# Python

## Introduction:-

Python is a high-level, interpreted programming language known for its simplicity and readability. it was created by Guido van Rossum. and released in 1991. Python's clean syntax make it an excellent choice for beginners, while its powerful libraries and frameworks make it popular among professionals.

* launched in python is
feb 1991 python 1
oct 2000 python 2
dec 2008 python 3

## Key features:-

* open source
* platfrom independent
* extensive libraries
* indentent programming
* strong community suport.

## Applications:-

* web applications
* mobile applications
* desktop application
* GUI- grafical user interface.
* gamming application
* machine learning
* deep learning
* AI, robotics, IOT
* graphical design.

## * Advantages of python:-

* Easy to learn and use
  - Sureple syntax similar to english, greate for biginners.
* Readability
  - clean and redable code makes it easier to maintain.
* large standard library
  - includes built-in modules for tasks like file I/O, math, web

* extensive community support.
* versatile and cross-platform.
  • works on windows, macos and linux; used in web database
* supports multiple paradigms
  • object-oriented, functional and procedural programing styles.
* Great for Rapid Development.
  • faster prototyping and development due to its simplicity.

Disadvantages of python:-

* slower speed.
  • interpreted language, so it's slower than compiled language like C or C++.
* High memory usage.
  Not ideal for memory-intensive tasks or mobile apps.
* week in mobile development
  Rarely used for building mobile applications.
* week in multi-threading
  parallel processing is harder.
* Runtime errors
  python is dynamically typed, which makes it prone to runtime errors
* Database access limitations.
* Not suitable for memory-intensive tasks.
* packing and deployment issues.

* Comments in python:-

Comments are notes written in the code that are not executed by python
They are used to explain the logic, make the program more readable and help other developers understand the code.

Types of comments in python:-

1: single line comment
2: multi line comment.

1. single-line comment:-

- starts with a # (hash) symbol.
- everything after # on that line is ignored by python.

ex:- # This is a single line comment.

```
x = 10 # assigning value 10 to variable x.
print(x)
```

2. multi-line comment:-

- python does not have a special syntax for multi-line comment.
- But we usually use triple quotes (''' or """) for writing lines.
- These are actually strings, but if not asigned to a variable, python ignores them.

ex:-

```
'''
This is a multi-line comment
It can span across multiple lines.
useful for explanations or documentation.
'''
print("Hello, python!")

"""
using triple double quotes
"""
```

* keywords in python:-

- keywords are reserved words in python
- They have special meaning and are used for specific tasks in the language.
- Because of this, we cann't use them as identifiers (variables names, functions names, class names, etc).
- Boolean keywords — True, false, None
- conditional key — if, elif, else.
- Looping — for, while, break, continue, pass
- functions related — def, return, lambda, yield
- class or object — class, self, del, with.
- logical operator — and, or, not, is, in

- Exception handling – try, except, finally, raise, assert.
- others – import, from, global, nonlocal, as.

Ex:-
```
# using keywords correctly.
def greet():
    for i in range(3):
        if i==1:
            continue    # skip when i=1
        print("Hello", i).
greet().
```

invalid usage (error):-
```
def = 10    # error: "def" is a keyword.
```

## * Variables :-

- A variable is a name given to a memory location where data is stored.
- It acts like a continer that holds values, and the value can change during program execution.

Declaring variables:-
- in python, you don't need to declare the data type.
- just assign a value using the '=' operator.

Ex:-
```
x = 10        # integer
name = "Nagi"     # string.
price = 99.5      # float.
is_active = True  # boolean.
```

Rules for naming variables:-
- must start with a letter (a-z to A-Z) or underscore (_).
- can contain letters, digits and underscore.
- can not be a python key word (if, for, while, class etc.).
- variable names are case-sensitive (Age and age are different).

Ex:-
```
age = 25
student_name = "karan"
num = 100
TOTAL = 500
marks1 = 90
```

invalid ex:-

```
1name = "suman"      # cannot start with number
student id = 45      # space not allowed
emp@id = "EMP23"     # special characters not allowed.
```

Dynamic type:-

Python is dynamically typed, meaning you don't need to declare the type: it's decided at runtime.

ex:- ① `x = 10` # integer
`x = "Hello"` # now becomes a string.

② multiple assig.

```
a,b,c = 10, 20, 30      # multiple assig
x = y = z = 50          # single value to multiple var.
```