Python Fundamentals

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Presentation By

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INTRODUCTION

INTRODUCTION

Python is a high-level, interpreted and general-purpose dynamic programming language that focuses on code readability. The syntax in Python helps the programmers to do coding in fewer steps as compared to Java or C++.

Let us learn the basic elements of python programming

INTRODUCTION

Why we Program?

The reason that programming is so important is that **it directs a computer to complete these commands over and over again, so people do not have to do the task repeatedly**. Instead, the software can do it automatically and accurately.

INTRODUCTION

Why we Program in python?

Python is commonly used for **developing websites and software, task automation, data analysis, and data visualization**. Since it's relatively easy to learn, Python has been adopted by many non-programmers such as accountants and scientists, for a variety of everyday tasks, like organizing finances.

INTRODUCTION

Advantages of Python

- Easy to Read, Learn and Write. Python is a high-level programming language that has English-like syntax.
- Improved Productivity.
- Interpreted Language.
- Dynamically Typed.
- Free and Open-Source.
- Vast Libraries Support.
- Portability.
- Slow Speed

Let’s Dive in to basic understanding of Python Syntax

The syntax of the Python programming language is **the set of rules which defines how a Python program will be written**. Python Line Structure: A Python program is divided into a number of logical lines and every logical line is terminated by the token NEWLINE

What is Character Set?

PYTHON CHARACTERSET

What is Character Set?

Character set is a bunch of identifying elements in the programming language.

PYTHON CHARACTERSET

PYTHON CHARACTERSET

- Letters:- A-Z, a-z
- Digits:- 0 to 9
- Special Symbols:- space + - / ( ) [ ] = ! = < > , ‘ “ $ # ; : ? &
- White Spaces:- Blank Space , Horizontal Tab, Vertical tab, Carriage Return.
- Other Characters:- Python can process all 256 ASCII and Unicode Characters.

What is Token or lexical unit?

TOKENS OR LEXICAL UNIT

What is Token?

Individual elements that are identified by programming language are called tokens or lexical unit.

TYPES OF LEXICAL UNITS

TOKENS / LEXICAL UNITS

What is Keyword or reserved word?

1. Keyword/Reserved Word

What is Keyword?

Keywords are also called as reserved words these are having special meaning in python language. The words are defined in the python interpreter hence these cant be used as programming identifiers.

Some Keywords of Python Language

Some Keywords of Python Language

and	assert
break	class
continue	def
del	elif
else	except
exec	finally
for	from

Some Keywords of Python Language

global	if
import	in
is	lambda
not	or
pass	print
raise	return
try	while
with	yield

What is an identifier?

2. IDENTIFIERS

What is an identifier?

A Python Identifier is a name given to a function, class, variable, module, or other objects that you'll be using in your Python program.

In short, its a name appeared in the program.

For example: a, b, c

a b and c are the identifiers and

a b & c and , are the tokens

PYTHON NAMING CONVENTIONS

OR

IDENTIFIER FORMATION RULES

PYTHON NAMING CONVENTIONS(1/4)

What are the python naming conventions?

1. An identifier can be a combination of uppercase letters, lowercase letters, underscores, and digits (0-9). Hence, the following are valid identifiers: myClass, my_variable, var_1, and print_hello_world.

PYTHON NAMING CONVENTIONS(2/4)

What are the python naming conventions?

2. The first character must be letter.
3. Special characters such as %, @, and $ are not allowed within identifiers.
4. An identifier should not begin with a number. Hence, 2variable is not valid, but variable2 is acceptable.

PYTHON NAMING CONVENTIONS(3/4)

What are the python naming conventions?

5. Python is a case-sensitive language and this behavior extends to identifiers. Thus, Labor and labor are two distinct identifiers in Python.
6. You cannot use Python keywords as identifiers.

PYTHON NAMING CONVENTIONS(4/4)

What are the python naming conventions?

7. You cannot use Python keywords as identifiers.
8. You can use underscores to separate multiple words in your identifier.

PYTHON NAMING CONVENTIONS

SOME VALID IDENTIFIERS:

Myfile1 DATE9_7_8
y3m9d3 _xs
MYFILE _FXd

SOME INVALID IDENTIFIERS:

MY-REC 28dre break
elif false del

What are literals?

3. LITERALS / CONSTANT VALUES

What are literals?

Literals are also called as constants or constant values these are the values which never change during the execution of program.

What are the types of literals?

TYPES OF LITERALS / CONSTANT VALUES

What are the types of literals?

1) String Literals or Constants.
2) Numeric Literals or Constants.
3) Boolean Literals or Constants.
4) Special Literal None.
5) Literal Collections.

What is string?

1. STRING LITERALS OR CONSTANTS

What is string?

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

‘Hello’

“Hello”

‘’’Hello’’’

Representation of String

REPRESENTATION OF STRING

```
>>>  s = “Hello Python”
```

This is how Python would index the string:

Backward Indexing

-12	-11	-10	-9	-8	-6	-6	-5	-4	-3	-2	-1
H	e	l	l	o		P	y	t	h	o	n
0	1	2	3	4	5	6	7	8	9	10	11

Forward Indexing

REPRESENTATION OF STRING

-12	-11	-10	-9	-8	-6	-6	-5	-4	-3	-2	-1
H	e	l	l	o		P	y	t	h	o	n
0	1	2	3	4	5	6	7	8	9	10	11

To access the first character on the string you just created, type and enter the variable name s and the index 0 within square brackets like this:

```
>>>s[0]
```

You'll get this output:

'H'

REPRESENTATION OF STRING

-12	-11	-10	-9	-8	-6	-6	-5	-4	-3	-2	-1
H	e	l	l	o		P	y	t	h	o	n
0	1	2	3	4	5	6	7	8	9	10	11

To access the last character, you can use this expression:
>>>s[len(s)-1]

You'll get the output:
'n'

Len() function is used to find the length of the string.

REPRESENTATION OF STRING

-12	-11	-10	-9	-8	-6	-6	-5	-4	-3	-2	-1
H	e	l	l	o		P	y	t	h	o	n
0	1	2	3	4	5	6	7	8	9	10	11

The expression introduces you to the *len function. There is actually an easier way to*
access the last item on the string:
>>>s[-1]
'n'
To access the penultimate character:
>>>s[-2]
'o'

TYPES OF STRINGS

What are the types of strings supported in python?

Python supports two ways of representation of strings:

1) Single Line Strings.
2) Multi Line Strings.

TYPES OF STRINGS

SINGLE LINE STRINGS

Strings created using single quote or double quote must end in one line are called single line strings

For Example:

Item="Computer"

Or

Item= 'Computer'

MULTI LINE STRINGS

Strings created using single quote or double quote and spread across multiple lines are called **Multi Line Strings**.

by adding **backslash ** one can continue to type on next line.

For instance:

```
Item = 'Key\
board'
```

SIZE OF STRINGS

SIZE OF STRINGS

‘\\’	Size is 1 (\ is an escape sequence)
‘abc’	size is 3
“\ab”	size is 2
“Raama\’s Laptop”	size is 13

Strings with Triple Quotes

STRINGS WITH TRIPLE QUOTES

For multi line strings created by triple quotes, while calculating size, the EOL(End of Line) character at the end of line is also counted.

For instance:

```
Str2="'x↵
y
z'''↵
```

Enter keys are considered as EOL so size of str2 is 5

Escape Sequences

ESCAPE SEQUENCES

\\	Back Slash
\’	Single Quote (‘)
\”	Double Quote (“)

ESCAPE SEQUENCES

\a	ASCII Bell
\b	ASCII Backspace
\f	ASCII Formfeed

ESCAPE SEQUENCES

\n	New Line
\r	Carriage return
\t	Horizontal Tab

ESCAPE SEQUENCES

\t	Vertical Tab
\x	16 bit hex value
\ooo	Octal Value

\\ Back Slash

Python 3.4.0 Shell

File Edit Shell Debug Options Windows Help

```
Python 3.4.0 (v3.4.0:04f714765c13, Mar 16 2014, 19:24:0
tel)] on win32
Type "copyright", "credits" or "license()" for more inf
>>> print("\\")
\
>>> print("\\Hello\\")
\Hello\
>>>
```

\' Single Quote

Python 3.4.0 Shell

File Edit Shell Debug Options Windows Help

```
Python 3.4.0 (v3.4.0:04f714765c13, Mar 16 2014, 19:24:06) [MSC v.1600
tel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> print("\' Hello \'")
' Hello '
>>> print ("\'Sainik School Amaravathinagar\'")
'Sainik School Amaravathinagar'
>>> print ("\'Praveen M Jigajinni\'")
'Praveen M Jigajinni'
>>> |
```

\” Double Quote

Python 3.4.0 Shell

File Edit Shell Debug Options Windows Help

```
Python 3.4.0 (v3.4.0:04f714765c13, Mar 16 2014, 19:24:06)
tel)] on win32
Type "copyright", "credits" or "license()" for more infor
>>> print("\"Sainik School Amaravathinagar\"")
"Sainik School Amaravathinagar"
>>> print("\"Python Programming\"")
"Python Programming"
>>> |
```

\a ASCII Bell

Python 3.4.0 Shell

File Edit Shell Debug Options Windows Help

```
Python 3.4.0 (v3.4.0:04f714765c13, Mar 16 2014, 19:2
tel)] on win32
Type "copyright", "credits" or "license()" for more
>>> print("\a\a\a\aComputer Programming is Fun")
••••Computer Programming is Fun
>>> print("\aComputer \aProgramming is Fun")
•Computer •Programming is Fun
>>> |
```

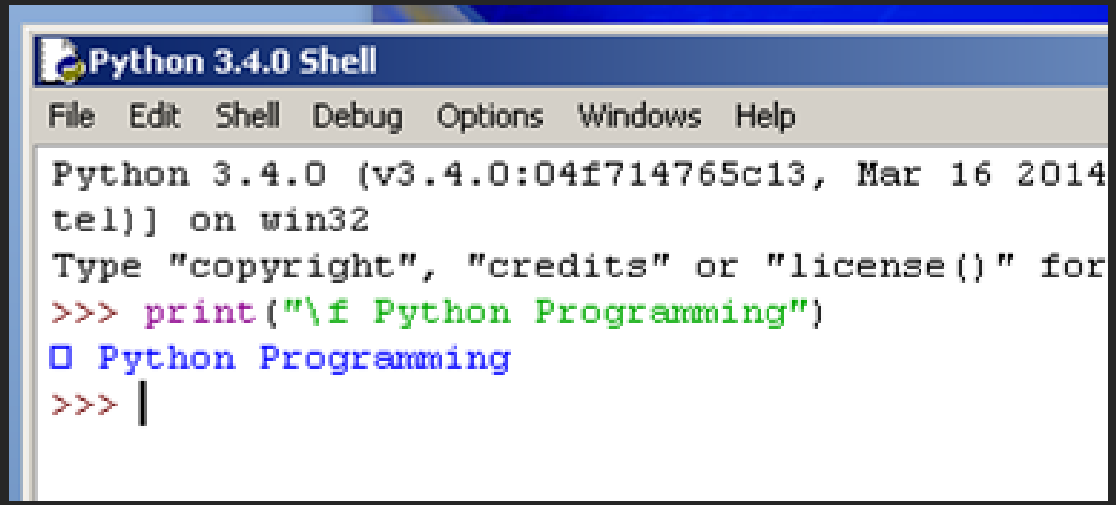
\b ASCII Backspace

Python 3.4.0 Shell

File Edit Shell Debug Options Windows Help

```
Python 3.4.0 (v3.4.0:04f714765c13, Mar 16 2014, 19:24:06) [MSC v
tel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> print("\b Python is OOP\'s Language")
 Python is OOP's Language
>>>
```

\f ASCII Form Feed



Form feed is a page-breaking ASCII control character. It forces the printer to eject the current page and to continue printing at the top of another. Often, it will also cause a carriage return. The form feed character code is defined as 12 (0xC in hexadecimal)

\n New Line

Python 3.4.0 Shell

File Edit Shell Debug Options Windows Help

```
Python 3.4.0 (v3.4.0:04f714765c13, Mar 16 2014, 19:24:06) [MSC v.1
tel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> print("\nWelcome \n to \n Python \n Programming ")

Welcome
 to
 Python
 Programming
>>>
```

\r Carriage Return

Python 3.4.0 Shell

File Edit Shell Debug Options Windows Help

```
Python 3.4.0 (v3.4.0:04f714765c13, Mar 16 2014, 19:24:06) [MSC v.
tel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> print("\r Welcome to Python")
 Welcome to Python
>>> |
```

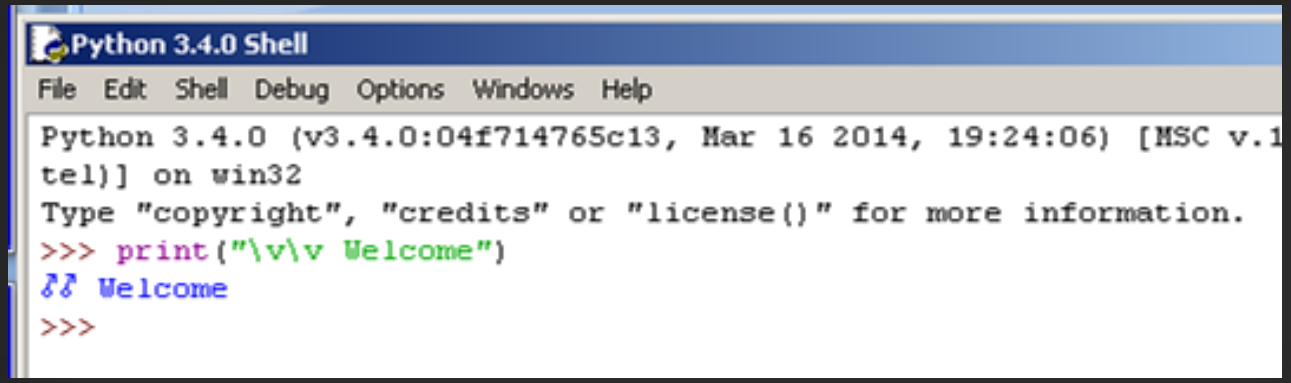
\t Horizontal Tab

Python 3.4.0 Shell

File Edit Shell Debug Options Windows Help

```
Python 3.4.0 (v3.4.0:04f714765c13, Mar 16 2014, 19:24:06) [MSC v.
tel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> print("\t\t Welcome\t to \t Python")
                Welcome         to      Python
>>> |
```

\v Vertical Tab



Vertical tab was used to speed up printer vertical movement. Some printers used special tab belts with various tab spots.

print("hello\vworld")

Output:

```
hello
     world
```

\x 16 bit Hex Val

Python 3.4.0 Shell

File Edit Shell Debug Options Windows Help

```
Python 3.4.0 (v3.4.0:04f714765c13, Mar 16 2014, 19:24:06) [MSC v.1
tel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> print("\x41")
A
>>> print("\x42")
B
>>> |
```

\OOO Octal Value

Python 3.4.0 Shell

File Edit Shell Debug Options Windows Help

```
Python 3.4.0 (v3.4.0:04f714765c13, Mar 16 2014, 19:24:06) [MSC v.
tel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> print("\110")
H
>>> print("\111")
I
>>> print("\120")
P
>>>
```

Note: ***OOO represents 3 octal digits.***

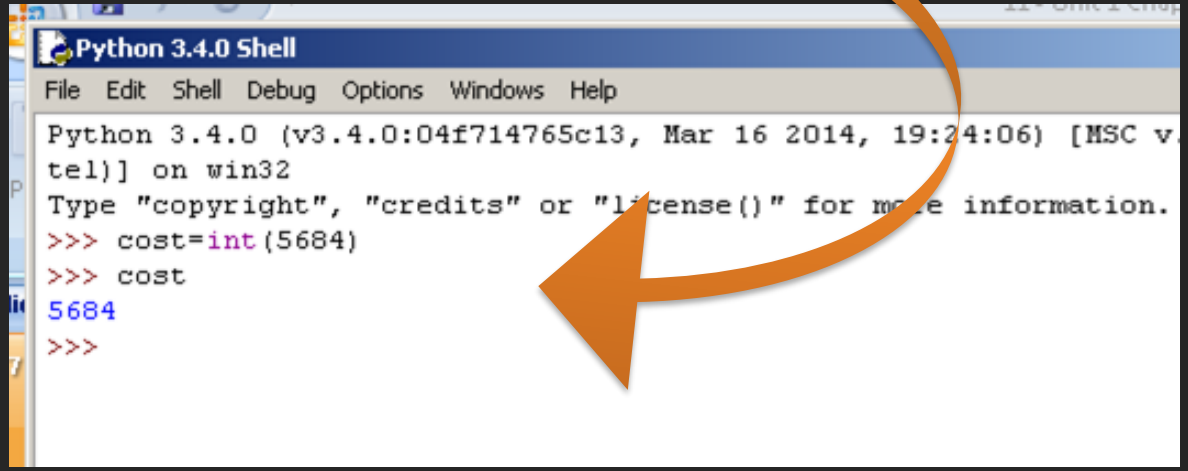
2. NUMERICAL LITERALS

Numerical Literals have the following types:

int or integers	- Whole numbers
float	- real values
Complex	- Complex numbers

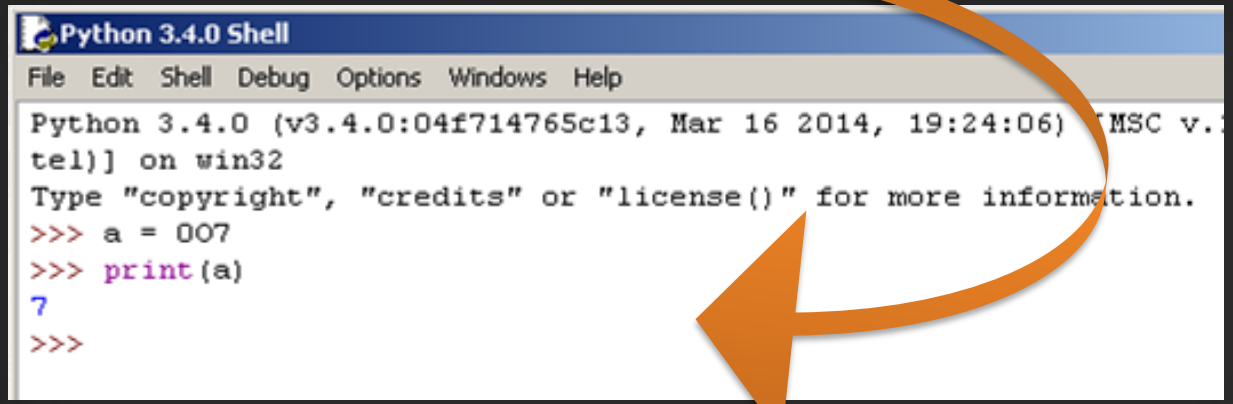
INTEGER LITERALS OR CONSTANTS

- **Decimal Integer Literals:** Any whole number (+ve) or (-ve).



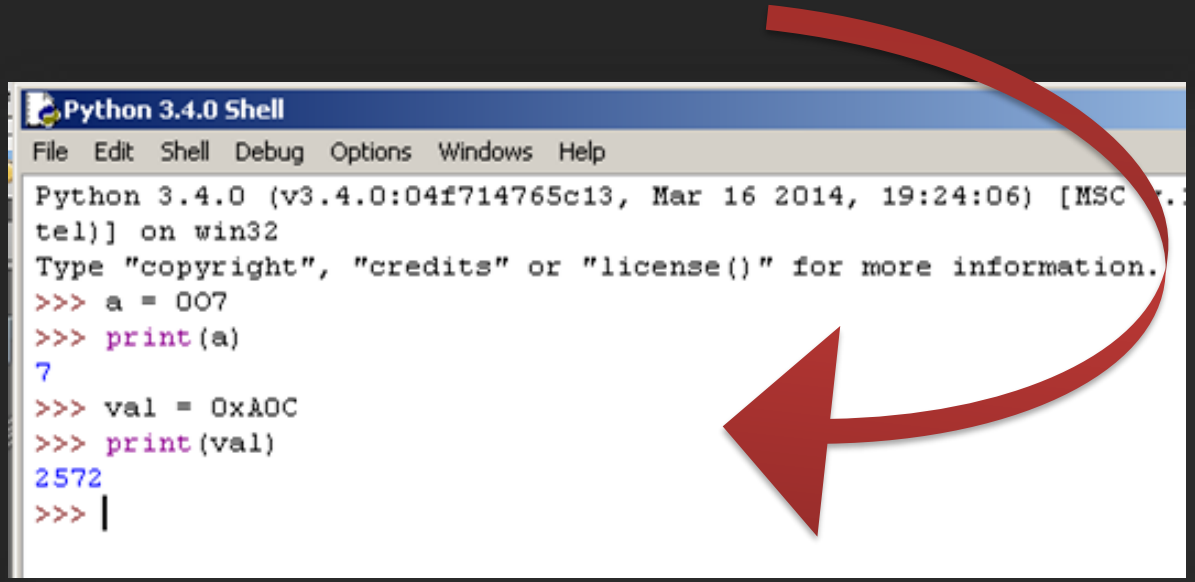
INTEGER LITERALS OR CONSTANTS

- **Octal Integer Literals(base 8):** A Sequence of digits starting with 0O (digit zero followed by letter o) is taken to be an Octal Integer **Literals.**



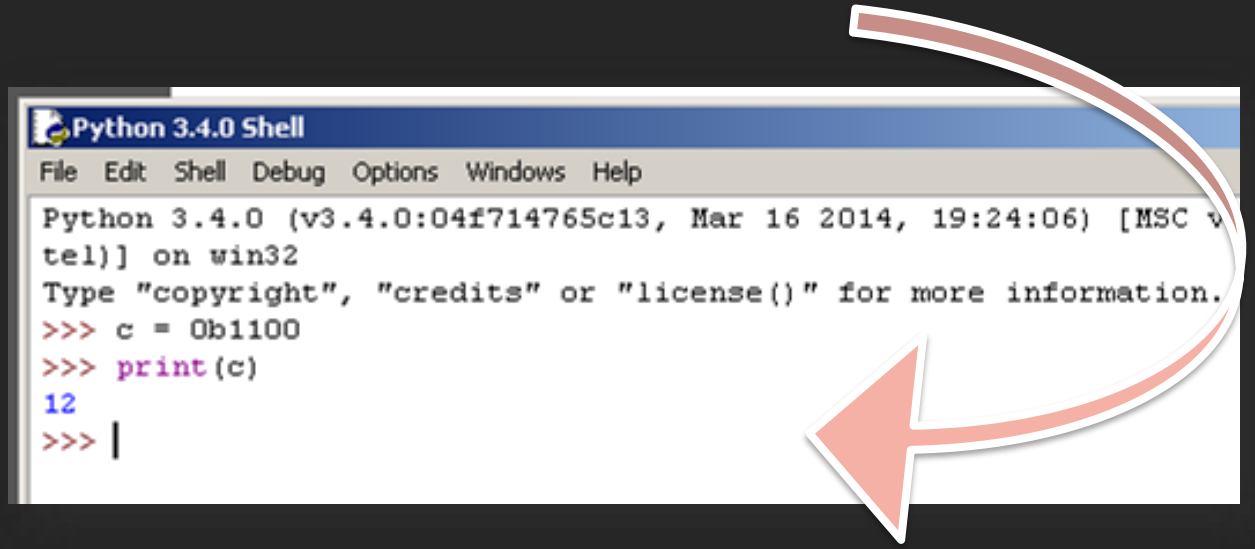
INTEGER LITERALS OR CONSTANTS

- **Hexadecimal Integer Literals (base 16):** Sequence of digits preceded by ox or OX is hexadecimal integer literals



INTEGER LITERALS OR CONSTANTS

❖**Binary literals (base 2):** To signify binary literals, you'll use the prefix '0B' or '0b' (zero and uppercase or lowercase 'b').

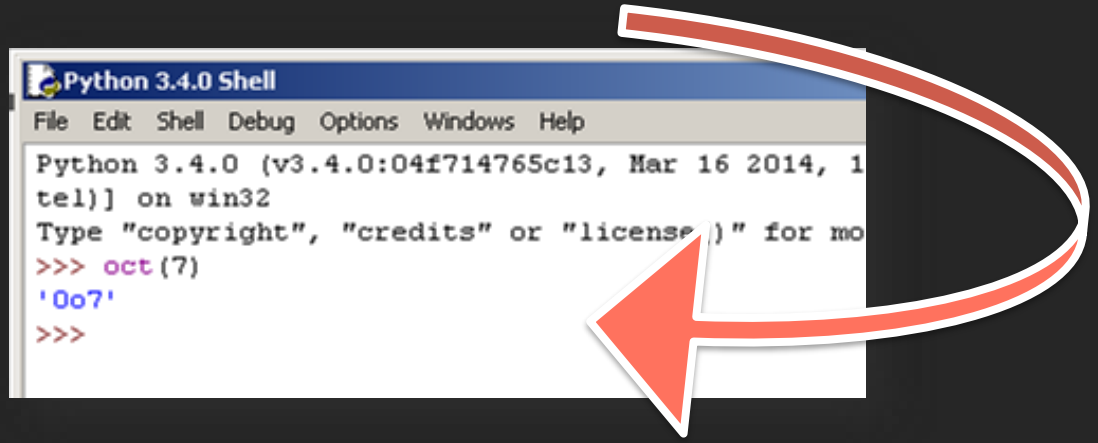


Converting Integers to their String Representation

oct ( )

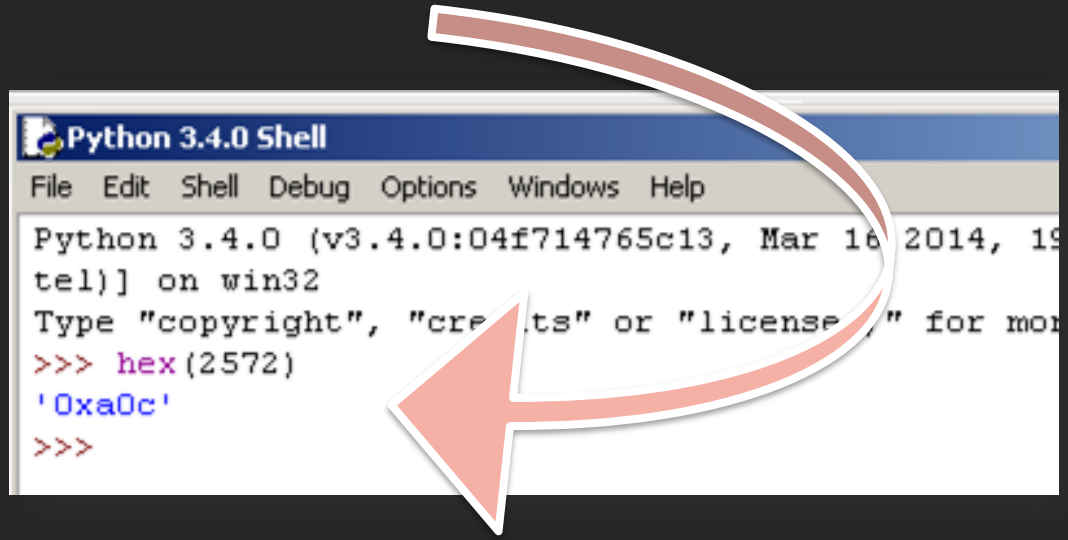
To convert an integer into its string representation, you can use the functions *hex(), bin(), and oct().*

To convert the integer 7 to its octal literal, type and enter oct(7) on the command prompt. You'll get the output '0o7':



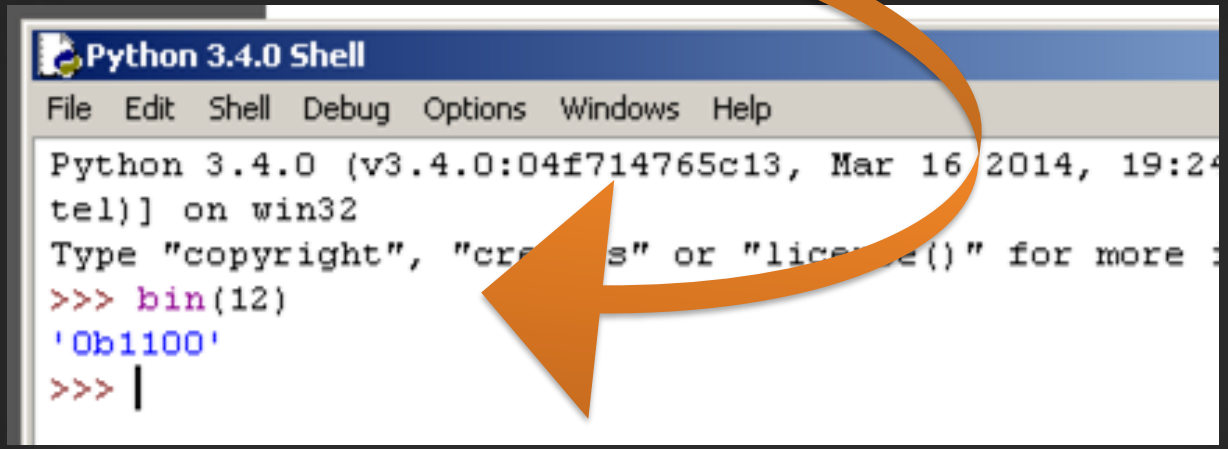
hex ( )

Here is what happens when you convert the integer 2572 to a hexadecimal literal:



bin ( )

see what happens when you use the bin() function to convert the integer 12 to its binary string:



FLOATING POINT LITERALS OR CONSTANTS

FLOATING POINT LITERALS OR CONSTANTS

Floating point literals are also called as real literals having fractional part.

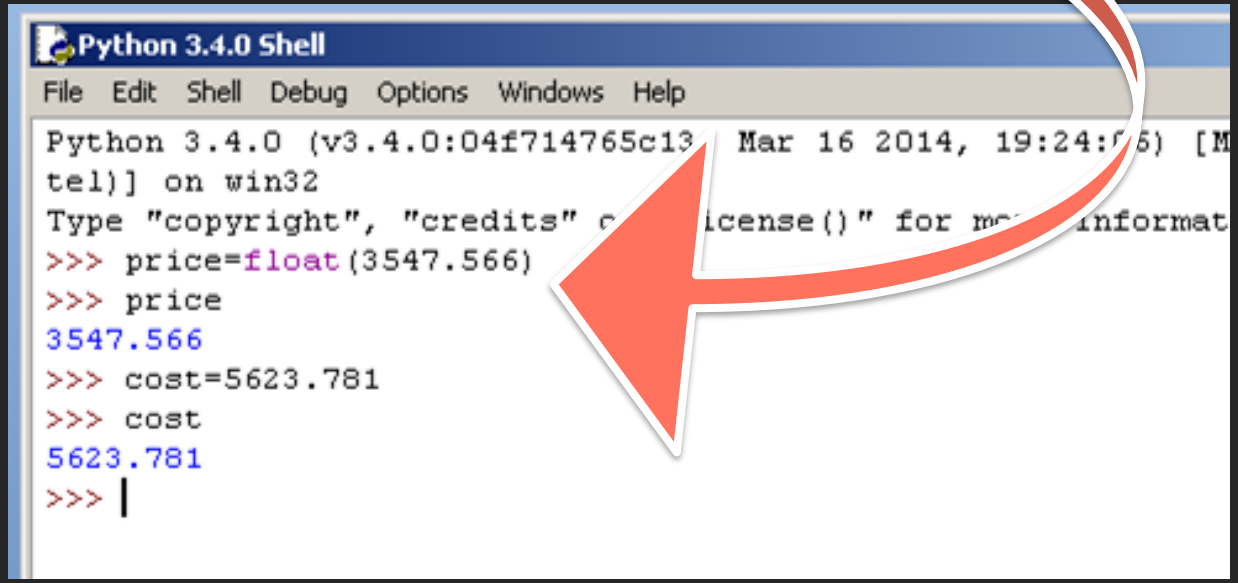
These may be written in one of the two forms:

1. **Fractional Form:** for example 15.75

1. **Exponent Form:** It consists of two parts **Mantissa** and **Exponent**. for example 5.8 can be represented as 0.58×10^{-1} = 0.58E01. where **mantissa part is 0.58** and **E01 is the exponent.**

FLOATING POINT LITERALS OR CONSTANTS

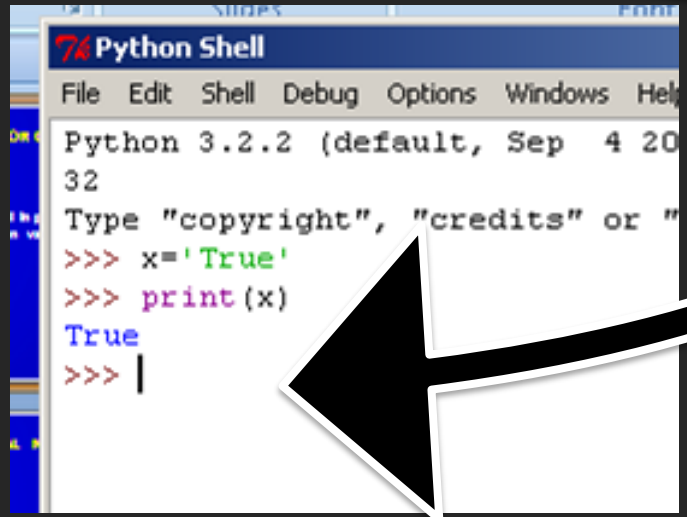
Float type



BOOLEAN LITERALS OR CONSTANTS.

3) BOOLEAN LITERALS OR CONSTANTS.

A Boolean literal in python is used to represent the Boolean values (true or false).

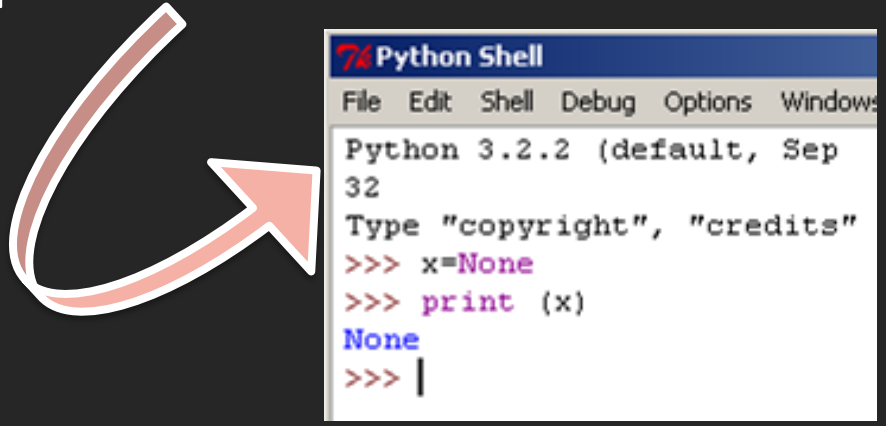


Special Literal - None

4) SPECIAL LITERAL NONE

The **None** literal is used to indicate absence of value.

For example: val = None



LITERAL COLLECTIONS

5) LITERAL COLLECTIONS

Python supports literal collections also such as tuple and lists ..etc

It will be to complex to discuss as we are in the beginning, subsequent chapters we will cover literal collections.

4. OPERATORS

OPERATORS

What is an operator?

Operators are tokens that trigger some computation when applied to a variable.

In detail we study in the next chapter.

5. PUNCTUATORS

PUNCTUATORS

Punctuators are also called as separators

The Followings are used as punctuators:

Brackets		[	]
Parentheses	(	)	
Braces	{	}	
Comma	,		
Semicolon		;	
Colon		:	
Asterisk	*		
Ellipsis	…		
Equal Sign		=	
Pound Sign/Hash		#	

WHITE SPACE

WHITE SPACE

- Use consistent indentation instead.
- The first line with less indentation is outside of the block.
- The first line with more indentation starts a nested block.
- Often a colon appears at the start of a new block. (E.g. for function and class definitions.).

COMMENTS

COMMENTS

Comments are non executable statements in a program.

Single line comment always starts with #

Multiline comment will be in triple quotes. For example ‘’’ write a program to find the simple interest ‘’’.

Note: Triple apostrophe is called docstrings.

STATEMENTS

STATEMENTS

In computer terminology statement refers to an instruction.

Program contains several statements. A collection of statements makes program

Another name for a program is code.

FUNCTIONS

FUNCTIONS

What is function?

Function is a self contained program segment which carries out some specific well defined task.

For Example:

```
def sqr( num ):
    result= num *num
    print ("Square = " , result)
sqr()
```

PYTHON PROGRAMMING CONVENTIONS

PYTHON PROGRAMMING CONVENTIONS

Statement Termination: python does not use any symbol to terminate the statement.

Maximum Line Length: Line Length be maximum 79 characters.

Whitespaces: you should always have whitespace around operators but not with parenthesis.

PYTHON PROGRAMMING CONVENTIONS

Block or Code Block: A group of statements which are part of another statement or function is called Block or Code Block.

Case Sensitive: Python is case sensitive.

VARIABLES AND ASSIGNMENTS

VARIABLES AND ASSIGNMENTS

Named labels are called variables.

For example: marks =86

78	79	80	81	82	83	84	85	86	87
2000	2016	2018	2026	2032	2044	2048	2050	2054	2068

marks refers to location 2054

VARIABLES AND ASSIGNMENTS

Now marks = 81

78	79	80	81	82	83	84	85	86	87
2000	2016	2018	2026	2032	2044	2048	2050	2054	2068

marks refers to location 2026

Note: Variables in python do not have fixed locations unlike other programming languages

VARIABLES AND ASSIGNMENTS

lvalues & rvalues:

Lvalue: Expressions that is on LHS (Left Hand Side) is called Lvalue.

Rvalue: Expressions that is on RHS (Right Hand Side) is called Rvalue.

VARIABLES AND ASSIGNMENTS

Multiple Assignments

Python is very versatile with assignment statements.

1. Assigning same value to multiple variables:

```
a=b=c=d=e=10
```

VARIABLES AND ASSIGNMENTS

Multiple Assignments

2. Assigning Multiple values to multiple variables:

```
p,q,r =5,10,15
print(q, r) will print   10  15
p,q=q,p
print (p,q) will print   10  5
```

VARIABLES AND ASSIGNMENTS

Multiple Assignments

2. Assigning Multiple values to multiple variables:

```
a,b,c = 5,10,7
b,c,a  =  a+1, b+2, c-1
print(a,b,c) will print 6 6 12
```

Now,

X=10

VARIABLES AND ASSIGNMENTS

Multiple Assignments

Expressions separated by commas are evaluated from left to right.

Now,

```
x     =     10
y,y   =     x+2,x+5
y,y   =     12,15
```

First It will assign y = 12 then y = 15

So print(y) will print 15

VARIABLES AND ASSIGNMENTS

Dynamic Typing:

A variable pointing to a value of certain type can be made to point to a value/object of different type this is called **Dynamic Typing.**

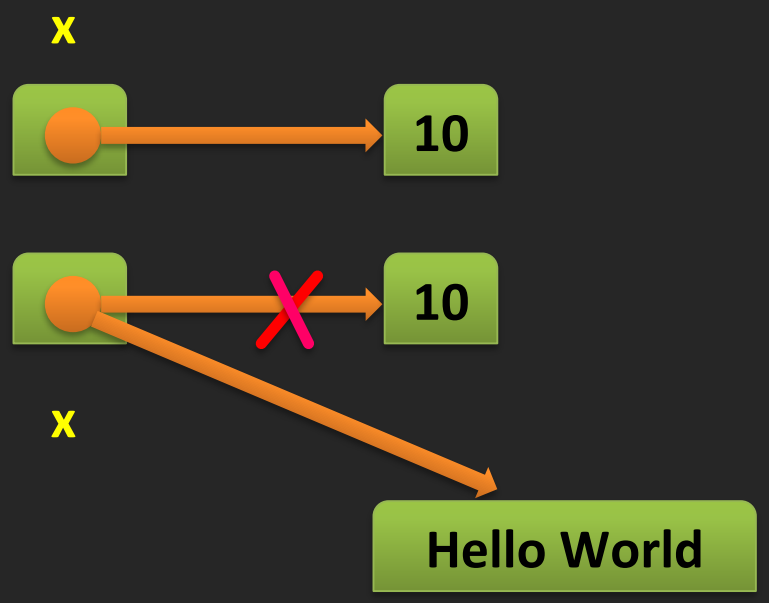
```
x=10
print(x)
x=“ Hello World”
print(x)
```

VARIABLES AND ASSIGNMENTS

Output will be

10

Hello World



VARIABLES AND ASSIGNMENTS

Caution with Dynamic Typing:

```
x = 'day'
y = x/2
```

Error! String can not be divided.

VARIABLES AND ASSIGNMENTS

type() function:

To know the data type of a value which is pointing use type ( )

```
>>>a=10
>>>type(a)
<class 'int'>
>>>a=20.4
>>>type(a)
<class 'float'>
```

Type returned as integer

Type returned as float

VARIABLES AND ASSIGNMENTS

type() function:

To know the data type of a value which is pointing use type ( )

```
>>>a="Hello"
>>>type(a)
<class 'str'>
```

Type returned as string

INPUT ( ) FUNCTION

INPUT ( ) FUNCTION

Input( ) Function is a built in function of python used to read values from the user

The general format or syntax of the input() is:

Variable_to_hold_the_value=input(message)

For Example:

Where,

variable_to_Hold_the_Value is a variable which is the label for a memory location where the value is stored.

INPUT ( ) FUNCTION

For Example:

```
p = input("Enter the value")

x = int(input("Enter x value"))
```

reads the value and converts it in to integer type data or value.

```
y=float(input("Enter y value"))
```

reads the value and converts it in to float type data or value.

INPUT ( ) FUNCTION

int ( ) and float ( ) Functions:

Python offers two functions to be used with input( ) to convert the received values:

Example 1: >>age = int(input("Enter age"))

Example 2: >>sal=float(input("Enter salary))

PRINT ( ) FUNCTION

PRINT ( ) FUNCTION

print( ) Function is a built in function of python used to display the values on the screen

The general format or syntax of the input() is:

print(*objects, sep=' ', end='\n', file=sys.stdout, flush=False)

The print function can print an arbitrary number of values ("value1, value2, ..."), which are separated by commas. These values are separated by blanks. In the following example we can see two print calls. We are printing two values in both cases, i.e. a string and a float number:

PRINT ( ) FUNCTION

print() Parameters:

objects - object to the printed. * indicates that there may be more than one object

sep - objects are separated by sep. Default value: ' ‘ end - end is printed at last

file - must be an object with write(string) method. If omitted it, sys.stdout will be used which prints objects on the screen.

flush - If True, the stream is forcibly flushed. Default value: False

PRINT ( ) FUNCTION

Example 1: How print() works in Python?

```
print("Python is fun.")
a = 5
#Two objects are passed:
print("a =", a)
b = a
 # Three objects are passed:
print('a =', a, '= b‘)
```

Output

```
Python is fun.
a = 5
a = 5 = b
```

PRINT ( ) FUNCTION

Example 2: How print() works in Python?

```
>>> print("a = ", a)
a = 3.564
>>> print("a = \n", a)
a =
3.564
>>>
```

Any Questions Please

Sample Test Questions On PYTHON FUNDAMENTALS

PYTHON FUNDAMENTALS

Each carries 2 Marks Questions (10 x 2 = 20)

1. What is EOL?
2. What is an escape sequence?
3. What is the maximum line length in a python program?
4. Write any four keywords of python language
5. What are the types of Assignment statements? Explain
6. Explain with a diagram how a variable refers to a memory location?

PYTHON FUNDAMENTALS

Each carries 2 Marks Questions (10 x 2 = 20)

7. What is Dynamic typing?
8. Write any four python naming conventions
9. What is input ( ) function? Write down the general format of input ( ) function and explain with proper example.
10. What is print ( ) function? Write down the general format of print ( ) function and explain with proper example.

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QUESTION BANK
PYTHON FUNDAMENTALS

PYTHON FUNDAMENTALS

One Mark Questions

1. What is character set?
2. What is token?
3. List the types of tokens
4. What is keyword?
5. What is an identifier? Give suitable example.
6. What is a literal?
7. What is string?
8. What is single line string?
9. What is multi line string?
10. What is EOL?
11. What is an escape sequence?
12. What is Boolean literal?

PYTHON FUNDAMENTALS

One Mark Questions

13. What is none?
14. What is an operator?
15. What is Unary Operator?
16. What is Binary Operator?
17. List the shift operators
18. List the Bitwise operators
19. What is an assignment statement?
20. What is Punctuators?
21. What is comment?
22. What is whitespace?
23. What is statement?

PYTHON FUNDAMENTALS

One Mark Questions

24. Weather python uses statement termination? Justify your answer
25. What is the maximum line length in a python program?
26. What is Block?
27. What is Code Block?
28. What is Code?
29. What do you mean by case sensitive language?

PYTHON FUNDAMENTALS

One Mark Questions

30. What is variable?
31. What is Lvalue?
32. What is Rvalue?
33. What is an Assignment statement?
34. What is Dynamic typing?

PYTHON FUNDAMENTALS

Two Marks Questions

1. Explain the character set of python
2. What are the types of tokens supported in python language?
3. Write any four keywords of python language
4. What are the types of literals?
5. Explain Boolean literals
6. What are relational operators?
7. What are the types of Assignment statements? Explain
8. What is General Structure or General format or Syntax?

PYTHON FUNDAMENTALS

Two Marks Questions

9. What are the types of comments? Explain with suitable examples
10. Explain with a diagram how a variable refers to a memory location?
11. While dealing with dynamic typing what caution must be taken care of? Explain with suitable example.

PYTHON FUNDAMENTALS

Three Marks Questions

1. What are the python naming conventions?
2. Explain the representation of string in python language.
3. Explain the types of strings supported by python language.
4. Explain escape sequences.
5. Explain numerical literals supported in python language.
6. Explain the Floating point literals supported in python language.

PYTHON FUNDAMENTALS

Three Marks Questions

7. Explain the General structure of python program and give example.
8. What is whitespace how its useful in python programming?
9. What is input ( ) function? Write down the general format of input ( ) function and explain with proper example.
10. What is print ( ) function? Write down the general format of print ( ) function and explain with proper example.

Thank You