Basics of Python Programming

Learning Objective:

After Having Studied this Chapter, You will be able to Understand : -

- *Why Companies Prefer Python?*
- *Pros and Cons of Python.*
- *Translator, Complier and Interpreter.*
- *Operating Modes of Python*

Python Introduction

The language founded in the year 1991 by the developer Guido Van Rossum, a Dutch programmer and principal author of Python programming language.

Python is the best choice for software professionals and for IT organisation because of its multi dimension programming paradigms.

1.1 WHY COMPANIES PREFER PYTHON?

Python is the top most programming language and best choice for programmers in the recent years over other programming languages like C, C++ and Java and is widely used by the programmers. The language has undergone a drastic change since its release 25 years ago as many add-on features are introduced.

The programmers of top most companies using Python as it has created a bench mark for itself in the software development, some of key attributes are.

Advantages of Python

- ✓ **INTERACTIVE**
- ✓ **PORTABLE**
- ✓ **HIGH LEVEL**
- ✓ **EASY-TO-LEARN**
- ✓ **EASY-TO-READ**
- ✓ **ROBUST**

1.2 PYTHON CONS

i) **SPEED:** Python is not good at speed when compared with C/C++, further it uses interpreter, and interpreters are slow in execution comparing with compilers.

ii) **MOBILE DEVELOPMENT:** It's not a good choice mobile development; it is excellent at server side and is being used to develop server side applications.

1.3 TRANSLATORS(Important)

Translators are the programs and are used to convert one language form in to another language form.

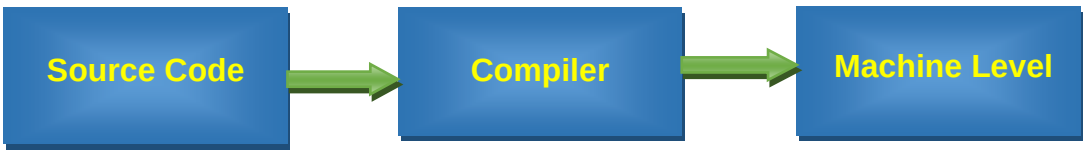
There are 2 types of translators exists

i) Compilers
ii) Interpreters

1.3.1 COMPILERS

Compilers are the system programs used to convert high level language to machine level language in 1 go.

Source code is the code in python.



1.3.2 INTERPRETER

Interpreters are also fall under category of system softwares used to convert high level language to machine level language line by line.

INTEGRATED DEVELOPMENT AND LEARNING ENVIRONMENT(IDLE)

IDLE (short for integrated development environment or integrated development and learning environment) is an integrated development environment for Python, which has been bundled with the default implementation of the language.

1.4 OPERATING MODES OF PYTHON

Python has Integrated Development Environment (IDE) or Integrated Development Learning Environments (IDLE) feature. Python can be operated in two ways/modes:

i) **Python Interactive Shell (IDLE) Mode**
ii) **Python IDLE Script (IDLE) Mode**

QUESTIONS AND ANSWERS

Very Short Answer Questions (VSA)- One Mark Questions

1. ***What is Python?***
   Ans: *Python is most popular server side programming language. Its most popular because of its wide range of standard library functions and other features like simplicity, interactive, object oriented and many more which attracts learner and developer.*

2. ***Name the Scientist who developed Python language?***
   Ans: *The language founded in the year 1991 by the scientist Guido Van Rossum, a Dutch programmer and principal author of Python programming language.*

3. ***What are the operating modes of python***
   Ans: *There are two modes of python interactive mode and script mode*

4. ***Weather python supports GUI applications?***
   Ans: *Yes, GUI Application can be built using python.*

5. ***Is python OOPs Language?***
   Ans: *Yes Python is an Object Oriented Language*

6. ***Weather Python supports HTML?***
   Ans: *No Python does not support Hyper Text Mark-up Language.*

Short Answer Questions (SA) - Two Mark Questions

1. ***What is python? List any 4 features of it***
   Ans: *Python is popular interpreted language. Python has a wide verity of scope in the programming, meaning it has wide range of standard library functions, interactive in nature, development environment feature, high-level, general-purpose, structured, object oriented and dynamic, interpreted programming language*

   Features of Python Programming Languages are,

   - ✓ ***Interactive***
   - ✓ ***Modular***
   - ✓ ***Interpreted***
   - ✓ ***Dynamic***

2. ***List any four advantages of python language***

Ans:

- ✓ ***Free and Open Source***
- ✓ ***Easy to Learn***
- ✓ ***Easy to use***
- ✓ ***Object Oriented***

3. ***Why it is coined as Python?***
   Ans*: When Python seeds were sown, Guido van Rossum was reading the published scripts from* ***"Monty Python's Flying Circus",*** *a BBC comedy series*

from the 1970s during the construction of Python Language. Van Rossum found Python as short, unique, and slightly mysterious, so he decided to call the language Python.

4. What is Translator? List its types

Ans: *Translators are the programs and are used to convert one language form in to another language form.*

There are three types of translators exists

a. *Compilers*
b. *Interpreters*
c. *Assemblers*

5. What is an interpreter?

Ans: *Interpreters fall under category of system software used to convert high level language to machine level language and vice versa. Interpreter converts line by line. Interpreters are predominately used in the field of Artificial Intelligence. Interpreters are used by languages like Lisp, Python.*

6. What is IDE or IDLE?

Ans: *An integrated development environment (IDE) OR Integrated Development Learning Environment (IDLE) is a software application that provides comprehensive facilities to computer programmers for software development. An IDE normally consists of a source code editor, build automation tools, and a debugger. Most modern IDEs have intelligent code generation and completion.*

FUNDAMENTALS OF PYTHON PROGRAMMING

Learning Objective:

After Having Studied this Chapter, You will be able to Understand : -

- *Python Character Set, Tokens, Identifiers and Literals.*
- *String Literals. Types of String Literals, Special Literal None.*
- *Operators, Punctuators and Variables.*
- *Escape Sequences, Input and Output in Python.*
- *Difference between Script and Program.*

2.1. PYTHON CHARACTER SET

A python script is made up of building blocks these building blocks include the followings

- **Alphabet Letters**:- A-Z, a-z
- **Digits/Numerals:-** 0 to 9

- **Special Symbols/Characters**: - space, +, -, /, (,), [,], =,! =, <, > , ‘ “ $ # ; : ? & ;
- **White Spaces: -** Blank Space, Horizontal Tab, Vertical tab, Carriage Return.
- **Other Characters: -** Python has the capability to process all 256 ASCII and Unicode Characters.

2.2 TOKENS OR LEXICAL UNIT

Minuscule element of a program is called token or lexical unit. Tokens are classified into

i) Keywords ii) Identifiers iii) literals

iv) Operators and v) Punctuators or Special Symbols.

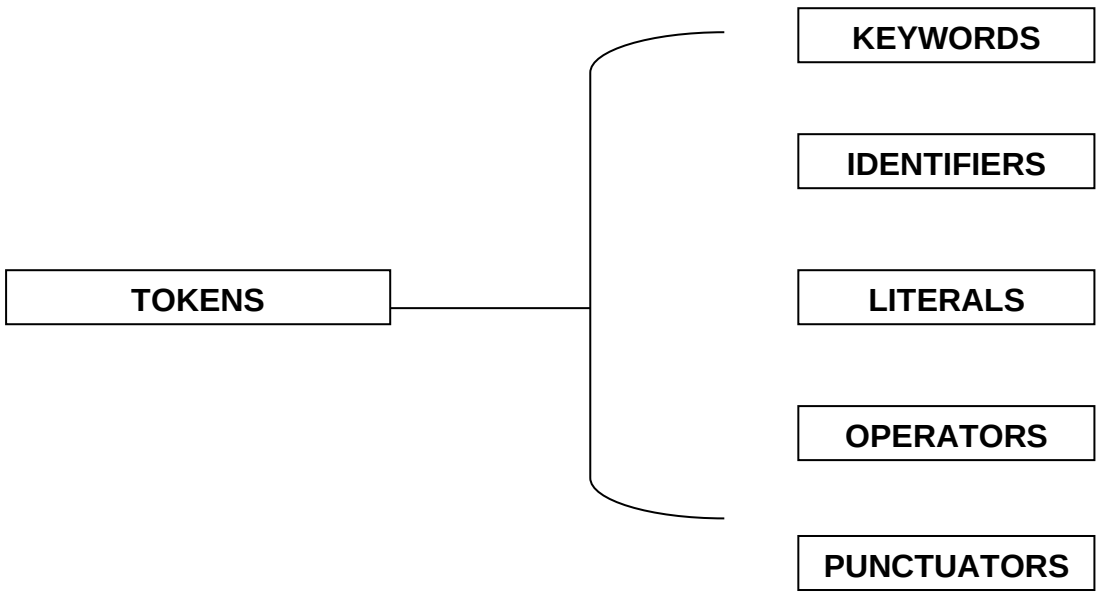


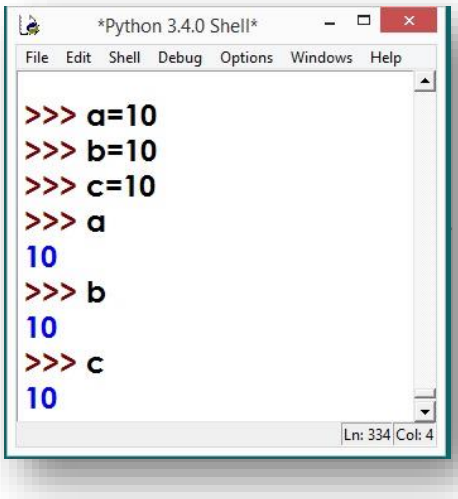
Figure 2.3 – Character Set

2.2.1 KEYWORDS OR RESERVED WORDS

Keywords are also called as Reserved Words and they convey meaning to the program. These keywords are the part of pythons and they have specific meaning in python language since we cannot use a keyword as variable name, function name or object name or any other identifier.

examples: for, if, and, or

2.3.2 IDENTIFIERS



If a programmer uses a name to store or represent something then that name is called as an identifier in the python script.

a,b,c are the names called as identifiers in the python. It is also known as variables which are used to store values of an instance.

2.2.2 STANDARD RULES FOR USING IDENTIFIERS IN PROGRAM(IMP)

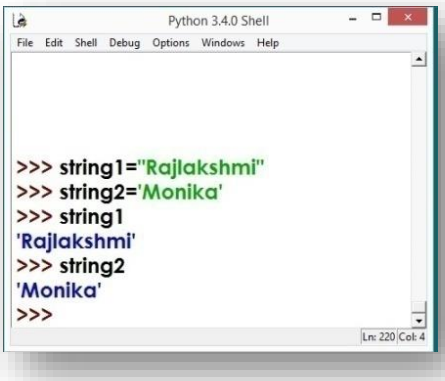
What makes valid identifier in python program?

- ✓ It must start with an alphabet or underscore.
- ✓ It may be combination of letters in lowercase (a to z) or uppercase (A to Z) or digits (0 to 9) or an underscore (_).

What makes invalid identifier in python program?

- ✓ It must not start with a digit.
- ✓ Keywords or reserved words cannot be used as identifiers in the python. Since they convey meaning in the language.
- ✓ One must not use special symbols like space, @, #, $, % etc.
  for, if, and 123_ab, ab_123,ray.dat, ab@123, or,

2.3 A STRING LITERALS OR CONSTANTS



Sequence of letters enclosed in quotes is called string or string literal or constant.

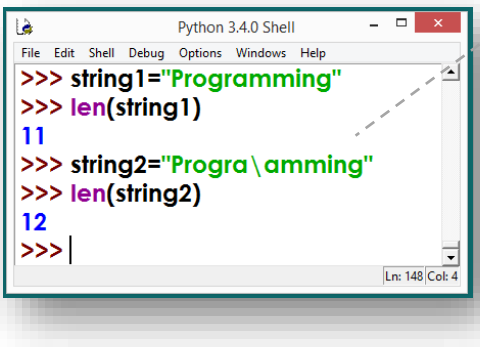
In python strings can be defined in three ways

i) Using Single Quote (‘)
ii) Using Double Quotes (“)
iii) Triple Quote(‘’’)

Single quote and double quote strings are same.

2.4 SIZE OF STRING IN PYTHON

Python provides len(string) function to find a length of given string. When a string contains escape sequence character then length of each escape sequence is 1 character which will be a part of the string. For example



Size of string1 is 11. When escape sequence \a (bell) is introduced in string2 then size of the string increased to 1 that is 12

Consider the below given example for better understanding.

What are escape sequences:

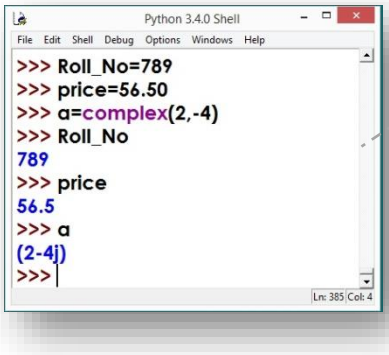
Escape sequences are special characters which are not possible to be entered directly by keyboard. These sequences start with \.

Example : “\a” , “\b”, “\n” . So each character preceded by \ size will be 1.

2.5 NUMERICAL LITERALS

Python supports 3 types of numerical literals and they are:

Int	- Whole numbers
float	- real values
Complex	- Complex numbers



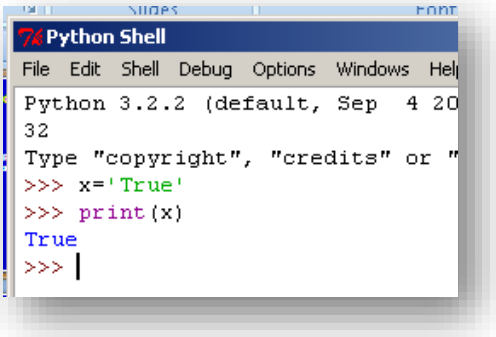
complex() is a method which returns complex number when real and imaginary parts are supplied to a function.

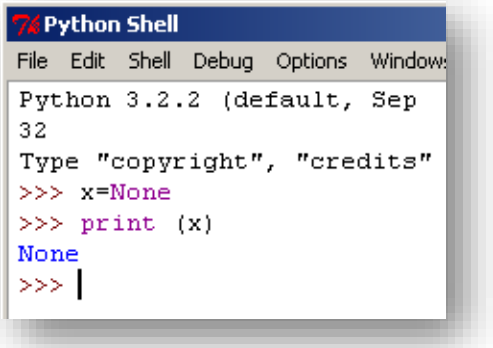
complex(real,img)

where 2 is real part and -4 is imaginary part.

2.6 BOOLEAN LITERAL

A Boolean literal in python is used to represent the Boolean values (True or False).





2.7 SPECIAL LITERAL None(IMP)

The None literal is used to represent absence of value in a python program.

For example: x= None

2.8 VARIABLES:

These are identifiers used to store values, the variables value changes during the execution.

Some of valid variables are:

```
>>>Stud_marks=67

>>>Cost=859
```

Once these variables are assigned a value during execution values may be altered hence these are called variables which can vary during run.

```
>>>Stud_marks=85

>>>Cost=850
```

2.9 NON PRINTING - ESCAPE SEQUENCE CHARACTERS IN PYTHON

Escape sequences are special characters or symbols which can't be entered directly through the keyboard.

NON PRINTING CHARACTERS - ESCAPE SEQUENCE LIST

Escape Sequence	Description	Example	Output

\\	Backslash printing	print("\\")	\
\`	single-quote printing	print ("\'")	'
\"	double quote printing	print ("\"")	"
\a	Bell or alert (eg. xterm)	print("\a")	N/A
\b	backspace removes previous character	print ("ab" + "\b" + "c")	ac
\n	New line	print ("hello\nworld")	hello world

2.10 COMMENTS

Whenever explanation for particular statement in a program is needed comments are inserted. Comments are non-executable statements used in program.

Single line Comment: it start with the pound character, # , and extends to the end of same line.

Example #this is a comment.

Multiline Comment: Multiline comments extend more than 1 line**.** Comments included in ‘’’ ‘’’ triple quotes are called multiline comments.

This is also known as docstring.

Example ‘’’This is a comment.

This is another comment’’’

Multiline comments uses triple quotes(‘’’) and are also called as docstrings

2.11 ASSIGNING VALUE USING = SYMBOL

A value to an identifier can be assigned using special symbol or token = (Equal to Sign). For example:-

```
>>>Name=”Siddarth”
>>>Daily_wage=550.55
>>>Stud_name=”Prakruti”
```

2.12 DIFFERENT TYPES OF ASSIGNMENT STATEMENT

Code reduction is one of the important feature of any programming language. Python provides shorten the code. The assignment statement can be used in many ways. Let us say

Example 1:

```
>>>A=78
>>>B=78
>>>C=78
```

```
>>>X,Y=10,7
>>>A,B,C=X+Y,Y-3,X+12
>>>      # Multiple expressions assigning to multiple variables also
>>>      #possible in python.
>>>      #Now A holds 17, B holds 4 and C holds 22
```

2.13 EVALUATION OF EXPRESSIONS IN ASSIGNMENT STATEMENTS

Always expression is evaluated from right to left in multiple assignments.

Example:

```
>>> x=10
>>> y=3
>>> x,y=x+2,y+x
>>> x
12
>>> y
13
```

First x+y will be evaluated then the value of is incremented by 2. Right to left.

2.14 DYNAMIC TYPING

Change of data type from one type to another is called type casting. If change of data type takes place while execution is called Dynamic Typing.

```
>>> x=10
>>> print(x)
10
>>> x="Computers"
>>> print(x)
Computers
```

x holds value 10. It is an integer data type. once string is assigned x changes its data type from integer to string, this technique is called dynamic typing.

Solved MCQs

1. Is Python case sensitive language?

a) yes

b) no

2. Identify invalid expression

a) _x_23 = 13

b) __mtr = 12

c) 46str__ = 1

d) none of the above

3. Identify invalid variable

a) my_val_1

b) 234our_string

c) payment

d) none of the above

4. Identify keywords

a) for

b) notin

c) para

d) none of the above

5 identify literal

a) *$($#)@#!

b) for

c) if

d) none

Ans:

1. a)	2. c)	3. b)	4. a)	5 .d)

SOLVED EXERCISE - 2.Questions

(a) What is the python character set?

Ans A python script is made up of building blocks. these building blocks include the followings

Alphabet Letters:- A-Z, a-z

Digits/Numerals:- 0 to 9

Special Symbols/Characters:- space + - / ( ) [ ] = ! = < > , ‘ “ $ # ; : ? & ;

White Spaces:- Blank Space , Horizontal Tab, Vertical tab, Carriage Return.

Other Characters:- Python has the capability to process all 256 ASCII and Unicode Characters.

(b) What is variable?

Ans These are identifiers used to store values, the variables value changes during the execution.Some of valid variables are

X=940

Y=748

Pay=5673

(c) What will be the output produced by the following?

```
x, y = 2, 6
x, y = y, x+2
print (x, y)
```

Ans 6 4

(d) Define None?

Ans None is literal and used to assign null value to an identifier in a program. It denotes non presence of value.

(e) Write a program to accept the radius and find its area and circumference.

Ans

```
r = float(input("Enter radius of the circle : "))
area= math.pi*r*r
circumference = 2 * math.pi * r
print("Area of the circle is :area)
print("Circumference of the circle is : circumference)
```

(f) What is the output of the following:

```
p1,q1,r1=2,3,4
r1,q1,p1 = p1+2,q1–2,r1+2
print (r1,q1,p1)
```

Ans 4 1 6

(g)

```
x=34
x+=x–x  ( x=x+x-x)

print(x)
```

Ans 34

(h) Identify invalid identifiers?
• pros• _m340 • 578top • else

Ans 578top and else

(i) What is an escape sequence? List any two escape sequences.

Ans Escape sequences are special characters or symbols used in conjunction with output statement. These denote some functionality while generating output

\a – bell

\n – new line

(j) What is the output of the following?

```
x,y=567,849

x,y=y,x+2

print(y,x)
```

Ans 849 569

(k) What is the output of the following?

```
x,y=7,2

x,y,x=x+1,y+3,x+10

print(y,y,x)
```

Ans 5 5 17

(l) What is the difference between interactive mode and script mode in Python?

Ans Python has two basic modes: script and interactive. The normal mode is the mode where the scripted and finished .py files are run in
the Python interpreter. Interactive mode is a command line shell which gives

immediate feedback for each statement, while running previously fed statements in active memory.

(m) Find out the output of the Following

x, y=2, 6

x, y=y, x+2

print (x, y)

Ans 6,4

(n) Give the output of following code construct:

print(" Fun","here",sep="@",end=".")

print("computer programming is \t fun")

print("Python \n Programming")

Ans Fun@here. computer programming is fun

Python

Programming

(o) Which of the following are invalid identifiers?

abc_d, break, 1rak, doc14, a2bc5, _punc, ray.dat

Ans break, 1rak, ray.dat are invalid identifiers.

(p) Give the output :

print("2"+"3")

print("2"*3)

Ans 23

222

(q) Out of the followings, find those identifiers, which cannot be used for naming Variables, Functions in a Python programming language:

Roll#No, continue, True, 41stno, _v1, No_2, false, Var1

Ans Roll#No, continue, True, 41stno.

(r) Which of the following is not a legal string operation and why?

>>>"KV"+"PD" % 2

>>>'Ken'+'DPS'

>>>"K"+"V"+"KDML"

>>>'KV' * 5

Ans >>>"KV"+"PD" % 2

Because mathematical operations cannot be performed on strings.

(s) What will be the output produced by following code?

```
x=20
x=x+5
x=x-10
print(x)
x,y=x-1,50
print (x,y)
```

Ans 15

14 50

(t) Find the error in the following code and write the corrected code.

```
temp=90
a=12
print(“x=”,x)
print (temp)
b = a + b
print( a And b)
```

Ans

```
temp=90
a=12
print("x=",x)
print (temp)
b = a + b
print( a and b)
```

***