PYTHON NOTES

Introduction:

Python is a popular programming language. It was created by ***Guido van Rossum***, and released in ***1991***.

Use Cases:

- Data Science, Machine Learning, GenAI.
- Web development (server-side).
- Software development.
- Mathematics.
- System scripting.

Print Function:

`print("Sureshvj")` → Print a string
`print(x)` → Print a variable x
`print(x,y)` → Print two variables.
`print(f"Suresh, {0}, {1}".format(x,y))` → Print format str ***way-1***
`print(f"Suresh, {}, {}".format(x,y))` → Print format str ***way-2***
`print(f"Suresh {x}")` → Print format str ***way-3***
`print("Python", end='@')` → `end` concatenates 2 print function messages with `end` value.
`print('09','12','2016', sep='-')` → `sep` will separate different values with `sep` value.

Variable declaration:

`x = 10`		Declare single int variable
`x = "Suresh VJ"`		Declare single str variable
`x, y = 26, "Suresh VJ"`	Different memory location	Declare multiple variables
`x, y = 5, 5`	Same memory location	Declare multiple variables
`x = y = "Suresh VJ"`	Same memory location	Declare multiple variables with single value

Variable Declaration Rules:

- Variable name should not start with **num, special char, capital letter**. (1a, @x, Age)
- Variable name shouldn't contain the **spaces**. (sur name = 'vj')
- Variable name can start with **underscore.** (_)

Constant Variables:

- It is a special type of variable whose value should not change. Declared with capital letters.
- The constant variables declared in a separate python file (constatnt.py) and use those variables in another file (main.py) by importing them.

constant.py	***main.py***

`# Declare constants`
`PI = 3.14`
`GRAVITY = 9.8`
	`# Import constant file we created above`
	`import constant`
	
	`print(constant.PI) # prints 3.14`
	`print(constant.GRAVITY) # prints 9.8`

Data Types:

Numeric data types	int, float, complex	26, 10.5, 2+3j
String data types	str	'Suresh VJ'
Sequence types	list, tuple, range	[], (), range(0,10)
Mapping data type	dict	{'key': value}
Set data types	set	{}
Boolean type	bool	True / False, 1 / 0
Null values	None	None

Imp points:

- All data types are **objects**.
- All data types have **immutable** property except `list`, `set`, `dict`.
- All data types have **object intern** properties.

Some data which support by python:

Long int	`9618112600`	`-------`
Binary	`0b0110101`	`0b-----`
Decimal	`100`	`100---`
Octal	`0o215`	`0c----`
Hexa-decimal	`0x12d`	`0x---d`

Operators:

Arithmetic operators	`+, -, /, //, %, *, **`
Comparison operators	`<, >, <=, >=, ==, !=, ===`
Assignment operators	`=, +=, -=, /=, //=, %=, *=, **=`
Logical operators	`and, or, not`
Identical operator	`is, in (is not, not in)`

Conditional Statements:

if:

```
if condition:
    # code
```

if - else:

```
if condition:
    # code
else:
    #code
```

elif :

```
if condition_1:
    # code
elif condition_2:
    #code
elif condition_3:
    #code
else:
    #code
```

Nested if:

```
if condition_1:
    # code
    if condition_2:
        # code
```

if - else:

```
if condition:
    if condition:
        # code
else:
    if condition:
        # code
```

Advanced Syntax:

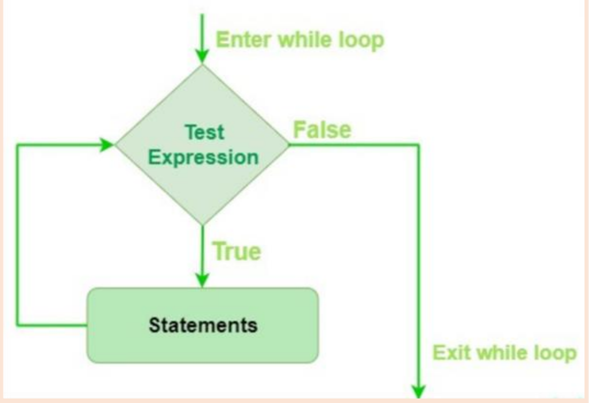
```
print("VJ") if <condition> else print("R")
print("A") if <condition_1> else print("B") if <condition_1> else print("C")
```

Imp Points:

`elif` is also possible without `else`.

loops:

While



```
while <condition>:
    # Code
```

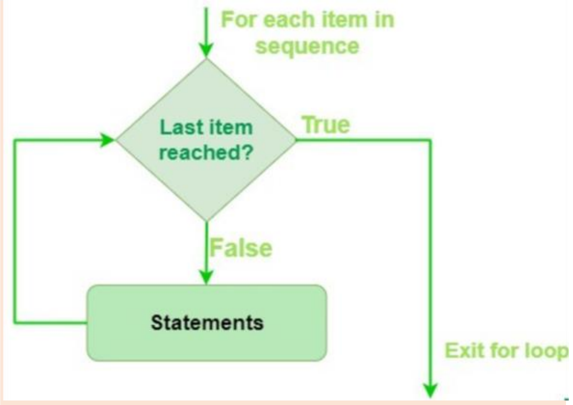
While with else

```
while <condition>:
    # Code
else:
    #code
```

Infinity while

```
while True:
    # Code
```

For:



```
for i in <iterator>:
    # code
```

For with else

```
for i in range(6):
  #code
else:
  print("Finally finished!")
```

For – else with break

```
for x in range(6):
  if x == 3: break
  print(x)
else:
  print("Finally finished!")
# The else not execute if loop
breaks
```

Control Flow Statements:

Pass

Pass Does nothing, just a placeholder.

```
for i in range(5):
    if i == 3:
        pass
    else:
        print(i)

# Do nothing when i
equals 3
```

Break:

Break exits the loop immediately.

```
for i in range(5):
    if i == 3:
        break
    print(i)

# Exit the loop when i
equals 3
```

Continue:

Continue skips the rest of the loop and starts the next iteration.

```
for i in range(5):
    if i == 3:
        continue
        print("X")
    print(i)

# Skip printing when i
equals 3
```

Type Casting:

The below constructors are used to perform the type casting.

```
int()        | float()  | complex()
bool()       | str()    | list()
tuple()      | set()    | dict()
```

from	int	float	complex	bool	str	list	tuple	set	dict
int	✓	✓	✓	1/0 CK	✓	X	X	X	X
float	✓	✓	✓	CK	✓	X	X	X	X
bool	✓	✓	✓	T/F	✓	X	X	X	X
complex	X	X	✓	CK	✓	X	X	X	X
str	✓	✓	X	CK	✓	✓	✓	✓	X
list	X	X	X	CK	✓	✓	✓	✓	X
tuple	X	X	X	CK	✓	✓	✓	✓	X
set	X	X	X	CK	✓	✓	✓	✓	X
dict	X	X	X	CK	✓	keys	keys	keys	✓

Mutable & Immutable:

Mutable:

If data can be changeable or updatable in current memory location then that objects

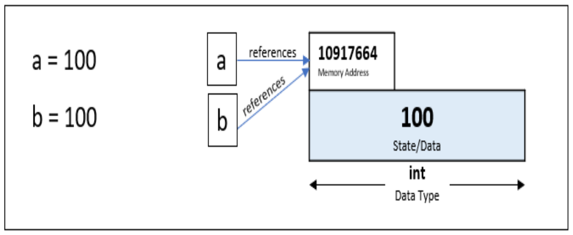
Immutable:

If data can't be changeable or updatable in current memory location then that objects are called as immutable.

Obj interning:

Object Interning is nothing but the two different variables having the same value is stored in the same address

If two variables / objects having same data, Python creates only one object and save that data in one instance only and provide the object address to both variables.



Eligible to interning property:

Int Float Bool Complex Str

Eligible to interning property:

List Tuple Set Dict

String:

Declaration: `''`, `""`, `''' '''`, `""" """`
Properties:

Immutable Ordered Sliceable Non-inclusive	Interned obj

- String index numbers starts from 0 in forward direction, and -1 in reverse direction.

Syntax	*Explanation*
`s.capitalize()`	Capitalize the starting character of the string and rest of all characters will be converted into lower case.
`s.title()`	title the starting character of each word in a string and rest of all characters will be converted into lower case.
`s.casefold()`	Used to convert string to lower case. It is similar to lower() string method, but case **removes all the case distinctions** present in a string.
`s.lower()`	Used for converting into lowercase
`s.upper()`	Used for converting into uppercase
`s.swapcase()`	Converts all uppercase characters to lowercase and vice versa
`s.istitle()`	It returns True if all the words in the string are title cased, otherwise returns False.
`s.islower()`	It returns **True** if all alphabets in a string are in lowercase. otherwise returns **False**.
`s.isupper()`	It returns **True** if all alphabets in a string are in uppercase. otherwise returns **False**.

`s.center(4, '*')`
`s.center(4)`
	It will return a new string which contains 4 * s before and after the input string “S”.

`s.strip()`
`s.strip(s1)`
	It Remove spaces / specified characters from starting and ending of the string.

`s.rstrip()`
`s.rstrip(s1)`
	It Remove spaces / specified characters from right side of the string.

`s.lstrip()`
`s.lstrip(s1)`
	It Remove spaces / specified characters from left side of the string.

`s.count('sub_str')`	Returns the number of occurrences of a substring in the given string
`s.find('sub_str')`	Returns the lowest index or first occurrence of the substring if it is found in a given string. If it is not found, then it returns -1.

`s.rfind('sub_str')`	Returns the rightmost index of the substring if found in the given string. If not found then it returns -1.
`s.startswith('sub_str')`	Returns **True** if a string starts with the specified prefix ('sub_str'), otherwise returns **False**.
`s.endswith('sub_str')`	Returns True if a string ends with the given suffix ('sub_str'), otherwise returns False.
`s.index('sub_str')`	Returns index of the first occurrence of an existing substring inside a given string. Otherwise, it raises **`ValueError`.**
`s.rindex('sub_str')`	Highest index of the substring inside the string if the substring is found. Otherwise, it raises **`ValueError`.**
`s.isnumaric()`	Returns "**True**" if all characters in the string are numeric characters, otherwise returns "**False**".
`s.isalnum()`	It checks whether all the characters in a given string are either alphabet or numeric (alphanumeric) characters.
`s.isalpha()`	It is used to check whether all characters in the String is an alphabet.
`s.isdisit()`	Returns "**True**" if all characters in the string are digits, Otherwise, It returns "False".
`s.isdecimal()`	Returns true if all characters in a string are decimal, else it returns False.
`s.isspace()`	Returns "**True**" if all characters in the string are whitespace characters, Otherwise, It returns "**False**". This function is used to check if the argument contains all whitespace characters, such as: • ' ' – Space • '\t' – Horizontal tab • '\n' – Newline • '\v' – Vertical tab • '\f' – Feed • '\r' – Carriage return

List:

Declaration: `[], list()`
Properties:

Mutable	Allow duplicates
Ordered	Not interned obj
Sliceable	Allow all data types
Non-inclusive	

- Declaration Possible ways:
  `[], [4], [4,], [4, ]`
- List index numbers starts from 0 in forward direction, and -1 in reverse direction.

`l.append(val)`	Append the value end of the list
`l.extend([val, val, ..])`	Add provided list of values at end
`l.insert(idx, val)`	Insert a value at a particular index position
`l.copy()`	Copy the list into another variable.
`l.count(val)`	Returns the frequency of a value from a list.
`l.index(val)`	Return the index number of a value.
`l.reverse()`	Reverse the list.
`l.sort(reverse= T / F)`	Sort the list – default ascending order (`reverse= False`)
`l.pop(idx)`	Remove specified indexed value – default remove last value

Tuple:

Declaration: `()`, `tuple()`
Properties:

Immutable	Allow duplicates
Ordered	Not interned obj
Sliceable	Allow all data types
Non-inclusive	

- Declaration Possible ways:
  ```
  t = 1,2,3
  (), 4,, (4, )
  ```
- Tuple index numbers starts from 0 in forward direction, and -1 in reverse direction.

`t.count(val)`	Returns the frequency of a value from a list.
`t.index(val)`	Return the index number of a value.

Set:

Declaration: `{}`, `set()`
Properties:

Mutable	Not allow duplicates
Not ordered	Not interned obj
Can't sliceable	Not allow dict, list, set

- Declaration Possible ways:
  ```
  {}, {4}, {4,}, {4, }
  ```
- Set allows only mutable data types.

`s.add(val)`	Add a value to set
`s.clear()`	Remove all values from set
`s.copy()`	Return a copy of the set
`s1.difference(s2)`	Returns difference (*items exist only in the first set*) between two sets.
`s1.difference_update(s2)`	Update the set s1 with items which are not existed in s2.
`s.discard("val")`	Remove a specified item
`s1.intersection(s2)`	Returns a set with items which are present in both s1, s2 sets.
`s1.intersection_update(s2)`	Removes the items from s1 which are not present in s2.

Concatenation:

Concatenation is the process of extend the value with new value.

Ex: `a = "Suresh", b = " VJ"`
b concatenates with a is `"Suresh VJ"`

1. str with str concatenation is possible.
2. list with list concatenation is possible.
3. tuple with tuple concatenation is possible.

`a+b, a+=b`
we can do concatenation by above ways

Sort & Reverse:

Sort:

`sortend(x)` → ascending
`sortend(x, reverse=True)` → descending

- When we sort the string, that returns list of characters. If we want to converts that list

`".join(output_list)`

Reverse:

```
x[::-1]
Reversed(x)
```

- Can't apply reverse operation on Set and Dict

Comprehension:

Let's consider list x as below & applying comprehension in 3 way i.e *with out condition, with if, with if else*

```
                x = range(0,11)

        lst = [i+2 for i in x]
    lst = [i+2 for i in x if i <= 5]
lst = [i+2 if i > 3 else i for i in x]
```

This concept applicable to:
List Tuple Set Dict

For Dict we should pass key value pair as below:

```
lst = {f"key{i}" : i+2 for i in x}
```