**Level 1: Reading a Text File**

1. Open a new Python Repl and run the following program.

fileHandle = open("myfile.txt","r")

fileContents = fileHandle.read()

print(fileContents)

fileHandle.close()

1. Why does this program produce a run-time error?

This program produces a run-time error because there is no such file that exists by the name “myfile.txt”.

1. Add a text file to your project as follows:
   * Click on “Add File” icon in the files pane/window.
   * Type “myfile.txt” and return.
   * “myfile.txt” is now open in the editor pane/window.
   * Type some text into “myfile.txt”
   * Make sure to add several lines of text

1. Switch back to main.py pile and run the program.
   1. What gets printed out?

The text that I wrote in myfile.txt is displayed.

* 1. Explain the result.

The result displays the information that was written in the file “myfile.txt”.

1. Load and run the following program.

fileHandle = open("myfile.txt","r")

line = fileHandle.readline()

count = 1

while line :

print("Line ", count, " : ",line.strip())

line = fileHandle.readline()

count += 1

fileHandle.close()

1. Compare and contrast the output of the first and second program
   1. How is the read() function similar to the readline() function?

They are similar because both of them display the whole text that is in the file.

* 1. How is the read() function different from the readline() function?

In the readline() function, the program is asking to display the text with the line number mentioned whereas in the read() function, the program is asking to read the whole thing.

1. Research the Python open() function for file I/O (input / output).
   1. How do you specify which file to open?

When you type open(), in the brackets, the name of the file that you would like to open has to be specified.

* 1. Modify the program to open a different file.

fileHandle = open("extrafile.txt","r")

fileContents = fileHandle.read()

print(fileContents)

fileHandle.close()

1. Research how to open a file in a sub-directory.
   1. Modify the second program to open a file in a sub-directory.
   2. Demo your program to Mr. Nestor.
   3. List your program modifications below.

fileHandle = open("subdirectory/hello.txt")

line = fileHandle.readline()

count = 1

while line :

print("Line ", count, " : ",line.strip())

line = fileHandle.readline()

count += 1

fileHandle.close()

**Level 2: Writing a Text File**

1. Research the Python open() function for file I/O (input / output).
   1. What does the file mode “r” mean?

“R” means to read the file.

* 1. What mode is used to open a file for writing?

“W” mode is used to open a file for writing.

* 1. What other file modes can be used? List and explain their meanings.

There are multiple like: r, rb, r+, w, wb, w+, wb+, a, ab, a+, and ab+.

“R” is for reading the file, “w” is for writing in the file, and “a” is for appending the file. Rb is to open a file in binary format as well as open in reading format. W+ is the same as “w” but allows you to read from the file as well. Ab+ is the same as “ab” but also opens for reading.

1. Load and run the following program.

print("Enter test to write to a file")

print("Type STOP to end the program")

print(" ")

lineNumber = 0

while True :

lineNumber += 1

userPrompt = "Enter Line " + str(lineNumber) + " : "

userText = input(userPrompt)

if userText == "STOP" :

break

print(userText)

1. Modify the program to open a text file for writing.
   1. Demo your program to Mr. Nestor
   2. List your program modifications below

fileHandle=open("text.txt", "w")

print("Enter test to write to a file")

print("Type STOP to end the program")

print(" ")

lineNumber = 0

while True :

lineNumber += 1

userPrompt = "Enter Line " + str(lineNumber) + " : "

userText = input(userPrompt)

if userText == "STOP" :

break

print(userText)

1. Replace the line “print(userText)” with a command to write the value of “userText” to an open file.
   1. Verify that text was written to your file
   2. Demo your program to Mr. Nestor
   3. List your program modifications below
2. fileHandle=open("text.txt","w")
3. print("Enter text to write to a file")
4. print("Type STOP to end the program")
5. print(" ")
6. lineNumber = 0
7. while True :
8. lineNumber += 1
9. userPrompt = "Enter Line " + str(lineNumber) + " : "
10. userText = input(userPrompt)
11. if userText == "STOP" :
12. break
13. fileHandle.write(userText)
14. fileHandle.close()

**Level 3: Binary Files**

1. Add a folder to your repl workspace and call it “images”.
2. Locate and download a “BMP” format image file and add it to your images folder.
   1. The file must be a BMP file. JPG, GIF, PNG, etc. will not work
   2. Add the image by using “drag-and-drop” onto your images folder.
   3. You can use the “Penguin.bmp” file from the GitHub Topic B folder if you want
3. Load the following program
   1. Add it to your repl
   2. Modify the “open” command to read your image file
   3. Run the program and examine the data output.

"""

Function to convert 4 bytes (1 word) into a decimal integer

"""

def convertWordToInteger(dataWord) :

result = int(dataWord[3])

result += 256 \* int(dataWord[2])

result += 512 \* int(dataWord[1])

result += 1024 \*int(dataWord[0])

return result

"""

Function to display raw file data

Each data byte is displayed in row order

"""

def dumpRawData(rawData) :

idx = 0

for row in range(8) :

rowText = " ";

for col in range(8) :

rowText += str(rawData[idx]).zfill(3) + " "

idx += 1

print(rowText)

"""

Main program code begins here

- Start with opening and reading the data file

"""

handle = open("Penguin.bmp", "rb")

rawData = handle.read(64)

handle.close()

"""

Print out the RAW data contained at the start of the file

- This is the Header Information

- A BPM (Bitmap) Image has a well defined Header

- Each grouping of bytes has a specific meaning

"""

print(" ")

print("RAW Image Header Data (64 bytes)")

dumpRawData(rawData)

print(" ")

"""

According to the BMP specification the first two bytes

have the value "BM".

"""

print("First Two Bytes")

print(str(rawData[0]).zfill(3), str(rawData[1]).zfill(3))

print(" ")

"""

According to the BMP specification the image Width

is contained in the 4 bytes (1 word) biginning at

position 18

"""

print("Image Width Data")

dataText = str(rawData[18]).zfill(3) + " "

dataText += str(rawData[19]).zfill(3) + " "

dataText += str(rawData[20]).zfill(3) + " "

dataText += str(rawData[21]).zfill(3)

print("Image Width: (raw)", dataText)

dataText = str(rawData[21]).zfill(3) + " "

dataText += str(rawData[20]).zfill(3) + " "

dataText += str(rawData[19]).zfill(3) + " "

dataText += str(rawData[18]).zfill(3)

print("Image Width: (re-ordered)", dataText)

dataWord = [rawData[21],rawData[20],rawData[19],rawData[18]]

print("Image Width: (pixels)", convertWordToInteger(dataWord))

print(" ")

"""

According to the BMP specification the image Height

is contained in the 4 bytes (1 word) biginning at

position 22

"""

print("Image Height Data")

dataText = str(rawData[22]).zfill(3) + " "

dataText += str(rawData[23]).zfill(3) + " "

dataText += str(rawData[24]).zfill(3) + " "

dataText += str(rawData[25]).zfill(3)

print("Image Width: (raw)", dataText)

dataText = str(rawData[25]).zfill(3) + " "

dataText += str(rawData[24]).zfill(3) + " "

dataText += str(rawData[23]).zfill(3) + " "

dataText += str(rawData[22]).zfill(3)

print("Image Width: (re-ordered)", dataText)

dataWord = [rawData[25],rawData[24],rawData[23],rawData[22]]

print("Image Width: (pixels)", convertWordToInteger(dataWord))

print(" ")

"""

END OF PROGRAM

"""

1. Decode the meaning of the first two bytes of data in the header data of a BMP file.
   1. What are the values of the first two bytes?

066 and 077 are the values of the first two bytes.

* 1. Look up the values in an ASCII character table. Google “ASCII Character Table” or Download the ASCII Conversion Chart from the GitHub Topic B folder.
  2. What ASCII characters do these two bytes represent?

066 represents B and 077 represents M.

1. Open and examine the BMP file format specification for the “Signature” data field
   1. Open the URL listed below to access the document
   2. According to the document, the first two bytes of data are the “Signature”
   3. What is the description of the “Signature” in a BMP file?

‘BM’ is the description of the “Signature” in a BMP file.

* 1. How does this compare to your answer to question #4 above?

The value of the first two bytes was also BM in question #4.

<http://www.ece.ualberta.ca/~elliott/ee552/studentAppNotes/2003_w/misc/bmp_file_format/bmp_file_format.htm>

1. Examine the BMP file format specification for the Width data field
   1. Locate the “Width” data field in the BMP specification document.
   2. What is the size, in bytes, of this field?

The size, in bytes, of this field is 4 bytes.

* 1. What is the value, in bytes, of this field for your image file? (Look at the program output)

The value, in bytes, of this field in my image is 78 bytes.

* 1. What is the value, in decimal, of this field for your image file? (Look at the program output)

The value, in decimal, of this field for my image is 000 000 002 118.

1. Examine the BMP file format specification for the Height data field
   1. Locate the “Height” data field in the BMP specification document.
   2. What is the size, in bytes, of this field?

The size of this field is 4 bytes.

* 1. What is the value, in bytes, of this field for your image file? (Look at the program output)

The value of this field for my image file is 63 bytes.

* 1. What is the value, in decimal, of this field for your image file? (Look at the program output)

The value of this field for my image file is 000 000 001 098.

1. Open your BMP image file in an application program like Paint or Photoshop.
   1. What is the size of your image file?

The size of my image file is 630 pixels is width and 354 pixels is height.

* 1. How does this compare to the output of the program?

In the output of my program, it is given that the image file size width is 630 pixels and height is 354 pixels which is the same as what Photoshop gave me.