, object-oriented, functional, and symbolic math
- **Everywhere**
  Computational Intelligence (CI), Natural Language Processing (NLP), Computer Graphics (CG), Computer Vision (CV), and Embedded System (ES).

Python in CI/AI

There are two big Python library in machine learning

TensorFlow

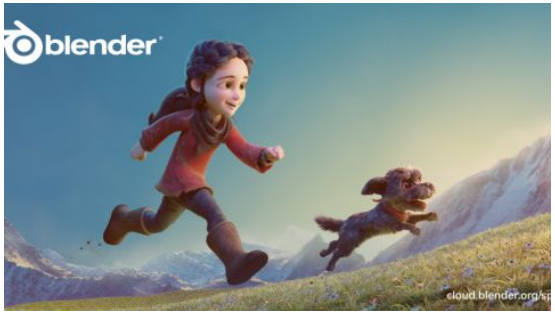
PyTorch

https://robertmarks.org/REPRINTS/1993_IntelligenceComputationalVersus.pdf

Python in NLP

https://medium.com/microsoftazure/7-amazing-open-source-nlp-tools-to-try-with-notebooks-in-2019-c9eec058d9f1

Python in CG

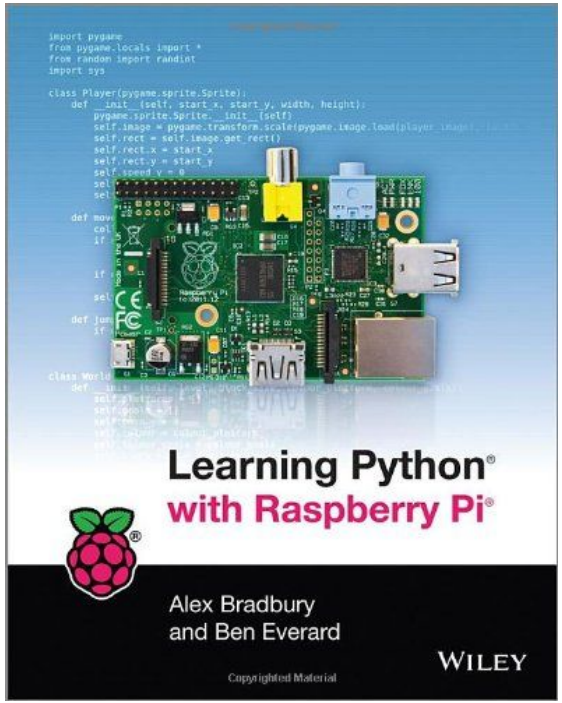


INKSCAPE 1.0

Draw Freely.

Python in CV

Python in ES


Learning Python®
with Raspberry Pi®
Alex Bradbury
and Ben Everard
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Three programming principles:

Sequential
Looping
Branching

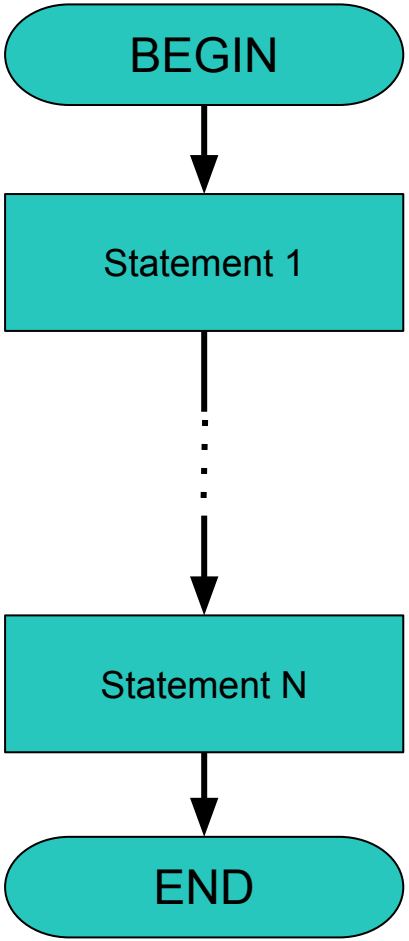
Tip

This three programming principles is the building block for imperative programming paradigm.

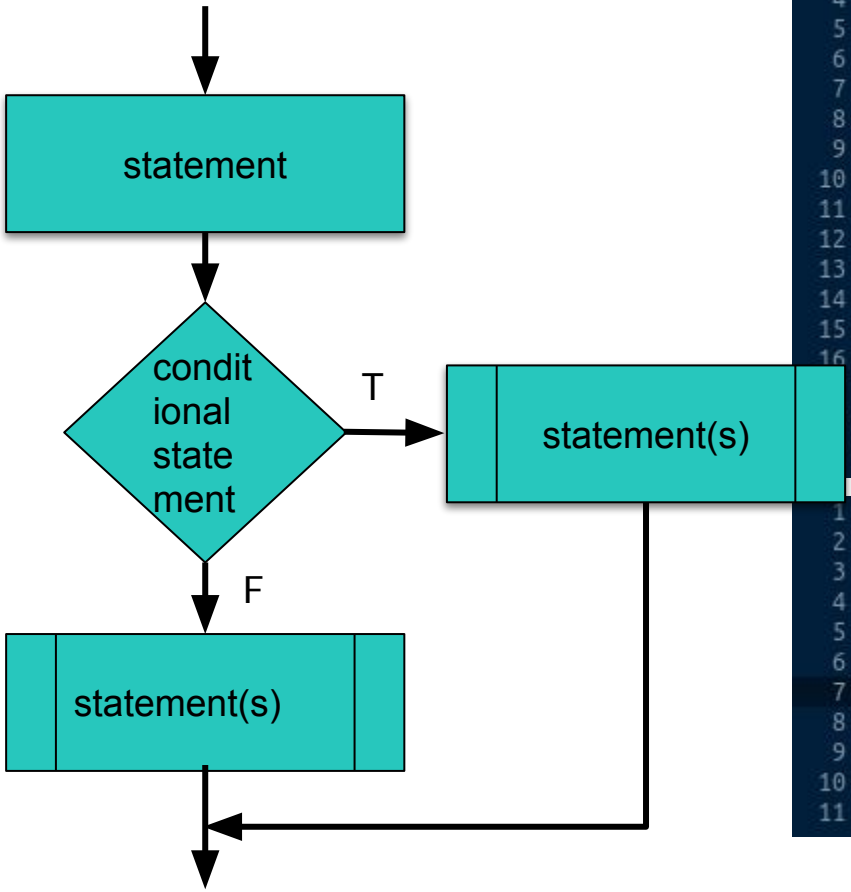
Sequential

```java
public class CoolArithmetic{

    public static void main(String []args){

        //Declaration and initialization of variables
        int a = 10, b = 20;
        System.out.println("a = " + a + " b = " + b);

        //Arithmetic Trick
        a = a + b;
        b = a - b;
        a = a - b;

        //Print the result
        System.out.println("a = " + a + " b = " + b);

    }
}
```

```python
# Declaration and initialization of variables
a, b = (10, 20)
print("a =", a, " b =", b)

# Arithmetic Trick
a = a + b
b = a - b
a = a - b

# Print the result
print("a =", a, " b =", b)
```



Branching



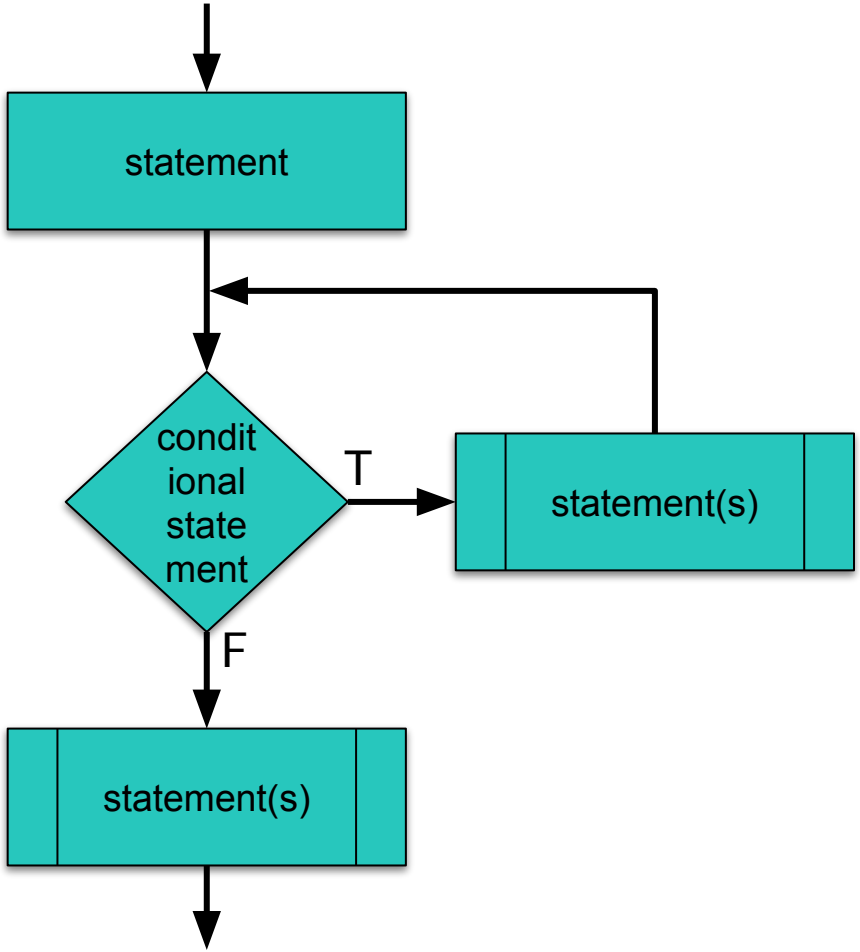

```java
public class Mod2{

    public static void main(String []args){

        // Ask for an integer as an input
        java.util.Scanner scanner = new java.util.Scanner(System.in);
        int x = scanner.nextInt();

        // Calculate the modulus two of x
        int m = x % 2;

        // Determine if the number is even or odd
        if(m == 0)
            System.out.println("Even number");
        else
            System.out.println("Odd number");

    }
}
```

```python
# Ask an integer as input
x = int(input("Please enter an integer: "))

# Calculate the modolus two of x
m = x % 2

# Determine if the number is even or odd
if m == 0:
    print('Even number')
else:
    print('Odd number')
```

Looping

```java
public class LoopExample{

    public static void main(String []args){
        // Array of string.
        String[] a = {"Mary", "had", "a", "little", "lamb"};

        // For each loop with index
        int i = 0;
        for (String element : a) {
            System.out.println(i + " " +element);
            i++;
        }

    }
}
```

```python
# List of string.
a = ['Mary', 'had', 'a', 'little', 'lamb']

# Use a range function to generate the index
for i in range(len(a)):
    print(i, a[i])
```



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Example!

Guess a number between 0-15 by asking yes/no questions!

First attempt

Use a regular loop with range function

Time It!

How long to execute

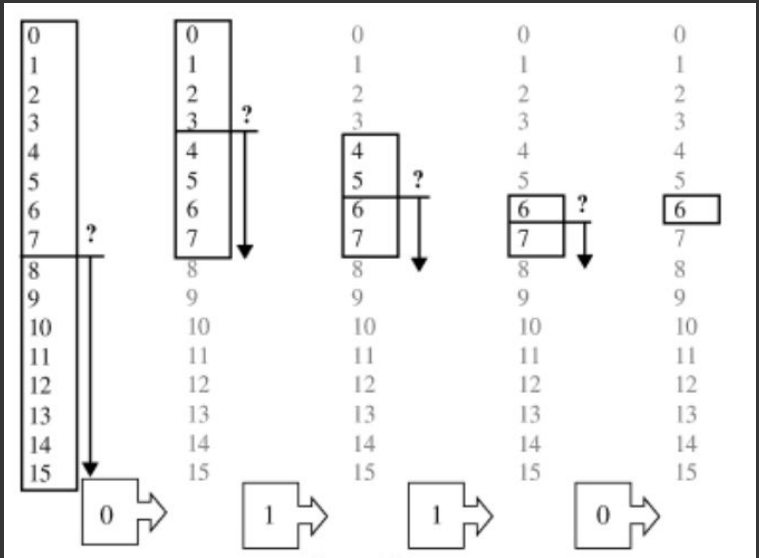
Tip

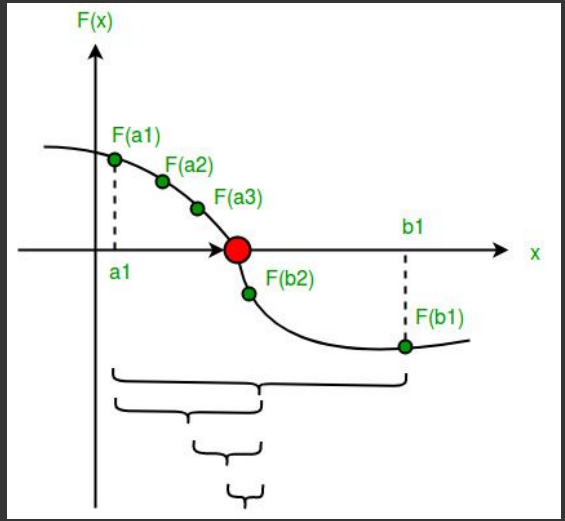
%%timeit

Try to find a number between 0 - (2**20-1)

2nd Attempt! Binary search

Do interval halving.





Tip

20 Questions game

Binary tree

Bisection method in numerical

Which one is faster?

Time it again

Order of growth
(Big-O notation)

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Congratulation!

You have learned about important imperative programming principles using Python.

Now, it your turn!

You can ask **any questions** and please give me your feedback at https://bit.ly/e1_feedback