

Assignment 5

Maximum Marks: 30

Parent process P creates three child processes, C1, C2, and C3. Each child process executes a memory and CPU intensive application of your choice. Your choice should be such that the children execute for considerable periods of time and acquire considerable amount of memory (say, on the stack or on the heap).

The parent process P wants to periodically monitor the status of its children to determine:

- are each of the three children, C1, C2, and C3 alive?
- what is the CPU utilization of each child process?
- what is the memory usage of each child process?

Note that P received the PIDs of C1, C2, C3, during the `fork()` system call. In order to obtain the periodic status, P does the following:

- (a) It periodically forks a child, M, creates a pipe with it, and redirects the standard output of M to the pipe (that is, when M writes to `stdout` it can be read by P from the pipe). The monitoring interval can be implemented with the `sleep` command.
- (b) Once M is created, it chooses a suitable system call from the `exec` family to execute the “`ps`” command with suitable arguments (thereby writing its output into the pipe with its parent P). Thereafter M terminates.
- (c) P reads the output of M from the pipe, finds the entries corresponding to C1, C2, and C3 (that is, if they are alive) and extracts their respective CPU and memory utilizations (in percentage, as reported by “`ps`”). P writes the timestamp and the information extracted in the terminal.
- (d) When P finds that C1, C2, and C3 are not present in the listing of “`ps`”, it writes “All children have terminated” and stops.

Please study the syntax and arguments of “`ps`” carefully so that you execute it with the optimal set of arguments.

You need to submit the following:

1. The C program for P
2. The applications run by C1, C2, C3. These must be made available in a form that the TA can run your system in your absence