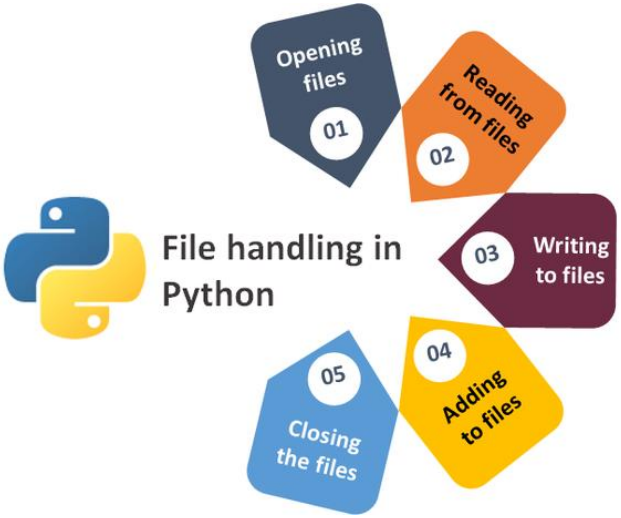
CT60A0203
Introduction to Programming: Python
Week 6

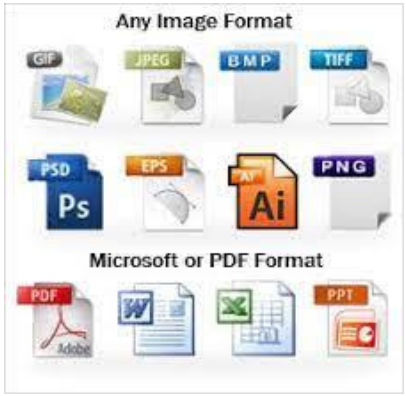
- **Learning objectives: File I/O processing in Python**

- To learn File handling in Python
- To explore properties in Python
- To learn how to seek and manipulated contents of file via programs
- To define member functions for file handling in Python



At the conclusion of this lecutre, students will be able to create, update files via Python code and user defined functions.

- **File:** It is a designated container that mainly used to store data in the forms of text, picture, audio and video in the computer/storage media for future retrieval.



- Why do we need a file to store the information?
  - Because data stored in variables in a program will be lost when program terminates.
  - So, to keep the data received, calculated via programs or other sources we use files as storage cabinet or folder.

- How to create, access, update files via using Python programs?
- Python has file object/library that contains many built-in procedures/functions.

- Refer https://docs.python.org/3/tutorial/inputoutput.html#reading-and-writing-files

➢How to create a new text file and store contents into it?

➢ The key method that mainly used to create, open, update and to close a file is → **open()**

```
# create a new file called "asd.txt if does not exist
# if file already exists then it opens for writing
f1 = open("asd.txt","w")
f1.write("My first file contents")
f1.write("\nsecond line of the file")
f1.close() # closing the file
# if file exists it will open in read mode
f2 = open("asd.txt")  # or f2=open("asd.txt","rt")
print(f2.read()) # read contents of the file
```

```
#open the file already exists and add contents
# otherwise create a new file and add contents
f = open("asd.txt","a")
f.write("\nThird line of the file")
f.write("\nFourth line of the file")
f.close()

f1 = open("asd.txt")
print(f1.read())
```

➢**Assume file is exists with some contents, What will happen if we open the file in "w" mode and try to add some more contents on it?**

```
#open the file already exists in write mode
f = open("xyz.txt","w")
f.write("HelloLUT!")
f.write("HelloHebut!")
f.close()
#open file for reading
f1 = open("xyz.txt")
print(f1.read())
```

xyz.txt

Hello World! Hello Python!

xyz.txt

HelloLUT! HelloHebut!

```
#reading the contents from a file
f = open("customer.txt")
print(f.readline())
print(f.readline())
```

```
Shell
Python 3.7.9 (bundled)
>>> %Run example4.py
  Ashok, M, 46, Lahti

  Saara, F, 32, Nairobi
```

customer.txt

Ashok, M, 46, Lahti
Saara, F, 32, Nairobi
Xiaboo, M, 43, Beijing
Ram, M, 24, Kathmandu

```
#reading the contents from a file
f = open("customer.txt")
#print(f.read())
print(f.readlines())
```

```
Shell
Python 3.7.9 (bundled)
>>> %Run example4.py

  ['Ashok, M, 46, Lahti\n', 'Saara, F, 32, Nairobi\n', 'Xiaboo, M, 43, Beijing\n', 'Ram, M, 24, Kathmandu']

>>>
```

What is the difference between read(), readline(), and readlines()?

➢Now let us use query to pull data in the file!

```
1  #reading the contents from a file
2  f = open("customer.txt")
3  for x in f:
4      if x.find("F,")>=0:
5          print(x)
6  f.close()
```

```
Shell
Python 3.7.9 (bundled)
>>> %Run example5.py

  Saara, F, 32, Nairobi

  Rami, F, 24, Kathmandu
```

customer.txt

Ashok, M, 46, Lahti
Saara, F, 32, Nairobi
Xiaboo, M, 43, Beijing
Rami, F, 24, Kathmandu
Fazil, M, 56, Cairo

```
1  #reading the contents from a file
2  f = open("height.txt")
3  for x in f:
4      if float(x)>150:
5          print(x)
6  f.close()
```

```
Shell
Python 3.7.9 (bundled)
>>> %Run example6.py

  166.50

  170.0

  162.20

  180.0

  156.50
```

height.txt

166.50
170.0
150.0
162.20
180.0
156.50
134.50
145.60

Find the smallest and highest height value listed in the file

➢Some more! with open statement

```
1  with open ("abc.txt","w") as f1:
2      for i in range(10):
3          f1.write(str(i)) # file write can accept only strings
4
5
6  with open ("pqr.txt","w") as f2:
7      for i in range(5):
8          x = int(input("Enter your age:"))
9          if x>18:
10             f2.write(str(x)+"\n")
11 #file closing is not required
```

abc.txt

```
0123456789
```

pqr.txt

```
34
89
19
```

Shell

```
Python 3.7.9 (bundled)
>>> %Run with.py

  Enter your age:34
  Enter your age:17
  Enter your age:89
  Enter your age:-45
  Enter your age:19
```

```
1  def displayfile(filename):
2      with open(filename) as f1:
3          print(f1.read())
4
5  def sortdatafile(fn):
6      with open(fn) as f2:
7          y = f2.readlines()
8          y.sort()
9          for i in y:
10             print(i)
11
12 displayfile("abc.txt")
13 sortdatafile("height.txt")
```

Shell

```
  156.50

  134.50

  145.60
>>> %Run example9.py
  0123456789
  134.50

  145.60
  150.0

  156.50

  162.20

  166.50

  170.0

  180.0

>>>
```

```
1  def displayfile(filename):
2      with open(filename) as f1:
3          print(f1.read())
4
5  displayfile("Z:/Python 2021_Fall/Fall 2021_CT60A0203/Week 6/abc.txt")
6
```

➢Absolute path example

Sorted data

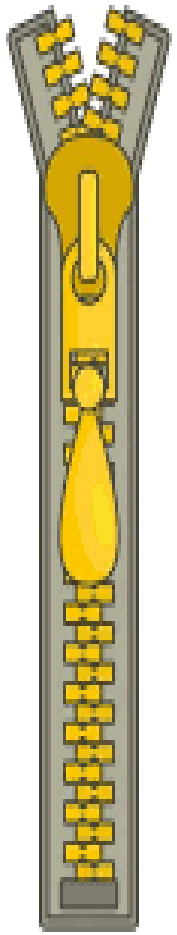
➢Some more! How about zipping the file contents

```
1  with open("firstname.txt") as f1:
2      with open("lastname.txt") as f2:
3          with open ("names.txt","x") as f3:#creates a new file if exists then will throw error
4              f1lines = f1.readlines()
5              f2lines = f2.readlines()
6
7              for l1, l2 in zip(f1lines, f2lines):
8                  f3.write("{} {}\n".format(l1.rstrip(), l2.rstrip()))
9
10 fr = open("names.txt")
11 print(fr.read())
12 fr.close()
```

Shell

```
Python 3.7.9 (bundled)
>>> %Run example8.py

  Ashok Kumar
  Chen Wang
  Peter Larsson
  Mikko Laakso
  Albert Clive
  Priya Raman
  Vicky Eduard
```



firstname.txt

```
Ashok
Chen
Peter
Mikko
Albert
Priya
Vicky
```

lastname.txt

```
Kumar
Wang
Larsson
Laakso
Clive
Raman
Eduard
```

names.txt

```
Ashok Kumar
Chen Wang
Peter Larsson
Mikko Laakso
Albert Clive
Priya Raman
Vicky Eduard
```

➢Recall file modes

File mode	Operation
w	Open a file if exists or create a new file
r	Open an existing file to read
a	Open a file for append (add) or create a new file if not exists and append
x	Create a new file + throw an error if file already exists!

File mode	Operation
w+	Open a file for writing and reading. But program crashes if file does not exist
r+	Open a for file reading and writing. But program crashes if file does not exist
a+	Open a file for appending and reading

➢**Well! the difference between w, r, a, w+, r+, a+?**

➢**https://mkyong.com/python/python-difference-between-r-w-and-a-in-open/#difference-between-r-r-w-w-a-and-a**

➢Code for self study

exampleex3.py

```
1  f1 = open("students.txt") # read student data
2  f2 = open("revisedStudents.txt","w") # write into new file
3  for student in f1: # loop to read data -> end of file
4      s = student.split(",") #split data separated by comma
5      if int(s[2])>0: #the index of grade in a row is 2
6          f2.write(s[0]+","+s[1]+","+s[2].strip()+",P"+"\n")
7      else:
8          f2.write(s[0]+","+s[1]+","+s[2].strip()+",F"+"\n")
9          #strip cut the "\n"
10 f1.close()
11 f2.close()
12 f3 = open("revisedStudents.txt") # read data
13 print(f3.read())
14
```

Shell

```
Python 3.7.9 (bundled)
>>> %Run exampleex3.py

  s101,78,3,P
  s102,0,0,F
  s103,58,1,P
  s104,64,2,P
  s105,46,0,F
  s106,93,5,P
  s107,85,4,P
```

students.txt

```
s101,78,3
s102,0,0
s103,58,1
s104,64,2
s105,46,0
s106,93,5
s107,85,4
```

revisedStudents.txt

```
s101,78,3,P
s102,0,0,F
s103,58,1,P
s104,64,2,P
s105,46,0,F
s106,93,5,P
s107,85,4,P
```

➢Student id, final exam score, grade (students.txt contents)

➢Student id, final exam score, grade, and result[pass/fail] (revisedStudents.txt)