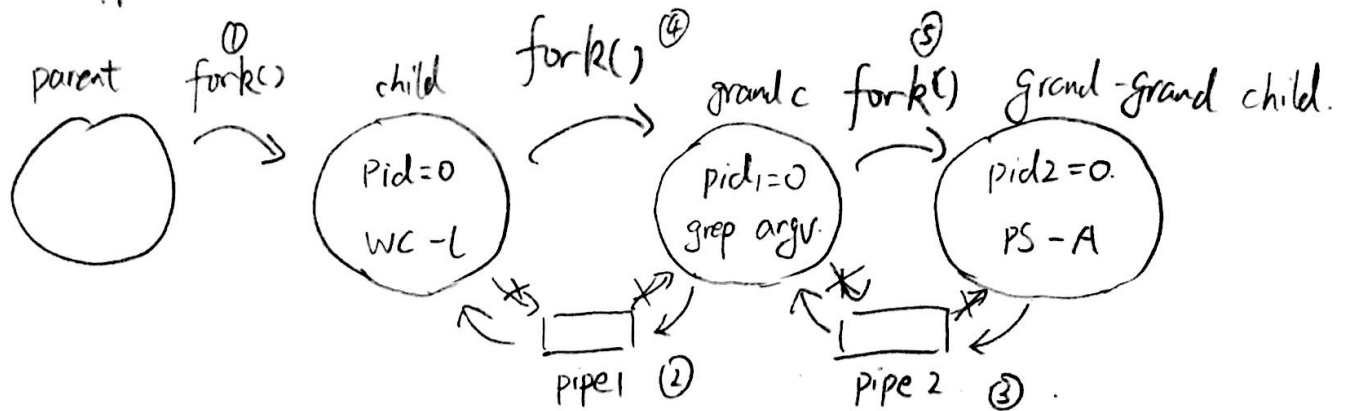


## ① processes.cpp



\* When in the child process, all non-related pipe channels will be closed.

## ② shell.java (please check code comments for details)

1. To run shell, type "l Shell" after "java Boot".

2. Algorithm:

- ① print "shell["
- ② read command and parse to String
- ③ check if command is "Exit" or "exit". If yes, exit shell, If not, continue
- ④ split command by ";", since commands by ";" are asynchronous call, and they have to done one by one.
  - ④.1 check if sub command is empty or made by pure spaces. if yes, skip to execute next sub command
  - ④.2 check if sub command contains "&". If yes, then split sub commands by "&" and executes all commands after split at same time. I use a counter to count how many valid process executed. And then use a for loop to run "join()" as count of times. So that make sure all synchronize call finish.
- ⑤ execute asynchronous call by ";" and record the tidID. I used a while loop to make sure the current tidID finish, and then continue to next asynchronous call
- ⑥ increase the "shell" process count by 1