CSE 344 SYSTEM PROGRAMMING - HOMEWORK #03
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In the assignment, one parent process and four child processes are required to be created. Normally it was enough to create four pipes for this process. But a bi-directional transmission is desired. That's why eight pipes were made. 8 pairs of file descriptors were created to be used in these pipes.

Firstly, it is checked whether the user has entered the program arguments correctly. Then, it is checked that the specified input files are opened correctly. It is checked whether there are enough bytes in the files according to the n parameters entered by the user. If not, the files are closed and the program ends.

Pipes are created. If there is an error, the program ends. This process is applied for all pipes. After that, it is passed to the stage where child processes will occur.
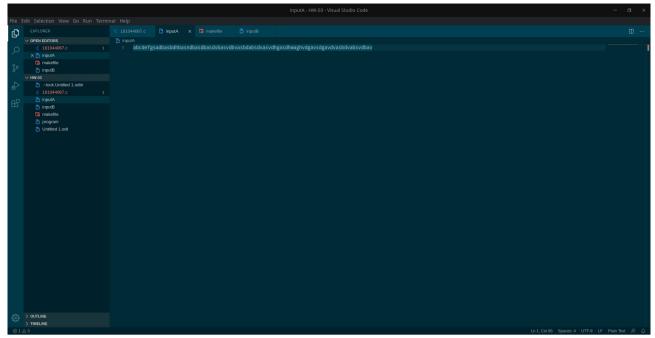
In both child processes and parent processes, the correct ends of file discriptors are closed. There will be communication between them and there will be a one-way byte flow using pipes. Another pipe will be used for reverse communication.

In the parent process, the quarter matrix that will go to each child process is calculated and sent. Child processes take matrix values and call the calculate functions to calculate their values. These are 4 of them (calculate_C11, calculate_C12, calculate_C21, calculate_C22).
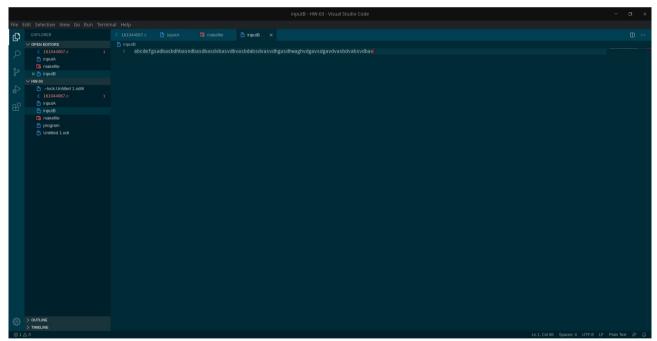
Parent then waits for all the children. After all the kids have finished they get the results and create a matrix_C. Then the singular values of this matrix_C are printed on the screen. The SIGCHLD signal is captured in the catcher function before these operations are performed. So this signal is captured when the child process is finished. Likewise, when the SIGINT signal is captured, all processes (to be the last parent) are terminated. After using each malloc, it is returned free.

USAGE :

inputA

inputB

```
gokhan@has: ~/Desktop/CSE344-SYSTEMS-PROGRAMMING/HW-03          +
Parent process started ...

ERROR (-n) : Invalid argument
gokhan@has:~/Desktop/CSE344-SYSTEMS-PROGRAMMING/HW-03$ ./program -i inputA -j inputB -n -150
Parent process started ...

ERROR (-n) : Invalid argument
gokhan@has:~/Desktop/CSE344-SYSTEMS-PROGRAMMING/HW-03$ ./program -i inputA -j inputB -n 1
Parent process started ...

MATRIX A :
 97  98
 99 100


MATRIX B :
 97  98
 99 100


Child process 1 started ...
Child process 2 started ...
Child process 3 started ...
Child process 4 started ...
SIGCHLD is caught
SIGCHLD is caught
SIGCHLD is caught
SIGCHLD is caught

MATRIX C :

19111 19306
19503 19702

SINGULAR VALUES :
0.000  38813.500
gokhan@has:~/Desktop/CSE344-SYSTEMS-PROGRAMMING/HW-03$
```

n is 1 example


```
gokhan@has: ~/Desktop/CSE344-SYSTEMS-PROGRAMMING/HW-03          +
0.000  38813.500
gokhan@has:~/Desktop/CSE344-SYSTEMS-PROGRAMMING/HW-03$ ./program -i inputA -j inputB -n 2
Parent process started ...

MATRIX A :
 97  98  99 100
101 102 103 115
 97 100  98  97
115  98 100 104


MATRIX B :
 97  98  99 100
101 102 103 115
 97 100  98  97
115  98 100 104


Child process 1 started ...
Child process 2 started ...
Child process 3 started ...
SIGCHLD is caught
Child process 4 started ...
SIGCHLD is caught
SIGCHLD is caught
SIGCHLD is caught

MATRIX C :

40410 39202 39399 40973
43315 41872 42099 43781
40170 39012 39207 40794
42713 41458 41679 43286

SINGULAR VALUES :
164955.321  124.824  3.527  43.734
gokhan@has:~/Desktop/CSE344-SYSTEMS-PROGRAMMING/HW-03$
```

n is 2 example

n is 3 example

n is 4 example

They was sent in a separate folder to make the screenshots look better.