

Lab 4 - Signals

Write a C program to search for a given value from a list (array) of numbers as follows:

Parent (Main) Process:

1. The parent (main) process is called with the following arguments:
 - a. A search integer value X.
 - b. List of integers.

Example: ./main.out 5 7 8 5 3 2 1 6 0

Explanation: 5 is the search value. The list of integers are 7, 8, 5, 3, 2, 1, 6, 0

2. The parent creates an array and fills it with the list of integer values from the command line. (0.5)
3. It prints the process information (i.e. process ID).
For example: I am the parent, PID = 1233.
4. It forks two children in parallel.
5. **Update:** It sleeps for 5 seconds.
6. It waits for both children to exit before it can terminate.
7. Before termination, it prints "Value Not Found".

Each Child Process:

1. It prints the process information (i.e. process ID and parent process ID).
For example: I am the first/second child, PID = 1234, PPID = 1233
2. It searches the first or the second half of the array for "X". The first child should search in the first half, the second child should search in the second half. In case of a list with an odd number of elements, break the tie by assigning the middle number to any of the two halves.
3. If the search item is found:
 - a. The child process sends a signal SIGUSR1 to the parent to inform it that it found that item X.
 - b. The child process sends the position of "X" to the parent as exit code.
4. If the search item is not found:
 - a. The child process sleeps for 3 seconds.
 - b. It prints a termination message "Child 1 (or 2) terminates" and then terminates.

SIGUSR1 Handler:

Note: The handler should be called whenever SIGUSR1 is called.

Non-code question: Who will be the process executing the code in the handler? (Parent or First Child or Second Child). How did you know?

1. The handler should wait for the exit code of any of the two children.
2. If it received exit code from any child:
 - a. It should print ("Child 1(or 2): Value X found at position Y").
 - b. It should kill all three processes.
3. If it did not receive exit code from any child:
 - a. Is that actually possible? [Hint: No]
 - b. **Non-code question: Why is it not possible that the signal handler may not receive an exit code?**

Answer the non-code questions as comments in your code.