Python basics

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Introduction of Python

- **Python is ideal for non-professional programmers**

  Easy to learn, and powerful.

- **Python is Scripting language**

  Python interpreter can interpret (rather than compile) and automate the execution of tasks

- **Python is for automation**

  Work with software applications, Microsoft Office

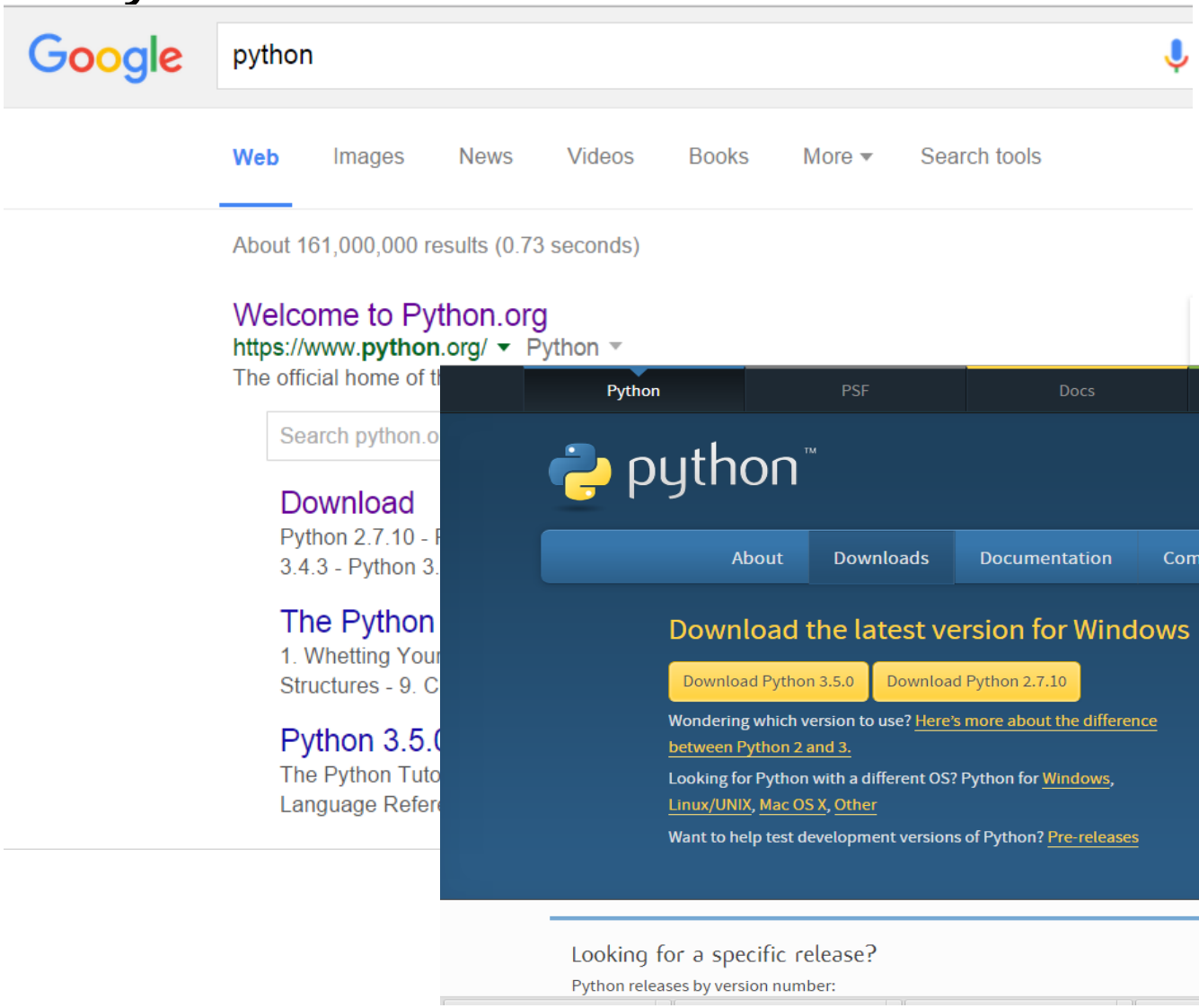
- **Python is for science**

  Numpy, Pandas, opencv…

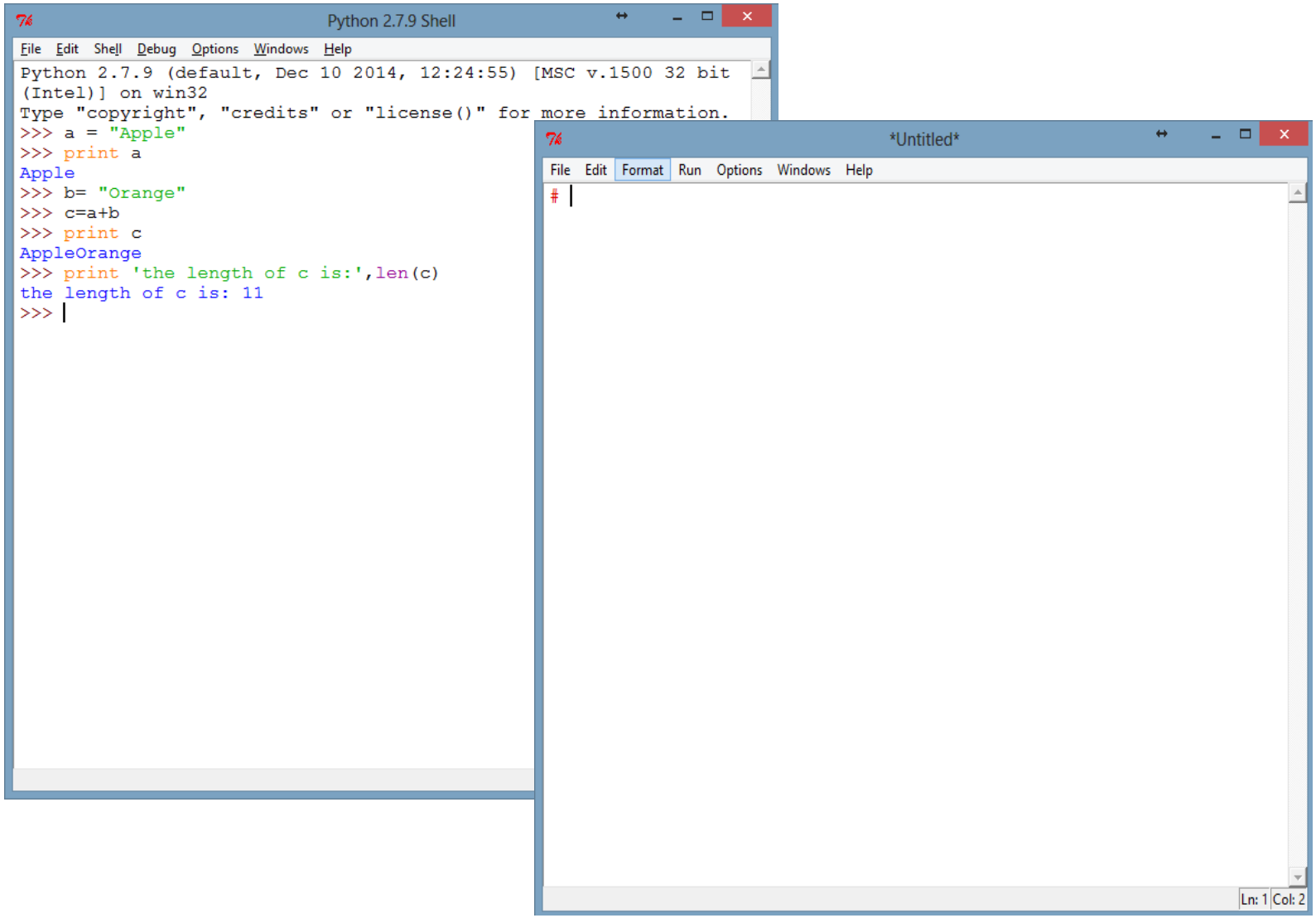
Python applications

Python IDE

Python official website



Python IDE


Python 2.7.9 Shell
File Edit Shell Debug Options Windows Help
Python 2.7.9 (default, Dec 10 2014, 12:24:55) [MSC v.1500 32 bit (Intel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> a = "Apple"
>>> print a
Apple
>>> b= "Orange"
>>> c=a+b
>>> print c
AppleOrange
>>> print 'the length of c is:',len(c)
the length of c is: 11
>>>
Untitled
File Edit Format Run Options Windows Help
#
Ln: 1 Col: 2

Data types - Number

Integer

Number with no decimal part, 1, 2, 4

```
>>> a = 1
>>> print a
1
```

Float

Decimal number, like 1.10, 10.243

```
>>> b = 1.0
>>> print b
1.0
>>> c = 10.243
>>> print c
10.243
```

Data types – number operations

Number operations

Add

```
>>> 3 + 2
5
```

Subtract

```
>>> 3 - 2
1
```

Negative

```
>>> -2 + 3
1
```

Division

```
>>> 11.0 / 3
3.6666666666666
```

Division (truncate)

```
>>> 11.0 // 3
3.0
```

Division remainder

```
>>> 11.0 % 3
2.0
```

Multiply

```
>>> 3 * 3
9
```

Exponent

```
>>> 3 ** 3
27
```

Exponent

```
>>> pow(3,3)
27
```

Data types – number operations

Number operations of float and integer

```
>>> a = 1
>>> c = 10.243
>>> print a+c
11.243
```

Conversion between float and integer

```
>>> fa = float(a)
>>> print fa
1.0
>>> ic = int(c)
>>> print ic
10
```

Data types – string

Strings are text, anything that is enclosed by quotes.

Single or double quotes are fine but **consistency** is needed for a given string.

```
>>> a = 'Apple'
>>> b = "Apple"

>>> c = 'Apple"
SyntaxError: EOL while scanning string literal
```

Data types – string

String operations

1. Print strings

```
>>> a = 'c:\desktop\good'
>>> print a
c:\desktop\good
>>> b = 'c:\desktop\notgood'
>>> print b
c:\desktop
otgood
```

Why? How to print ‘c:\desktop\notgood’ correctively

Add a ‘r’ before the string

```
>>> b = r'c:\desktop\notgood'
>>> print b
c:\desktop\notgood
```

Data types – string

String operations

2. Connect two strings

```
>>> a = "Apple"
>>> print a
Apple
>>> b= "Orange"
>>> c=a+b
>>> print c
AppleOrange
```

3. The length of a string

```
>>> print c
AppleOrange
>>> print 'the length of c is:',len(c)
the length of c is: 11
>>>
```

Data types – string

4. Other string operations

Lowercase, Uppercase, split …

```
>>> a = 'Apple'
>>> print a
Apple
>>> print a.lower()
apple
>>> print a.upper()
APPLE
>>> print a.split('l')
['App', 'e']
```

Data types – string

5. Variable substitution in strings

The substitute is used to create a string dynamically.

%s is for string

%f is for float number

%d is for integer number

```
polygon = 'rectangle'
length = 12
width = 3.145

print "This polygon is a %s" % polygon
print "the length of the %s is %d" %(polygon,length)
print "the width of the %s is %f" %(polygon,width)
```

```
This polygon is a rectangle
the length of the rectangle is 12
the width of the rectangle is 3.145000
```

Data structures

1. List

Stores numbers. strings, lists, dictionaries, etc.

```
>>> List=[10.0,20,'float',100]
>>> print List
[10.0, 20, 'float', 100]
```

Add a new element to the list

```
>>> List.append(0.23)
>>> print List
[10.0, 20, 'float', 100, 0.23]
>>> List.insert(2,'InsertElement')
>>> print List
[10.0, 20, 'InsertElement', 'float', 100, 0.23]
```

List sequences

```
>>> print List[0],List[1],List[2],List[3],List[4]
10.0 20 float 100 0.23
```

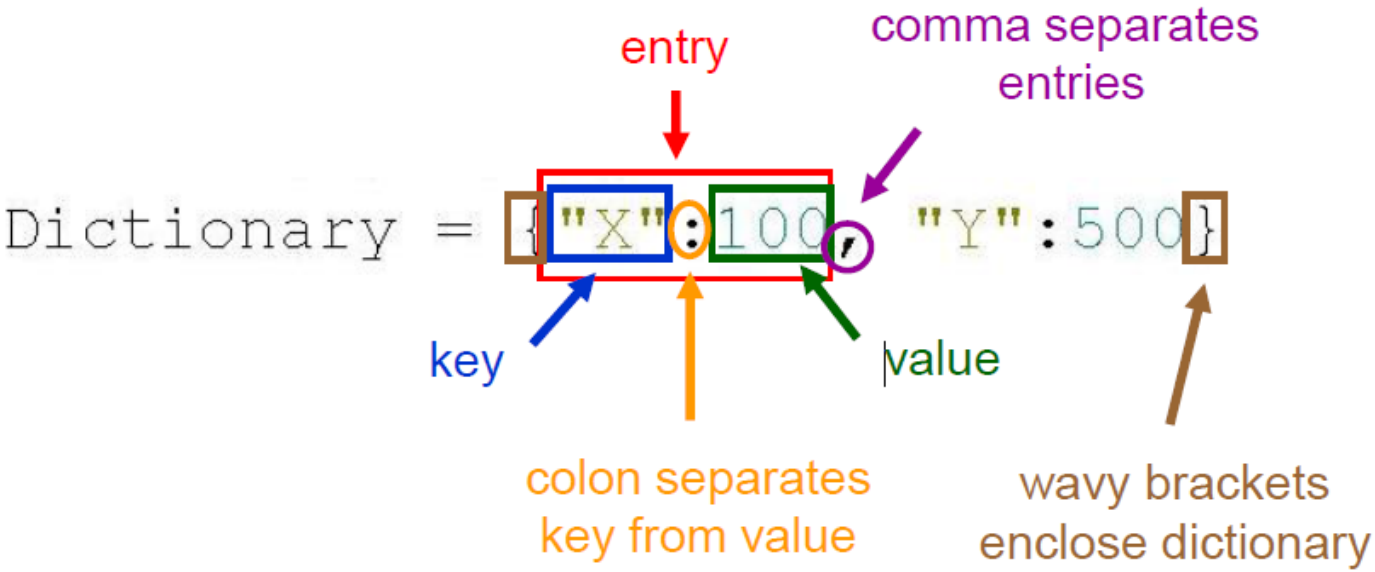
```
>>> print List[-1],List[-2]
0.23 100
```

```
>>> print List[1:3]
[20, 'float']
```

Data structures - list

2. Dictionary

Different with list, every element in a dictionary has two attributes - key and value

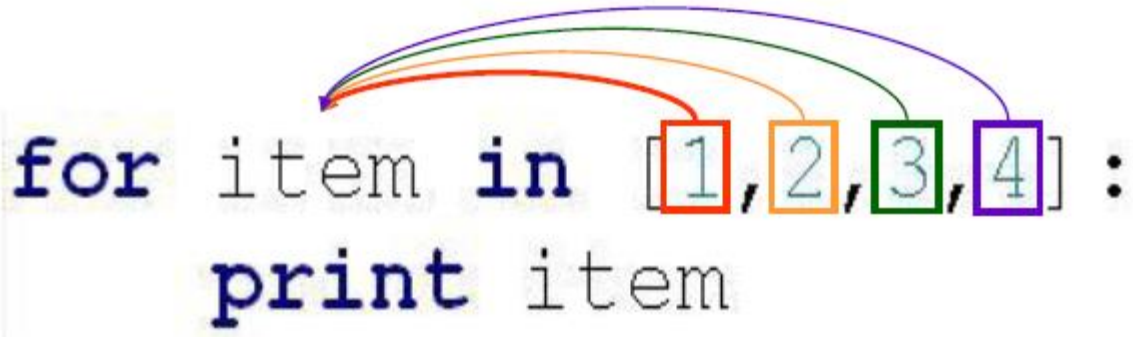



```
>>> a = {"X":10,"Y":20,"Z":30}
>>> print a
{'Y': 20, 'X': 10, 'Z': 30}
>>> print a{"X"}
SyntaxError: invalid syntax
>>> print a["X"]
10
>>>
```

J. Parent, 2013

For loop

for loop: example



Value of item	Output
item = 1	1
item = 2	2
item = 3	3
item = 4	4

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For loop

For loop is used to do some repetitive operations.

```
# CALCULATE THE SUM OF 1 TO 100
num = range(101)
sum = 0
for i in num:
    sum = sum + i
print 'the sum of 1 to 100 is:',sum
```