Massive Information &
Knowledge Engineering

Problem Solving using List and Dictionary in Python

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Grade Calculator Problem

- studDic = {

```
'Kun Toto': {'Physic I': 'A', 'Lab Physic I': 'C+', 'Thai
Lang Com': 'B+', 'Land of Smile': 'D', 'Intro Japanese':
'B+'},

'Somchai Rukdee': {'Lab Physic I': 'B+', 'Physic I': 'B',
'Math I': 'C', 'Com    Programming': 'D', 'Thai Lang Com':
'F', 'Art of Living': 'A', 'Land of Smile':   'A'}}
```

Helping Data Structures

- `subList = ['Physic I', 'Lab Physic I', 'Math I', 'Com Programming', 'Thai Lang Com', 'Art of Living', 'Land of Smile', 'Intro Japanese']`
- `subDic = {'Physic I': 3, 'Lab Physic I': 1, 'Math I': 3, 'Com Programming': 3, 'Thai Lang Com': 3, 'Art of Living': 3, 'Land of Smile': 3, 'Intro Japanese': 3}`
- `grade = {'A':4,'B+':3.5,'B':3,'C+':2.5,'C':2,'D+':1.5,'D':1,'F':0}`

Browse into the studDic

```
01 studDic = {'Kun Toto': {'Physic I': 'A', 'Lab Physic I': 'C+',
   'Thai Lang Com': 'B+', 'Land of Smile': 'D', 'Intro Japanese':
   'B+'}, 'Somchai Rukdee': {'Lab Physic I': 'B+', 'Physic I':
   'B', 'Math I': 'C', 'Com Programming': 'D', 'Thai Lang Com':
   'F', 'Art of Living': 'A', 'Land of Smile': 'A'}}
02 for n,v in studDic.items():
03   print(f'Name: {n}\n{v}')
```

Browse into the studDic /2

```
01 for n,v in studDic.items():
02    print(f'Name: {n}’)
03    for s,g in v.items():
04      print(f'{s} ({g})', end=' ')
05    print()
```

Dictionary key->subject, value->grade

Browse into the studDic /3

```
01 for n,v in studDic.items():
02    print(f'Name: {n}’)
03    #for s,g in v.items():
04    #  print(f'{s} ({g})', end=' ')
05    #print()
06    calGrade(v)
```

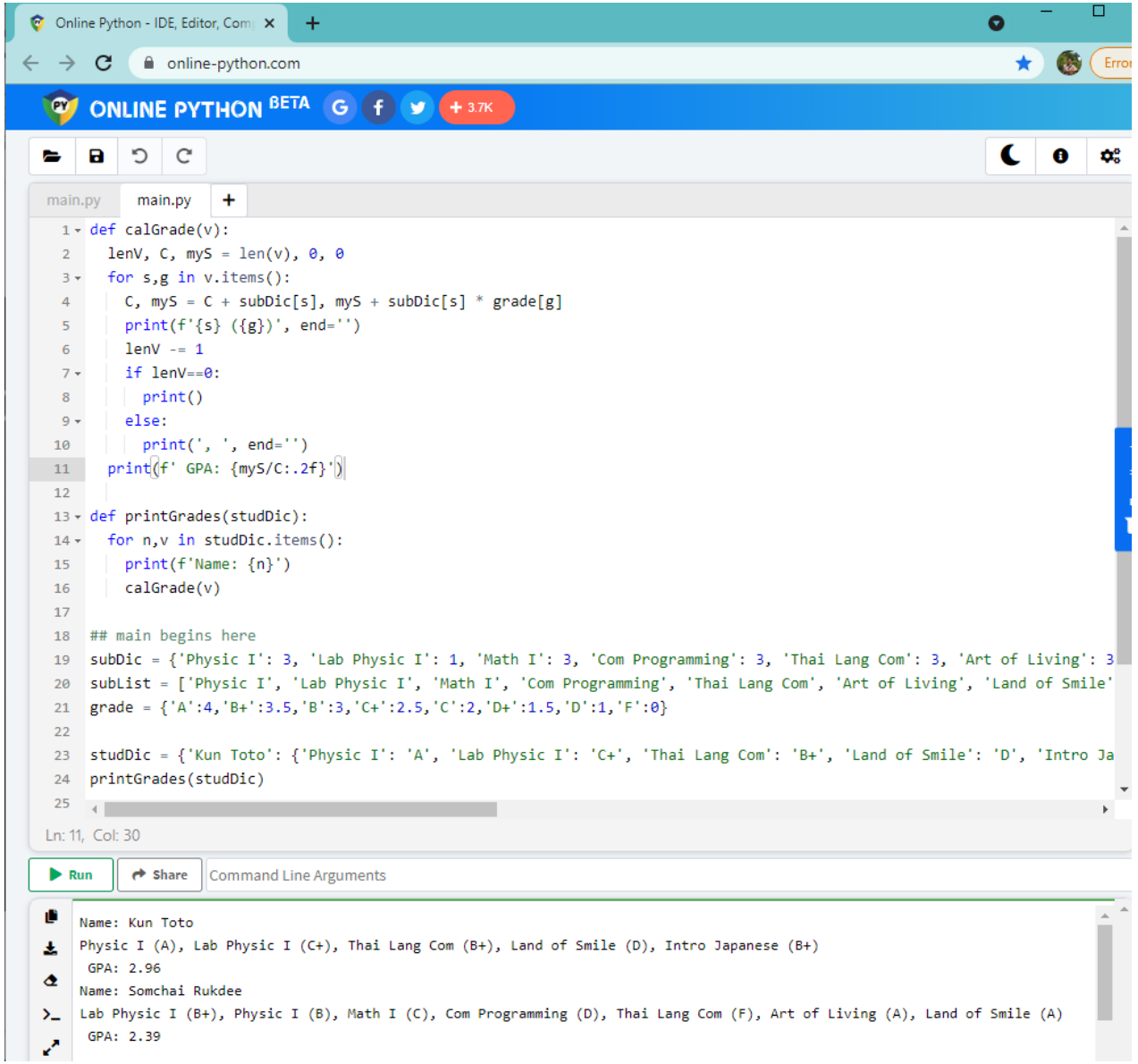
```
01 def calGrade(v):
02    lenV = len(v)
03    for s,g in v.items():
04       print(f'{s} ({g})', end='')
05       lenV -= 1
06       if lenV==0:
07          print()
08       else:
09          print(', ', end='')
```

calGrade()

```
01 def calGrade(v):
02   lenV = len(v)
03   for s,g in v.items():
04     print(f'{s} ({g})', end='')
05     lenV -= 1
06     if lenV==0:
07       print()
08     else:
09       print(', ', end='')
```

```
01 def calGrade(v):
02   lenV, C, myS = len(v), 0, 0
03   C, myS = C+subDic[s], myS+
                subDic[s]*grade[g]
04   for s,g in v.items():
05     print(f'{s} ({g})', end='')
06     lenV -= 1
07     if lenV==0:
08       print()
09     else:
10       print(', ', end=‘’)
11   print(f' GPA: {myS/C:.2f}')
```

BreakOut01


Online Python - IDE, Editor, Com
online-python.com
ONLINE PYTHON BETA
+ 3.7K
main.py
main.py
def calGrade(v):
lenV, C, myS = len(v), 0, 0
for s,g in v.items():
C, myS = C + subDic[s], myS + subDic[s] * grade[g]
print(f'{s} ({g})', end='')
lenV -= 1
if lenV==0:
print()
else:
print(', ', end='')
print(f' GPA: {myS/C:.2f}')
def printGrades(studDic):
for n,v in studDic.items():
print(f'Name: {n}')
calGrade(v)
main begins here
subDic = {'Physic I': 3, 'Lab Physic I': 1, 'Math I': 3, 'Com Programming': 3, 'Thai Lang Com': 3, 'Art of Living': 3
subList = ['Physic I', 'Lab Physic I', 'Math I', 'Com Programming', 'Thai Lang Com', 'Art of Living', 'Land of Smile'
grade = {'A':4,'B+':3.5,'B':3,'C+':2.5,'C':2,'D+':1.5,'D':1,'F':0}
studDic = {'Kun Toto': {'Physic I': 'A', 'Lab Physic I': 'C+', 'Thai Lang Com': 'B+', 'Land of Smile': 'D', 'Intro Ja
printGrades(studDic)
Ln: 11, Col: 30
Run
Share
Command Line Arguments
Name: Kun Toto
Physic I (A), Lab Physic I (C+), Thai Lang Com (B+), Land of Smile (D), Intro Japanese (B+)
GPA: 2.96
Name: Somchai Rukdee
Lab Physic I (B+), Physic I (B), Math I (C), Com Programming (D), Thai Lang Com (F), Art of Living (A), Land of Smile (A)
GPA: 2.39

How could we get studDic?

- studDic = {

  'Kun Toto': {'Physic I': 'A', 'Lab Physic I': 'C+', 'Thai Lang Com': 'B+', 'Land of Smile': 'D', 'Intro Japanese': 'B+'},

  'Somchai Rukdee': {'Lab Physic I': 'B+', 'Physic I': 'B', 'Math I': 'C', 'Com Programming': 'D', 'Thai Lang Com': 'F', 'Art of Living': 'A', 'Land of Smile': 'A'}}

printSubjMenu()

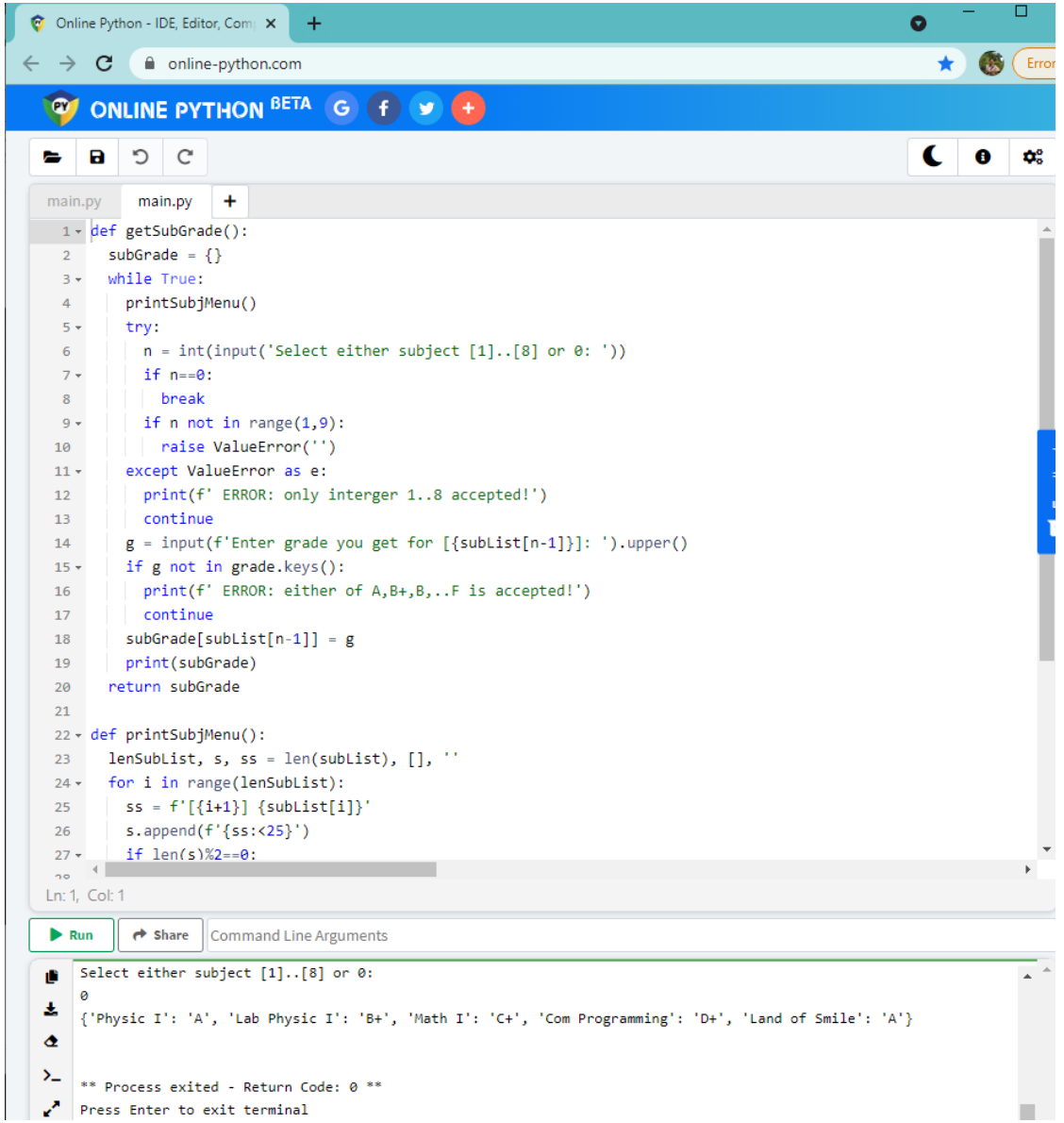
```
01 def printSubjMenu():
02    lenSubList, s, ss =
          len(subList), [], ''
03    for i in range(lenSubList):
04       ss = f'[{i+1}] {subList[i]}'
05       s.append(f'{ss:<25} ')
06       if len(s)%2==0:
07          print(s[0],s[1])
08          s = []
```

From helping data structures, we can easily draw a simple menu like this.

```
[1] Physic I              [2] Lab Physic I
[3] Math I                [4] Com Programming
[5] Thai Lang Com         [6] Art of Living
[7] Land of Smile         [8] Intro Japanese
```

```
01 subGrade = {}
02 while True:
03   printSubjMenu()
04   try:
05     n = int(input('Select either subject [1]..[8] or 0: '))
06     if n==0:
07       break
08     if n not in range(1,9):
09       raise ValueError('')
10   except ValueError as e:
11     print(f' ERROR: only interger 1..8 accepted!')
12     continue
13   g = input(f'Enter grade you get for [{subList[n-1]}]: ').upper()
14   if g not in grade.keys():
15     print(f' ERROR: either of A,B+,B,..F is accepted!')
16     continue
17   subGrade[subList[n-1]] = g
18   print(subGrade)
```

BreakOut02


Online Python - IDE, Editor, Com
online-python.com
ONLINE PYTHON BETA
main.py
main.py
def getSubGrade():
subGrade = {}
while True:
printSubjMenu()
try:
n = int(input('Select either subject [1]..[8] or 0: '))
if n==0:
break
if n not in range(1,9):
raise ValueError('')
except ValueError as e:
print(f' ERROR: only interger 1..8 accepted!')
continue
g = input(f'Enter grade you get for [{subList[n-1]}]: ').upper()
if g not in grade.keys():
print(f' ERROR: either of A,B+,B,..F is accepted!')
continue
subGrade[subList[n-1]] = g
print(subGrade)
return subGrade
def printSubjMenu():
lenSubList, s, ss = len(subList), [], ''
for i in range(lenSubList):
ss = f'[{i+1}] {subList[i]}'
s.append(f'{ss:<25}')
if len(s)%2==0:
Ln: 1, Col: 1
Run
Share
Command Line Arguments
Select either subject [1]..[8] or 0:
0
{'Physic I': 'A', 'Lab Physic I': 'B+', 'Math I': 'C+', 'Com Programming': 'D+', 'Land of Smile': 'A'}
** Process exited - Return Code: 0 **
Press Enter to exit terminal

Play with BreakOut02

```
01  subGrade = {}
02  while True:
03    name = input('Enter student\'s name or press ENTER to end: ')
04    if name == '':
05      printGrades(studDic)
06      break
07    subjGrade = getSubGrade()
08    print(name, subjGrade)
09    studDic[name] = subjGrade
```

main.py

```
48  def gradeCal():
49      studDic = {}
50      while True:
51          name = input('Enter student\'s name or press ENTER to end: ')
52          if name == '':
53              printGrades(studDic)
54              break
55          subjGrade = getSubGrade()
56          print(name, subjGrade)
57          studDic[name] = subjGrade
58      return studDic
59
60  ## main begins here
61  subDic = {'Physic I': 3, 'Lab Physic I': 1, 'Math I': 3, 'Com Programming': 3, 'Thai
    Lang Com': 3, 'Art of Living': 3, 'Land of Smile': 3, 'Intro Japanese': 3}
62  subList = ['Physic I', 'Lab Physic I', 'Math I', 'Com Programming', 'Thai Lang Com',
    'Art of Living', 'Land of Smile', 'Intro Japanese']
63  grade = {'A':4,'B+':3.5,'B':3,'C+':2.5,'C':2,'D+':1.5,'D':1,'F':0}
64
65  studDic = gradeCal()
```

Console Shell

```
Enter student's name or press ENTER to end:
Name: Kun Toto
Physic I (A), Lab Physic I (C+), Math I (D+), Com Programming (A)
 GPA: 3.10
Name: Somchai Rakdee
Physic I (C+), Lab Physic I (B+), Math I (A), Com Programming (D)
 GPA: 2.60
```

File Handling

```
01 studDic = {'Kun Toto': {'Physic I': 'A', 'Lab Physic I': 'C+', 'Thai Lang Com':
   'B+', 'Land of Smile': 'D', 'Intro Japanese':   'B+'}, 'Somchai Rukdee': {'Lab
   Physic I': 'B+', 'Physic I': 'B',  'Math I': 'C', 'Com Programming': 'D', 'Thai Lang
   Com': 'F', 'Art of Living': 'A', 'Land of Smile': 'A'}}
02 fp = open('studentDic.txt', 'w')
03 for n,v in studDic.items():
04   fp.write(f'{n}')
05   for s,g in v.items():
06     fp.write(f',{s},{g}')
07   fp.write('\n')
08 fp.close()
09 fp = open('studentDic.txt', 'r')
10 s = fp.read()
11 fp.close()
12 print(s)
```

File Handling/2

```
01 studDic = {'Kun Toto': {'Physic I': 'A', 'Lab Physic I': 'C+', 'Thai Lang Com':
   'B+', 'Land of Smile': 'D', 'Intro Japanese':   'B+'}, 'Somchai Rukdee': {'Lab
   Physic I': 'B+', 'Physic I': 'B',  'Math I': 'C', 'Com Programming': 'D', 'Thai Lang
   Com': 'F', 'Art of Living': 'A', 'Land of Smile': 'A'}}
02 with open('studentDic.txt', 'w') as fp:
03   for n,v in studDic.items():
04     fp.write(f'{n}')
05     for s,g in v.items():
06       fp.write(f',{s},{g}')
07     fp.write('\n’)
08
09 with open('studentDic.txt', ‘r') as fp:
10   s = fp.read()
11
12 print(s)
```

main.py

```
1   studDic = {'Kun Toto': {'Physic I': 'A', 'Lab Physic I': 'C+', 'Thai Lang
    Com': 'B+', 'Land of Smile': 'D', 'Intro Japanese':   'B+'}, 'Somchai
    Rukdee': {'Lab Physic I': 'B+', 'Physic I': 'B',  'Math I': 'C', 'Com
    Programming': 'D', 'Thai Lang Com': 'F', 'Art of Living': 'A', 'Land of
    Smile': 'A'}}
2   #print(studDic)
3
4   with open('studentDic.txt', 'w') as fp:
5     for n,v in studDic.items():
6       fp.write(f'{n}')
7       for s,g in v.items():
8         fp.write(f',{s},{g}')
9       fp.write('\n')
10
11  with open('studentDic.txt', 'r') as fp:
12    s = fp.read()
13
14  print(s)
```

Console Shell

```
> s.split('\n')
['Kun Toto,Physic I,A,Lab Physic I,C+,Thai Lang Com,B+,Land of Smile,D,Intro Japane
se,B+', 'Somchai Rukdee,Lab Physic I,B+,Physic I,B,Math I,C,Com Programming,D,Thai
Lang Com,F,Art of Living,A,Land of Smile,A', '']
> s.split('\n')[0]
'Kun Toto,Physic I,A,Lab Physic I,C+,Thai Lang Com,B+,Land of Smile,D,Intro Japanes
e,B+'
> s.split('\n')[0].split(',')
['Kun Toto', 'Physic I', 'A', 'Lab Physic I', 'C+', 'Thai Lang Com', 'B+', 'Land of
 Smile', 'D', 'Intro Japanese', 'B+']
>
```

File Handling/3

```
01 with open('studentDic.txt', 'r') as fp:
02   s = fp.read()
03
04 stdDico = {}
05 for line in s.split('\n'):
06   if line != ‘’:
07     w = line.split(',')
08     n,v = w[0], {}
09     for i in range(1,len(w),2):
10       v[w[i]] = w[i+1]
11     stdDico[n] = v
12 print(stdDico)
13 studDic == stdDico
```

File Handling/4

```
01 stdDico = {}
02
03 with open('studentDic.txt', 'r') as fp:
04   for line in fp:
05     if line != '':
06       w = line.strip().split(',')
07       n,v = w[0], {}
08       for i in range(1,len(w),2):
09         v[w[i]] = w[i+1]
10       stdDico[n] = v
11
12 print(stdDico)
13 studDic == stdDico
```

```
# readline() vs readlines()
fp = open('studentDic.txt', 'r’)
s = fp.readline()

# also try s = fp.readlines()
```

That’s all, folk..

Lorem Ipsum

Dolor Sit Amet

Consectetuer Elit

Nunc Viverra

Lorem Ipsum

Dolor Sit Amet

Consectetuer Elit

Nunc Viverra

Lorem Ipsum

Dolor Sit Amet

Consectetuer Elit

Nunc Viverra