Shellfyre

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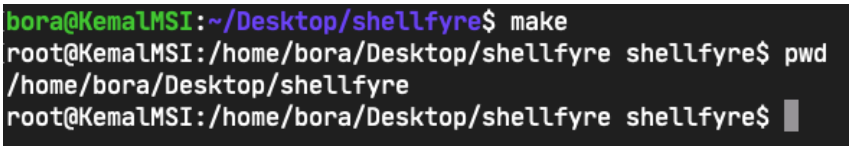
Installation

Use the provided Makefile. Type **make** in the project directory at the command line, then enter your password. Provided Makefile compiles the kernel module and the source code of the **Shellfyre**, then runs the program with **sudo** permissions. To insert the kernel module, program is executed with **sudo** permissions. The kernel module is removed when the user types **exit** and exits the shell. Type **make clean** to clean the executable files.

Part I – Basic Commands

We have implemented our custom execute function in order to use execv() system call rather than excevp(). It enables the user to use any built-in shell command, including running commands at the background.

Implementation: The program searches the directories at the user's $**PATH** and searches the given command using **stat**. If it exists, the program returns the path of the file and executes it.

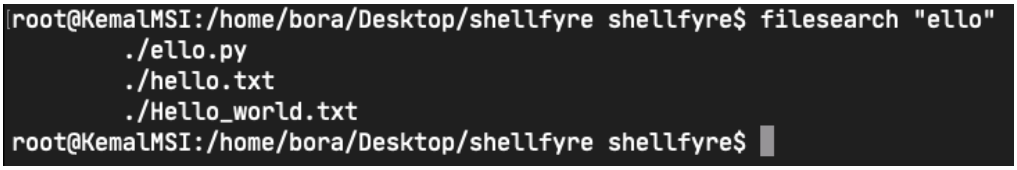


Part II – Custom Commands

filesearch

This command is for searching files that includes a string in its name. It takes two or one arguments. First one is the string that will be searched and the second one is search option. It is used as follows: **filesearch "STRING" <-r or -o>**
-r option is for searching the string recursively in the subdirectories and -o option is for opening the files. -r and -o options can be used together but they must come after the given string.

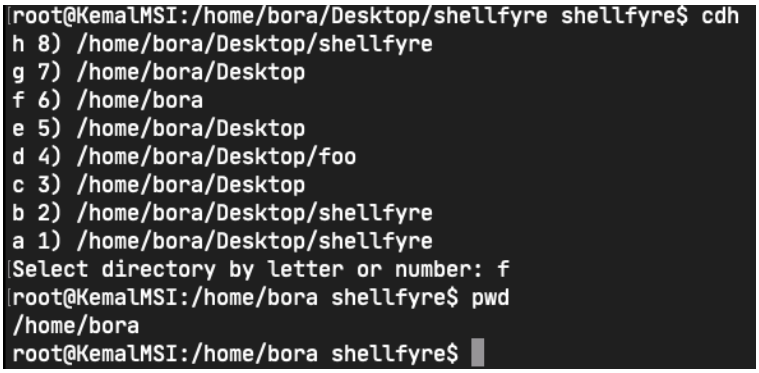
Implementation: The program searches the given string in current directory. If there this directory contains subdirectories and -r option is given, then it calls itself recursively on subdirectories. If -o option is given, it opens the files using **xdg-open**.



cdh

This command lists last visited ten directories and expects user to choose one of the listed indexes. Then it changes the current directory to the directory at the chosen index.

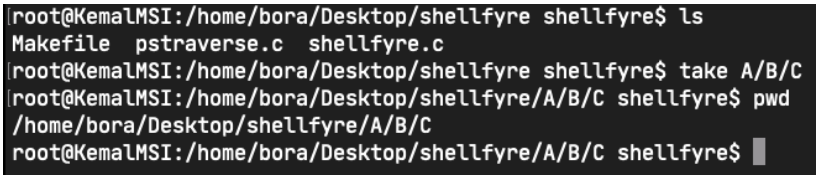
Implementation: When a directory is changed in **shellfyre** with **cd**, program creates a history file in the project directory named *cdh_history.txt* and stores the visited directories in this file. When **cdh** is called, last ten visited directories are listed respectively.



take

This command takes one argument and changes the current directory to the given directory. If the directories do not exist, it creates them. Usage is as follows:
take A/B/C where A, B and C are directories.

Implementation: The program tokenizes the given string from "/" characters. The directories are created if they do not exist, then change into it.



joker

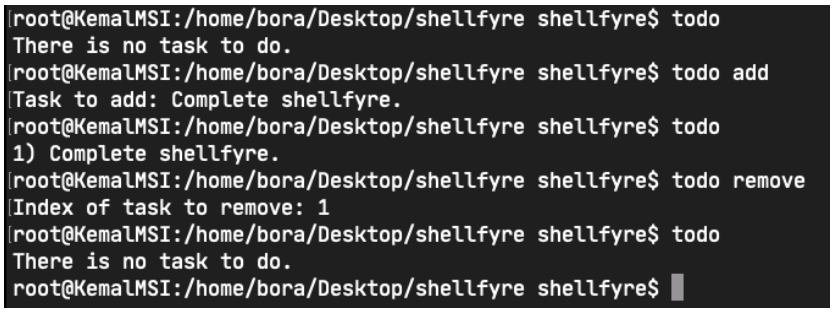
When this command is called once, it generates a random joke at each 15 minutes and displays it on the user's screen.

Implementation: When the command is entered, the program schedules a job using **crontab** and displays a joke at each 15 minutes. The joke is fetched from internet using **curl** and displayed with **notify-send**.

todo *(created by Kemal Bora Bayraktar)*

This command shows the current todo list. If the user calls it with no arguments, it shows the tasks. The user can add a task by calling it like **todo add**, then entering the task. To remove a task, it should be called like **todo remove**, then entering the index of the task to remove.

Implementation: When the **todo add** is first used, a file named *todo_list.txt* is created in project directory and the entered task is appended to file. When **todo** is called the tasks are listed from this file and when **todo remove** is called they are removed from here.



Part III – Kernel Modules

pstraverse

This command lists the subprocess tree of the given PID by treating the PID as root either using Depth First Search or Breadth First Search. The command is used as follows: **pstraverse <PID> <-d or -b>**. -d is for DFS, -b is for BFS. The user can see the output of the command with **dmesg** command.

Implementation: The program inserts the kernel module when the command is entered first time and it creates a character device file. When the user enters the command again it communicates with the kernel module through the device file and no insertion needed. While the user is exiting the shell, device file and the kernel module are removed.

Here is the usage and output of the **pstraverse** command with option -d and -b respectively.

```
root@KemalMSI:/home/bora/Desktop/shellfyre shellfyre$ pstraverse 1045 -d
root@KemalMSI:/home/bora/Desktop/shellfyre shellfyre$ exit
bora@KemalMSI:~/Desktop/shellfyre$ dmesg | tail -n 21
[  242.535165] Name: gnome-session-b PID: 1045
[  242.535170] Name: gnome-shell PID: 1098
[  242.535173] Name: Xwayland PID: 1188
[  242.535176] Name: ibus-daemon PID: 1343
[  242.535179] Name: ibus-dconf PID: 1352
[  242.535181] Name: ibus-engine-sim PID: 1366
[  242.535184] Name: gsd-sharing PID: 1236
[  242.535186] Name: gsd-wacom PID: 1237
[  242.535189] Name: gsd-color PID: 1239
[  242.535191] Name: gsd-keyboard PID: 1242
[  242.535194] Name: gsd-print-notif PID: 1245
[  242.535196] Name: gsd-rfkill PID: 1258
[  242.535198] Name: gsd-smartcard PID: 1260
[  242.535201] Name: gsd-datetime PID: 1264
[  242.535203] Name: gsd-media-keys PID: 1266
[  242.535205] Name: gsd-screensaver PID: 1273
[  242.535208] Name: gsd-sound PID: 1275
[  242.535210] Name: gsd-a11y-settin PID: 1276
[  242.535212] Name: gsd-housekeepin PID: 1278
[  242.535215] Name: gsd-power PID: 1282
[  245.392179] Module pstraverse is removed succesfully...
```

```
root@KemalMSI:/home/bora/Desktop/shellfyre shellfyre$ pstraverse 1045 -b
root@KemalMSI:/home/bora/Desktop/shellfyre shellfyre$ exit
bora@KemalMSI:~/Desktop/shellfyre$ dmesg | tail -n 21
[  286.456930] Name: gnome-session-b PID: 1045
[  286.456931] Name: gnome-shell PID: 1098
[  286.456932] Name: gsd-sharing PID: 1236
[  286.456933] Name: gsd-wacom PID: 1237
[  286.456933] Name: gsd-color PID: 1239
[  286.456934] Name: gsd-keyboard PID: 1242
[  286.456935] Name: gsd-print-notif PID: 1245
[  286.456935] Name: gsd-rfkill PID: 1258
[  286.456936] Name: gsd-smartcard PID: 1260
[  286.456937] Name: gsd-datetime PID: 1264
[  286.456937] Name: gsd-media-keys PID: 1266
[  286.456938] Name: gsd-screensaver PID: 1273
[  286.456939] Name: gsd-sound PID: 1275
[  286.456939] Name: gsd-a11y-settin PID: 1276
[  286.456940] Name: gsd-housekeepin PID: 1278
[  286.456940] Name: gsd-power PID: 1282
[  286.456941] Name: Xwayland PID: 1188
[  286.456942] Name: ibus-daemon PID: 1343
[  286.456942] Name: ibus-dconf PID: 1352
[  286.456943] Name: ibus-engine-sim PID: 1366
[  289.323804] Module pstraverse is removed succesfully...
```