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O-LEVEL (M3-R5.1)
Python Programming By

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CHAPTER-3

INTRODUCTION TO PYTHON

History of Python

- Python laid its foundation in the late 1980s.
- The implementation of python was started in December 1989 by Guido Van Rossum at CWI(centrum Wiskunde & Informatica) in Netherland.
- Python was developed by Guido Van Rossum in 1991 at National Research Institute for mathematics and computer science in the Netherland and officially released on February 20, 1991(version 0.9.0).
- In 1994, Python 1.0 was released with new features like lambda, map, filter, and reduce.
- The latest version of Python 3.13.2 (4-Feb-2025)



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What is Python?

Python is a general-purpose, dynamically typed, high-level, compiled and interpreted, garbage-collected, and purely object-oriented programming language that supports procedural, object-oriented, and functional programming. It is case-sensitive.

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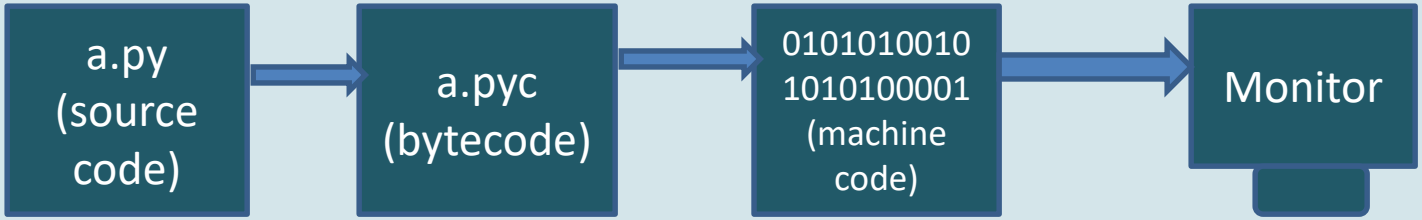
Application of python

- Web development
- Gaming
- Scientific and numeric computing
- Text processing
- Network programming
- Data science
- Machine learning
- Software development

Introduction To Python Interpreter And Program Execution

Python interpreter is a program that executes other python programs.A python program contains source code(ex: a.py) and this code first compiled by python compiler to produce byte code, which creates file with extensions .pyc (ex:a.pyc). The byte code compilation happened internally and completely hidden from developer . This byte code is given to Python Virtual Machine which converts the byte code to machine code. This machine code is run by processor and finally the results are produced.



PVM is software that contains an interpreter that converts the byte code to into machine code. PVM is most often called Python Interpreter. PVM contains a complier in addition to the
Interpreter. This Compiler is called Just In Time (JIT) compiler which is useful to speed up execution of the python program.

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How to use python?

Once installed, the python console can be accessed in several ways. Python is considered an interpreted language because Python programs are executed by an interpreted . There are two ways to use the interpreter.

1.Interactive mode(Command-line)-Python Shell

2.Script mode-(Intergrated Development Environment-IDLE)

Using Comment

Comments can be used to explain Python code. It can be used to make the code more readable. Comment in Python begin with a hash mark (#) and white space character and continue to the end of line.

this is a comment

Python multiline comment:

Python does not really have a syntax for multiline comments,you can create multiline comments in python. There are two simple ways to do so.

1. In the firstway, you can insert a # for each line:

this is comment

this is comment

2. Another thing you can do is use multiline strings by wrapping your comment inside a set of triple quotes:

“”” if I really hate pressing enter and

Typing all those hash marks , I could

just do this instead

“””

What is variable?

A variable is a name which is used to refer memory location and used to hold value . In python, variable also called as an identifier . A variable can have a short name(like x) or a more descriptive name(carname).

❖ **Rules for declaring python variables:**

- A variable name must start with a letter or the underscore character.
- A variable name cannot start with a number.
- A variable name can only contain alpha-numeric characters and underscores(A-z,0-9,_).
- Variables name are case-sensitive(age , Age and AGE are three different variables).
- We can’t use reserved words as variables.
- There is no length limit for a variable.

What is keywords/Reserved words.

Python keywords are special reserved words which convey a special meaning to the compiler/interpreter.

- ❖Keywords are contains only alphabet symbols.
- ❖Except the following three keywords all other contains only lower case alphabet symbols.

  True , False , None
- ❖Switch concept not there in the python.
- ❖Do while loop is not there in the python.
- ❖int , float data types are not required in python to declare a variable. That's why not available in python keywords list.

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Keyword list:

True	False	None	assert	await	pass
and	or	not	is	as	yield
if	elif	else	async	in	while
for	except	finally	raise	break	continue
return	Try	import	from	class	def
global	del	with	nonlocal		lambda

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What is Token?

The smallest individual unit or element in a program is known as a token a lexical unit. Each token should be separated from the other by a space. Python has the following tokens:

- Keywords
- Identifiers
- Literals(constant)
- Punctuators
- operators

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What is Literal?

Literals can be defined as a data that given in a variable or constant. For example 9,-1.5, ”olevel”,’ram” are literals. Literals are fixed numeric or non-numeric value.

Python support the following Literals:

- ❖String literals
- ❖Numeric literals(int,float,long,complex)
- ❖Boolean literals
- ❖Special literals (None)

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What is datatype?

It represent the datatype of data what are choosing.
The type of data stored inside a variable.
Python has the following 14 datatypes built-in by default,in thses categories:

- ❑Numeric types- int,float,complex
- ❑Boolean types-bool
- ❑Set types-set,frozenset
- ❑Text type- str
- ❑Sequence types-list,tuple,range
- ❑ Binary types-bytes,bytearray,memoryview

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Python Numbers

Integer:

A number(positive or negative) without decimal point are called integers or whole numbers.If wants to represent an integer value then we go for int datatype.

For example:

```
>>>x=22
>>>type(x)
<class ‘int’>
```

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Float:

We can use float datatype to store the data which is available in the form of the numbers with decimal places.

For example:

```
>>>a=12.234
>>>type(a)
<class 'float'>
```

Complex:

In python ,complex data type is used to store complex numbers data. The format of complex data type is a+bj or a-bj.

Here ‘a ‘ is called real part and ‘b’ is called imaginary part.

For example:

```
>>>a=1+2j
>>>type(a)
<class ‘complex’>
```

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Bool:

To represent logical values true or false then we go for bool datatype.In bool datatype allowed value are True and False. In python ,in true value starting letter ‘t’ should be capital ‘T’,in false value starting letter ‘f’ should be capital ‘F’ otherwise PVM gives an error message.

For example:

```
>>>a=10
>>>b=20
>>>c=a>b
>>>print(c)
False
```

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What is Sets?

Set is a class treated as datatype.A set data type represents unorder collection of elements or to represent a group of unique values as a single entity.

For example:

```
>>>a={1,2,3}        #create set
>>>print(a)
{1,2,3}
>>>type(a)
<class ‘set’>
```

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What is string?

Strings are sequences of character data.To store collection of characters,then we use string data type.The string data type in python is called str and str is one of the class treated as data type.A string enclosed within ‘single quotes’ or “double Quotes”.

For example:

```
>>>a=“python”
>>>print(a)
‘python’
>>>type(a)
<class ‘str’>
```

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Lists:

A list contains items separated by commas and enclosed within square brackets [].

For example:

```
>>>a=[1,2,3,4,5]]
>>>print(a)
[1,2,3,4,5]
>>>type(a)
<class ‘list’>
```

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Tuple:

A tuple contains items separated by commas and enclosed within parentheses ().

For example:

```
>>>a=(1,2,3,4)
>>>print(a)
(1,2,3,4)
>>>type(a)
<class ‘tuple’>
```

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Dictionary:

Dictionaries are used to store data values in key:value pairs.It are enclosed by curly braces { } .

For example:

```
>>>a={1:100,2:200,3:300}
>>>print(a)
{1:100,2:200,3:300}
>>>type(a)
<class ‘dict’>
```

❖Typecasting or Data Type Conversions

The process of converting the value of one data type to another data type is called type conversions. Python has two types of type conversions.

1. Implicit Type Conversion
2. Explicit Type Conversion

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1.Implicit Type Conversion

When python automatically converts one data type to another data type.

For example:

```
>>>a=12
>>>b=13.0
>>>type(a)
<class ‘int’>
>>>type(b)
<class ‘float’>
>>>print(a+b)
25.0
>>>type(a+b)
<class ‘float’>
```

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2.Explicit Type Conversion

when users convert the datatype of an object to required data type.we use the predefined function like int(),float() etc.

For example:

```
>>>a=123
>>>type(a)
<class ‘int’>
>>>b=“123”
>>>type(b)
<class ‘str’>
>>>b=int(b)      #explicit conversion
>>>print(a+b)
246
```

Accepting input from console:

User enters the values in the Console and that value is then used in the program as it was required. To take input from user we make use of a built-in function input().

❖ Input():

This function can be used to read data directly from the keyboard in the from of string type.We have to convert that string to our required type by using type casting method.

```
>>>a=input("Enter any value:")
Enter any value: 20
>>>print(a)
20
```

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eval():

eval() function is used to evaluate the value of a string.It takes a string as an argument,evaluate even expressions,provided the input is a string.

```
>>>eval(“56”)
56
```

print():

The print() function prints the specified message or given object to the standard output device or to the text stream file.

```
>>>print(“python”)
python
```

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Escape sequence:

In python, a backslash character in a string indicates that one or more characters that follow it should be treated specially. This is called as an escape sequence.Escape sequences allow you to include special characters in strings. To do this,simply add a backslash(\) before the character you want to escape.

```
>>>print(hello\n python”)
hello
python
>>>print(“hello\t python)
hello		python
```

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The following is a table of escape sequences:

\a	-	bell
\n	-	new line
\t	-	horizontal tab
\r	-	carriage return
\b	-	back space
\f	-	form feed
\v	-	vertical tab
\’	-	single quote
\”	-	double quote
\\	-	backslash symbol