Lecture 1
Python Basic

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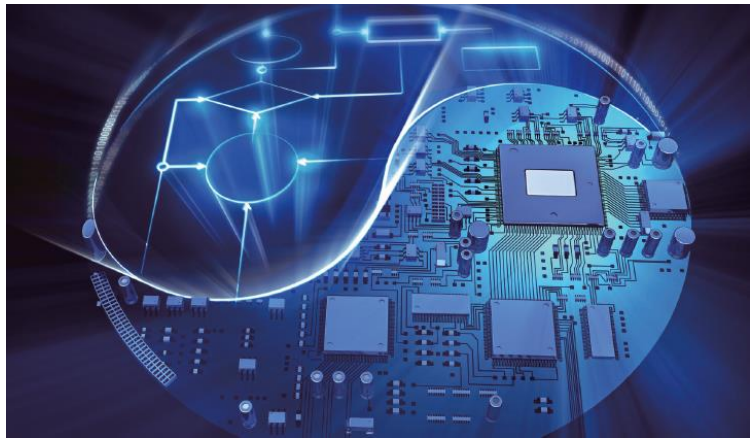
Python Introduction

Programming Language

- Common expression & grammar
- Distinct philosophy

C

C



C++

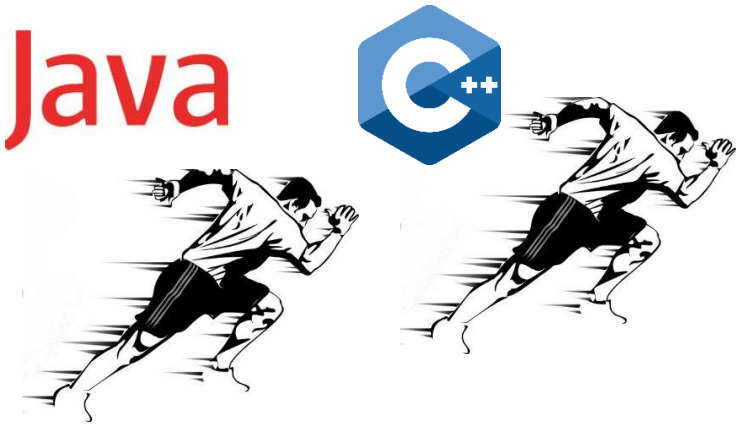
HARD

JAVA

Java

Normal

spring



Java

Python

python

django

Python Basic - Print

```
print ("Hello, World")

print (5.3)

print (1 + 3)

print ('a')
print ('b')

print ('a', 'b')
# print ('a') // tip: comment
```

Python Basic - Variables and Assigning

```
a = 1
print (a)

var0 = "Hello"

var1 = 10
var2 = 5

a = b = "Python"
print (a)
print (b)

a = "Python"
b = a
print (b)
```

Python Basic - Variables and Assigning

```
a, b = ('python', 'life')
(a, b) = 'python', 'life'
[a, b] = ['python', 'life']

a = 3
b = 5
a, b = b, a // a = 5, b = 3
```

Python Basic - Variables

- What can be variable names?
- Combination of
  - alphabets a. b. c. A. B. C.…
  - digits 1. 2. 3.…
  - underbar _
- Starts with lower case
- Should contain meaning

  Var(x). var(o)

  a(x). b(x). numOfStudents(o). num_of_students(o)

Python Basic - Data Type Number

- Integer
  - a = 123
  - a = -178
  - a = 0

- Floating-point
  - a = 1.2
  - a = -3.45

Python Basic - Data Type Number

- Fundamental operations

- Plus : + , Minus : - , Multiply : * , Divide : /

```
a = 7
b = 2
print (a + b) // 9
print (a - b) // 5
print (a * b) // 14 ( print (a ** b) // 49 )
print (a / b) // 3.5 ( print (a // b) // 3 )
print (a % b) // 1
```

Python Basic - Data Type Number

```
a = 2
b = a * 2
print (b) // 4

a = 5
a = a + 1
print (a) // 6

a = 5
a += 1 ( a = a $ 3 -> a $= 3)
print (a) // 6

c = 10
c *= 2
print (c) // 20
```

Python Basic - Data Type String

a = "KUSITMS is alcohol"

a = 'KUSITMS is alcohol'

a = """KUSITMS is alcohol"""

a = '''KUSITMS is alcohol'''

a = 'Python's favorite food is perl!' (x)

a = "Python's favorite food is perl!" (o)

a = 'Python₩'s favorite food is perl!' (o)

Python Basic - Data Type String

Life is too short
You need python

```
a = "Life is too short₩nYou need python"
print (a)

a = """
        Life is too short
        You need python
        """
print (a)
```

Python Basic - Data Type String

- String operations

```
head = "Python"
tail = " is fun"
print (head + tail) // Python is fun

a = "Python"
print (a * 2) // PythonPython

print ("=" * 10) // ==========

print ("Python" + 2) // error
print ("Python" + str(2)) // Python2
```

Python Basic - Data Type String

- String Indexing

```
a = "Life is too short, You need Python"

print (a[0]) // L
print (a[1]) // i
print (a[2]) // f
print (a[3]) // e
print (a[4]) // ` `
print (a[5]) // i
...
print (a[-1]) // n
print (a[-2]) // o
print (a[-0]) // L
```

Python Basic - Data Type String

- String Slicing

a = "Life is too short, You need Python"

- How to print Life?

```
print (a[0]+a[1]+a[2]+a[3]) // Life
print (a[0:4]) // Life
print (a[0:3]) // Lif
print (a[5:7]) // is
print (a[19:]) // You need Python
print (a[:17]) // Life is too short
print (a[:]) // Life is too short, You need Python
print (a[19:-7]) // You need
```

Python Basic - Data Type String

- String Slicing

```
a = "20160930Rainy"

data = a[:8]
weather = a[8:]
print (data) // 20160930
print (weather) // Rainy

word= "Pithon"
word[1] = 'y' // error
newWord = word[:1] + 'y' + word[2:]
print (newWord) // Python
```

Python Basic - Data Type String

- String Formatting

```
a = "I eat %d apples." % 3
print (a) // I eat 3 apples.

a = "I eat %s apples." % "five"
print (a) // I eat five apples.

number = 3
a = "I eat %d apples." % number
print (a) // I eat 3 apples.
```

Python Basic - Data Type String

- String Formatting

```
number = 10
day = "three"
a = "I ate %d apples. So I was sick for %s days." %(number, day)
// I ate 10 apples. So I was sick for three days.
```

%s: String, %c: character, %d: Integer, %f: floating-point

Python Basic - Data Type String (Functions)

```
a = "hobby"
print (a.count('b')) // 2

a = "Python is best choice"
print (a.find('b')) // 10
print (a.find('k')) // -1

a = "."
print (a.join('abcd')) // a = "a.b.c.d"
```

Python Basic - Data Type String (Functions)

```
a = "hi"
a.upper() // a = "HI"

a = "HI"
a.lower() // a = "hi"

a = " hi "
a.strip() // a = "hi"
```

Python Basic - Data Type
List

- List_name=[a1, a2, ….]

```
odd = [1, 3, 5, 7, 9]

a = []
b = [1, 2, 3]
c = ['Life', 'is', 'too', 'short']
d = [1, 2, 'Life', 'is']
e = [1, 2, ['Life', 'is']]
```

Python Basic - Data Type
List

- List indexing

```
a = [1, 2, 3]

print (a) // [1, 2, 3]
print (a[0]) // 1
print (a[1]) // 2
print (a[2]) // 3
print (a[0] + a[2]) // 4
print (a[-1]) // 3
```

Python Basic - Data Type
List

- List indexing

```
a=[1, 2, 3, ['a', 'b', 'c']]

print (a[0]) // 1
print (a[-1]) // ['a', 'b', 'c']
print (a[-1][0]) // a
print (a[-1][1]) // b
```

Python Basic - Data Type
List

- List Slicing

```
a=[1, 2, 3, 4, 5]

print (a[0:2]) // [1, 2]
print (a[:2]) // [1, 2]
print (a[2:]) // [3, 4, 5]

a = [1, 2, 3, ['a', 'b', 'c'], 4, 5]

print (a[2:5]) // [3, ['a', 'b', 'c'], 4]
print (a[3][:2]) // ['a', 'b']
```

Python Basic - Data Type
List

- List Operation

```
a = [1, 2, 3]
b = [4, 5, 6]
print (a + b) // [1, 2, 3, 4, 5, 6]

a = [1, 2, 3]
print (a * 3) // [1, 2, 3, 1, 2, 3, 1, 2, 3]
```

Python Basic - Data Type
List

- List Modification

```
a = [1, 2, 3]
a[2] = 4
print (a) // [1, 2, 4]

a = [1, 2, 3]
a[1:2] = ['a', 'b', 'c']
print (a) // [1, 'a', 'b', 'c', 3]

a = [1, 2, 3]
a[1] = ['a', 'b', 'c']
print (a) // [1, ['a', 'b', 'c'], 3]
```

Python Basic - Data Type
List

- List Deletion

```
a = [1, 'a', 'b', 'c', 3]
a[1:3] = []
print (a) // [1, 'c', 3]

a = [1, 'c', 3]
del a[1]
print (a) // [1, 3]

a = [1, 2, 3]
del a[1:3]
print (a) // [1]
```

Python Basic - Data Type List (Functions)

```
a = [1, 2, 3]
a.append(4) // a = [1, 2, 3, 4]
a.append([5, 6]) // a = [1, 2, 3, 4, [5, 6]]

a = [1, 4, 3, 2]
a.sort() // a = [1, 2, 3, 4]

a = ['a', 'c', 'b']
a.sort() // a = ['a', 'b', 'c']
```

Python Basic - Data Type List (Functions)

```
a = [1, 2, 3, 4]
a.reverse() // a = [4, 3, 2, 1]

a = [1, 2, 3]
print (a.index(3)) // 2
print (a.index(1)) // 0
print (a.index(0)) // error
```

Python Basic - Data Type List (Functions)

```
a = [1, 2, 3]
a.insert(0, 4) // a = [4, 1, 2, 3]
a.insert(3, 5) // a = [4, 1, 2, 5, 3]

a = [1, 2, 3, 1, 2, 3]
a.remove(3) // a = [1, 2, 1, 2, 3]
a.remove(3) // a = [1, 2, 1, 2]
```

Python Basic - Data Type
List (Functions)

```
a = [1, 2, 3]
a.pop() // a.pop() = 3, a = [1, 2]

a = [1, 2, 3]
a.pop(1) // a.pop(1) = 2, a = [1, 3]

a = [1, 2, 3, 1]
print (a.count(1)) // 2
```

Python Basic - Data Type
Tuple

```
t1 = ()
t2 = (1,)
t3 = (1, 2, 3)
t4 = 1, 2, 3
t5 = ('a', 'b', ('ab', 'cd'))

t1 = (1, 2, 'a', 'b')
del t1[0] // error
t2 = (1, 2, 'a', 'b')
t2[0] = 'c' // error
```

Indexing / Slicing / Operations are supported like list

Python Basic - Data Type Dictionary

{Key1: Value1, Key2: Value2, Key3: Value3 ···}

```
dic = {'name': 'pey', 'phone': '01068631342', 'birth': '1118'}

a = {1: 'hi'}

a = {'a': [1, 2, 3]}
```

Python Basic - Data Type Dictionary

```
a = {1: 'a'}

a[2] = 'b' // a = {2: 'b', 1: 'a'}

a['name'] = 'pey' // a = {'name': 'pey', 2: 'b', 1: 'a'}

a[3] = [1, 2, 3] // a= {'name': 'pey', 3: [1, 2, 3], 2: 'b', 1: 'a'}

del a[1] // a= {'name': 'pey', 3: [1, 2, 3], 2: 'b'}
```

Python Basic - Data Type Dictionary

```
a = {1: 'a', 2: 'b'}
print (a[1]) // a
print (a[2]) // b


grade = {`pey`: 10, `Juliet`: 99}
print (grade[pey]) // error
print (grade[`pey`]) // 10
print (grade[`Juliet`]) // 99
```

Python Basic - Data Type Dictionary

Key should be distinct value

```
a = {1: 'a', 1: 'b'}
print (a) // {1: 'b'}
```

Cannot use lists for keys

```
a = {[1, 2]: 'hi'} // error
```

Python Basic - Data Type
True & False

- There is 'Boolean' data type

```
a = True
b = False (Capital)
print (a)
```

- Boolean operator : and, or, not

```
not True // False
not False // True

True and True // True
True and False // False
False and False // False

True or True // True
True or False // True
False or False // False
```

Python Basic - Data Type
True & False

```
a = False
b = True
print (not (a and b)) // True
```

• Boolean operator priority : ( ) 〉 not 〉 and 〉 or

```
c = not False or True and False
print (c) // True
```

Python Basic - Data Type
True & False

- Comparing Operator : >, <, >=, <=, ==, !=

```
a = 2 ; b = 3
print (a > b) // False
print (a < b) // True

a = 2 ; b = 2
print (a == b) // True
print (a != b) // False

a = 5
print (a >= 3) // True
print (a == 5) // True
c = (a > 6)
print (c) // False
```

Python Basic - Data Type
True & False

- Other Data type also can be True or False

String
True: "python"
False: ""

List
True: [1,2,3]
False: []

Number
True: not 0
False: 0

Python Basic - Control Statement if, else, elif

```
if (Boolean condition):
        statement1
        ...
else:
        statement2
        ...


money = 9000
if money > 10000:
        print ("taxi")
else:
        print ("bus") // bus
```

Python Basic - Control Statement if, else, elif

```
a = 17
if a % 2 == 0:
        print ("Even")
else:
        print ("Odd") // Odd

a = 20
if a > 10 and a != 30:
        print ("yes") // yes
else:
        print ("no")
```

Python Basic - Control Statement if, else, elif

```
if 1 in [1, 2, 3]:
        print ("yes") // yes
else:
        print ("no")

if 'j' not in 'python':
        print ("yes") // yes
else:
        print ("no")
```

Python Basic - Control Statement if, else, elif

```
a = 20
if a > 10 and a != 30:
        pass // Nothing happened
else:
        print ("no")

a = 17
if a % 2 == 0: print ("Even")
else: print ("Odd") // Odd
```

Python Basic - Control Statement if, else, elif

```
a = 10
if a > 5
        print ("yes")
else
        print ("no") // Error
```

```
a = 10
if a > 5:
        print ("yes")
else:
    print ("no") // Error
```

Notice : Don't forget ' : ' & Tap

Python Basic - Control Statement if, else, elif

```
if (Boolean condition):
        statement
        ...
elif (Boolean condition):
        statement
        ...
elif (Boolean condition):
        statement
        ...
else:
        statement
        ...
```

Python Basic - Control Statement if, else, elif

```
grade = 76
if grade >= 90:
        print ("A")
elif grade >= 80:
        print ("B")
elif grade >= 70:
        print ("C") // C
elif grade >= 60:
        print ("D")
else:
        print ("F")
```

Python Basic - Control Statement if, else, elif

```
grade = 86
if grade >= 90:
        if grade >= 95:
                print ("A+")
        else:
                print ("A0")
elif grade >= 80:
        if grade >= 85:
                print ("B+") // B+
        else:
                print ("B0")
else:
        print ("F")
```

Python Basic - Control Statement while

```
while (Boolean condition):
        statement1
        statement2
        ...


i = 1
while i <= 10:
        print (i)
        i = i + 1 // 1 2 3 4 5 6 7 8 9 10
```

Also don't forget ' : ' & Tap

Python Basic - Control Statement while

```
a = 1
while a < 10:
        a = a * 2
print (a) // 16

a = ['x', 'y', 'z', 'w']
i = 0
while i < 4:
        print (a[i])
        i = i + 1 // x y z w
```

Python Basic - Control Statement while (Continue & Break)

```
a = 1
while True:
        a = a + 1
        if a >= 100:
                break
print (a) // 100

lis = ['a', 'b', 'c', 'd']
i = -1
while i < 3:
        i = i + 1
        if lis[i] == 'c':
                continue
        print (lis[i]) // a b d
```

Python Basic - Control Statement for

```
for (variable) in (list_name):
        statement1
        statement2
        ...


test_list = ['one', 'two', 'three']
for i in test_list:
        print (i) // one two three
```

Python Basic - Control Statement for

```
marks = [90, 25, 67, 45, 80]
number = 0
for mark in marks:
        number = number + 1
        if mark >= 60:
                print (str(number) + " student is passed")
        else:
                print (str(number) + " student is failed")
// 1 student is passed
// 2 student is failed
// 3 student is passed ···
```

Python Basic - Control Statement for

```
sum = 0
for i in range(1, 11):
        sum = sum + i
print (sum) // 55

for i in range(5):
        print (i) // 0 1 2 3 4
```

Python Basic - Control Statement for

```
marks = [90, 25, 67, 45, 80]
for number in range(len(marks)):
        if marks[number] < 60: continue
        print (str(number+1) + " student is passed")
// 1 student is passed
// 3 student is passed
// 5 student is passed

for i in range(2, 10):
        for j in range(1, 10):
                print (i * j, end = " ")
        print ("") // ?
```

Exercise 1

Print below pattern

```
*
**
***
****
*****
```

Exercise 2

Calculate average of student's score

[70, 60, 55, 75, 95, 90, 80, 80, 85, 100]

Answer: 79.0

Exercise 3

Print all prime number p<=100

Prime number: 2, 3, 5, 7, 11, 13, 17…

```
C:₩Python27₩python.exe C:/Users/Jaeyun/PycharmProjects/myFirstProject/test.py
2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71 73 79 83 89 97

Process finished with exit code 0
```

Exercise 4

Print all twin-prime number pair (p1, p2) p2<=100

twin-prime number (p1, p2):
both p1, p2 are prime numbers and p2 = p1 + 2

twin-prime number: (3, 5), (5, 7), (11, 13), (17, 19) …

(3,5)
(5,7)
(11,13)
(17,19)
(29,31)
(41,43)
(59,61)
(71,73)

Exercise 5

Make program which print binary notation of number 925
(925 is in decimal notation)

Ex) binary notation of number 3 : 11
Ex) binary notation of number 5 : 101
Ex) binary notation of number 7 : 111
Ex) binary notation of number 17 : 10001

Hint:

```
a = []
a.append(3) // a = [3]
a.append(4) // a = [3, 4]
a.reverse() // a = [4, 3]
```

Question