

SYSTEM PROGRAMMING – HW_3 – REPORT

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Firstly, the command line parsed to the variable with getopt(). Then, I read the inputs and wrote them to allocated 2D arrays as inputA and inputB. Open files were closed and then I created quarter 2D arrays as firstA, firstB, secondA, etc... My inputA and inputB were parsed to these quarters. If there is a sufficient character in the file, program exits gracefully. For this, I checked all the inputs is between 33 and 126. Because these values are valid according to ASCII Table .At the end, input A and B were deallocated with free().

I created pipes between P1 and its children P2, P3, P4, P5 and then fork().

P1 wrote the quarters to the pipes and children waited until their pipe was ready.

Parent process waited its children as a synchronous barrier.

And then, parent read the pipes and fill the quarters and then combine them to the res 2D arrays. (All free() operations was made explicitly.)

For the singular value decomposition, I found a code from web. Because, in the homework pdf, it told us to copy and paste external resources.

I use this : http://www.mymathlib.com/matrices/linearsystems/singular_value.html

Parent process wrote the result matrix to the terminal and then calculate svd. The svd result was written to the terminal by the parent. The svd result may be uncorrect. Because, I use external code as I said before.

General topics of homework like this.

Also, I wrote signal handlers for SIGCHLD and SIGINT. Both of them works well. In terms of SIGINT program exits gracefully with the help of exit(). Because exit function close all of the open files and free all allocated memory. On the other end, in terms of SIGCHLD, parent waits its children synchronously.

For the signals, I wrote sleep() functions as a comment in the code. In the demo, I use them for how to signal works.

Sample Output like these...

its shows to getopt() -->

```
mrdoner34@mrdoner34: ~/Desktop/System/SystemH3
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ ./141044062 -i inputA.txt -k inputB.txt -n 2
./141044062: invalid option -- 'k'
Unknown option : k
Program EXIT !!
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ ./141044062 -i inputA.txt -j inputB.txt -n2 2
./141044062: invalid option -- 'f'
Unknown option : f
Program EXIT !!
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ ./141044062 -i inputA.txt -j inputB.txt -n2 2
Extra argument(s) : 2
Program EXIT !!
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ ./141044062 -i inputA.txt -j inputB.txt -n 2
Child P4 Done
Child P3 Done
Child P2 Done
Child P5 Done
catcher caught SIGCHLD
RESULT MATRIX (returns from children) :
48606 61011 52906 53442
47568 60071 51602 52016
50304 63322 54668 55168
48210 60841 52318 52750
Singular value decomposition of Result Matrix is :
217019.184 394.087 0.000 0.000
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$
```

Normal Input :

```
mrdoner34@mrdoner34: ~/Desktop/System/SystemH3
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ make run
./141044062 -i inputA.txt -j inputB.txt -n 4
Child P4 Done
Child P3 Done
Child P2 Done
catcher caught SIGCHLD
RESULT MATRIX (returns from children) :
Child P5 Done
191794 213224 209275 228844 190297 209842 220901 208437 199058 220308 204858 221899 202839 219710 235120 248772
208625 236548 222836 254571 207043 232170 243870 226599 220021 240123 229190 235285 224233 248542 261767 273735
212392 243055 231105 255500 210663 233154 250628 223582 221812 246009 226654 245727 229501 253839 259962 273695
220320 259504 240644 272840 218346 241035 258782 247099 228685 248949 241510 253542 247428 260128 274775 289217
211983 243311 235704 257987 211583 236681 248132 230015 226291 244801 226670 247174 233157 249031 261185 276959
220567 238301 237235 258337 215124 238589 253694 230888 222416 248875 229978 253632 227902 249435 267382 279701
213085 235305 225520 256705 209098 238337 246995 225137 223533 244651 231165 238264 224247 254568 265618 277379
221781 259766 243628 275359 225268 248933 263699 237345 241844 260871 246295 252470 244479 266437 281586 288713
220807 254229 240350 274543 219829 248726 258512 242357 236498 251655 243708 249165 244265 260983 280267 289981
229971 256090 253745 277719 224334 260082 263432 236483 244384 263934 243626 261736 248716 276000 282169 295206
224694 271529 244029 283510 228032 252319 270615 243172 245247 264973 254325 253838 253669 280184 287303 295885
225803 276470 252000 283329 229557 250892 272703 244129 245112 266084 249924 262573 259180 278560 283198 294978
211867 241847 237495 258705 210027 238771 248334 220285 227323 242760 224081 245044 234366 249444 261801 271052
220265 260198 249286 276251 224277 248855 261144 237324 242570 256126 242174 253985 248981 258486 279944 285082
186265 224020 203707 239321 191935 212529 222236 211061 208388 218962 216259 208224 210946 224673 244903 249548
230759 254064 248403 271127 224524 253214 269625 233433 236507 264340 239086 265835 242210 274004 277752 292724

Singular value decomposition of Result Matrix is :
3920391.791 39050.077 27206.756 23977.435 19651.749 11895.779 6798.675 3638.470 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ ./141044062 -i inputA.txt -j inputB.txt -n 2
Child P2 Done
catcher caught SIGCHLD
Child P3 Done
Child P4 Done
RESULT MATRIX (returns from children) :
Child P5 Done
48606 61011 52906 53442
47568 60071 51602 52016
50304 63322 54668 55168
48210 60841 52318 52750

Singular value decomposition of Result Matrix is :
217019.184 394.087 0.000 0.000
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ ./141044062 -i inputA.txt -j inputB.txt -n 3
Child P3 Done
Child P2 Done
```

Signal Handling :

SIGCHLD

```
Terminal
mrdoner34@mrdoner34: ~/Desktop/System/SystemH3
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ clear

mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ make run
./141044062 -i inputA.txt -j inputB.txt -n 4
7488
catcher caught SIGCHLD
Child P3 Done
Child P2 Done
Child P5 Done
Child P4 Done
RESULT MATRIX (returns from children) :
191794 213224 209275 228844 190297 209842 220901 208437 199058 220308 204858 221899 202839 219710 235120 248772
208625 236548 222836 254571 207043 232170 243870 226599 220021 240123 229190 235285 224233 248542 261767 273735
212392 243055 231105 255500 210663 233154 250628 223582 221812 246009 226654 245727 229501 253839 259962 273695
220320 259504 240644 272840 218346 241035 258782 247099 228685 248949 241510 253542 247428 260128 274775 289217
211983 243311 235704 257987 211583 236681 248132 230015 226291 244801 226670 247174 233157 249031 261185 276959
220567 238301 237235 258337 215124 238589 253694 230888 222416 248875 229978 253632 227902 249435 267382 279701
213085 235305 225520 256705 209098 238337 246995 225137 223533 244651 231165 238264 224247 254568 265618 277379
221781 259766 243628 275359 225268 248933 263699 237345 241844 260871 246295 252470 244479 266437 281586 288713
220807 254229 240350 274543 219829 248726 258512 242357 236498 251655 243708 249165 244265 260983 280267 289981
229971 256090 253745 277719 224334 260082 263432 236483 244384 263934 243626 261736 248716 276000 282169 295206
224694 271529 244029 283510 228032 252319 270615 243172 245247 264973 254325 253838 253669 280184 287303 295885
225803 276470 252000 283329 229557 250892 272703 244129 245112 266084 249924 262573 259180 278560 283198 294978
211867 241847 237495 258705 210027 238771 248334 220285 227323 242760 224081 245044 234366 249444 261801 271052
220265 260198 249286 276251 224277 248855 261144 237324 242570 256126 242174 253985 248981 258486 279944 285082
186265 224020 203707 239321 191935 212529 222236 211061 208388 218962 216259 208224 210946 224673 244903 249548
230759 254064 248403 271127 224524 253214 269625 233433 236507 264340 239086 265835 242210 274004 277752 292724

Singular value decomposition of Result Matrix is :
3920391.791 39050.077 27206.756 23977.435 19651.749 11895.779 6798.675 3638.470 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ ps
PID TTY TIME CMD
7252 pts/0 00:00:00 bash
7498 pts/0 00:00:00 ps
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$
```

SIGINT

```
Terminal
mrdoner34@mrdoner34: ~/Desktop/System/SystemH3
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ make run
^Catcher caught SIGINT
catcher caught SIGINT
catcher caught SIGINT
Exiting Gracefully...
Exiting Gracefully...
catcher caught SIGINT
Exiting Gracefully...
make: *** wait: No child processes. Stop.
make: *** Waiting for unfinished jobs....
make: *** wait: No child processes. Stop.
catcher caught SIGINT
Exiting Gracefully...
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ make run
./141044062 -i inputA.txt -j inputB.txt -n 4
7449
^Catcher caught SIGINT
catcher caught SIGINT
Exiting Gracefully...
catcher caught SIGINT
Exiting Gracefully...
catcher caught SIGINT
Exiting Gracefully...
catcher caught SIGINT
Exiting Gracefully...
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$ ps
PID TTY TIME CMD
7252 pts/0 00:00:00 bash
7454 pts/0 00:00:00 ps
mrdoner34@mrdoner34:~/Desktop/System/SystemH3$
```

No ZOMBIES .

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