COM S 352 Homework 2

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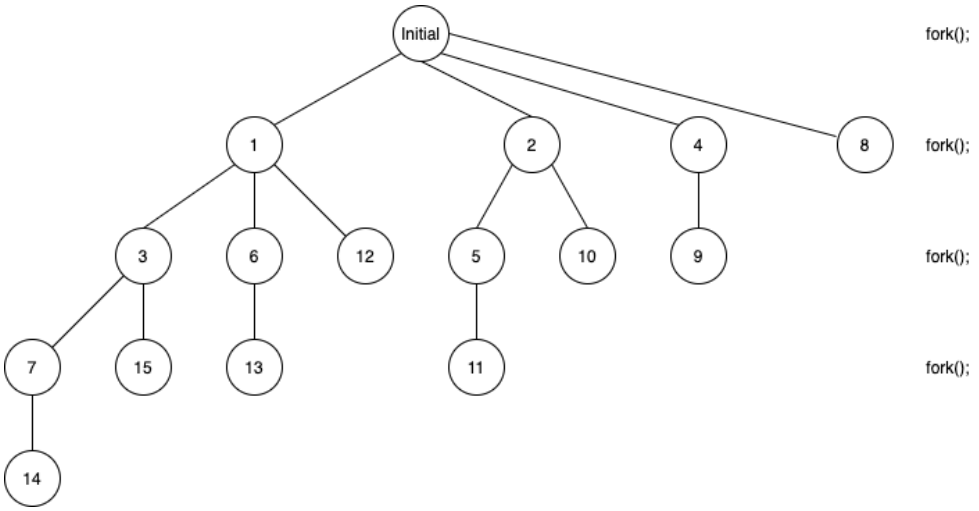
February 12, 2021

Question 1

First the operating system saves all data then transfers control the the kernal. The kernel saves the context of the old proccess in its PCB and then grabs the new process and loads the saved data into the new process. Finally the OS transfers control back to user mode.

Question 2



16 total processes created

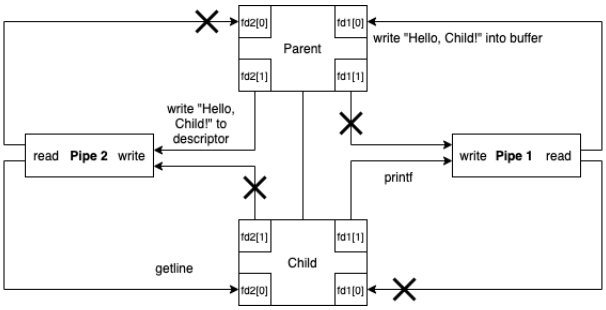
Question 3

The program executes, then runs into the *fork()* function, where it creates a child process. This child process will enter the *else if* statement because its pid is 0 then it will hit the *exec()* function. The *exec()* function replaces the childs memory space with a new program, in this case it is *ls*. Now that the child no longer exsists it will not reach the line, *printf("LINE J")*. However, if the *exec()* function results in an error and memory is not replaced the child process will run the line *printf("LINE J")*.

Question 4

A: 0 //child
B: 2606 //child
C: 2606 //parent
D: 2603 //parent

Question 5



The program starts with its initializations, *int fd1[2]*, *int fd2[2]*, and *pid_t pid = fork()* Then the child goes into the *if(pid == 0)* block where it closes a read and write descriptor then turns *fd1[1]* into a *printf* and *fd2[0]* into a *getline* using the *dup2()* function. The child then runs the *execlp()* function and the child process terminates while also allowing the parent to communicate between the two pipes. The parent goes into the *else* block and closes another read and write then writes "Hello, Child!" to pipe 1, like mentioned before, the *execlp("cat", "cat", NULL)* allows the parent to read the message "Hello, Child!" from pipe 2 and save it in the buffer. The program then prints out the buffer.

Question 6

$\delta/(\delta + \sigma)$

System A:
$\delta = 20$ms
$\sigma = 1$ms

$20/(20 + 1)$
$= 95.24\%$

System B:
$\delta = 15$ms
$\sigma = 1$ms

$15/(15 + 1)$
$=93.75\%$
The system with a slice of 20ms will be more efficient by 1.49%

Question 7

1. **Running to Waiting**
   During an I/O or event wait, The process is going to enter a waiting state because it is waiting for I/O input/output.

2. **Waiting to Ready**
   After waiting for an I/O response (completion) it will move to a ready state where it waits for reassignment.

3. **Running to Ready**
   The transition from running to ready will occur when an interrupt is triggered.