AERE 361: Lab 5

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1 Exercise 1

Problem:

- The main goal is to open a file read a certain set of lines and output them to the user. In the last case we must create a file if given a new filename and fill it with numbers

Design:

- **Head**
  - Begins by creating `filename = (char*) malloc(255 *sizeof(char))` which creates character memory for the filename.
  - Then `fopen` to variable `data` and check `if(data == NULL)` and print error if true
  - start loop `for 0:2` and `read` to `printf` strings on the lines
  - `fclose` file to end
- **Tail**
  - Begins by creating `filename = (char*) malloc(255 *sizeof(char))` which creates character memory for the filename
  - Then `fopen` to variable `data` and check `if(data == NULL)` and print error if true
  - Use `fseek` and `SEEK_END` to move pointer to the end of the file
  - Then `while 0:2` count from bottom up and if `fgetc` gets to new line `count++`
  - Finish with `free(filename)` and `fclose`
- **Out**
  - Begins by creating `filename = (char*) malloc(255 *sizeof(char))` which creates character memory for the filename
  - Now `if data == NULL` then `fopen` and `for 1:100 fprintf` and `fclose`
  - Or `else` file already exists then `fclose`

Complexity:

- **Head: 0.054 sec**
- **Tail: 0.057 sec**
- **Out: 0.001 sec**

2 Exercise 2

Problem:

- We need to create an array based on user input then retrieve the element asked for if possible and print it.

Design:

- Begin with `printf` to ask user for array size
- Then `if` exceeds 250, return error
- Use `malloc(sizeof(float) * num)` to create array memory
- With given formula loop `for i < num`
- Then `printf` ask for element to retrieve
- Check `if` element was within bounds, print error if not
- Fianlly `printf` element number and `free(array)`

Complexity:

- **Bounds: 0.020 sec**

3 Exercise 3

Problem:

- We need to make an array that will print a pretty spiral matrix based on the user `n` input

Design:

- Intialize printing loop with `printmatrix(int,int,int)`
- Use `for m 0:N and for n 0:N` to create loop to print matrix
- Ask for user integer `printf` then `scanf` and test `if r:100` print error if not valid integer
- Then `malloc` fto allocate array and `for i 0:input` allocate columns
- Create `if input == 1` to print 1X1 matrix since it is outlier case
- Then `row and col = ceiling((input -1) / 2)` and intialize varaibles for current direction, counter and direction length
- Use 3 `for` loops to create magical spiral matrix

Complexity:

- **1X1 matrix: 0.082 sec**
- **10X10 matrix: 0.085 sec**
- **100X100 matrix: 2.655 sec**

4 Sources

https://stackoverflow.com/questions/18701924/get-a-segment-fault-while-reading-a-file

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https://fresh2refresh.com/c-programming/c-file-handling/fseek-seek_set-seek_cur-seek_end-functions-c/

https://unix.stackexchange.com/questions/25592/creating-a-sequence-of-numbers-one-per-line-

https://www.geeksforgeeks.org/power-function-cc/#:~:text=pow()(%)20is(%)20function(%)20to,(%)5E2(%)2C(%)20which(%)20is(%)2016

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https://www.geeksforgeeks.org/print-a-given-matrix-in-spiral-form/