CSCI 2330 – Shell Exercises

Suppose you have a shell program that works like a normal shell, but also prints "**shell: SIGINT**" or "**shell: SIGCHLD**" on the receipt of a SIGINT or SIGCHLD, respectively. Further suppose that **prog** is some long-running, non-shell program with signal handlers for SIGINT and SIGCHLD (overriding the default actions) that print "**pid N: SIGINT**" or "**pid N: SIGCHLD**" where **N** is the pid of the **prog** process.

Consider a shell process with **pid=10** and **pgid=10** in which the following sequence of events occurs. Assume that the OS assigns successive PIDs (11, 12, etc.) to each new process.

    1.   User executes **prog** in the background (e.g., **./prog &**)
    2.   User executes **prog** in the foreground (e.g., **./prog**)
    3.   The **prog** process created by step #1 calls **fork**.
    4.   User types Control-C.
    5.   The process created by step #3 exits.
    6.   The process created by step #1 exits.
    7.   The process created by step #2 exits.

a. Excluding the shell process, how many processes are created by the above steps? How many jobs are created?

b. Draw a picture of the process tree just after step #3, including the shell process. Label each process with a PID and PGID.

c. Write out the output (from all processes) when the above events occur.

d. If step #7 happens very close to the same time as step #6, how might the output from part (c) be different?