Supporting '&' and 'exit' on smsh1

Homework Assignment #8

ELEC462-003 System Programming

(Instructor: Prof. Suh, Young-Kyoon)

Due: 13:59:59 pm, Thursday, May 11, 2023

Modify smsh1.c to support the '**&**' command terminator to **run a command in the background**. Also, you must be able to support "exit" command to **exit the program**. When you type in a "exit" command while the background program is running, you must **KILL** a running background program too. Perhaps you need to modify **next_cmd()** too.

[Expected output including several examples]

```
[yksuh@macan:~/courses/ELEC462/homeworks/hw8$ gcc -o hw8 hw8.c splitline.c execute.c
[yksuh@macan:~/courses/ELEC462/homeworks/hw8$ ./hw8
[> ping knu.ac.kr  ← Created a new process.
 PING knu.ac.kr (155.230.11.1) 56(84) bytes of data.
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=1 ttl=252 time=0.473 ms
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=2 ttl=252 time=0.401 ms
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=3 ttl=252 time=0.415 ms
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=4 ttl=252 time=0.440 ms
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=5 ttl=252 time=0.408 ms
[ps     ← Cannot receive other command
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=6 ttl=252 time=0.417 ms
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=7 ttl=252 time=0.420 ms
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=8 ttl=252 time=0.461 ms
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=9 ttl=252 time=0.511 ms
[ps     ← Cannot receive other command
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=10 ttl=252 time=0.418 ms
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=11 ttl=252 time=0.395 ms
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=12 ttl=252 time=0.438 ms
 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=13 ttl=252 time=0.418 ms
^C
--- knu.ac.kr ping statistics ---
13 packets transmitted, 13 received, 0% packet loss, time 12255ms
rtt min/avg/max/mdev = 0.395/0.431/0.511/0.042 ms
[> exit  ← Received the next command: exit.
 yksuh@macan:~/courses/ELEC462/homeworks/hw8$ ▐
```

```
[yksuh@macan:~/courses/ELEC462/homeworks/hw8$ ./hw8
[> ping knu.ac.kr &
PID : 7438    ← Created a new process.
> PING knu.ac.kr (155.230.11.1) 56(84) bytes of data.
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=1 ttl=252 time=2.20 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=2 ttl=252 time=0.431 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=3 ttl=252 time=0.383 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=4 ttl=252 time=0.408 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=5 ttl=252 time=0.415 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=6 ttl=252 time=0.401 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=7 ttl=252 time=0.430 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=8 ttl=252 time=0.371 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=9 ttl=252 time=0.440 ms
ps   ← Can receive another command: ps.
  PID TTY          TIME CMD
 7437 pts/1     00:00:00 hw8
 7438 pts/1     00:00:00 ping
 7440 pts/1     00:00:00 ps
24009 pts/1     00:00:00 bash
> 64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=10 ttl=252 time=0.415 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=11 ttl=252 time=0.456 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=12 ttl=252 time=0.421 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=13 ttl=252 time=0.405 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=14 ttl=252 time=0.458 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=15 ttl=252 time=0.360 ms
     ← After kill PID 7438 at another terminal
```

```
yksuh@macan:~/courses/ELEC462/homeworks/hw8$ ./hw8
> ping knu.ac.kr &
PID : 7452  ← Created a new process.
> PING knu.ac.kr (155.230.11.1) 56(84) bytes of data.
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=1 ttl=252 time=0.892 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=2 ttl=252 time=0.405 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=3 ttl=252 time=0.411 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=4 ttl=252 time=0.529 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=5 ttl=252 time=0.372 ms
64 bytes from www.knu.ac.kr (155.230.11.1): icmp_seq=6 ttl=252 time=0.456 ms
exit  must kill PID 7452.

--- knu.ac.kr ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5096ms
rtt min/avg/max/mdev = 0.372/0.510/0.892/0.179 ms
yksuh@macan:~/courses/ELEC462/homeworks/hw8$ ▌
```

Submission

Q & A

If you have a question, then contact TA by email (rinyo0126@knu.ac.kr). Or, leave your messages on LMS Q&A board.

Late Day Policy

All exercises are due at 13:59:59 pm on the assigned due date. A grading penalty will be applied to late assignments. Any assignment turned in late will be penalized 50% per late day.

Plagiarism

No plagiarism will be tolerated. Also, NEVER use ChatGPT. If the assignment is to be worked on your own, please respect it. If the instructor determines that there are substantial similarities exceeding the likelihood of such an event, he will call the two (or more) students to explain them and possibly to take an immediate test (or assignment, at the discretion of the instructor) to determine the student's abilities related to the offending work.