Python Introduction

自動化開發與認證課

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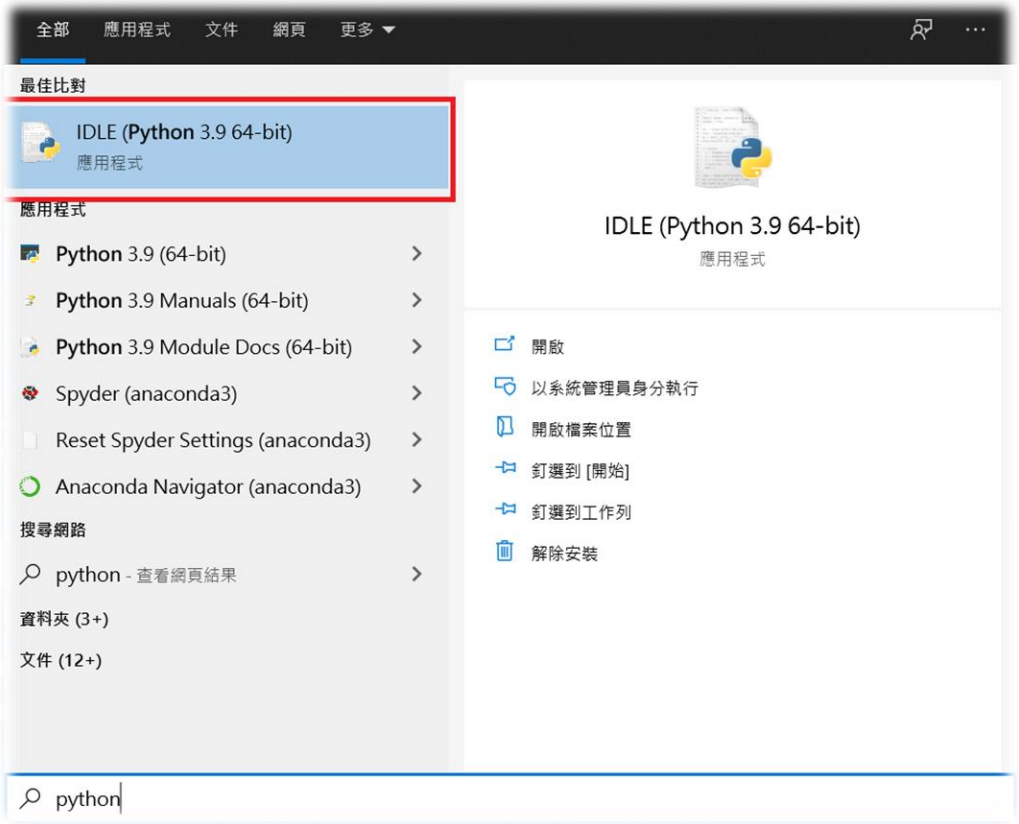
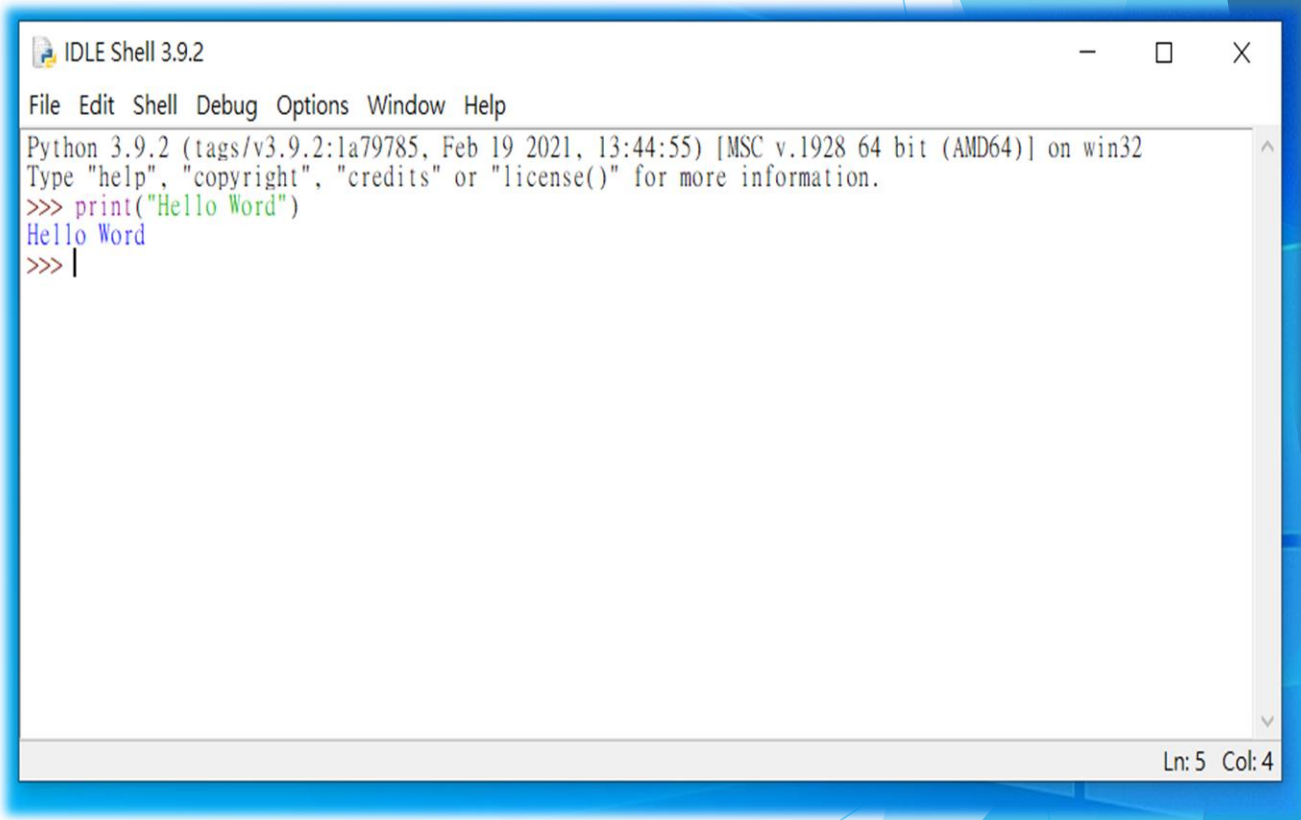
Python Install

Python Install

Download : https://www.python.org/downloads/

Python Install

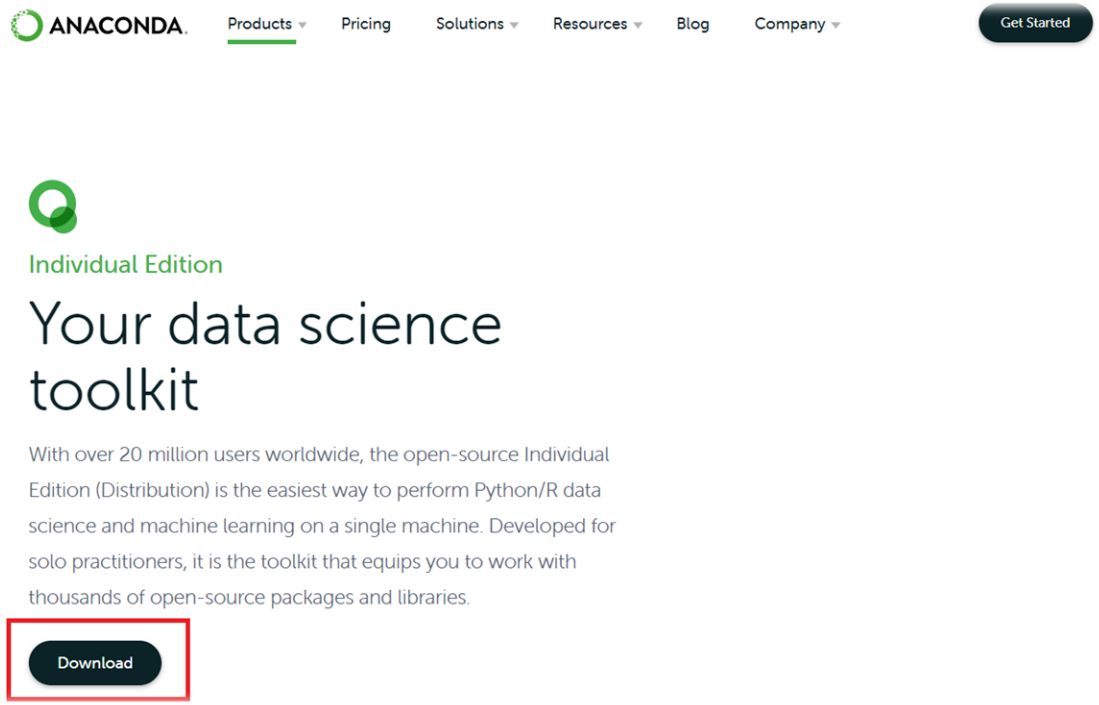


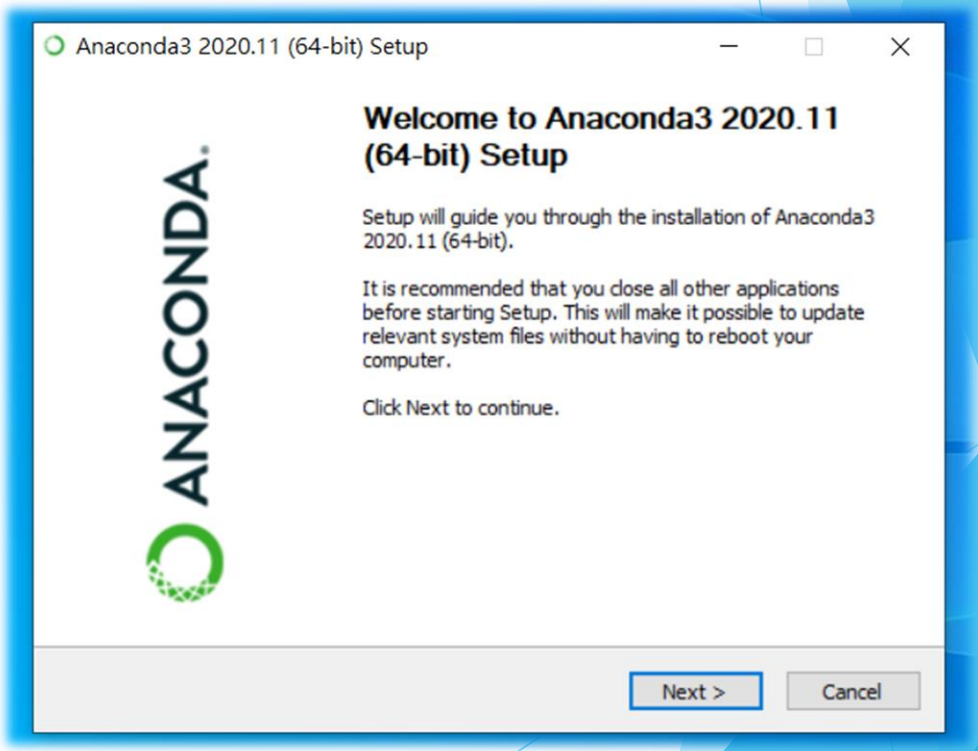


Anaconda(Spyder)

Anaconda (Spyder)

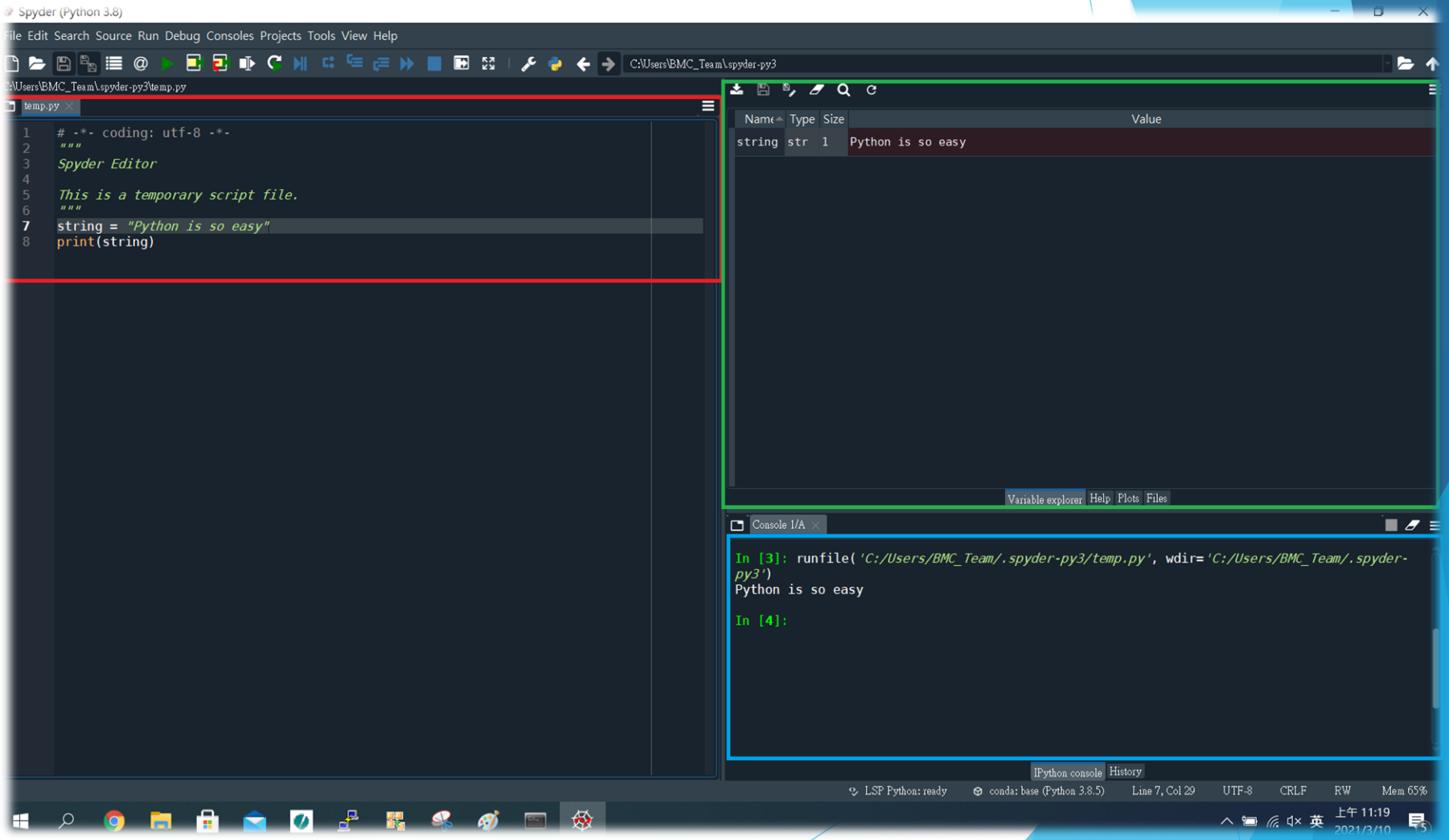
https://www.anaconda.com/products/individual





Anaconda (Spyder)

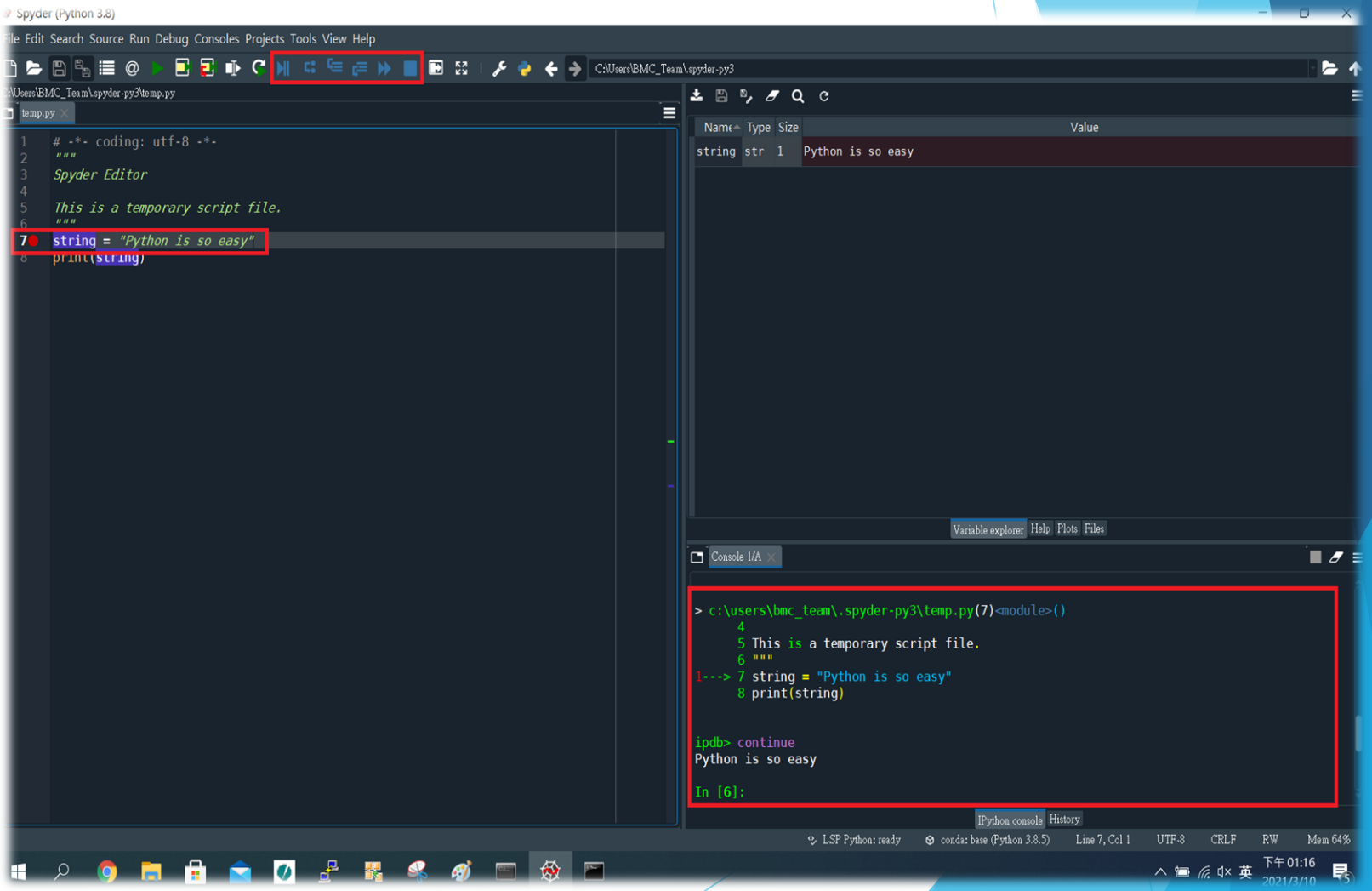
- Browse tabs
- Variables explorer
- Console



Anaconda (Spyder)

Debug mode

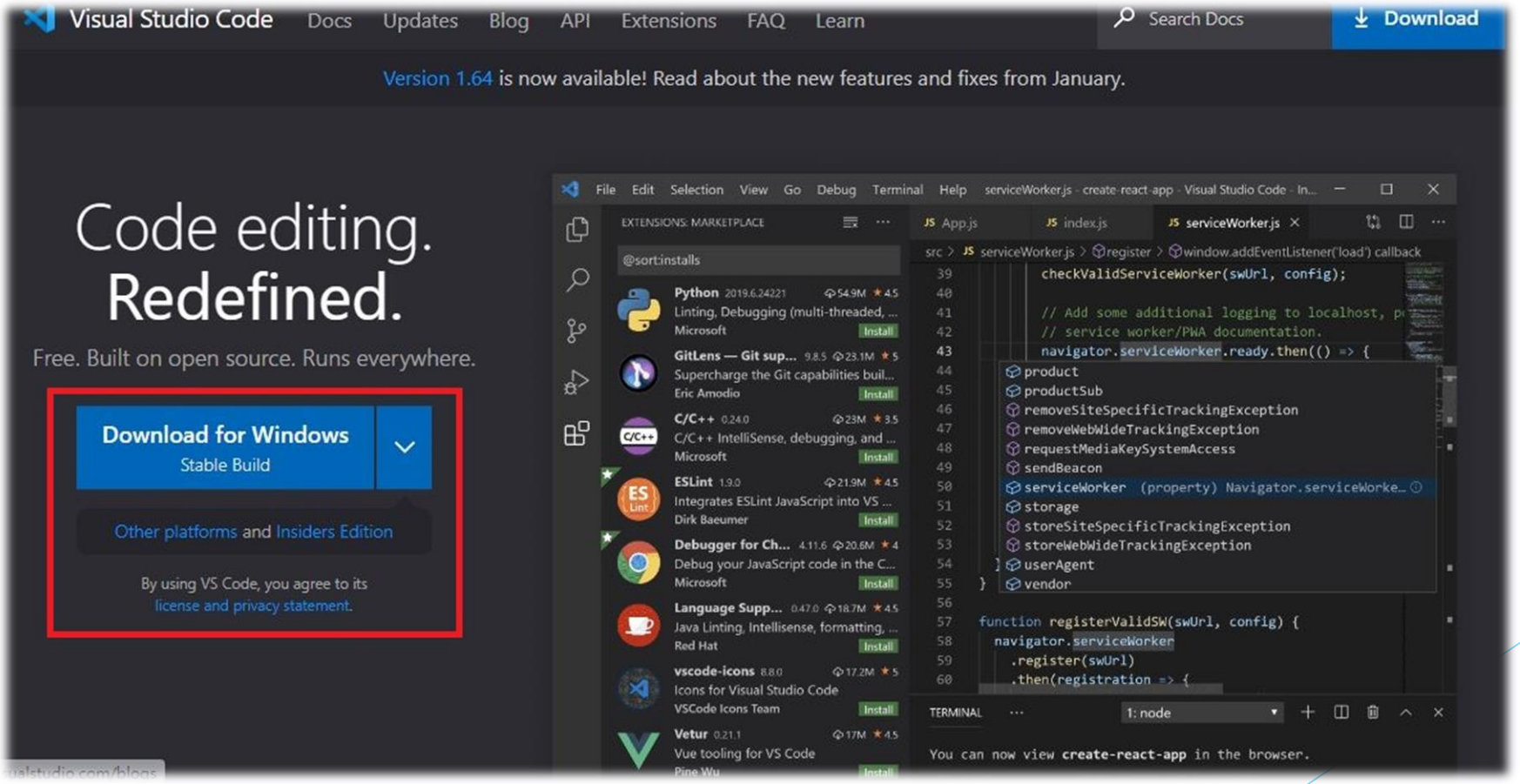
- By step to execute
- View all of the variables



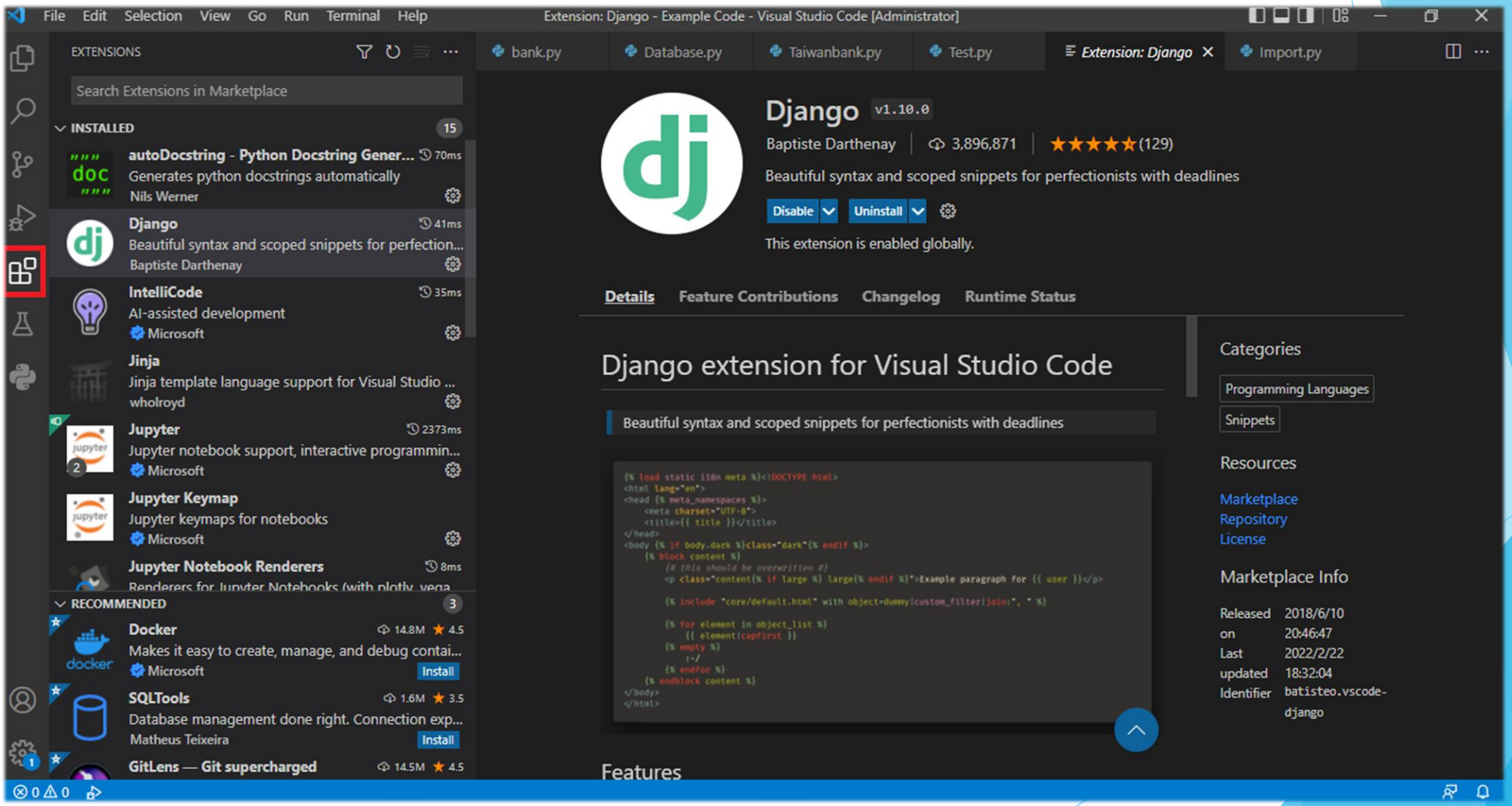
Visual Studio Code

Visual Studio Code

Download : https://code.visualstudio.com/

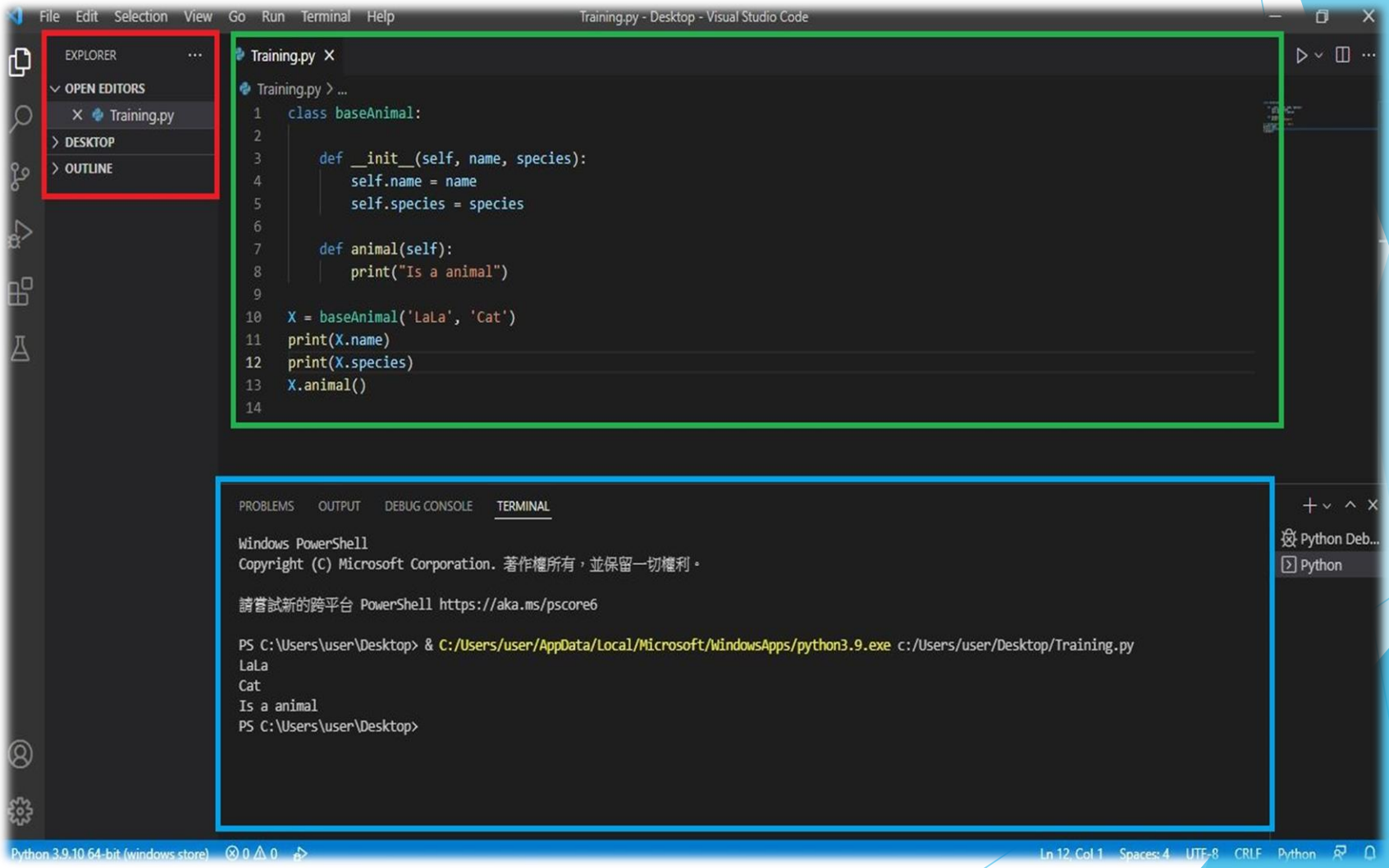


Visual Studio Code (Extensions)



Visual Studio Code

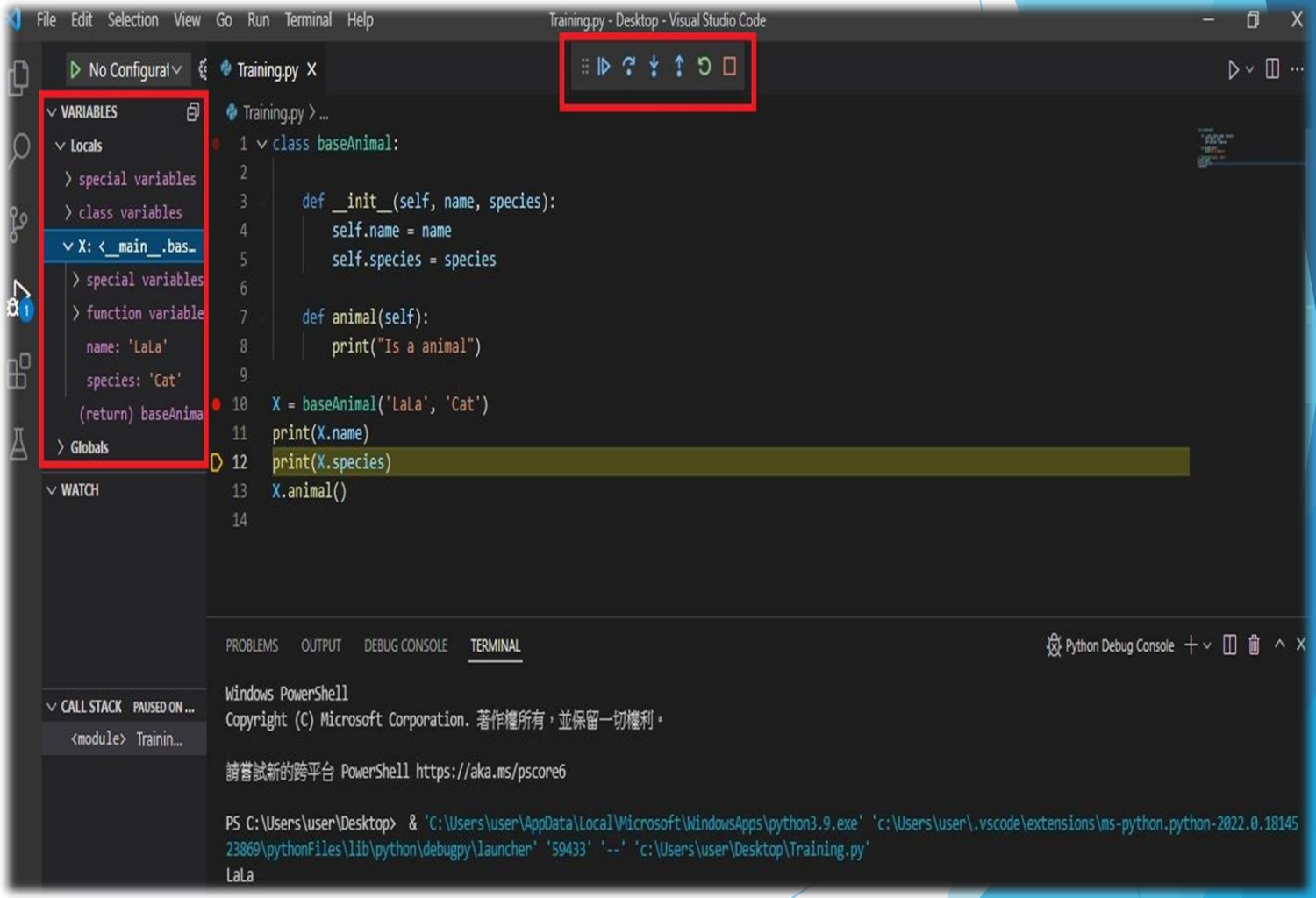
- Explorer
- Code
- Console



Visual Studio Code

Debug mode

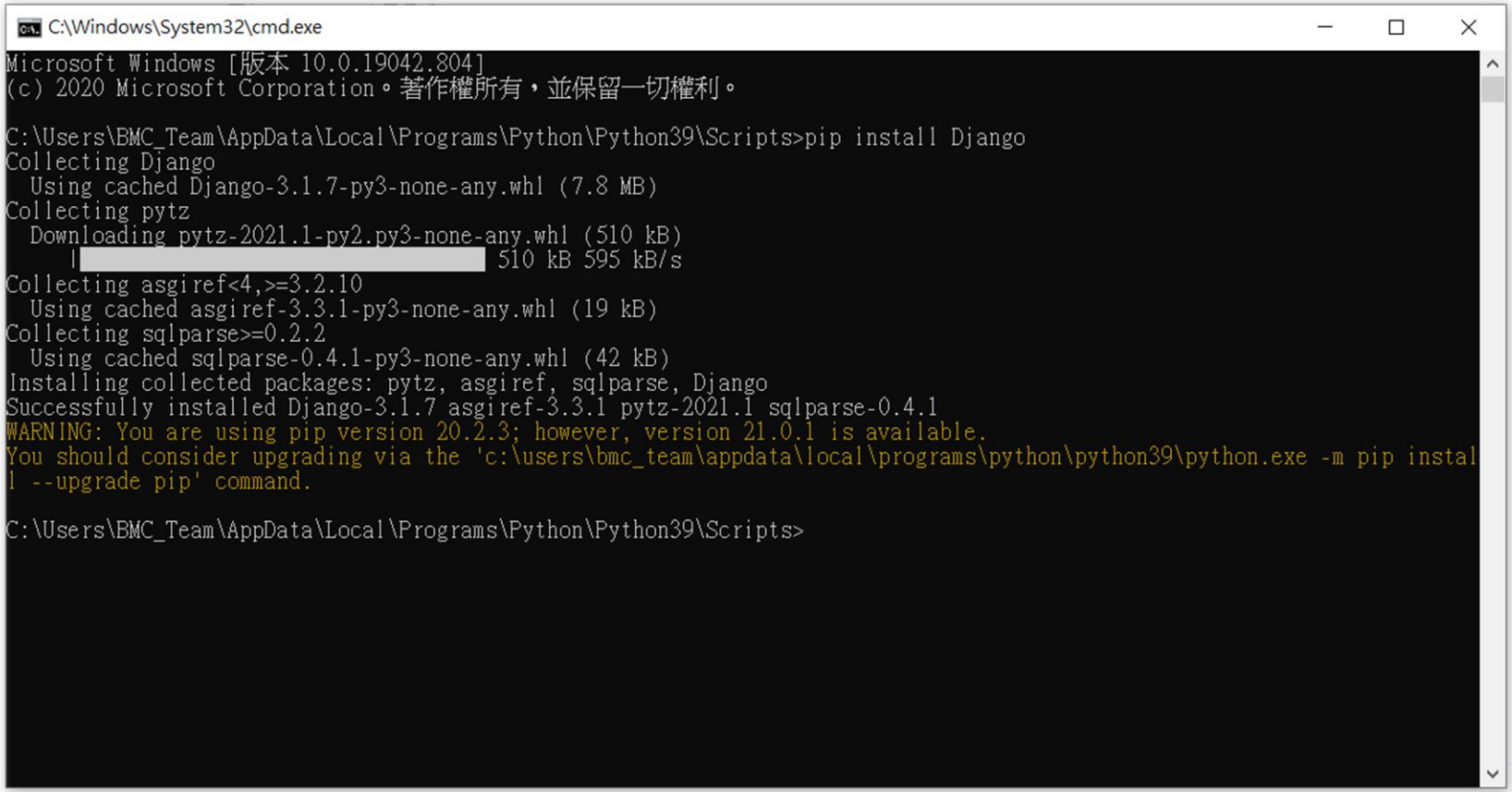
- By step to execute
- View all of the variables



Package Install

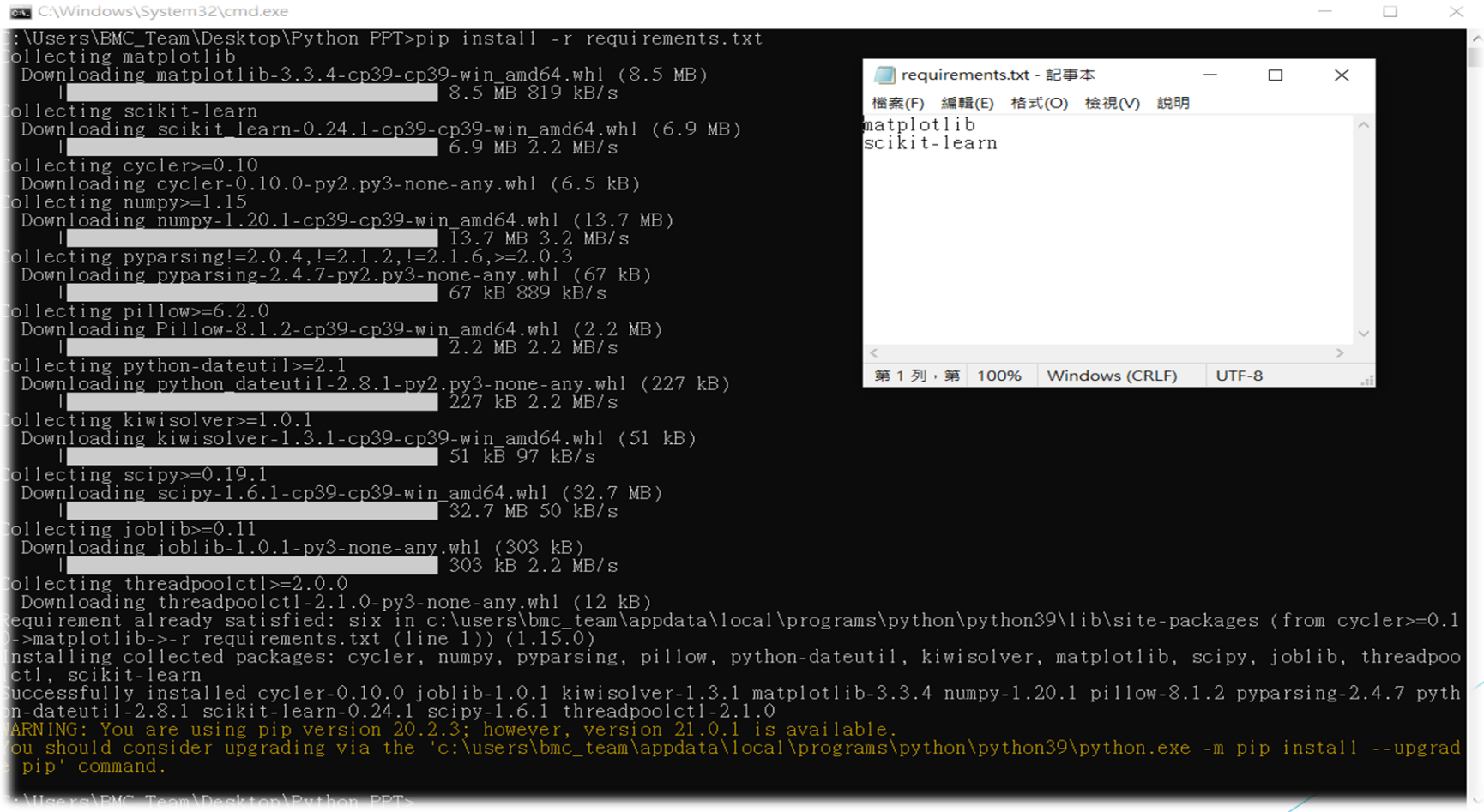
Package Install (Python)

```
$ pip install $PackageName
```



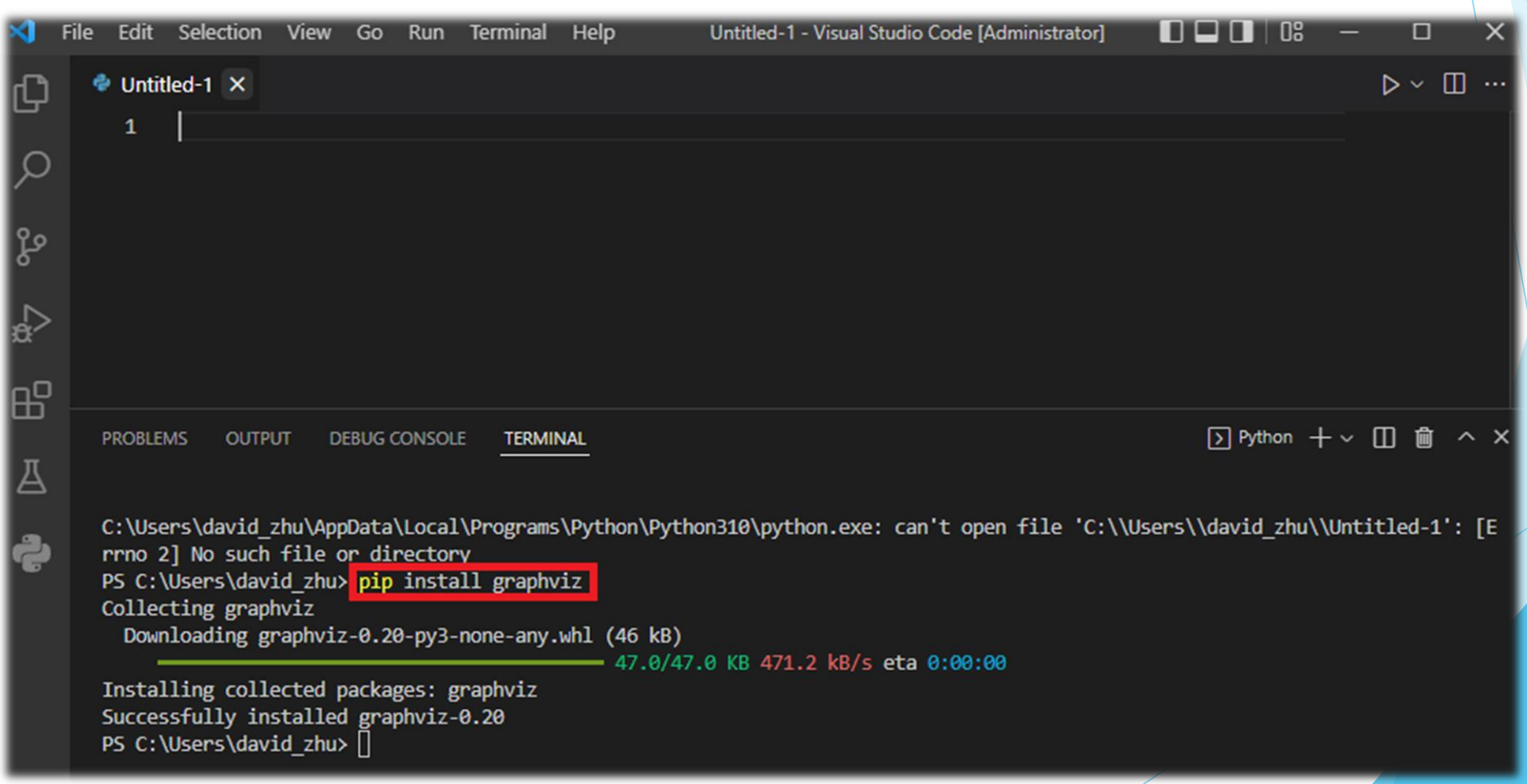
Package Install (requirements.txt)

$ pip install -r requirements.txt



Package Install (VS code)

```
$ pip install $PackageName
```



Common

Common(Keyword)

False	class	finally	is	Return
None	continue	for	lambda	Try
True	def	from	nonlocal	While
and	del	global	not	With
as	elif	if	or	Yield
assert	else	import	Pass	
break	except	in	Raise	

**** Don't used to name the variable***

Common(Built-in functions)

abs()	delattr()	hash()	memoryview()	set()
all()	dict()	help()	min()	setattr()
any()	dir()	hex()	next()	slice()
ascii()	divmod()	id()	object()	sorted()
bin()	enumerate()	input()	oct()	staticmethod()
bool()	eval()	int()	open()	str()
breakpoint()	exec()	isinstance()	ord()	sum()
bytearray()	filter()	issubclass()	pow()	super()
bytes()	float()	iter()	print()	tuple()
callable()	format()	len()	property()	type()
chr()	frozenset()	list()	range()	vars()
classmethod()	getattr()	locals()	repr()	zip()
compile()	globals()	map()	reversed()	__import__()
complex()	hasattr()	max()	round()	

**** Don't used to name the function***

Common(Variable name)

1. First word should be ***English*** or _.

2. After the first word that can used ***English***, ***numeric*** or _ .

Data Type

Data Type

1. Numeric type
    - Integer (int)
    - Floating-point (float)
    - Boolean (bool)

2. Text type
    - String (str)

3. Sequence type
    - List[]
    - Tuple()
    - Dict{}
    - Set{}

Data Type (Integer)

```
x = 1                    # Assign 1 to x
print(x)                 # print x
print(type(x))           # print x type
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/
1
<class 'int'>
```

Data Type (Float)

```
x = 1.5                 # Assign 1.5 to x
print(x)                # print x
print(type(x))          # print x type
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
1.5
<class 'float'>
```

Data Type(Arithmetic operator)

+	加	a+b
-	減	a-b
*	乘	a*b
/	除	a/b
%	取餘數	a%b

Data Type(Arithmetic operator)

```
a = 6                                # Assign 6 to a
b = 3                                # Assign 3 to b

print("a + b = ", a + b)             # a + b
print("a - b = ", a - b)             # a - b
print("a * b = ", a * b)             # a * b
print("a / b = ", a / b)             # a / b
print("a mod b = ", a % b)           # a mod b
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduc
zhu/AppData/Local/Programs/Python/Python310/python.exe "c:/Users/david_
hon_Introduction-main/Example Code/Test.py"
a + b =  9
a - b =  3
a * b =  18
a / b =  2.0
a mod b =  0
```

Data Type(Comparison operator)

<	小於	a < b
>	大於	a > b
<=	小於等於	a <= b
>=	大於等於	a >= b
==	相等	a == b
!=	不相等	a != b

**** It will return the Boolean type***

Data Type(Comparison operator)

```
a = 6                                   # Assign 6 to a
b = 3                                   # Assign 3 to b

print("a < b  ", a < b)                  # a < b ?
print("a > b  ", a > b)                  # a > b ?
print("a <= b  ", a <= b)                # a <= b ?
print("a >= b  ", a >= b)                # a >= b ?
print("a = b  ", a == b)                 # a = b ?
print("a != b  ", a != b)                # a != b ?
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-
zhu/AppData/Local/Programs/Python/Python310/python.exe "c:/Users/david_zhu/
hon_Introduction-main/Example Code/Test.py"
a < b   False
a > b   True
a <= b   False
a >= b   True
a = b   False
a != b   True
```

Data Type (Str)

```
x = "string "              # Assign “string” to x
print(x)                   # print x
print(type(x))             # print x type
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
String
<class 'str'>
```

Data Type (bool)

```
x = True                # Assign “True” to bool x
y = False               # Assign “False” to bool y

print(x)                # print x
print(type(x))          # print x type
print(y)                # print x
print(type(y))          # print x type
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
True
<class 'bool'>
False
<class 'bool'>
```

Data Type (Float transfer to Integer)

```
x = 10.5                # float type
print(x)                # print x
print(type(x))          # print x type

x = int(x)              # float transfer to integer
print(x)                # print x
print(type(x))          # print x type
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Exampl
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main
10.5
<class 'float'>
10
<class 'int'>
```

Data Type (Integer transfer to String)

```
x = 10                  # Integer type
print(x)                # print x
print(type(x))          # print x type

x = str(x)              # Integer transfer to string
print(x)                # print x
print(type(x))          # print x type
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
10
<class 'int'>
10
<class 'str'>
```

Data Type (String transfer to Integer)

```
x = "10"                    # String type of the Integer
print(x)                    # print x
print(type(x))              # print x type

x = int(x)                  # String transfer to Integer
print(x)                    # print x
print(type(x))              # print x type
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
10
<class 'str'>
10
<class 'int'>
```

Data Type (String transfer to Integer)

```
x = "string"              # String type
print(x)                  # print x
print(type(x))            # print x type

x = int(x)                # String transfer to Integer
print(x)                  # print x
print(type(x))            # print x type
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example Code> & C:/
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/Example Code
string
<class 'str'>
Traceback (most recent call last):
  File "c:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example Code\T
    x = int(x)                # String transfer to Integer
ValueError: invalid literal for int() with base 10: 'string'
```

**** Only String type of the Integer can be transfer***

Data Structure

Data Structure (Tuple)

```
x =  1 ,"string", False     #Assign 1, “string”, False to bool x
y = ( 1 ,"string", False)  #Assign (1, “string”, False) to tuple y

print(x)                    #print x
print(type(x))              #print x type

print(y)                    #print y
print(type(y))              #print y type
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/E
(1, 'string', False)
<class 'tuple'>
(1, 'string', False)
<class 'tuple'>
```

Data Structure (Tuple)

```
x = ( 1 ,"string", False) #Assign (1, “string”, False) to tuple x
x[0] = 2                  #Assign 2 to x[0]

print(x)                  #print x
print(type(x))            #print x type
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example Code> & C:/Users/david_zhu/AppData/Local
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/Example Code/Test.py"
Traceback (most recent call last):
  File "c:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example Code\Test.py", line 3, in <module>
    x[0] = 2                      #Assign 2 to x[0]
TypeError: 'tuple' object does not support item assignment
```

**** Tuple object doesn’t support item assignment***

Data Structure (List)

```
x = [ 1 ,"string", False]  #Assign [1, “string”, False] to list x

print(x)                    #print x
print(type(x))              #print x type
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
[1, 'string', False]
<class 'list'>
```

Data Structure (List)

```
x = [ 1 ,"string", False]  #Assign (1, “string”, False) to tuple x
print(x)                    #print(x)
x[0] = 2                    #Assign 2 to x[0]
print(x)                    #print x
print(type(x))              #print x type
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
[1, 'string', False]
[2, 'string', False]
<class 'list'>
```

* *List object support item assignment*

Data Structure (list.append)

```
x = [ 1 ,"string", False]   #Assign [1, “string”,False] to list x
print(x)                    #print x
print(type(x))              #print x type

x.append("Python")          #add “python” to list x
print(x)                    #print x
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
[1, 'string', False]
<class 'list'>
[1, 'string', False, 'Python']
```

* ***append() function add to end of the List***

Data Structure (list.insert)

```
x = [ 1 ,"string", False]   #Assign [ 1 ,"string", False] to list x
print(x)                    #print x
print(type(x))              #print x type

x.insert(0, "python")       #insert “python” to list x[0]
print(x)                    #print x
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
[1, 'string', False]
<class 'list'>
['python', 1, 'string', False]
```

Data Structure (list.remove)

```
x = [ 1 ,"string", False]  #Assign [ 1 ,"string", False] to list x
print(x)                   #print x
print(type(x))             #print x type

x.remove("string")         #remove from list x
print(x)                   #print x
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
[1, 'string', False]
<class 'list'>
[1, False]
```

Data Structure (Two-dimensional List)

```
list1 = [[1,2,3],              # Assign 1~9 to two-dimensional list
         [4,5,6],
         [7,8,9]]

print(list1[1][0])             # Print list[1][0]
print(list1[1][1])             # Print list[1][1]
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/E
4
5
```

Data Structure (Set)

```
set1 = {"A","B","C",1 ,2}
set2 = {"A","B","D",1 ,3}

print("A" in set1)          # "A" in set1 or not

print(set1 | set2)          # Union (聯集)

print(set1 & set2)          # Intersection (交集)

print(set1 - set2)          # Subtraction (差集)

print(set1 ^ set2)          # XOR (互斥或)
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
True
{'A', 'B', 2, 1, 3, 'D', 'C'}
{'A', 'B', 1}
{'C', 2}
{'C', 3, 2, 'D'}
```

Data Structure (Dict)

```
dict = {"Name" : "David", "Age" : 28, "Weight" : 70, "Height" : 176}

print(dict["Name"])

print(dict["Age"])

print(dict["Weight"])

print(dict["Height"])
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
David
28
70
176
```

Data Structure (dict.clean())

```
dict = {"Name" : "David", "Age" : 28, "Weight" : 70, "Height" : 176}

print(dict)

dict.clear()

print(dict)
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
{'Name': 'David', 'Age': 28, 'Weight': 70, 'Height': 176}
{}
```

Data Structure (dict.copy())

```
dict = {"Name" : "David", "Age" : 28, "Weight" : 70, "Height" : 176}

dict2 = dict.copy()

print("dict : ", dict)

print("dict2 : ", dict2)
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
dict :  {'Name': 'David', 'Age': 28, 'Weight': 70, 'Height': 176}
dict2 :  {'Name': 'David', 'Age': 28, 'Weight': 70, 'Height': 176}
```

Data Structure (dict.get())

```
dict = {"Name" : "David", "Age" : 28, "Weight" : 70, "Height" : 176}

print(dict.get("Name"))

print(dict.get("Age"))
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
David
28
```

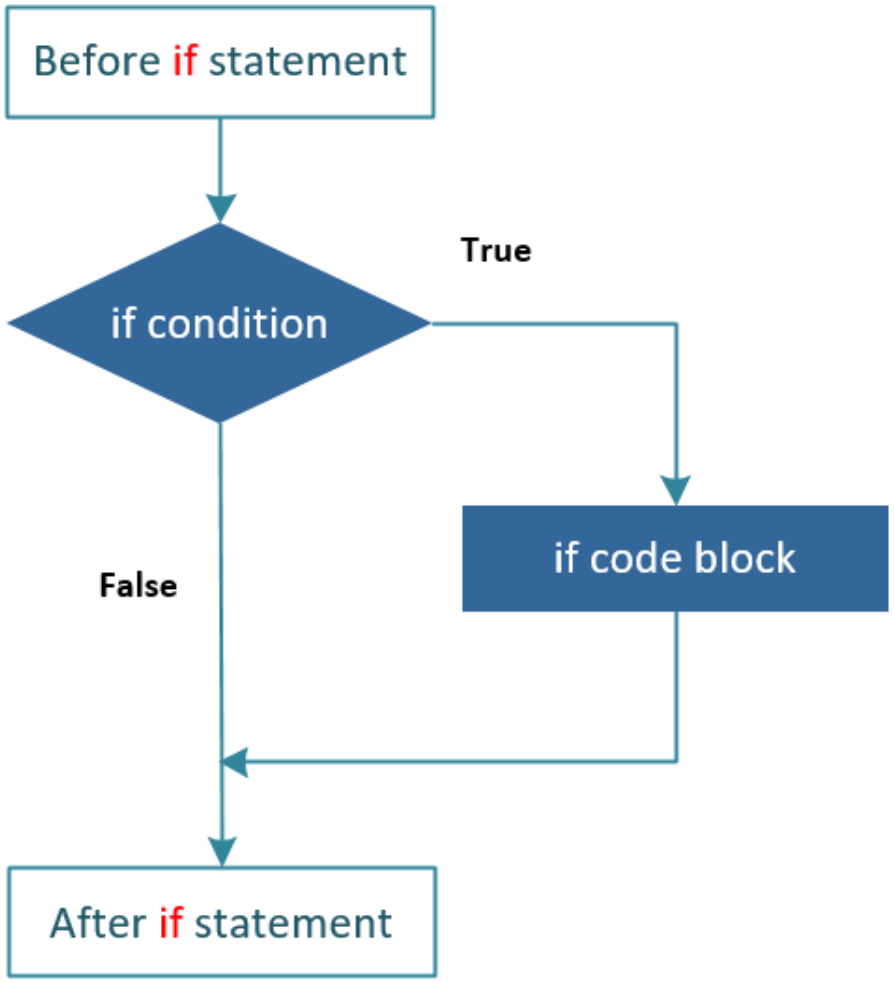
Data Structure (dict compare)

```
dict = {"Name" : "David", "Age" : 28, "Weight" : 70, "Height" : 176}
dict2 = {"Name" : "Ricky", "Age" : 28, "Weight" : 70, "Height" : 176}

print("Compare Result", dict == dict2)

dict2["Name" ] =  "David"

print("Compare Result", dict == dict2)
```

```
PS C:\Users\david_zhu\Desktop\test> & C:/Users/david_zhu/AppData/Local/Programs/
n310/python.exe c:/Users/david_zhu/Desktop/test/test.py
Compare Result False
Compare Result True
```

Flow control

Flow control (If_else)

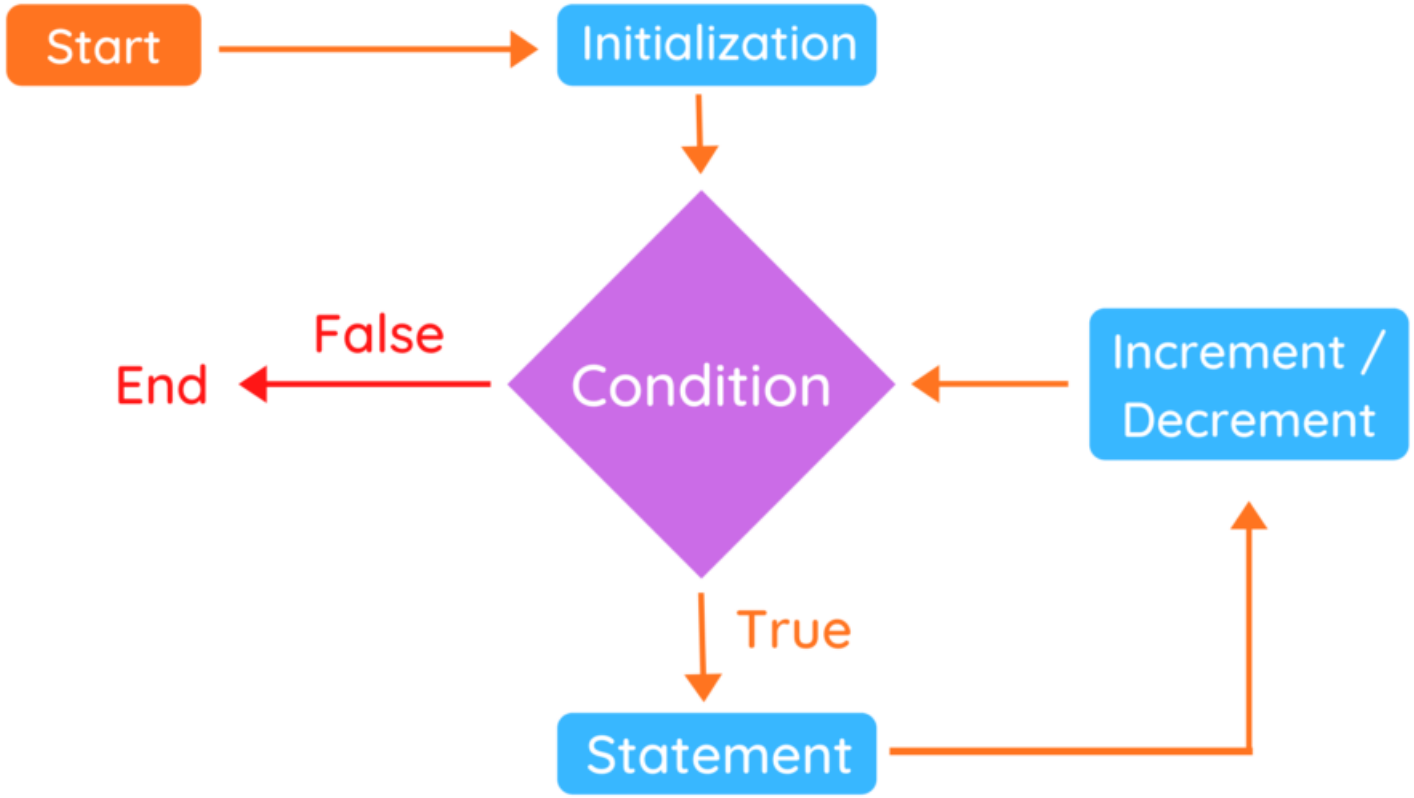


Flow control (If_else)

```
x = int(input("Please enter an integer: "))    # Assign input number to x

if x < 50:
    print("The Integer is small than 50")      # If x < 50, print

elif x > 50:
    print("The Integer is more than 50")       # If x > 50, print

else:
    print("The Integer is  50")                # If not meets above, print
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
Please enter an integer: 60
The Integer is more than 50
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
Please enter an integer: 40
The Integer is small than 50
```

Flow control (for_loop)



Flow control (for_loop)

```
words = ["Python", "Java", "C++"]     # Assign List[] to words

for w in words:
    print(w, len(w))                   # Print w in words[] and count it.
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\E
 "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/Ex
Python 6
Java 4
C++ 3
```

Flow control (for_range)

```
for i in range(10):
    print(i)                    # Print i from 0 to 9
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example Code>
 "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/Example Code/T
0
1
2
3
4
5
6
7
8
9
```

Flow control (nested_loops)

```
words = ["A", "B", "C", "D"]          #Assign “A”, “B”, “C”, “D” to words

for i in range(5):
    for j in words:
            print(j)                  #Print j
```

```
"c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/Example Code/Test.py"
A
B
C
D
A
B
C
D
A
B
C
D
A
B
C
D
A
B
C
D
A
B
C
D
```

Flow control (break)

```
for i in range(5):
      print(i)                    #Print I
      if i == 3:                  #if i = 3
        print("Loop Break")  #print “Loop Break” then break loop
        break
```

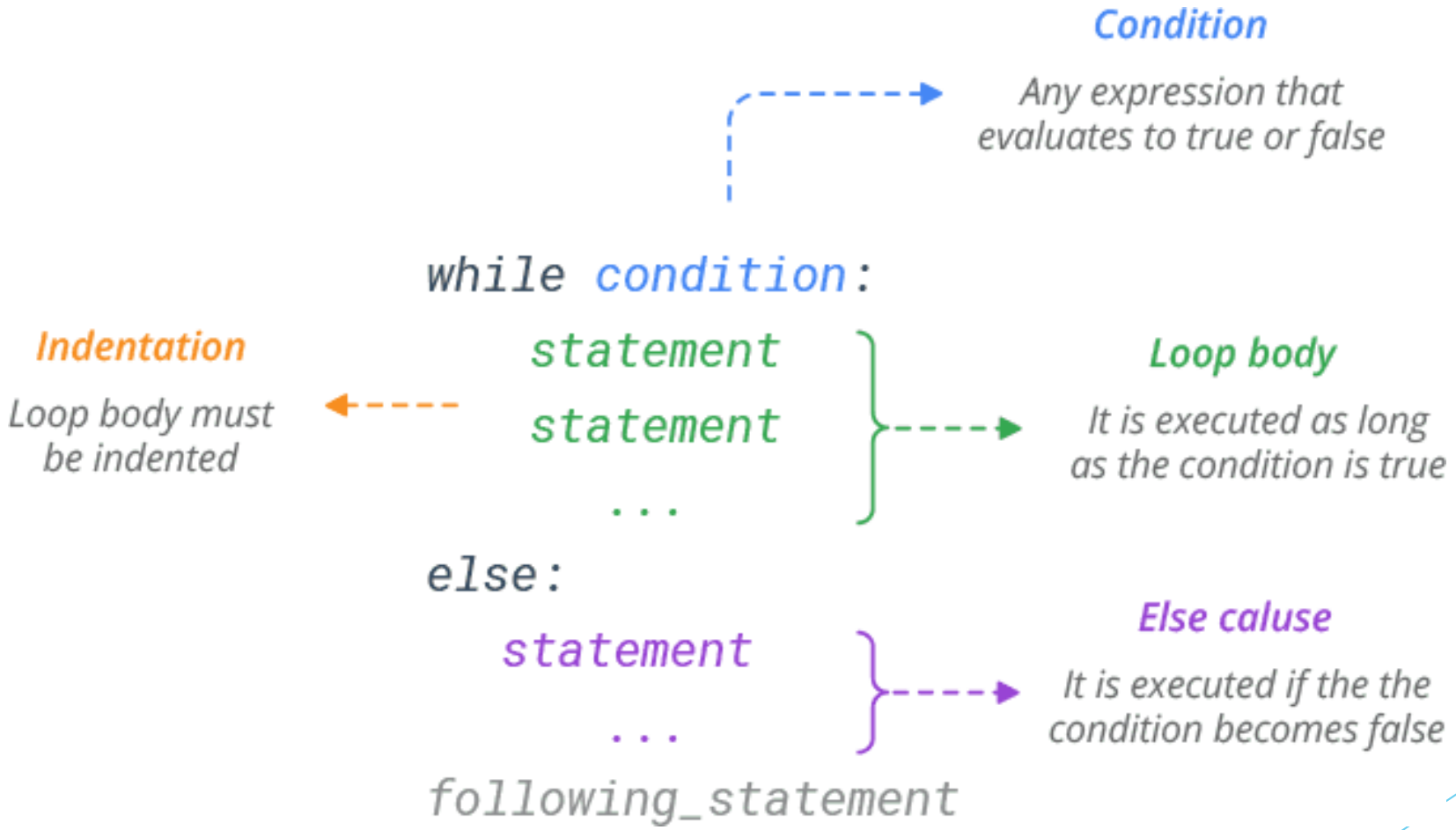
```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example Code>
 "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/Example Code/"
0
1
2
3
Loop Break
```

Flow control (continue)

```
for i in range(5):
    if i == 3:                  #if i = 3
        continue                #Bypass then continue loop
    print(i)                    #Print i
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example Code
 "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/Example Code/
0
1
2
4
```

Flow control (while_loop)



Flow control (while_loop)

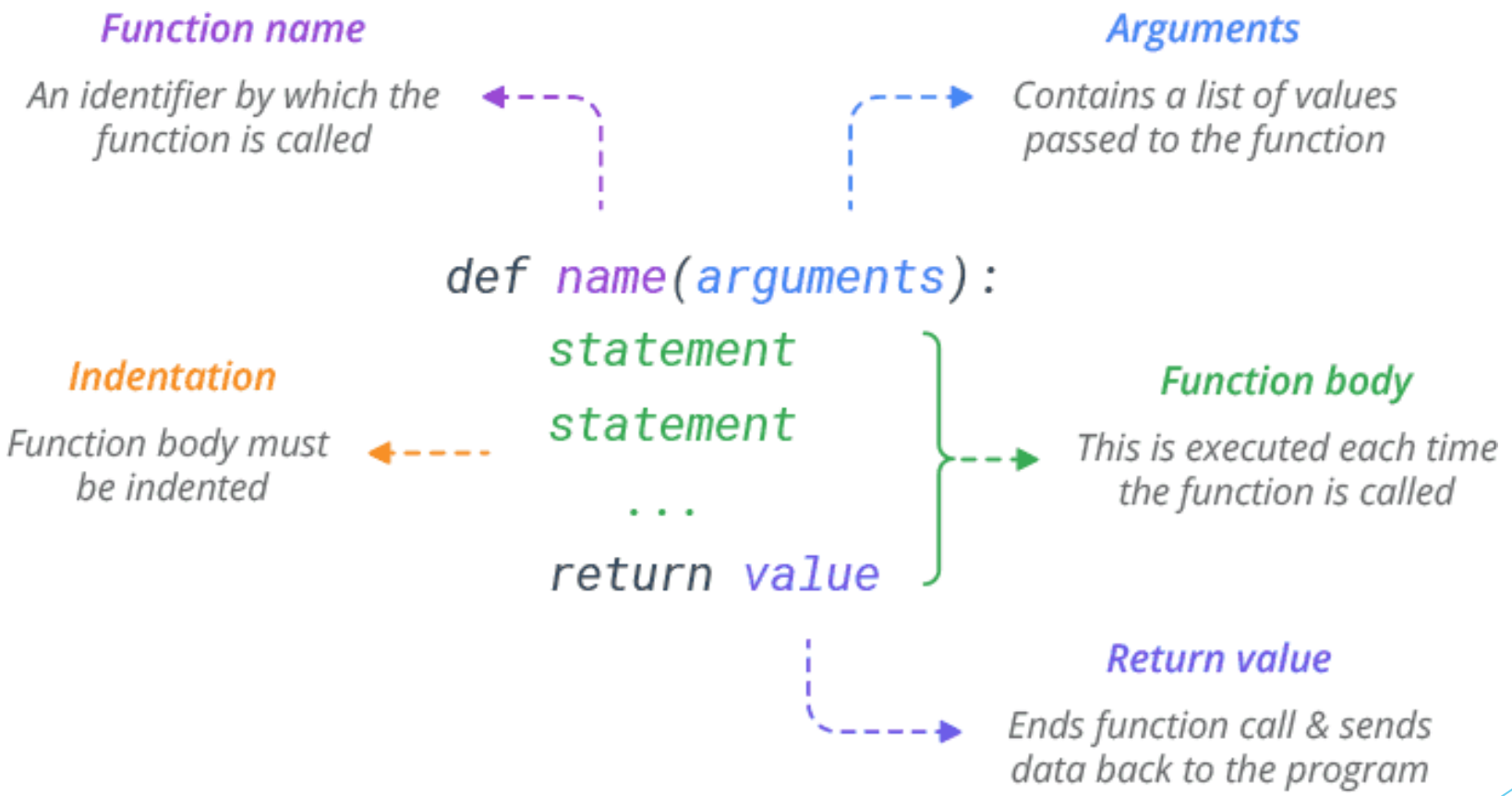
```
i = 0                                   # assign 0 to i
while i < 10:                           # if i < 10 is true
    print(i)                            # print i
    i += 1                              # I + 1
else:
    print("finished")                   # if i < 10 is false
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example Code
 "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/Example Code/
0
1
2
3
4
5
6
7
8
9
finished
```

Flow control (infinite_loop)

```
i = 0                                   # assign 0 to i
while True:                             # infinite_loop
    print(i)                            # print i
    i += 1                              # I + 1
else:
    print("finished")                   # if i < 10 is false
```

Flow control (function)



Flow control (function)

```
def example(n):          # function example()
    n+=5                 # n = n + 5
    print(n)             # print n

example(10)              # call function example()
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example Code>
 "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/Example Code/T
15
```

Flow control (return)

```
def example(n):          # function example()
      n+=5               # n = n + 5
      return n           # return n to this function

x = example(10)          # assign to x
print(x)
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example Code>
 "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/Example Code/T
15
```

Flow control (return & print)

```
def example(n):          # function example()
      n+=5               # n = n + 5
      x = 100
      print(n)           # print n on console only
      return x           # return x to this function

result = example(10)     # assign to result
print(result + 100)
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main
 "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
15
200
```

- ***Return is return the result to function***
- ***Print is print the result on console only***

Flow control (global/local variable)

```
gobal_x = 1                          # Assign 1 to gobal_x
def example():                       # Function example()
      local_x = 2                    # Assign 2 to local_x
      local_y = 6                    # Assign 6 to local_y
      print("global x:",gobal_x)     # print global_x
      print("local x:",local_x)      # print local_x
      print("local y:", local_y)     # print local_y

example()                            # call function example()
print("local y:", local_y)           # print local_y
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main
 "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
global x: 1
local x: 2
local y: 6
Traceback (most recent call last):
  File "c:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction
    print("local y:", local_y)                    # print local_y
NameError: name 'local_y' is not defined. Did you mean: 'locals'?
```

Flow control (file write)

```
file = open("Testfile.txt","w")        # Open file

file.write("Code by David")            # Write file

file.close                             # stream close
```

Flow control (file read)

```
file = open("Testfile.txt", "r")        # Open file

print(file.read())                      # Read file

file.close                              # stream close
```

```
PS C:\Users\david_zhu\Desktop\AMI DevNet Test Case Transfer to Excel> & C
rs/david_zhu/Desktop/AMI DevNet Test Case Transfer to Excel/FileRW.py"
Code by David
```

Flow control (with as)

```
txtfile= "Code by David.\n Hello ASUS"

with open("Testfile.txt","w") as file:        # Open file and stream close
    file.write(txtfile)                       # Write file

with open("Testfile.txt","r") as file:
    print(file.read())                        # Read file
```

```
PS C:\Users\david_zhu\Desktop\AMI DevNet Test Case Transfer to Excel> &
rs/david_zhu/Desktop/AMI DevNet Test Case Transfer to Excel/FileRW.py"
Code by David.
Hello ASUS
```

Module

Module(Import)

```
#util.py

def example1():
        print("example1 function")

def example2():
        print("example2 function")
```

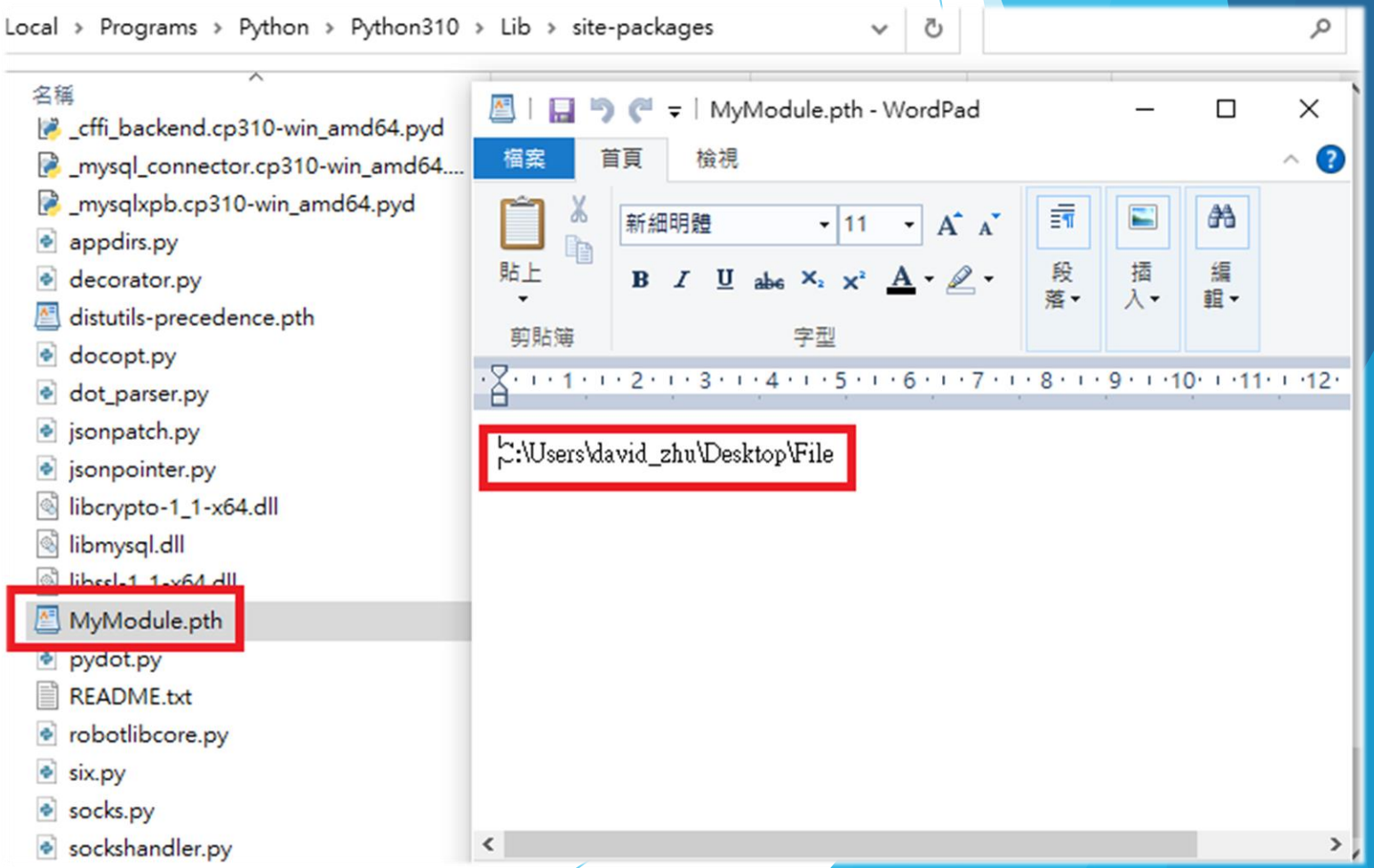
```
#Demo.py

Import util

util.example1()

util.example2()
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
example1 function
example2 function
```

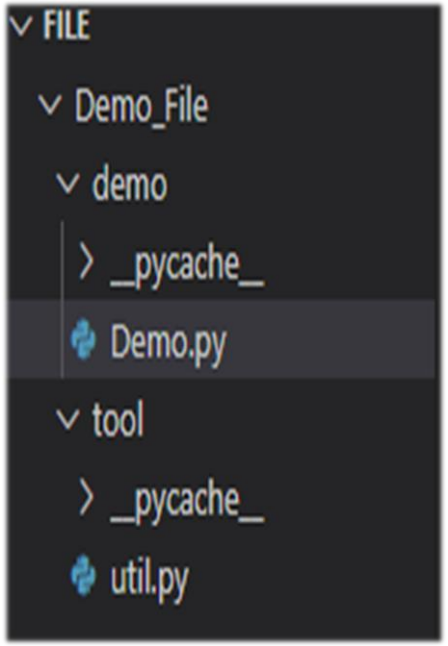
Module (Different Folder Import)

Add Project package path as below with ***.pth*** file for python to Identify your package module

**AppData\Local\Programs\Python\Python310\Lib\site-packages*



Module(Different Folder Import)




```
#util.py

def example1():
        print("example1 function")

def example2():
        print("example2 function")
```

```
#Demo.py

from Demo_File.tool import util

util.example1()

util.example2()
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
example1 function
example2 function
```

Module (if __name__ == "__main__":)

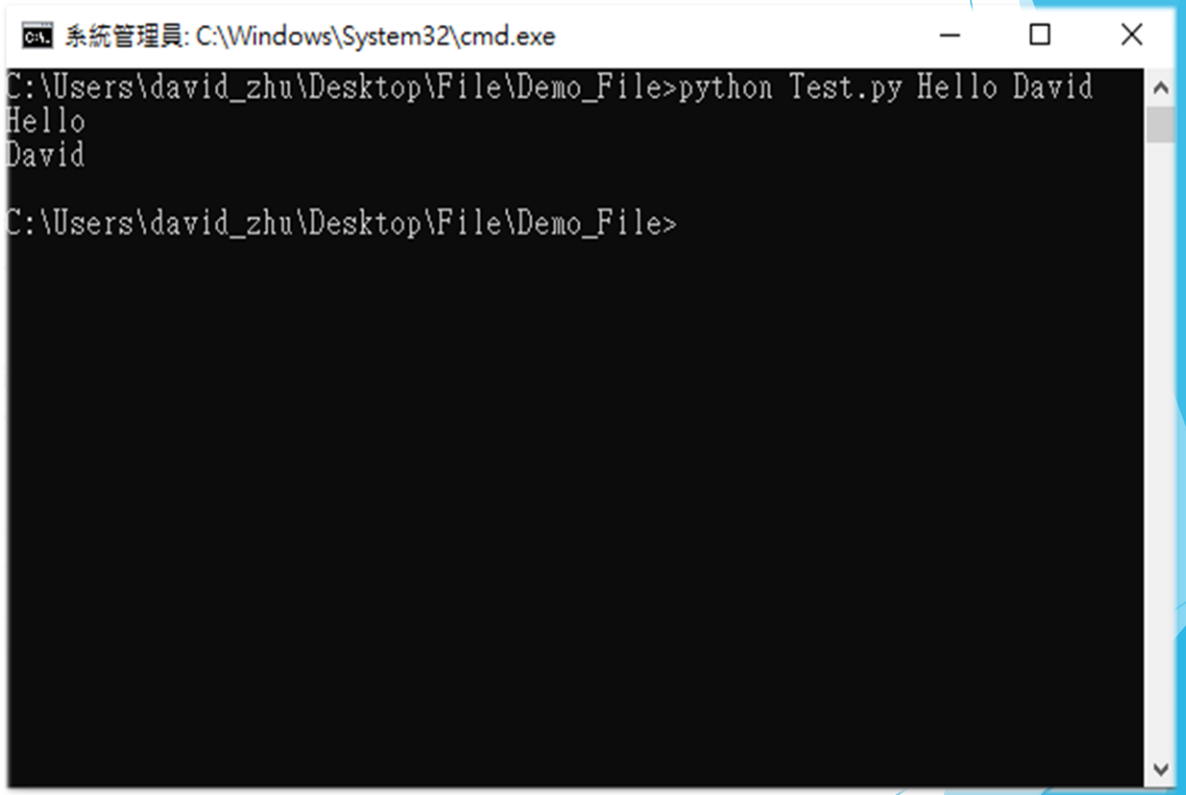
```python
#Test.py

def example1():
    print("example1 function")

def example2():
    print("example2 function")

if __name__ == "__main__":
    print("Under 'Test.py' module")
```

```python
#import.py

import Test

Test.example1()

Test.example2()
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
example1 function
example2 function
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
Under 'Test.py' module
```

Module (Library modules)

```
#temp.py
import sys

def example1(n):
        print(n)

def example2(m):
        print(m)

if __name__ == "__main__":
    example1(str(sys.argv[1]))
    example2(str(sys.argv[2]))
```



Exception

Exception (Error Type)

Exception (***checking***)

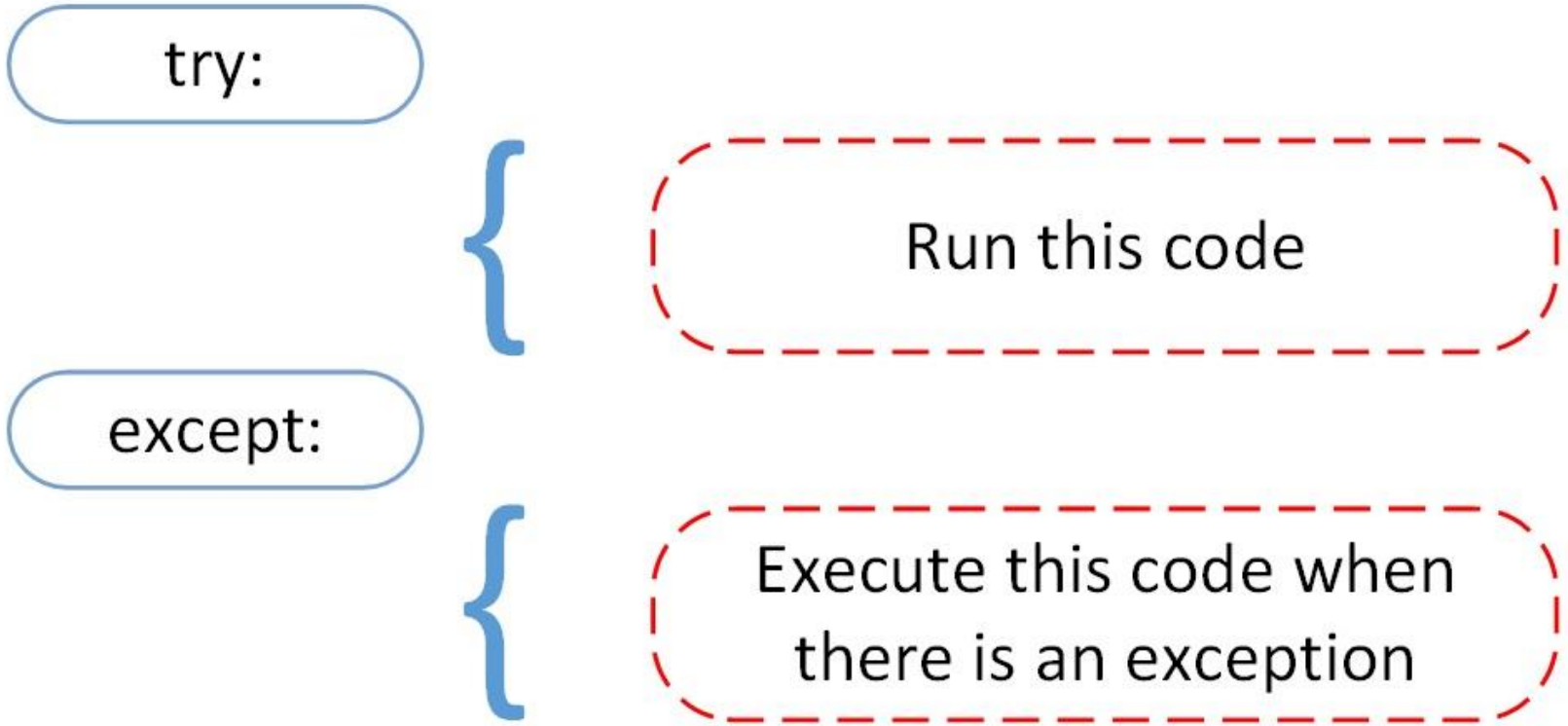
EX : ValueError, NameError, TypeError

Runtime Exception (***unchecking***)

EX : OS crash, HW component error …….

Can’t be catch by python.

Exception (Error Type)



Exception (Error)

```
# Exception error

Number = int(input( "Please enter a number : "))
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Examp
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-mai
Please enter a number : string
Traceback (most recent call last):
  File "c:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\
    Number = int(input( "Please enter a number : "))
ValueError: invalid literal for int() with base 10: 'string'
```

Exception (try_catch)

```
# Exception error

try:
    Number = int(input("Please enter a number: "))

except ValueError:
    print("Oops!  That was no valid number.  Try again...")

else:
    print("Input successfully")

finally:
    print("Code by David")
```

```
Please enter a number: string
Oops!  That was no valid number.  Try again...
Code by David
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
Please enter a number: 5
Input successfully
Code by David
```

Object-oriented Programming

Object-oriented Programming

1. Encapsulation 封裝：一種將函式介面的實作細節部份包裝、隱藏起來的方法，它也是一種***防止外界呼叫端，去存取物件內部實作細節的手段***。

2. Inheritance 繼承：繼承可以使得***子類具有父類別別的各種屬性和方法***，而不需要再次編寫相同的代碼。

3. Polymorphism 多型：指為不同資料類型的實體提供統一的介面，***透過不同的實例化物件來呼叫相同的方法可以達到不同的實作方式。***

Class (類別)

```
# Class sample

class baseClassName:
    <statement-1>
    .
    .
    .
    <statement-N>
```

Class (類別)

```
# Animal Class

class baseAnimal:                    # baseAnimal class
    string = "Is not a animal"

    def animal(self):
        print("Is a animal")

X = baseAnimal()                     # 實例化
print(X.string)                      # Call string
X.animal()                           # Call animal method
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
Is not a animal
Is a animal
```

Class (匿名物件)

```
# Animal Class

class baseAnimal:                          # baseAnimal class
    string = "Is not a animal"

    def animal(self):
        print("Is a animal")

print(baseAnimal().string)          # Call string
baseAnimal().animal()               # Call animal method
```

#以匿名物件的方式省略實例化的動作來使用物件內的方法

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/Python_Introduction-main/
Is not a animal
Is a animal
```

Class (__init__ 建構子)

```
# Animal Class

class baseAnimal:

    def __init__(self, name, species):
        self.name = name
        self.species = species

    def animal(self):
        print("Is a animal")

X = baseAnimal('LaLa', 'Cat')
print(X.name)
print(X.species)
X.animal()

#__init__ 作為設定物件初始化資料使用
#__init__ 附帶宣告的變數會成為實例化時需要的參數
```

```
PS C:\Users\david_zhu\Desktop\Python_Intro
thon.exe "c:/Users/david_zhu/Desktop/Pytho
LaLa
Cat
Is a animal
```

Encapsulation (封裝)

```
# Animal Class

class baseAnimal:

    def __init__(self, name, species):
        self.__name = name
        self.__species = species

    def animal(self):
        print("Is a animal")

X = baseAnimal('LaLa', 'Cat')
print(X.__name)
print(X.__species)
X.animal()
```

#透過封裝防止內部資料直接被外部呼叫

```
Traceback (most recent call last):
  File "c:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Intr
    print(X.__name)
AttributeError: 'baseAnimal' object has no attribute '__name'
```

Encapsulation (封裝)

```
# Animal Class

class baseAnimal:

    def __init__(self, name, species):
        self.__name = name
        self.__species = species

    def getAnimalName(getname):
        return getname.__name

    def getAnimalSpecies(getspecies):
        return getspecies.__species

X = baseAnimal("LaLa","Cat")
print(X.getAnimalName())
print(X.getAnimalSpecies())

#透過 Method 回傳被封裝的資料
```

```
PS C:\Users\david_zhu\Desktop\Python_I
thon.exe "c:/Users/david_zhu/Desktop/P
LaLa
Cat
```

Inheritance (繼承)

```
# Inheritance

class DerivedClassName(BaseClassName):
    <statement-1>
    .
    .
    .
    <statement-N>
```

Inheritance (繼承)

```
# Animal Class

class baseAnimal:

    def __init__(self, name, species):
        self.__name = name
        self.__species = species

    def getAnimalName(self):
        return self.__name

    def getAnimalSpecies(self):
        return self.__species

class cat(baseAnimal):
    def update(self):
        return "喵喵叫"

X = cat("LaLa","Cat")
print(X.getAnimalName())    #透過繼承取得父類別 Method
print(X.getAnimalSpecies())
print(X.update())           #依然可使用自己類別的 Method
```

```
PS C:\Users\david_zhu\Desktop\Python_Introdu
thon.exe "c:/Users/david_zhu/Desktop/Python_
LaLa
Cat
喵喵叫
```

Inheritance (多重繼承)

```
# Animal Class

class baseAnimal:
    def __init__(self, name):
        self.__name = name
    def getAnimalName(self):
        return self.__name

class baseAnimal2:
    def __init__(self, species):
        self.__species = species
    def getAnimalSpecies(self):
        return self.__species

class cat(baseAnimal, baseAnimal2):
    def __init__(self, name, specie):
        baseAnimal.__init__(self,name)
        baseAnimal2.__init__(self,specie)
    def update(self):
        return "喵喵叫"

X = cat("LaLa","Cat")
print(X.getAnimalName())    #透過多重繼承取得兩個父類別 Method
print(X.getAnimalSpecies())
print(X.update())           #多重繼承後依然可使用自己類別的 Method
```

```
PS C:\Users\david_zhu\Desktop\Python_Introdu
thon.exe "c:/Users/david_zhu/Desktop/Python_
LaLa
Cat
喵喵叫
```

Inheritance (覆寫)

```
# Animal Class

class baseAnimal:

    def __init__(self, name, species):
        self.__name = name
        self.__species = species

    def getAnimalName(self):
        return self.__name

    def getAnimalSpecies(self):
        return self.__species

class cat(baseAnimal):
    def update(self):
        return "喵喵叫"

    def getAnimalSpecies(self): #以相同名稱的 Method覆寫父類別
        return "我是貓咪"

X = cat("LaLa","Cat")
print(X.getAnimalName())    #透過繼承取得父類別 Method
print(X.getAnimalSpecies())
print(X.update())           #依然可使用本身類別的 Method
```

```
PS C:\Users\david_zhu\Desktop\Python_Intro
.exe "c:/Users/david_zhu/Desktop/Python_In
LaLa
我是貓咪
喵喵叫
```

Inheritance (super ())

```
# Animal Class

class baseAnimal:

    def __init__(self, name, species):
        self.__name = name
        self.__species = species

    def getAnimalName(self):
        return self.__name

    def getAnimalSpecies(self):
        return self.__species

class cat(baseAnimal):
    def update(self):
        return "喵喵叫"

    def getAnimalSpecies(self):       #以相同名稱的 Method 覆寫父類別
        return super().getAnimalSpecies()  #以 super() 調用父類別 Method

X = cat("LaLa","Cat")
print(X.getAnimalName())
print(X.getAnimalSpecies())
```

```
PS C:\Users\david_zhu\Desktop\Python_Introdu
thon.exe "c:/Users/david_zhu/Desktop/Python_
LaLa
Cat
喵喵叫
```

Abstract Method (抽象方法)

```
# Abstract Class

from abc import ABC, abstractmethod

class baseAnimal(ABC):          #繼承於 python內建的抽象類別
    @abstractmethod
    def getAnimalName(getname):
        pass
    @abstractmethod
    def getAnimalSpecies(getspecies):
        pass

animal = baseAnimal()
#抽象類別無法被直接實例化
```

```
Traceback (most recent call last):
  File "c:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\Example Code\Test.py", line 13, in <module>
    animal = baseAnimal()
TypeError: Can't instantiate abstract class baseAnimal with abstract methods getAnimalName, getAnimalSpecies
```

Abstract Method (抽象方法)

```
# Abstract Class

from abc import ABC, abstractmethod

class baseAnimal(ABC):
    @abstractmethod
    def getAnimalName(getname):
        pass
    @abstractmethod
    def getAnimalSpecies(getspecies):
        pass

class cat(baseAnimal):

    def __init__(self,name,species):
        self.name = name
        self.species = species

    def getAnimalName(self):  #以相同的 Function 名稱實現 overwrite
        return self.name

    def getAnimalSpecies(self):
        return self.species

cat1 = cat("Lala","橘貓")
print(cat1.getAnimalName())
print(cat1.getAnimalSpecies())
#抽象類別需透過繼承來實現，並 overwrite 抽象方法
```

```
PS C:\Users\david_zhu\Desktop\Python_Introduction-main\Python_I
thon.exe "c:/Users/david_zhu/Desktop/Python_Introduction-main/P
Lala
橘貓
```

Abstract Method (抽象方法)

```python
# Abstract Class

from abc import ABC, abstractmethod

class baseAnimal(ABC):
    @abstractmethod
    def getAnimalName(getname):
        pass
    @abstractmethod
    def getAnimalSpecies(getspecies):
        pass

class cat(baseAnimal):

    def __init__(self,name,species):
        self.name = name
        self.species = species

    def getAnimalName(self):
        return self.name

cat1 = cat("Lala","橘貓")

#抽象類別可以強制繼承時所要實作的方法
#若沒有在繼承時將抽象類別的方法實作則會產生 error
```

```
Traceback (most recent call last):
  File "c:\Users\david_zhu\Desktop\Python_Introduction-main\Python_Introduction-main\E
ile\Test.py", line 22, in <module>
    cat1 = cat("Lala","橘貓")
TypeError: Can't instantiate abstract class cat with abstract method getAnimalSpecies
```

Polymorphism (多型)

```
# Polymorphism

class cat:
    def __init__(self,name,species):
        self.name = name
        self.species = species

    def getAnimalName(self):
        print("我叫",self.name)

    def getAnimalSpecies(self):
        print("我是",self.species)

class dog:
    def __init__(self,name,species):
        self.name = name
        self.species = species

    def getAnimalName(self):
        print("我叫",self.name)

    def getAnimalSpecies(self):
        print("我是",self.species)
```

```
cat1 = cat("Lala","橘貓")
cat2 = cat("YoYo","虎斑貓")

dog1 = dog("RuRu", "柴犬")
dog2 = dog("QQ", "吉娃娃")


cat1.getAnimalName()    #透過不同的實例化物件來呼叫 Method
cat1.getAnimalSpecies()

cat2.getAnimalName()
cat2.getAnimalSpecies()

dog1.getAnimalName()    #透過不同的實例化物件來呼叫 Method
dog1.getAnimalSpecies()

dog2.getAnimalName()
dog2.getAnimalSpecies()


#透過不同的實例化物件來呼叫相同的 Method 可以達到不同的實作方式
```

```
0/python.exe "c:/Users/david_zhu/
我叫 Lala
我是 橘貓
我叫 YoYo
我是 虎斑貓
我叫 RuRu
我是 柴犬
我叫 QQ
我是 吉娃娃
```

Reference

Python download
https://www.python.org/downloads/

Visual Studio Code download
https://code.visualstudio.com/download

Anaconda download
https://www.anaconda.com/products/individual

Python Document
https://docs.python.org/zh-tw/3/tutorial/index.html

Python Learn by example
https://www.learnbyexample.org/python-introduction/

Q&A