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Lab 1: Simple Shell (Multi-Processing)

Overall Code Organization:

The code defines a simple shell that allows the user to execute commands and built-in shell functions. The code is well-organized and follows good programming practices such as using functions to separate concerns and keeping code simple and easy to read.

The program starts by defining some global variables, including a debug mode flag and a function to write messages to a log file. It then defines several functions to execute commands and built-in shell functions, such as changing directories or exporting environment variables.

The shell function defines a loop that reads user input and evaluates it by calling the appropriate function to execute the command. The main function initializes the shell environment, sets up signal handling, and starts the shell loop.

Overall, the code is well-organized, easy to read, and follows good programming practices. However, some improvements could be made, such as adding error handling and improving the way the program handles user input.

Sample Runs:

```
mahmoud@mahmoud-virtual-machine:~/Desktop/Projects/1-Simple-Shell$ ./script
[2023-03-09 07:55:17] Shell started
$ ls
log.txt script script.c test
$ ls -l
total 32
-rw-rw-r-- 1 mahmoud mahmoud 183 ٩ ٥٧:٥٥ log.txt
-rwxrwxr-x 1 mahmoud mahmoud 17152 ٩ ٥٧:٤٢ script
-rw-rw-r-- 1 mahmoud mahmoud 3822 ٩ ٥٧:٤٢ script.c
drwxrwxr-x 2 mahmoud mahmoud 4096 ٩ ٥٧:٥٥ test
$
```

```
mahmoud@mahmoud-virtual-machine:~/Desktop/Projects/1-Simple-Shell$ ./script
[2023-03-09 07:55:40] Shell started
$ pwd
/home/mahmoud/Desktop/Projects/1-Simple-Shell
$ cd ..
[2023-03-09 07:55:45] Changed directory
$ pwd
/home/mahmoud/Desktop/Projects
$ cd ~
[2023-03-09 07:55:50] Changed directory
$ pwd
/home/mahmoud
$
```

```
mahmoud@mahmoud-virtual-machine:~/Desktop/Projects/1-Simple-Shell$ ./script
[2023-03-09 07:56:21] Shell started
$ echo "Hello World"
Hello World
$ echo "XYZ"
XYZ
$ bye
Error: Command not found.
$ exit
[2023-03-09 07:56:30] Shell terminated
mahmoud@mahmoud-virtual-machine:~/Desktop/Projects/1-Simple-Shell$
```

Process Hierarchy:

Processes										
Q firefox										
Process Name	User	% CPU	ID	Memory	Disk read tot	Disk write tot	Disk read	Disk write	Priority	
Firefox	mahmoud	0.00	42440	168.9 MB	4.2 MB	44.1 MB	N/A	N/A	Normal	
Privileged Cont	mahmoud	0.00	42607	36.7 MB	N/A	N/A	N/A	N/A	Normal	
Socket Process	mahmoud	0.00	42590	8.6 MB	4.1 kB	N/A	N/A	N/A	Normal	
Web Content	mahmoud	0.00	43080	12.5 MB	17.4 kB	N/A	N/A	N/A	Normal	
Web Content	mahmoud	0.00	43066	12.6 MB	28.7 kB	N/A	N/A	N/A	Normal	
Web Content	mahmoud	0.00	43063	12.6 MB	N/A	N/A	N/A	N/A	Normal	
WebExtensions	mahmoud	0.00	42777	21.4 MB	N/A	N/A	N/A	N/A	Normal	