程式設計概論
Programming 101

—String operation (字串變數的操作)

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Outline

- String generation
- Basic operations on strings: addition and multiplication
- Reference: searching and manipulation strings
- Build-in function: len() function

String(字串)

- Strings: contain characters
- Strings are enclosed by two single quotes(‘) or two double quotes(“)
- String addition: concatenate strings
- String multiplication
- Select substring
- Calculate the length of a string: len(string_name)

Example_1

- print("ABC"+"abc")
- print("ABC","abc")
- print("ABC"+"abc"+"+*-/")
- print("ABC"*3)
- print(2*"abc")
- print(len('abcde'))

Indexing & string slicing

- Accessing the individual characters in a string is with an index.
- Each character in a string has an index that specifies its position in the string.
- x1='Python程式設計'

index	0	1	2	3	4	5	6	7	8	9
內容	P	y	t	h	o	n	程	式	設	計
index	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1

Python uses 0 as the starting index.

```
print(x[0])  # out P
print(x[1])  # output y
print(x[6])  # output 程
print(x1[-1]) # output 計 (印出最後一個字元)
print(x1[-6]) # output o
print(len(x1))  # output 10 (印出該字串的長度)
```

Indexing & string slicing (cont.)

x1[a:b]: 取出x1的索引值從a到b前一個字元的內容 (p.349)

- x1='Python程式設計'

index	0	1	2	3	4	5	6	7	8	9
內容	P	y	t	h	o	n	程	式	設	計
索引	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1

```
print(x1[2:5])     # 'tho'
print(x1[3:7])     # 'hon程'
print(x1[6:-1])    # '程式設'
print(x1[:2])    # 印出索引0,1 (不包含2)
print(x1[2:])    # 印出索引2...9 (不包含10)
print(x1[9:10])  # 取出最後一個字元印出
```

```
print( "Py" in "Python")
print("py"  in "Python")
```

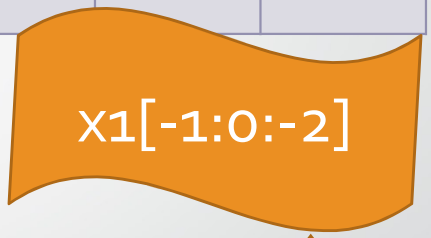
Practice

string1='python programming code’

- Q1: print program substring from string1
- Q2: print python substring from string1
- Q3: print python_code substring from string1

字串的片段運算子(進階)

索引	0	1	2	3	4	5	6	7	8	9
內容	P	y	t	h	o	n	程	式	設	計

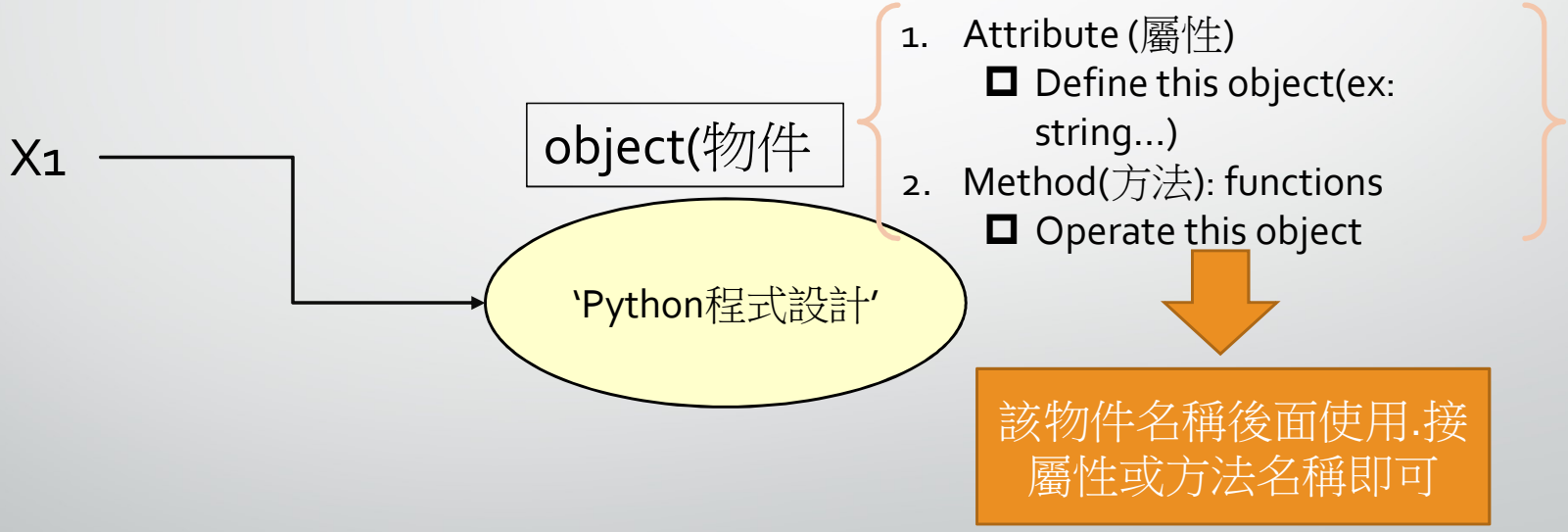


- x1='Python程式設計'
- x1[a:b:c]=x1[開始索引值:(結束索引值的後一個):遞增量]
  - a,b,c皆為正或負整數
  - (b-a)的數值=欲取出子字串的長度
  - c代表遞增量及方向
  - a:若沒有寫預設值0
  - b:若沒有寫預設值到最後一個數值
  - c:若沒有寫預設值1
- print(x1[0:8:2])
- print(x1[::-2])

字串進階 -
使用字串類別(class)內提供的函式(function)

Functions in the string class

X1='Python程式設計'



String conversion method

- x1='Python程式設計'
- print(x1.upper()):傳回字串x1的所有字元轉換成大寫的字串
- print(x1.lower()) : 傳回字串x1的所有字元轉換成小寫的字串
- print(x1.swapcase()): 傳回字串x1大小寫互換的字串
- print(x1.replace(old,new)): 傳回字串x1的old字串取代為new的字串
- print(x1. capitalize()): 傳回字串x1的第一個字元轉換成大寫的字元
- print(x1. title()):傳回字串x1的每個單字第一個字元轉換成大寫的字元

若 old沒出現在x1？

針對特定子字串進行操作

- find() method: 找出特定子字串，找出字串裡面尋找子字串第一次出現的位置，傳回的結果是第一次出現的索引值，若沒找到則傳回-1
- rfind() method: r是reverse，從字串尾段開始搜尋，並傳回第一次出現該子字串出現的索引值
- str2='me myself and I'
- print(str2.find('and'))
- print(str2.find('you'))
- print(str2.find('e'))
- print(str2.rfind('e'))

How to search for substrings in a string (字串中搜尋子字串的方法)

```
var1='PythonPythonPythonPython'
print(var1.count('Python'))   # number of occurrences of 'Python' in the string var1
print(var1.startswith("Python"))    # does the string var1 start with 'Python'?
print(var1.endswith('Python'))    # does the string var1 end with 'Python'?
print(var1.find('Python'))   #search 'Python' from the beginning of the string var1
print(var1.rfind('Python'))   #search 'Python' from the end of the string var1
print(var1.startswith('Python', 0, len(var1)-5  ))
print(var1.endswith('Python', 0, len(var1)-3  ))    # advanced example
```

字串內置方法(cont.)

- Provide str.isxxx() function for checking xxx attributes (判斷字串是否有xxx屬性)
  - var='python programming 123'
  - print(var.isdigit()) # 是否全為數字
  - print(var.isalpha()) # 是否全為字母
  - print('var.isalnum()) # 是否全為數字或字母
  - print(var.islower()) # 是否全為小寫
  - print (var.isupper()) # 是否全為大寫
  - print(var.isspace()) # 是否全是空白，是傳回True
  - print(var.istitle()) # 是否每個單字第一個字元都是大寫字元，是傳回True

Return True/False

Practice

- s1='Today is Friday'
  1. s1是否包含'day'?
  2. 'day'出現在s1的次數
  3. 利用s1建立一個新字串變數new1，令new1的值為"Today is Saturday"
  4. s1的每個單字的第一個字元都是大寫嗎?

Summary

- Python uses **0** **as the starting index.**
  - string slicing
  - list slicing

high

low

Priority (優先順序表)	
Operator	Introduction
[...],(...), {...}	list, set, tuple, dict
a[i], a[i:j]	index(索引)
a**b	Exponent(指數)
+a, -a	Positive/negative number (正,負號)
a*b, a/b, a//b, a%b	Multiplication, division (乘法, 除法, 餘數...)
a+b, a-b	Addition, substation (加法, 減法)
<, >, <=, >=, ==, !=	Comparison(比較)
not a	Not logic
a and b	And logic
a or b	or logic

Exercise 2

Question 1

1. Assume the variable *big* references a string. Write a statement that converts the string it references to lowercase, and assigns the converted string to the variable *little*.
2. str3="Python language programming"
   A. How many 'g's are in str3?
   B. Use the search function and print the index of 'p' from str3

Question 2

- At a university, each student is assigned a system login name, which the student uses to log into the campus computer system. You will use the following algorithm to generate a login name:

1. *Get the first three characters of the student's first name. (If the first name is less than three characters in length, use the entire first name.)*

2. *Get the first three characters of the student's last name. (If the last name is less than three characters in length, use the entire last name.)*

3. *Get the last three characters of the student's ID number. (If the ID number is less than three characters in length, use the entire ID number.)*

4. *Concatenate the three sets of characters to generate the login name.*

- *For example*, if a student's name is Amanda Spencer, and her ID number is ENG6721, her login name would be AmaSpe721.

Does s3 exist in s1?

Question 3

Print these result

s1='HappyNewYear'

s2='happynewyear'

s3='new'

s4 ='birthday'

- Q1: The length of s1 is ?
- Q2: Are the lengths of s1 and s2 equal? Please print False or True?
- Q3: Does s3 exist in s1? Please print False or True?

Review

- Textbook: chapter 9: 9.2