

Values and Types

Values:

Values are the basic units of data, like a number or a string that a program manipulates. *Example:* 2, 'Hello World'. These values belong to different data types. That is 2 is an integer data type and Hello World is a string data type.

Types/ Data types:

A type is a category of values. Integers(type int), floating point(type float), Booleans(type bool), strings(type str) and lists, tuples, dictionaries are predefined data types in python. They are called **built-in data types**.

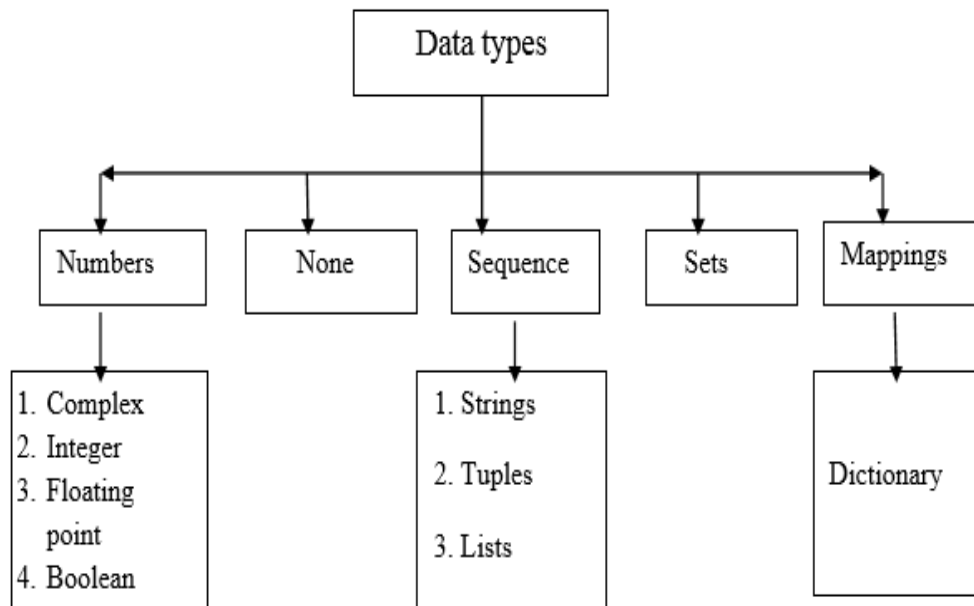


Fig: List of data types in Python

Integer (type int)

An integer data type represents the whole numbers. It represents positive and negative numbers. Integer data type have unlimited size in Python.

Example: -3, 2 etc

Types of integer data type:

- i) Regular integer
- ii) Binary literals (base 2)
- iii) Octal literals (base 8)

iv) Hexa decimal literals (base 16)

i) Regular integer

They are normal integers.

Example:

```
>>>a=9293
```

```
>>>b= -136
```

ii) Binary literals (base 2)

A binary literal is of the form zero followed by an uppercase B or lowercase b. The literals are 0 and 1.

Example:

```
>>>bin=0b1111
```

```
>>>print(bin)
```

Output:

```
15
```

iii) Octal literals (base 8)

An octal literal is a number prefixed with zero followed by either uppercase O or lowercase o. The literals are 0 to 7.

Example:

```
>>>oct=0O24
```

```
>>>print(oct)
```

Output:

```
20
```

iv) Hexa decimal literals (base 16)

A hexa decimal literal is prefixed by 0(zero) followed by an upper case X or a lower case x. The literals are 0 to9, [a-f/A-F].

Example:

```
>>>hex=0x9A
```

```
>>>print(hex)
```

Output:

```
154
```

Floating point numbers (type float)

Numbers with fractions or decimal points are called floating point numbers. Floating point data type is used to represent scientific notations where the upper case 'E' or lower case 'e' signifies the 10th power.

Example 1:

```
>>>3.3e3
3300.0
```

Example 2:

```
>>>112.9e2
11290.0
```

Example 3:

```
>>>c=2.1
>>>type(c)
<type 'float'>
```

Boolean (type bool)

Boolean data type was found by George Boole (1815-1864).It takes 2 values(True or False).These two values are used when evaluating comparisons, conditional expressions etc. The common way to produce boolean value is relational operator. The various relational operators used in python are <,>, <=,>= etc.

Example 1:

```
>>>3<4
True
```

Example 2:

```
>>>a= (3>4)
>>>a
False
```

Example 3:

```
>>>a= (3>4)
>>>a
>>>type(a)
<type 'bool'>
```

Strings (type str)

String is defined as collection of characters which may consist of letters, numbers and special symbols or a combination of these types within quotes. An individual character in a string is accessed using an index. The index should always be an integer (positive or negative). An index starts from 0 to n-1.

Strings are immutable i.e. the contents of the string cannot be changed after it is created. Python will get the input at run time by default as a string. Python treats single quotes is same as double quotes.eg: 'hello' or "hello".

String operators:

Consider, X holds "python" and Y holds "program".

| Operator | Description | Example |
|----------|--|--------------------------|
| + | Concatenation-Adds values of 2 strings | >>>X+Y python program |
| * | Repetition-creates new string.(i.e.)concatenate multiple copies of same string | >>>X*2 python python |
| [] | Slice-Gives the character from the given range. | >>>x[0:3] pyt |
| [:] | Range slice-Give the characters from the given range. | >>>x[1:2] y |
| in | Membership-returns true if a character exists in the given string. | >>>t in X true |
| not in | Membership-returns true if a character not exists in the given string. | >>>m not in X true |

Built-in string methods:

- capitalize()-This function capitalizes the first letter of a string.
- islower()-It returns true, if all the characters in given string are lower case
- isupper()-It returns true, if all the characters in given string are upper case.
- len(string)-Returns the length of the string.
- lower()-Convert all upper case letters to lower case letters.

Example Program:

```
>>>str="HelloPython"
>>>print str
HelloPython
>>>print str[0]
H
>>>print str[0:3]
Hel
```

```
>>>print str[5:]
Python
>>>print str*2
HelloPython HelloPython
>>>print str+"welcome"
HelloPython welcome
```

List

List data type contains elements of various data types. Values in a list are called elements or items of list. The list is enclosed by square brackets [], where items are separated by commas. List values can be accessed using slice operator ([] or [:]). The index 0 represents beginning of the list and -1 represents ending of the list.

- list[0] represents beginning of list.
- list[-1] represents ending of list.

Syntax:

```
listname= [value1,value2,...value n]
```

Example:

```
>>>mylist = [10, 10.5, 'programming']
```

Example Program:

```
>>>mylist= ()
>>>mylist=['python',10,10.5,'program']
>>>print mylist
['python',10,10.5,'program']
>>>print mylist[1:3]
[10, 10.5]
>>>print mylist[2:]
[10.5,'program']
>>>print mylist*2
['python',10,10.5,'program','python',10,10.5,'program']
>>>print mylist[-1]
['program']
```