

# **NHẬP MÔN LẬP TRÌNH** **(Introduction to Programming)**

## **Chapter X – Summary**

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Dec. 2022

# Programming

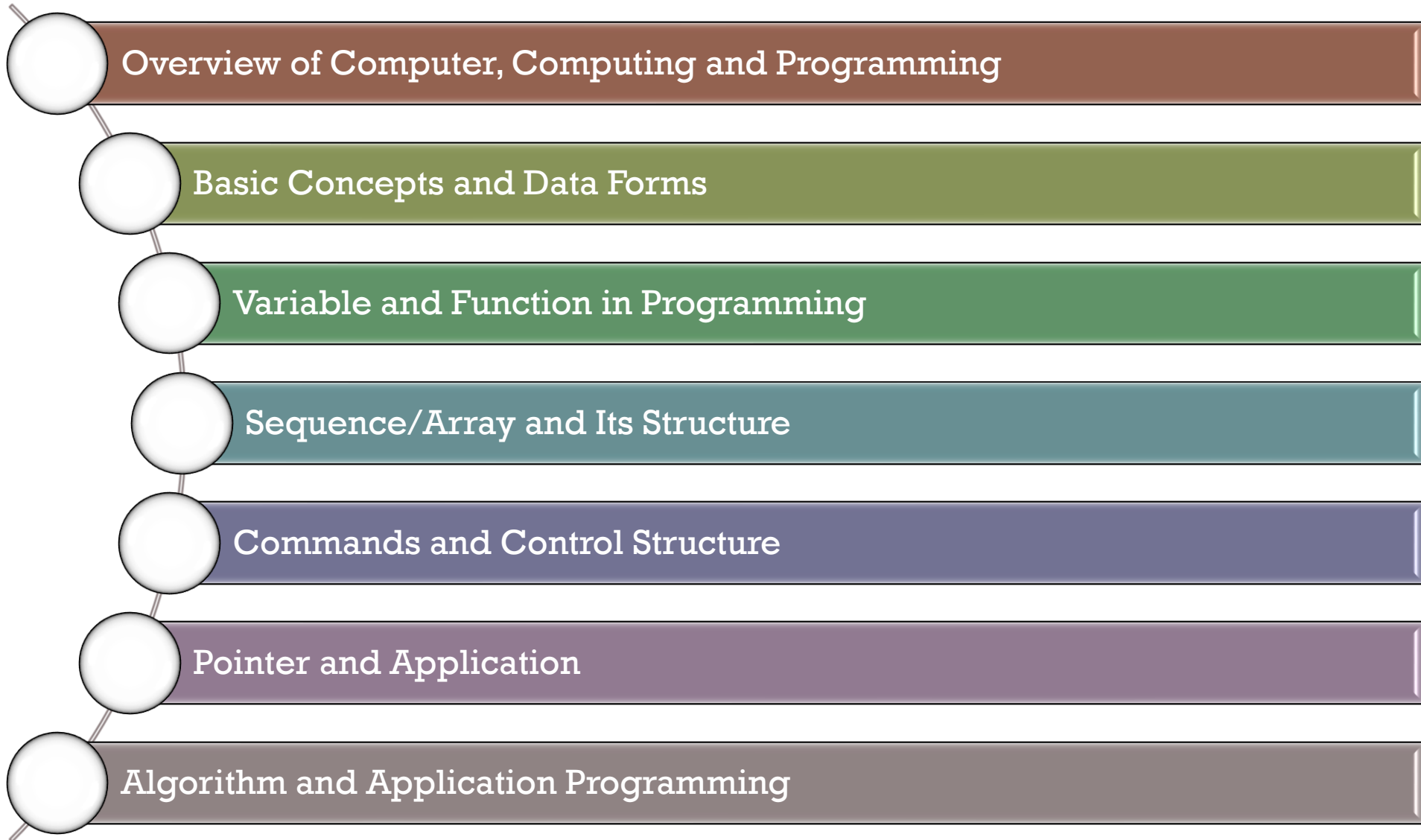
Hamilton was a self-taught programmer, working in the US in the 1960's. Owing to the success of her previous work, Hamilton was the first programmer to be hired for the Apollo project. She became the Director of Software Engineering at the MIT Instrumentation lab. Her lab developed the on-board flight software for NASA's Apollo space project, which took humankind to the moon.

The achievement was a monumental task at a time when computer technology was in its infancy: The astronauts had access to only 72 kilobytes of computer memory (a 256-gigabyte cell phone today carries almost a million times more storage space). Programmers had to use paper punch cards to feed information into room-sized computers with no screen interface.

**Margaret Hamilton, NASA's lead software engineer for the Apollo, stands next to the code she wrote by hand that took humanity to the moon in 1969.**



# Outline



# References

## Main:

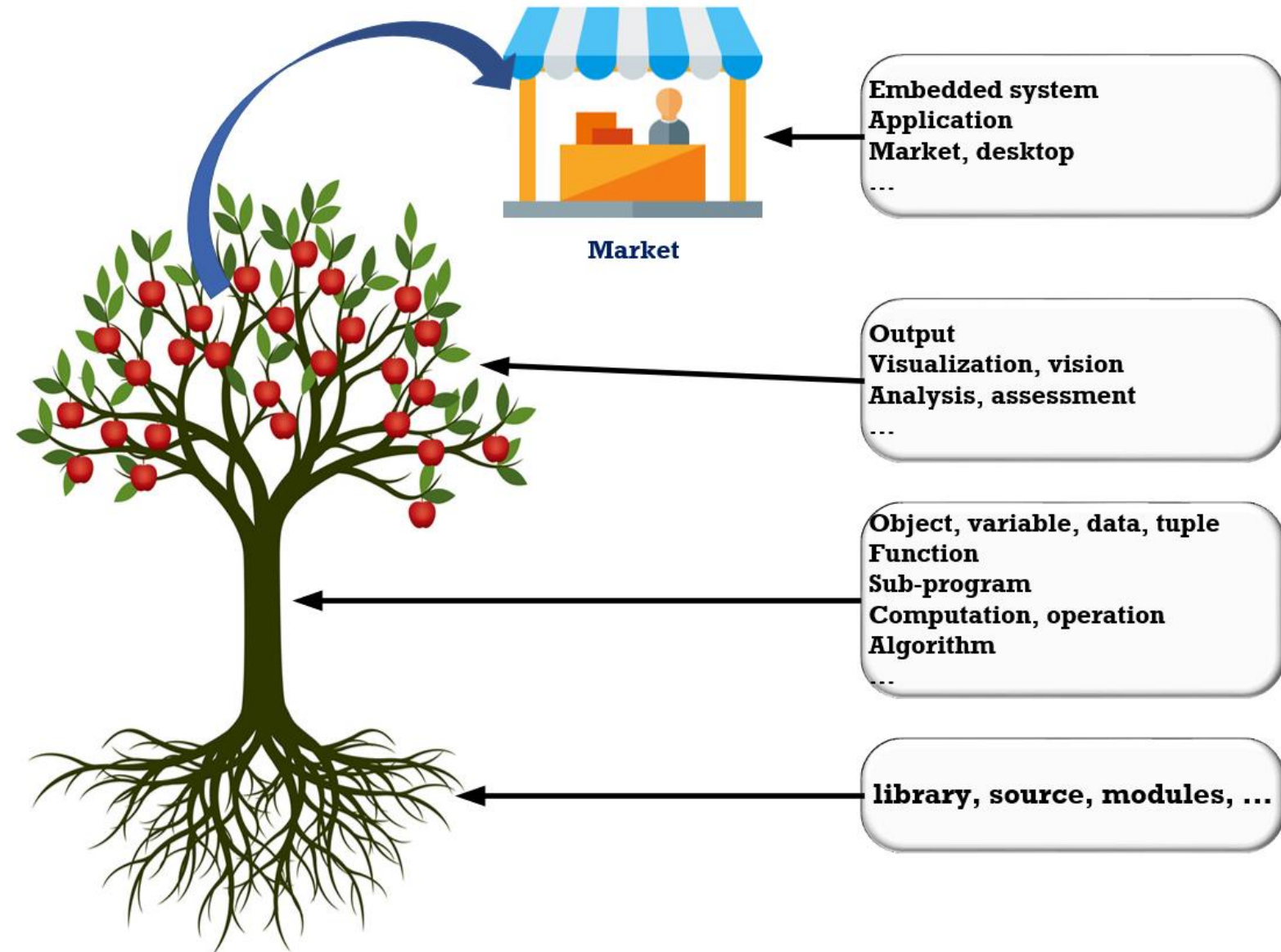
- Maurizio Gabbrielli and Simone Martini, 2010. *Programming Languages: Principles and Paradigms*, Springer.
- Cao Hoàng Trữ, 2004. *Ngôn ngữ lập trình- Các nguyên lý và mô hình*, Nhà xuất bản Đại học Quốc gia Tp. Hồ Chí Minh

## More:

- Wes McKinney, 2013. *Python for Data Analysis*, O'Reilly Media.
- Guido van Rossum, Fred L. Drake, Jr., 2012. *The Python Library Reference*, Release 3.2.3.
- Slides here are collected and modified from several sources in Universities and Internet.

# Computer programs

## General structure:



# Chapter 01: Overview

- ❑ What is computer and programming
- ❑ Needs to programming languages
- ❑ Introduction to Python programming
- ❑ Programming concepts
- ❑ Programming design
- ❑ Coding

# Chapter 02: Concepts & Data structure

- ❑ Structure of Computer programs  
Python for Data Analysis
- ❑ Data forms/types and computation
- ❑ Python library for programming
- ❑ Programming for Data analysis



# Chapter 02: Concepts & Data structure

- ❑ Objects
- ❑ Types: boolean, integer, float, string, complex
- ❑ Variables: global variables, local variables
- ❑ Methods, Calculation, Computations
- ❑ Classes, functions
- ❑ Sequences: list, tuples, set, dictionary
- ❑ Arrays: 1D array (vector), 2D array (matrix), n-D array ...



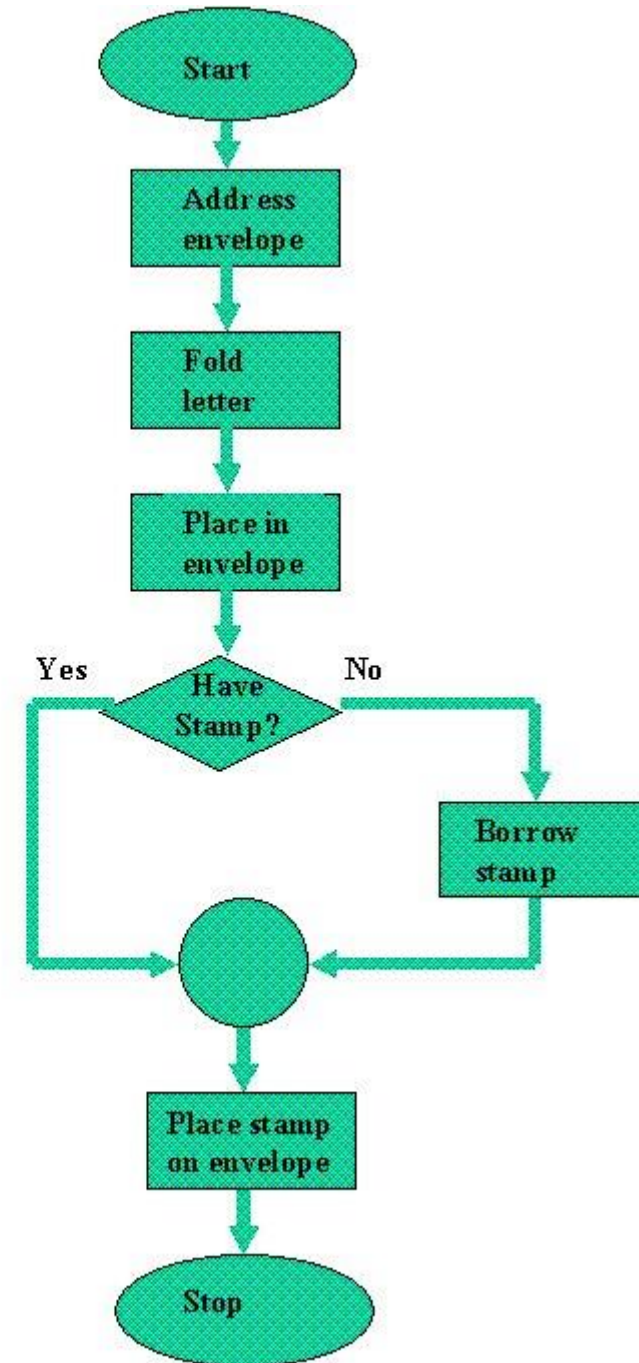
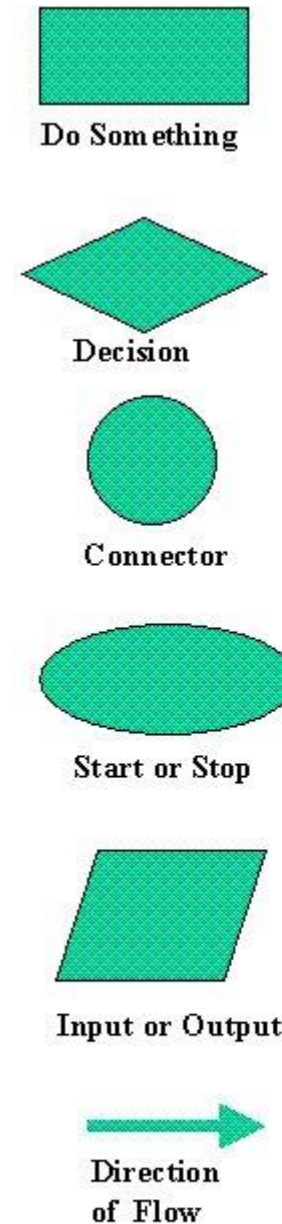
# Chapter 03: Programming components

□ Parameters and variables

□ Class, functions design

□ **Computer programming**

- Modeling
- Data Reading-Writing-Updating-Deleting
- Flow charts, diagram, graph/figure ...

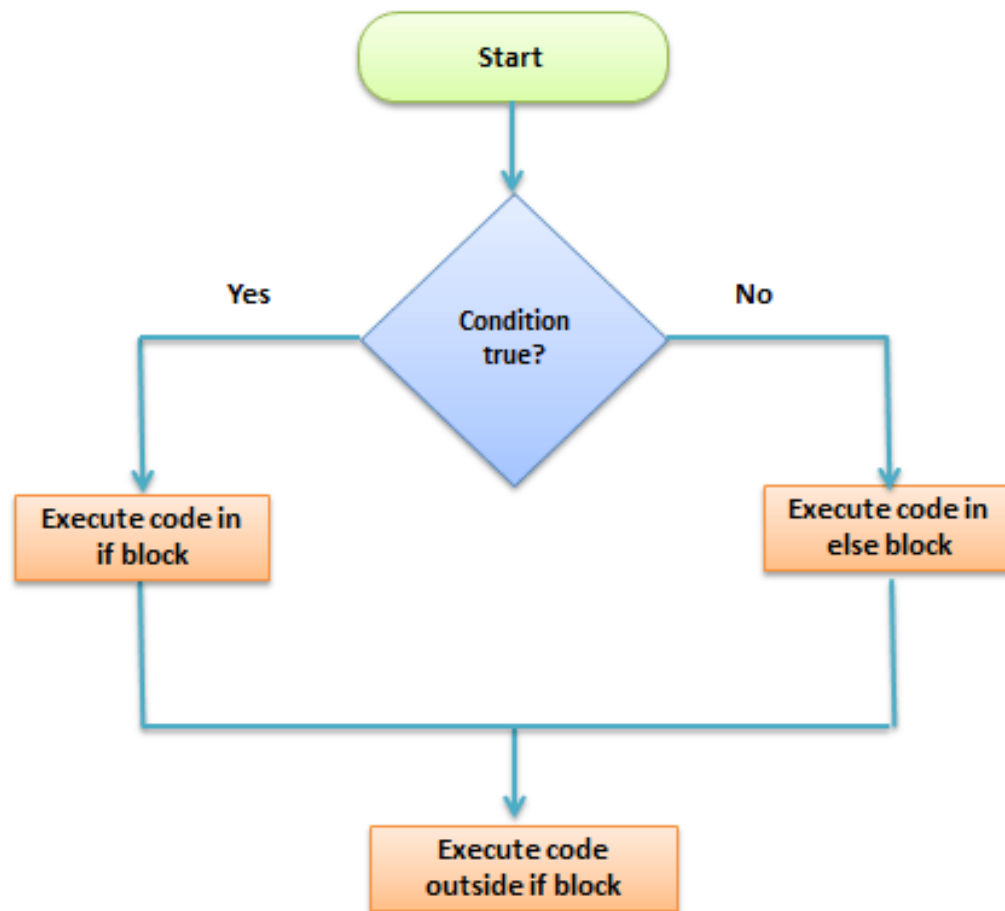


# Chapter 04: Sequence & Array

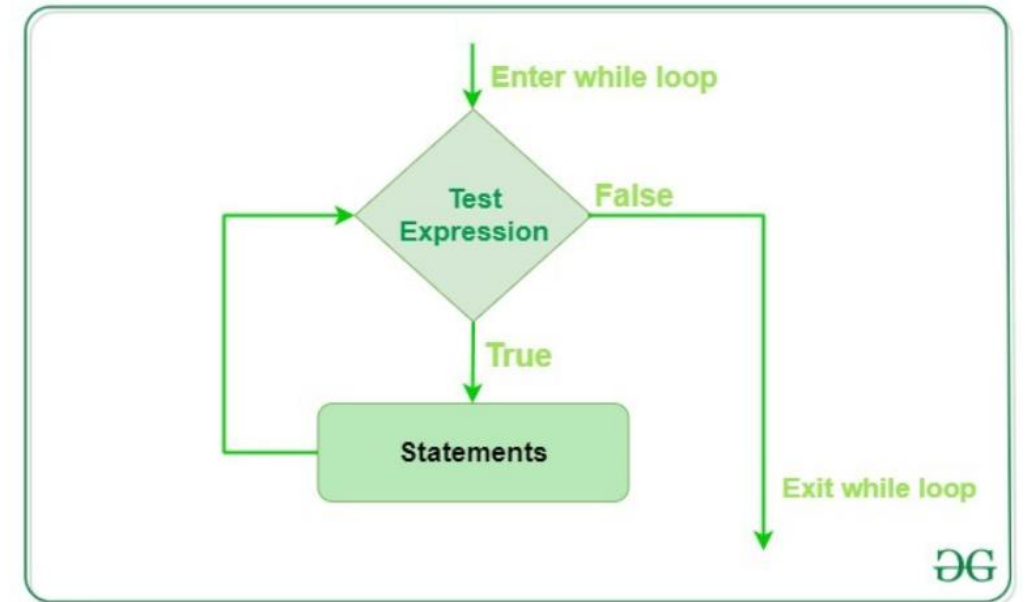
- ❑ Sequences: lists,
  - ❑ Sequences: strings,
  - ❑ Sequences: sets,
  - ❑ Sequences: tuples,
  - ❑ Sequences: dictionary
- 
- ❑ Arrays: 1D dimensional (vector),
  - ❑ Arrays: 2D dimensional (matrix),
  - ❑ Arrays: multi-dimensional (tensor)

# Chapter 05: Command, loop, statement

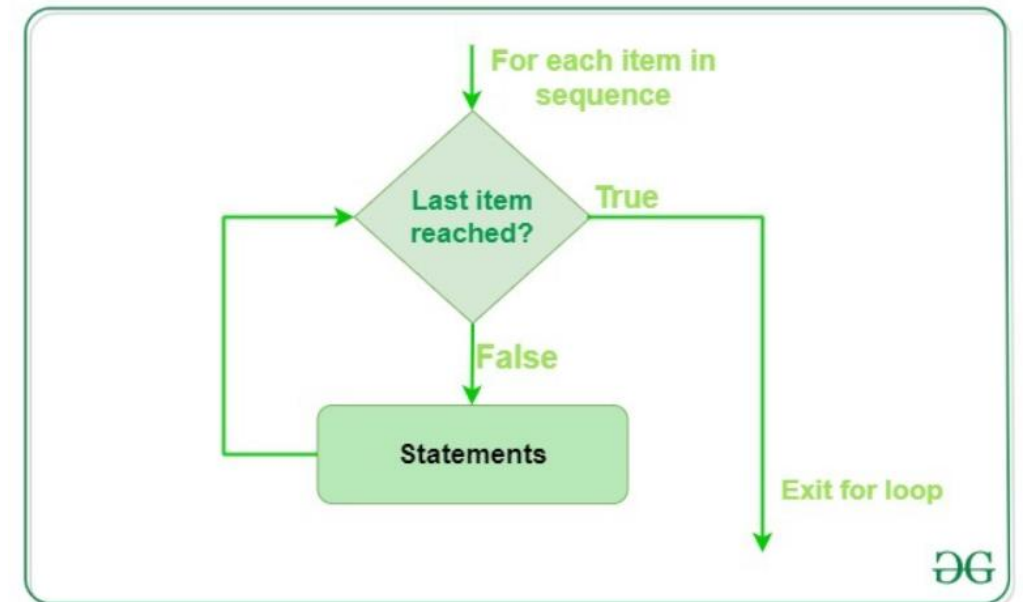
- ❑ For ... loop,
- ❑ While ... loop,
- ❑ If/else ... statement



Flowchart of While Loop :



Flowchart of for loop

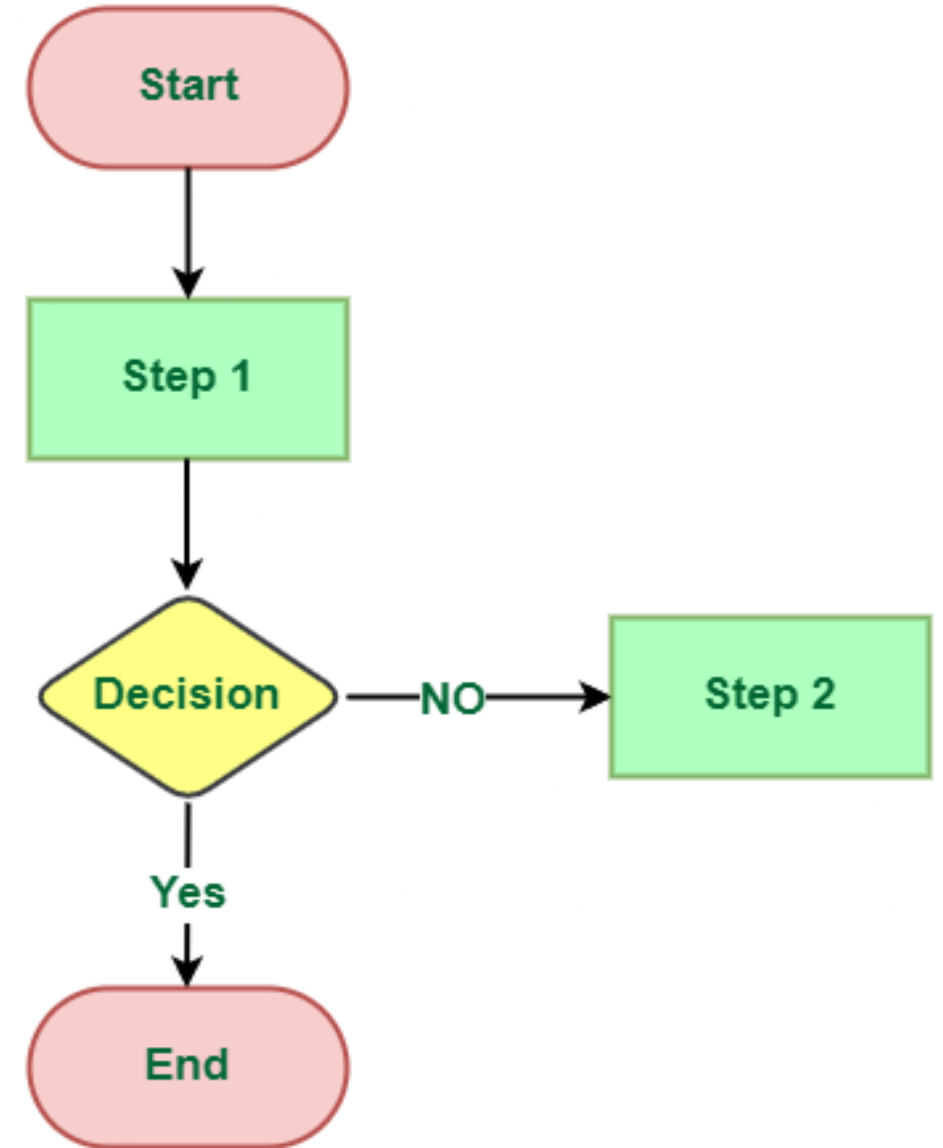


# Chapter 06: Pointers

- ❑ What are the Pointers?
- ❑ Pointers are used in PYTHON?
- ❑ Uses of the Pointer in Python
- ❑ Multiple-Pointers Approaches

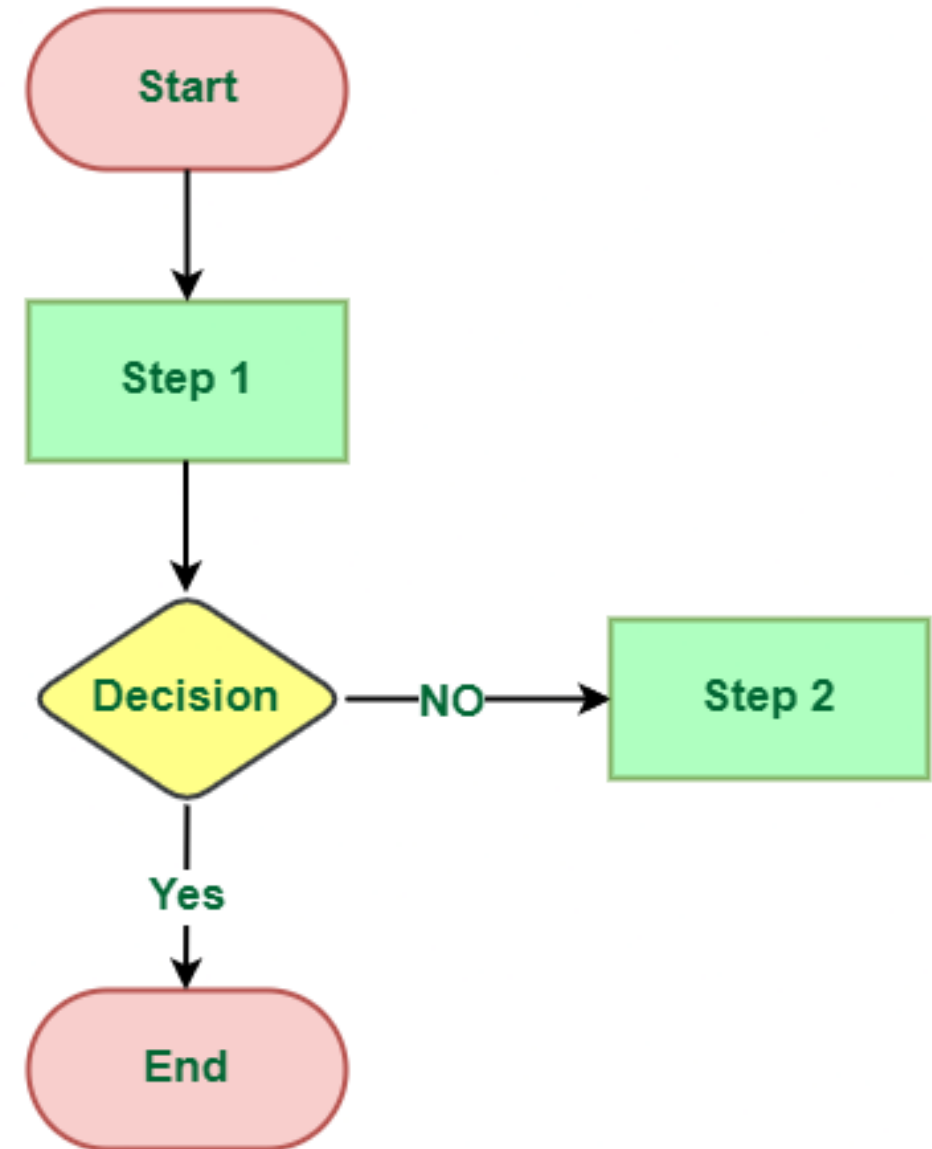
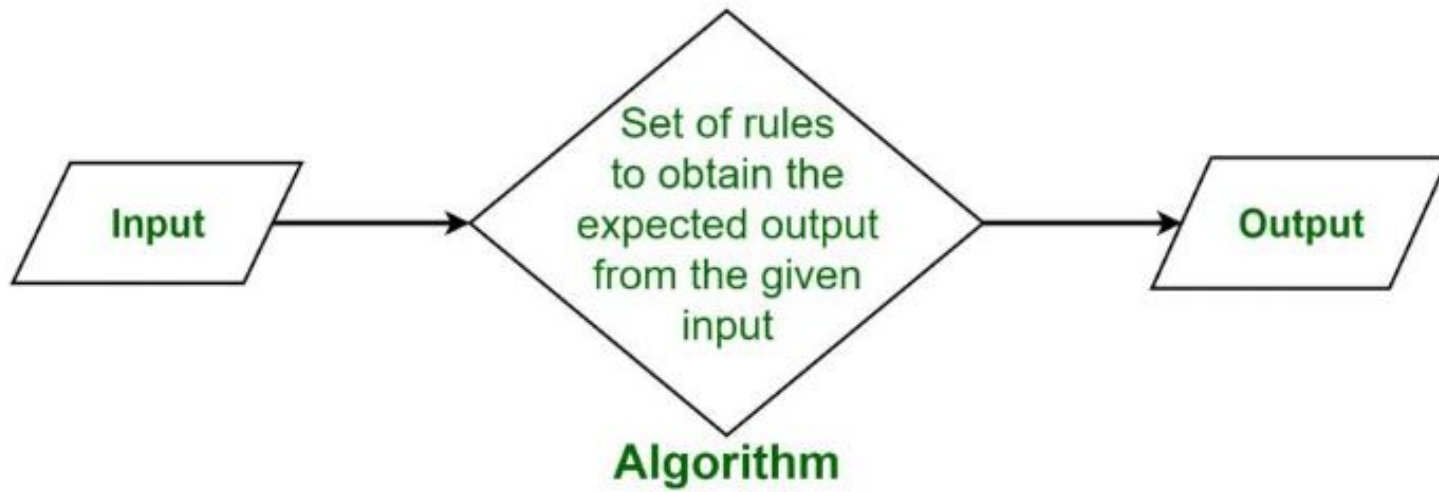
# Python Programming

## Algorithms



# Chapter 07: Algorithms

## Design of Algorithm in Python Programming



# Chapter 07: Algorithms

## Design of an Algorithm in Python Programming

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**Algorithm 1** : What is algorithm that we do for the real purpose/problem

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- 1: **Input:** What are "data/information" you known from input
  - 2: **Output:** What are "results" you want to find from output
  - 3: **Initialization:** The values of inputs for problem solving. Set  $n := 0$
  - 4: **Repeat**
  - 5:   Step 1: Doing something / checking / decision / analyzing.
  - 6:   Step 2: Doing something / checking / decision / analyzing.
  - 7:   Step ...
  - 8:   Step N: Doing something / checking / decision / analyzing.
  - 9: Set  $n := n + 1$
  - 10: **Stop** Convergence: satifying the requirements. Collect the results as "SOLUTION".
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