

CSE344 System Programming HW2 Report

Program

In program, it reads the "input" file in P1(parent process) 20 by 20 bytes and it process the bytes with least square method in critical section then writes the processed data(estimated equation) in temp file that created by mkstemp this way: (x_1,x_1), (x_2,y_2), ..,(x_10,y_10), ax+b. While writing the P1 process to the temp file, P2(child process) will read them and calculate the errors in critical section and write them to the output file this way: . (x_1,x_1), (x_2,y_2), ..,(x_10,y_10), ax+b, MAE, MSE, RMSE.

Program's functions

write_lock(...): It runs like a normal write system call but this function also provides write lock and unlock by using flock structure. So I use this function everywhere instead of write.

read_lock(...): It runs like a normal read system call but this function also provides read lock and unlock by using flock structure. So I use this function everywhere instead of read.

read_line(...): Reads line after the given offset and if remove_line parameter is 1 then deletes the determined line with the algorithm that saves back the all characters from the line after the line to delete until the file is finished along the length of the line.

(Handler function) single_array_catcher(...): Saves the signal that caught in least_square_method function critical section in the signal array.

least_square_method(...): Finds the coordinates using the given 20 byte char pointer value as parameter and finds an equation by applying the least square method using these coordinates. Then it turns it all into a string and prints it.

standart_dev(...): Calculates the standart deviation by dividing N.

mean_errors(...): It separates the string containing the coordinates and the equation given as parameters into its tokens and then calculates the errors with this data. At the end of the function, it adds errors to the string that came as input and returns it as a new string.

(P1's main function) read_input_file(...): Reads the input file and process by using "least_square_method(...)" and writes the processed data in temp file.

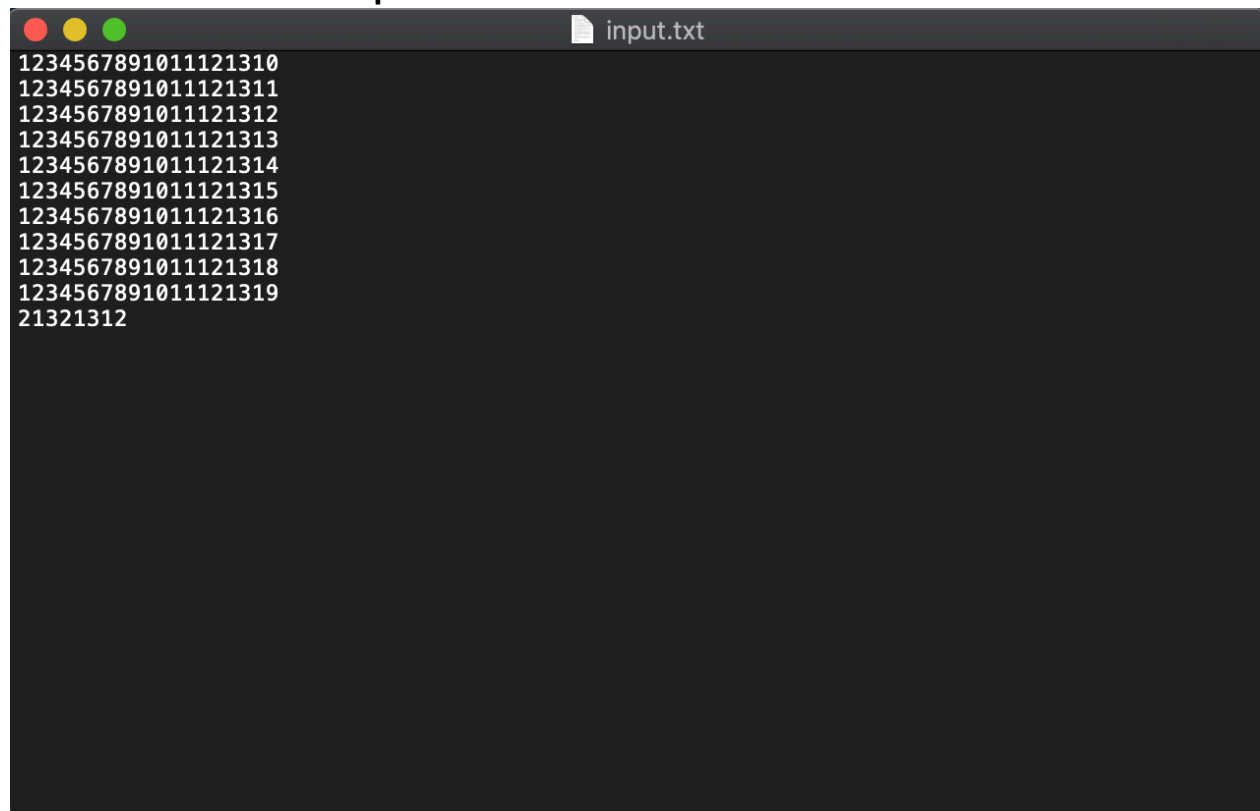
(P2's main function) read_temp_file(...): Reads the temp file and process by using "mean_errors(...)" and writes the processed data in output file.

(Handler function) catcher(...): main() function's catcher. Catches the SIGTERM, SIGUSR1, SIGUSR2.

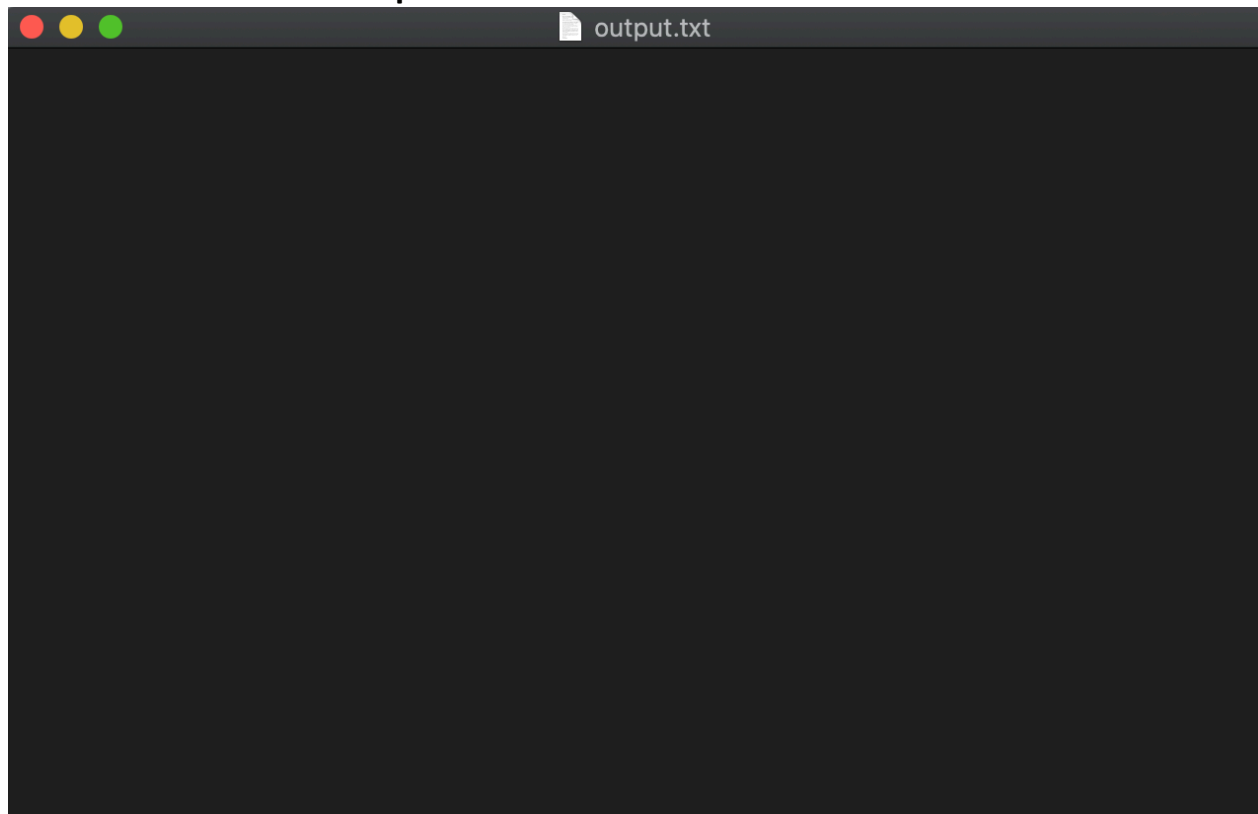
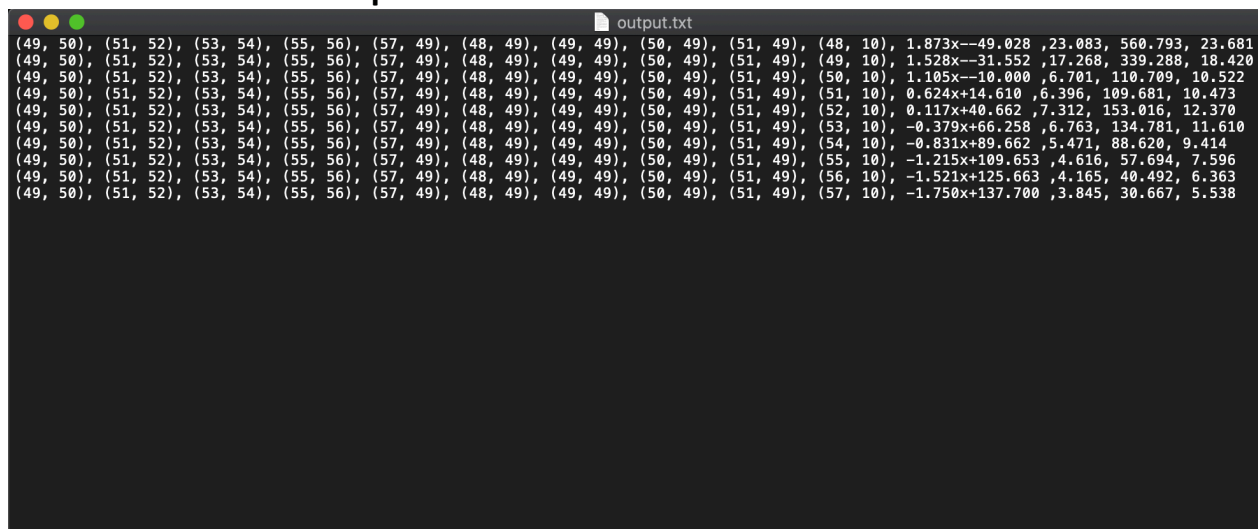
main(): It forks the main process and creates two separate processes. Expects a readable value from the child process parent from the processes. When the signal (SIGUSR2) comes from the parent, it understands that it is a readable value and continues. Also, the child waits for the signal from the parent to terminate the process (SIGUSR1), and deletes the files.

Sample Execution Screenshots

Before the execution input file:

A screenshot of a terminal window with a dark background. The title bar at the top shows three colored circles (red, yellow, green) on the left and a document icon with the text "input.txt" on the right. The terminal displays a list of 19 lines of numbers, each consisting of a sequence of digits. The first 18 lines are identical: "1234567891011121310". The 19th line is "21321312".

```
1234567891011121310
1234567891011121311
1234567891011121312
1234567891011121313
1234567891011121314
1234567891011121315
1234567891011121316
1234567891011121317
1234567891011121318
1234567891011121319
21321312
```

Before the execution output file:**After the execution output file:**

After the execution terminal:

```
→ SYS-HW2 ./program -i input.txt -o output.txt
***Parent process started***
SIGUSR2 signal sent.
catcher caught SIGUSR2
***Child process started***
Parent read bytes:208
Number of line estimated equations:10
There were not get any signal in critical sections.
SIGUSR1 signal sent.
catcher caught SIGUSR1
MAE=23.083 MSE=560.793 RMSE=23.681 Mean=202.519 Standart Dev=253.338
MAE=17.268 MSE=339.288 RMSE=18.420 Mean=124.992 Standart Dev=151.531
MAE=6.701 MSE=110.709 RMSE=10.522 Mean=42.644 Standart Dev=48.155
MAE=6.396 MSE=109.681 RMSE=10.473 Mean=42.183 Standart Dev=47.757
MAE=7.312 MSE=153.016 RMSE=12.370 Mean=57.566 Standart Dev=67.525
MAE=6.763 MSE=134.781 RMSE=11.610 Mean=51.051 Standart Dev=59.239
MAE=5.471 MSE=88.620 RMSE=9.414 Mean=34.501 Standart Dev=38.301
MAE=4.616 MSE=57.694 RMSE=7.596 Mean=23.302 Standart Dev=24.349
MAE=4.165 MSE=40.492 RMSE=6.363 Mean=17.007 Standart Dev=16.631
MAE=3.845 MSE=30.667 RMSE=5.538 Mean=13.350 Standart Dev=12.265
***Child process finished***
***Parent process finished***
→ SYS-HW2
```