Python
File (Simple)

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開啟檔案

- <file> = open(<filename>, <mode>)
  - <file>：開啟檔案物件
  - <filename>：檔名
  - <mode>：開檔模式
    - r: 唯讀
    - w (write):覆蓋寫入內容
    - a (append): 在後加入新內容

```
infile = open('hello.txt', 'r') # 以讀取模式開檔
outfile = open('hello.txt', 'w') # 以寫入模式開檔
```

r	**開啟檔案只讀取**
rb	開啟檔案只讀取格式為 binary
r+	開啟檔案可讀取寫入
rb+	開啟檔案可讀取寫入binary
w	開啟檔案只寫入
w+	可讀取可寫入模式
wb	開啟檔案只寫入二進位格式
a	只允許新增
a+	允許新增與讀取

關閉檔案

- <file>.close() #將緩衝區內容寫入檔案，關閉檔案
  - 檔案讀寫可能產生IOError，而不會呼叫fp.close()造成關檔錯誤 。
  - 為保證是否出錯都正確關閉檔案，可使用try ... finally

```
try:
  fp = open('hello.txt', 'r')
  print(fp.read())
  fp.write('test')
except FileNotFoundError:
  print("file not found")
except:
  print("Something wrong")
finally:
  fp.close()
```

- 用with 開檔，若錯誤，檔案仍會自動關閉，錯誤情境：
  - 執行 return, continue, break跳出 with 指令區塊
  - 發生例外 (Exception)

```
with open('hello.txt', 'r') as fp:
```

讀取檔案

- <file>.read()
  - 讀取全部或剩餘資料，回傳長字串
- <file>.readline()
  - 讀取下一行資料，回傳字串
  - 利用迴圈一次讀一行資料

```
with open('filename.txt', 'r') as infile:
    while True:
        data = infile.readline()    # 一次讀一行資料
        print(type(data))
        print(data)
        if not data:                # 所有資料讀取完畢
            break
        print(line, end='')         # end='': 不要自動加換行
```

讀取檔案

- <file>.readlines()
  - 讀取全部或剩餘資料，
  - 回傳串列，每個元素都是一行資料

```
with open('filename.txt', 'r') as fp:
    data2 = fp.readlines()
    print(type(data2))
    print(data2)
```

```
with open('filename.txt', 'r') as infile:
    for line in infile.readlines():   # 一次讀取所有資料，再一行一行處理
        print(line, end='')
```

```
# Python 讀檔將每行資料存到串列中的元素，上述程式可簡化
with open('filename.txt', 'r') as infile:
    for line in infile:
        print(line, end='')
```

寫檔 4 個方法

- write
- writelines

```
# 開啟檔案
fp = open("out.txt", "a")
# 寫入 This is a testing! 到檔案緩衝區
fp.write("This is a testing!")
#將緩衝區寫入檔案，關閉檔案
fp.close()
```

```
# 開啟檔案
fp = open("filename.txt", "w")
# 將 lines 所有內容寫入到緩衝區
lines = ["One\n", "Two\n", "Three\n"]
fp.writelines(lines)
#將緩衝區寫入檔案，關閉檔案
fp.close()
```

- print

```
# 開啟檔案
fp = open("out.txt", "a")
# 寫入 This is a testing! 到檔案緩衝區
print("This is a testing!\n", file=fp)
#將緩衝區寫入檔案，關閉檔案
fp.close()
```

- with open

```
text = ["this is ","a book"]
with open("out.txt", 'a') as out_file:
    for line in text:
        out_file.write(line)
```

Exercise

- 利用迴圈一次讀一行資料，將偶數行資料印出

```
with open('filename.txt', 'r') as infile:
    line_num=0
    for line in f
        line_num+=1
        if line_num%
            print(line, end='')
```

- 一次讀取、印出多行資料，將全部資料的第一個字與最後一個字印出

```
fp = open('hello.txt', 'w')
fp.write("First line\n#Second line\n#Third")
fp.close()
with open('hello.txt', 'r') as infile:
    data = infile.r
    print(data)
    print(data[0], data[-1])
```

讀寫檔案

- 顯示檔案所有行，忽略以#開頭的行

```
with open("hello.txt") as f:
    for line in f:
        if line.strip()[0] !=  "#":
            print(line)
```

- 把passwd檔案中'root'字串用'west'替換，另存tmp檔案

```
with open("passwd.txt") as f1:
    # 遍歷檔案的每一行內容；
    for line in f1:
        # 字串替換
        bline = line.replace("root", "west")
        with open("tmp", "a+") as f2:
            # 寫入新檔案
            f2.write(bline)
```

```
root    word
user    pass
```

```
west    word
user    pass
```

Exercise

- 讀取English.txt檔案，將其中xi 字串以yi 替換，

```
I love cat and love dog, but I am afraid of tiger.
```

- X, Y 分別存在 translate.txt檔案的第一 row和第二row
  - X =[xi], Y=[yi]，X是英文，Y是中文翻譯

```
cat dog tiger
貓 狗 老虎
```

- 存檔Chinese.txt+

```
I love 貓 and love 狗, but I am afraid of 老虎.
```

Exercise

- code

```
def getHeader():  #讀取檔案第0行和第2行
    i=0
    with open('translate.txt', 'r',encoding="utf-8") as infile:
        for line in infile:
            if i==0:
                eng=line.split()
            else:
                chi=line.split()
            i = i +1
    return eng, chi
```

```
def convert(aFile, bFile, eng, chi):
    f1 = open(aFile,encoding="utf-8")
    f2 = open(bFile,'w',encoding="utf-8")
    data = f1.read()
    #zip將eng, chi打包成 tuple
    for e, c in zip(eng, chi):
        data = data.replace(e, c)
        print(e,c, data)
    print(data, '####')
    f2.write(data)
    f1.close()
    f2.close()

eng, chi = getHeader()
convert('English.txt', 'Chinese.txt', eng, chi)
```

讀取CSV檔案

班級,學號,期中考成績
一甲,110591052,80
一甲,110591053,90
一乙,110591054,85
一丙,110591055,75
一丙,110591056,95
一丙,110591057,80
一丙,110591058,90
一乙,110591059,100
一乙,110591060,85
一乙,110591061,95

- csv.reader()讀取csv資料，一列一列印出

```
import csv
#f= open('data.csv', encoding='utf-8')
f= open('data.csv')
readFile = csv.reader(f)          #<_csv.reader object at 0x0000025AE3EE2EC0>
print(readFile)
for row in readFile:
    print(row)
f.close()
```

- 使用with開啟csv檔案
  - 加上 newline=''，為讓資料中包含的換行符號可正確解析

```
import csv
with open('data.csv', newline='') as csvfile:
    readFile = csv.reader(csvfile)
    for row in readFile:
        print(row)
```

讀取CSV檔案

- 指定分隔符號
  - 資料欄位分隔符號非使用預設逗號，而是其他符號，讀取時要指定分隔符號

```
import csv
with open('data2.csv', newline='') as csvfile:
    readFile = csv.reader(csvfile, delimiter=':')
    for row in readFile:
        print(row)
```

```
班級:學號:期中考成績
一甲:110591052:80
一甲:110591053:90
一乙:110591054:85
一丙:110591055:75
一丙:110591056:95
一丙:110591057:80
一丙:110591058:90
一乙:110591059:100
一乙:110591060:85
一乙:110591061:95
```

讀取CSV檔案

- class.csv

```
班級,學號,期中考成績
一甲,110591052,80
一甲,110591053,90
一乙,110591054,85
一丙,110591055,75
一丙,110591056,95
一丙,110591057,80
一丙,110591058,90
一乙,110591059,100
一乙,110591060,85
一乙,110591061,95
```

- 讀取csv 檔案內容後，轉為dictionary 格式
  - csv.DictReader()自動把第一列(row)當作欄位名稱，第二列後的每一列轉為 dictionary，如此可以使用欄位名稱存取資料

```
import csv
with open('class.csv', newline='') as csvfile:
    readFile = csv.DictReader(csvfile)
    print(readFile)          #印出 <csv.DictReader object at 0x0000025AE3F9F010>
    for row in readFile:
        print(row['班級'], row['學號'], row['期中考成績'])
```

寫入CSV檔案

- 一次寫入二維表格
  - 若資料是已整理好二維表格，可一次把整張表格寫進 csv 檔案

```
import csv
# 二維表格
table = [['班級', '學號', '成績'],
         ['資工一', '109590001', 90],
         ['資工一', '109590002', 85]]
with open('output.csv', 'w', newline='') as csvfile:
    writer = csv.writer(csvfile)
    writer.writerows(table)    # 寫入二維表格
```

- 寫入 Dictionary
  - 資料格式是 dictionary，可使用 csv.DictWriter()寫入 csv 檔案中

```
import csv
with open('output.csv', 'w', newline='') as csvfile:
    columns = ['班級', '學號', '成績']
    # 將 dictionary 寫入 CSV 檔
    writer = csv.DictWriter(csvfile, fieldnames=columns, delimiter=':')
    writer.writeheader()   # 寫入第一列的欄位名稱
    writer.writerow({'班級': '資工一', '學號': '109590003', '成績': 95})   # 寫入資料
    writer.writerow({'班級': '資工一', '學號': '109590004', '成績': 88})   # 寫入資料
```

delimiter=':' is optional

Exercise

- 一行一行讀檔案 score.txt
  - 計算平均，將平均寫到最下面

Input file: score.txt

```
班級,學號,期中考成績,
資工一,109590001,88,
資工一,109590002,90,
資工一,109590003,92,
資工一,109590004,85,
資工一,109590005,87,
資工一,109590006,95,
資工一,109590007,80,
資工一,109590008,84,
資工一,109590009,86,
資工一,109590010,83,
```

Output file: avg_score.txt

```
Class,Student ID,Score,
資工一,109590001,88,
資工一,109590002,90,
資工一,109590003,92,
資工一,109590004,85,
資工一,109590005,87,
資工一,109590006,95,
資工一,109590007,80,
資工一,109590008,84,
資工一,109590009,86,
資工一,109590010,83,
平均,,87.0,
```

Exercise

- 製作一個csv檔 score.csv
  - 一行一行讀檔案 score.csv，製作成字典
  - 計算每位學生平均，寫在學生資料最後，計算全班平均，寫到最下面

Input file: score.csv

```
班級,學號,國文,數學,英文
資工一,109590001,80,80,80
資工一,109590002,90,90,90
資工一,109590003,70,70,70
資工一,109590004,60,60,60,
```

Output file: output.csv

```
Class,Student ID,average,
資工一,109590001,80,
資工一,109590002,90,
資工一,109590003,70,
資工一,109590004,60,
75,75,75,75
```

Exercise

- 製作一個csv檔 score.csv
  - 一行一行讀檔案 score.csv，製作成字典
  - 計算每位學生平均，寫在學生資料最後，計算全班平均，寫到最下面
- 輸出成 output.csv

score.csv
班級,學號,國文,數學,英文
資工一,109590001,80,80,80
資工一,109590002,90,90,90
資工一,109590003,70,70,70
資工一,109590004,60,60,60,

Output.csv
Class,Student ID,average,
資工一,109590001,80,
資工一,109590002,90,
資工一,109590003,70,
資工一,109590004,60,
75,75,75,75

Exercise

```
import csv
def trans(row):
    data = {}
    score = 0
    subject = ['國文','英文','數學']
    for key, value in row.items():
        print('=>', key, value)
        if key in subject:
            score = score + int(value)
    for key, value in row.items():
        if
        eli
    data['average'] = score//3
    return data

with open('x.csv', newline='') as csvfile:
    readFile = csv.DictReader(csvfile)
    #print(readFile)
    inData = []
    for row in readFile:
        inData.append(trans(row))
print(inData)

with open('y.csv', 'w', newline='') as csvfile:
    #columns = ['班級', '學號','國文','數學','英文']
    columns = ['Class', 'Student Id','average']
    # 將 dictionary 寫入 CSV 檔
    writer = csv.DictWriter(csvfile, fieldnames=columns, delimiter=',')
    writer.writeheader()  # 寫入第一列的欄位名稱
    for data in inData:
        # 寫入資料
```

END