**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?

* Because there is no file found in “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 in the “myfile.txt” file
  1. Explain the result.
* When you put text into the “myfile.txt” file and run the program the program prints it out

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 both tell the program to read text
  1. How is the read() function different from the readline() function?
* Read() just reads one thing but readline() can read a specific line of text

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

* You use the name of the file you create to specify a file to open
  1. Modify the program to open a different file.

fileHandle = open("myfile.txt2","r")

line = fileHandle.readline()

count = 1

while line :

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

line = fileHandle.readline()

count += 1

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("folder/myfile.txt3","r")

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” is for reading
  1. What mode is used to open a file for writing?
* “w” is for writing
  1. What other file modes can be used? List and explain their meanings.
* “a” is for appending which means that all writes append to the end of the file regardless of the current seek position

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

file=open("userText","w")

print("test")

print("STOP")

print(" ")

lineNumber = 0

while True :

lineNumber += 1

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

userText = input(userPrompt)

if userText == "STOP" :

break

open("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

fileHandle=open("userText","w")

print("test")

print("STOP")

print(" ")

lineNumber = 0

while True :

lineNumber += 1

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

userText = input(userPrompt)

if userText == "STOP" :

break

open("userText")

**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

handle = open("Images/example.bmp","rb")

* 1. Run the program and examine the data output.

RAW Image Header Data (64 bytes)

066 077 110 127 012 000 000 000

000 000 054 000 000 000 040 000

000 000 244 001 000 000 034 002

000 000 001 000 024 000 000 000

000 000 056 127 012 000 019 011

000 000 019 011 000 000 000 000

000 000 000 000 000 000 255 255

255 255 255 255 255 255 255 255

First Two Bytes

066 077

Image Width Data

Image Width: (raw) 244 001 000 000

Image Width: (re-ordered) 000 000 001 244

Image Width: (pixels) 500

Image Height Data

Image Width: (raw) 034 002 000 000

Image Width: (re-ordered) 000 000 002 034

Image Width: (pixels) 546

"""

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 = B
* 077 = M
  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?
* B and 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?

* It is BM
  1. How does this compare to your answer to question #4 above?
* It’s the same thing

<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?

* It is 4 bytes
  1. What is the value, in bytes, of this field for your image file? (Look at the program output)
* 244 001 000 000
  1. What is the value, in decimal, of this field for your image file? (Look at the program output)
* 000 000 001 244

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?

* 4 bytes
  1. What is the value, in bytes, of this field for your image file? (Look at the program output)
* 034 002 000 000
  1. What is the value, in decimal, of this field for your image file? (Look at the program output)
* 000 000 002 034

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

* It is 500 in width and 546 in height
  1. How does this compare to the output of the program?
* This compares to the output because it shows how much the height is and how much the width is