Forks

[Actions](https://weber.instructure.com/courses/482258/assignments/4105186)

Example program and data:  [hw3example.zip](https://weber.instructure.com/courses/482258/files/91367548/download?wrap=1) which will only work on Linux. To unzip, type "unzip hw3example.zip"  (NOTE: you only need to include wall or CPU time in your program.)

The idea is for you to create a program that reads a binary random access file and finds the min and max. Your program will either use one process or it will use four processes (parallel computing) to achieve the answer. In order for your forked processes to work they must use pipes.

Instructions:

* Create at least two c programs to complete the following:
  + From the command prompt the user will run the following: "hw3 numForks fileName"
    - "numForks" can only be "1" or "4" - it indicates the number of processes that will be run.
    - "fileName" is the name of the binary random access file that will be used, generated by a program below.
  + If "1" is entered then the program calls exec on another c program that will return the max and min of the file to the user.
  + if "4" is entered then the program calls fork an appropriate number of times and calls exec on another program the appropriate times and ways and will return the max and min of the file to the user. Your program will need to use pipes to communicate between forked processes.
  + Regardless of "1" or "4" being entered, the program will report how much time it took to process the file.
* When the program runs your name is printed out.
* The first c program will take care of the command line arguments and possibly deal with forking.
* A second c program will actually figure out the min and max from the file.
* A third, fourth, fifth, etc. c programs may be created, but use caution to not confuse yourself.
* Create a Makefile that compiles all of your c programs when the user types 'make' from the command prompt. If your programs do not compile with 'make' then you get zero points.

The grader will create a random access binary file that he will use for grading all assignments. The code that he will use is at the bottom of this page.

Deliverable:

Zip up all you files, including the Makefile, and submit it to Canvas by the due date.

| HW3 - Forks | | |
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| **Criteria** | **Ratings** | **Pts** |
| This criterion is linked to a Learning OutcomeYour name is printed out | |  |  | | --- | --- | | **5.0 pts**  **Full Marks** | **0.0 pts**  **No Marks** | | 5.0 pts |
| This criterion is linked to a Learning OutcomeThe program accepts as input a number (can only be 1 or 4) followed by a filename | |  |  | | --- | --- | | **5.0 pts**  **Full Marks** | **0.0 pts**  **No Marks** | | 5.0 pts |
| This criterion is linked to a Learning OutcomeWhen run with "1", the program calls exec and runs the program to find the min and max | |  |  |  | | --- | --- | --- | | **20.0 pts**  **Full Marks** | **15.0 pts**  **Minor errors in exec** | **0.0 pts**  **No Marks** | | 20.0 pts |
| This criterion is linked to a Learning OutcomeThe program returns the correct answer. | |  |  |  | | --- | --- | --- | | **20.0 pts**  **Full Marks** | **15.0 pts**  **Either Min or max is incorrect.** | **0.0 pts**  **No Marks** | | 20.0 pts |
| This criterion is linked to a Learning OutcomeWhen run with "4", the program forks correctly and also calls exec correctly to run four processes to find the min and max. If fork is not used with "4" then the best you can have on this assignment is a 50. | |  |  |  |  |  | | --- | --- | --- | --- | --- | | **25.0 pts**  **All 4 processes are spawned with fork.** | **19.0 pts**  **At least 3 processes are spawned with fork (instead of all 4).** | **13.0 pts**  **At least 2 processes are spawned with fork (instead of all 4).** | **7.0 pts**  **1 process is spawned with fork (instead of all 4).** | **0.0 pts**  **No fork.** | | 25.0 pts |
| This criterion is linked to a Learning OutcomeWhether "1" or "4" is entered, the amount of time to process the file is reported. | |  |  |  | | --- | --- | --- | | **10.0 pts**  **Full Marks** | **5.0 pts**  **Time returned is not the total for parent program.** | **0.0 pts**  **No Marks** | | 10.0 pts |
| This criterion is linked to a Learning OutcomeExec is used with "4" and "1". If exec is not used then you get zero points. | |  |  | | --- | --- | | **15.0 pts**  **Full Marks** | **0.0 pts**  **No Marks** | | 15.0 pts |
| Total Points: 100.0 | | |