**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?

* No file or directory found in “myfile.txt”
* Run-time occurred because there was no file found in the program

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 I put into “myfile.txt” got printed out on main.py
  1. Explain the result.
* I put the text into the “myfile.txt”
* I went to my previous file called “main.py”
* Run it and got the text I put into “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?

* Both programs use the text from “myfile.txt” and outputs it to “main.py”
  1. How is the read() function different from the readline() function?
* Readline outputs the text on individual lines
* Read outputs all text at once

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 to specify open the file you want and to modify it.
  1. Modify the program to open a different file.
* fileHandle = open("myfile.txt2","r")

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("ok/myfile.txt2")

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?

* Open a file for reading
  1. What mode is used to open a file for writing?
* “w” is the mode for writing
  1. What other file modes can be used? List and explain their meanings.
* “b”-can be opened in binary mode

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("userText","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)
2. 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("Kappa")

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

open("userText")

**Level 3: Binary Files**

**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/dig10k\_penguin.bmp","rb")

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

RAW Image Header Data (64 bytes)

066 077 022 248 003 000 000 000

000 000 054 000 000 000 040 000

000 000 031 001 000 000 045 001

000 000 001 000 024 000 000 000

000 000 224 247 003 000 018 011

000 000 018 011 000 000 000 000

000 000 000 000 000 000 255 255

192 255 255 192 255 255 192 255

First Two Bytes

066 077

Image Width Data

Image Width: (raw) 031 001 000 000

Image Width: (re-ordered) 000 000 001 031

Image Width: (pixels) 287

Image Height Data

Image Width: (raw) 045 001 000 000

Image Width: (re-ordered) 000 000 001 045

Image Width: (pixels) 301

"""

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?

066 077 = “BM”

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?

* The description means “BM”
  1. How does this compare to your answer to question #4 above?
* It’s is the exactly the same thing both equal BM

<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?

* **4 Bytes**
  1. What is the value, in bytes, of this field for your image file? (Look at the program output)
* **031 001 000 000**
  1. What is the value, in decimal, of this field for your image file? (Look at the program output)
* **000 000 001 031**

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)
* **045 001 000 000**
  1. What is the value, in decimal, of this field for your image file? (Look at the program output)
* **000 000 001 045**

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

**287x301 Pixels**

* 1. How does this compare to the output of the program?
* This compares to my output because it shows how much pixels height and width have