

# CSE320 Assignment4

## Review Document

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The utmost goal for the assignment was to understand and implement the multithreading process of the C programming language using methods such as `pipe()`, `dup2()` and `fork()`. There were some hardships in understanding the logic of file descriptors and some fundamentals of library functions. Overall, it was a helpful assignment that helped me map out the process diagrams. Below are some critical troubles and significant things that I've learned that I wish to emphasize in the review documentation.

Things that I've learned:

- `pipe()` method enables the program to directly modify file descriptors and make it so that the user can the child process IO can be accessed through the parent process IO.
- `dup2()` does the magic of modifying file descriptors. With understanding the pre-defined variables for IO, redirecting IO won't be tough.
- `fork()` creates a copy of the current(parent) process as a child process, and it is known that we don't know which process will be executed first, but in my device, the parent process seems to run first every time.

Some troubles I've faces:

- From using the `fork()` method twice, to mimic the pipe unix feature, it was inevitable to wrap the latter pid with a conditional identifying that the process is not a pipe execution. Without understanding the `fork()` logic, it was questionable why there were two outputs of the `execvp()`.

Code execution results:

```
CSE320_SHELL> ls > test.txt
Output Redirection Detected!
Child process exited with status: 0
CSE320_SHELL> cat < test.txt
Input Redirection Detected!
Assignment4.pdf
assignment4
assignment4.c
assignment4.dSYM
assignment4.h
exec
exec.c
practice
practice.c
practice2
practice2.c
practice3
practice3.c
test.txt
Child process exited with status: 0
CSE320_SHELL> ps -a > test.txt
Output Redirection Detected!
Child process exited with status: 0
CSE320_SHELL> tail -n 2 test.txt
15889 ttys003      0:00.01 ./assignment4
16043 ttys003      0:00.01 ps -a
Child process exited with status: 0
CSE320_SHELL> ls -al | pwd
Pipe Detected!
/Users/hkwak60/Desktop/SUNY/SUNY2024/CSE320/CSE320/Assignment4
Pipe process exited with status: 0
CSE320_SHELL> pwd | ps
Pipe Detected!
  PID TTY          TIME CMD
 1546 ttys001      0:00.07 /bin/zsh -il
 1980 ttys002      0:00.05 -zsh
 1983 ttys003      0:00.15 -zsh
15889 ttys003      0:00.01 ./assignment4
Pipe process exited with status: 0
CSE320_SHELL> exit
hkwak60@gwaghojun-ui-MacBookPro Assignment4 %
```