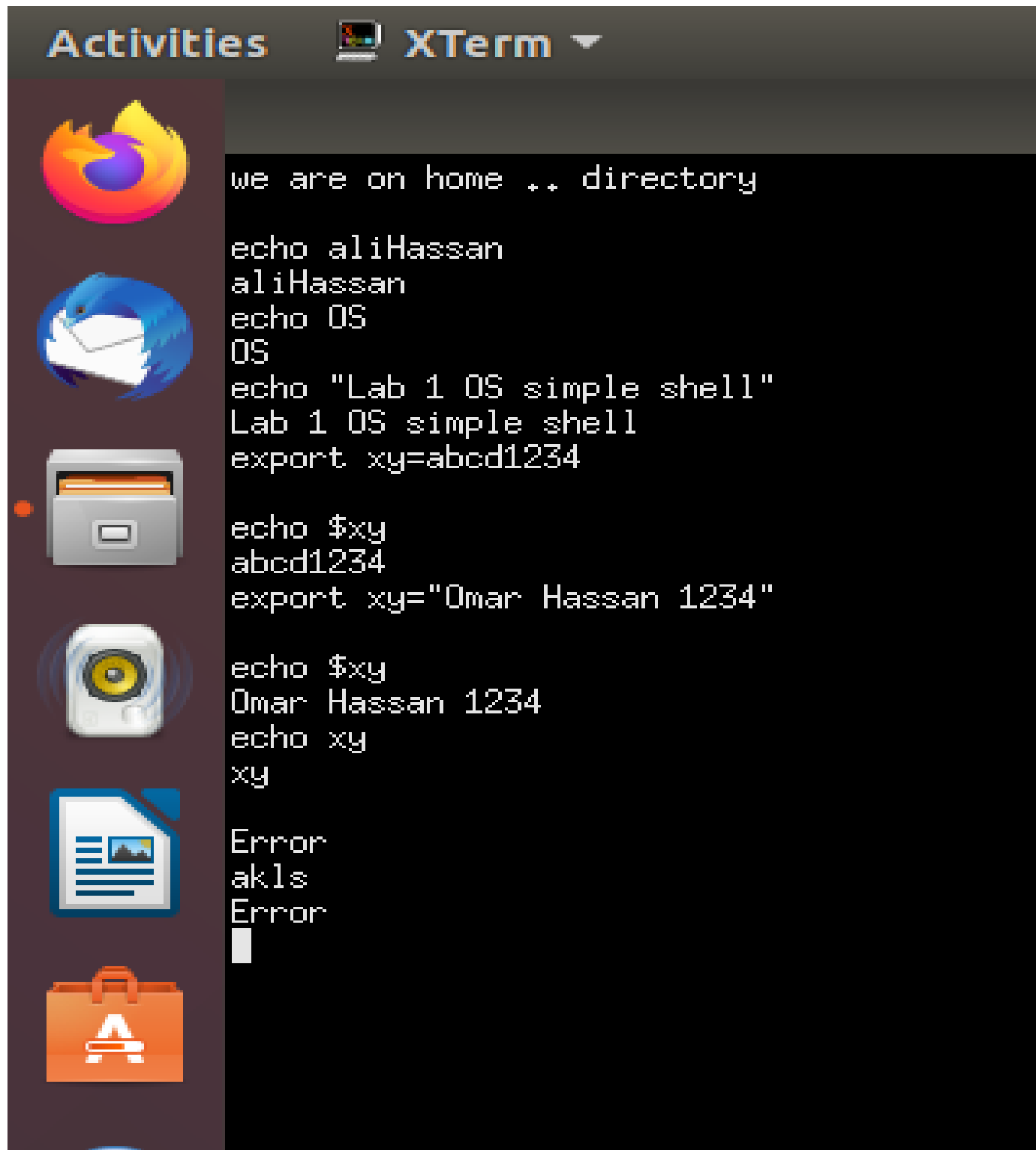# Lab 1 Report

Simple Shell (Multi-Processing)

Name: Ali Hassan Ali Ahmed ELSharawy   ID: 19016013

Description of major functions:

- In main function we define SIGCHLD signal to interrupt when background child terminate as parent will not wait for it so we handle this interrupt in handle child exit and write in the console and login text file.
- We set environment (current directory) to the program file location.
- Then we loop and scan the command and parse it according to spaces and if we find "quote we parse the whole string till "quote found as 1 string.
- We count number of words in command.
- After parsing we check first word of program if exit we exit the program else we call shell function and loop to scan another command.
- In shell function we check for first word of command so if we found echo or export or cd we call execute built in command function else we call execute command.
- For echo command we check for $ sign to search in variable array to get index of value location in value array so we get its value.
- For export command we check if variable exist to update its value else we insert new variable to array and add its value in value array at arr index variable which point to available end position in array.
- For cd we call chdir to change directory.

- For non-built command we check for & sign at end of command to set background flag in order not to wait child.
- Then we define array of char pointers to pass execvp parameters.

Sample Runs:

```
we are on home .. directory

echo aliHassan
aliHassan
echo OS
OS
echo "Lab 1 OS simple shell"
Lab 1 OS simple shell
export xy=abcd1234

echo $xy
abcd1234
export xy="Omar Hassan 1234"

echo $xy
Omar Hassan 1234
echo xy
xy

Error
akls
Error
```

```
we are on home .. directory

cd ..

ls
'lab 1 shell OS'

cd /home

ls
alielsharawy

cd /home/alielsharawy/Desktop

ls
OS

export location=/home/alielsharawy/Desktop

export varr=/home

export x=..

cd $varr

ls
alielsharawy

cd $location

ls
OS

cd $x

ls
Desktop   Documents   Downloads   examples.desktop   Music   Pictures   Public   snap   Templates   Videos
```

```
ls
OS

cd $x

ls
Desktop  Documents  Downloads  examples.desktop  Music  Pictures  Public  snap  Templates  Videos

ls -l
total 48
drwxr-xr-x 3 alielsharawy alielsharawy 4096 Mar 23 23:45 Desktop
drwxr-xr-x 2 alielsharawy alielsharawy 4096 Mar 21 18:33 Documents
drwxr-xr-x 2 alielsharawy alielsharawy 4096 Mar 21 18:33 Downloads
-rw-r--r-- 1 alielsharawy alielsharawy 8980 Mar 21 18:25 examples.desktop
drwxr-xr-x 2 alielsharawy alielsharawy 4096 Mar 21 18:33 Music
drwxr-xr-x 2 alielsharawy alielsharawy 4096 Mar 24 18:08 Pictures
drwxr-xr-x 2 alielsharawy alielsharawy 4096 Mar 21 18:33 Public
drwx------ 4 alielsharawy alielsharawy 4096 Mar 24 13:40 snap
drwxr-xr-x 2 alielsharawy alielsharawy 4096 Mar 21 18:33 Templates
drwxr-xr-x 2 alielsharawy alielsharawy 4096 Mar 21 18:33 Videos

ls -l -a
total 112
drwxr-xr-x 19 alielsharawy alielsharawy 4096 Mar 24 14:18 .
drwxr-xr-x  3 root         root         4096 Mar 21 18:25 ..
-rw------- 1 alielsharawy alielsharawy  779 Mar 24 17:22 .bash_history
-rw-r--r-- 1 alielsharawy alielsharawy  220 Mar 21 18:25 .bash_logout
-rw-r--r-- 1 alielsharawy alielsharawy 3771 Mar 21 18:25 .bashrc
drwx------ 17 alielsharawy alielsharawy 4096 Mar 24 14:18 .cache
drwx------ 17 alielsharawy alielsharawy 4096 Mar 24 16:05 .config
drwxr-xr-x  3 alielsharawy alielsharawy 4096 Mar 23 23:45 Desktop
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 21 18:33 Documents
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 21 18:33 Downloads
-rw-r--r-- 1 alielsharawy alielsharawy 8980 Mar 21 18:25 examples.desktop
drwx------  3 alielsharawy alielsharawy 4096 Mar 21 23:10 .gnupg
-rw------- 1 alielsharawy alielsharawy 1590 Mar 24 12:29 .ICEauthority
drwxrwxr-x  4 alielsharawy alielsharawy 4096 Mar 21 23:25 .java
drwx------  3 alielsharawy alielsharawy 4096 Mar 21 18:33 .local
drwx------  5 alielsharawy alielsharawy 4096 Mar 21 23:12 .mozilla
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 21 18:33 Music
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 24 18:08 Pictures
-rw-r--r-- 1 alielsharawy alielsharawy  807 Mar 21 18:25 .profile
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 21 18:33 Public
drwx------  4 alielsharawy alielsharawy 4096 Mar 24 13:40 snap
drwx------  2 alielsharawy alielsharawy 4096 Mar 21 23:10 .ssh
-rw-r--r-- 1 alielsharawy alielsharawy    0 Mar 21 18:42 .sudo_as_admin_successful
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 21 18:33 Templates
drwx------  6 alielsharawy alielsharawy 4096 Mar 24 14:18 .thunderbird
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 21 18:33 Videos
-rw-rw-r-- 1 alielsharawy alielsharawy  131 Mar 22 10:59 .xinputrc

cd $location
```

```
-rw-r--r-- 1 alielsharawy alielsharawy 8980 Mar 21 18:25 examples.desktop
drwxr-xr-x 2 alielsharawy alielsharawy 4096 Mar 21 18:33 Music
drwxr-xr-x 2 alielsharawy alielsharawy 4096 Mar 24 18:08 Pictures
drwxr-xr-x 2 alielsharawy alielsharawy 4096 Mar 21 18:33 Public
drwx------ 4 alielsharawy alielsharawy 4096 Mar 24 13:40 snap
drwxr-xr-x 2 alielsharawy alielsharawy 4096 Mar 21 18:33 Templates
drwxr-xr-x 2 alielsharawy alielsharawy 4096 Mar 21 18:33 Videos

ls -l -a
total 112
drwxr-xr-x 19 alielsharawy alielsharawy 4096 Mar 24 14:18 .
drwxr-xr-x  3 root         root         4096 Mar 21 18:25 ..
-rw-------  1 alielsharawy alielsharawy  779 Mar 24 17:22 .bash_history
-rw-r--r--  1 alielsharawy alielsharawy  220 Mar 21 18:25 .bash_logout
-rw-r--r--  1 alielsharawy alielsharawy 3771 Mar 21 18:25 .bashrc
drwx------ 17 alielsharawy alielsharawy 4096 Mar 24 14:18 .cache
drwx------ 17 alielsharawy alielsharawy 4096 Mar 24 16:05 .config
drwxr-xr-x  3 alielsharawy alielsharawy 4096 Mar 23 23:45 Desktop
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 21 18:33 Documents
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 21 18:33 Downloads
-rw-r--r--  1 alielsharawy alielsharawy 8980 Mar 21 18:25 examples.desktop
drwx------  3 alielsharawy alielsharawy 4096 Mar 21 23:10 .gnupg
-rw-------  1 alielsharawy alielsharawy 1590 Mar 24 12:29 .ICEauthority
drwxrwxr-x  4 alielsharawy alielsharawy 4096 Mar 21 23:25 .java
drwx------  3 alielsharawy alielsharawy 4096 Mar 21 18:33 .local
drwx------  5 alielsharawy alielsharawy 4096 Mar 21 23:12 .mozilla
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 21 18:33 Music
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 24 18:08 Pictures
-rw-r--r--  1 alielsharawy alielsharawy  807 Mar 21 18:25 .profile
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 21 18:33 Public
drwx------  4 alielsharawy alielsharawy 4096 Mar 24 13:40 snap
drwx------  2 alielsharawy alielsharawy 4096 Mar 21 23:10 .ssh
-rw-r--r--  1 alielsharawy alielsharawy    0 Mar 21 18:42 .sudo_as_admin_successful
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 21 18:33 Templates
drwx------  6 alielsharawy alielsharawy 4096 Mar 24 14:18 .thunderbird
drwxr-xr-x  2 alielsharawy alielsharawy 4096 Mar 21 18:33 Videos
-rw-rw-r--  1 alielsharawy alielsharawy  131 Mar 22 10:59 .xinputrc

cd $location

ls -l
total 4
drwxrwxr-x 6 alielsharawy alielsharawy 4096 Mar 21 23:27 OS

ls -a
.  ..  OS

ls -a -l
total 12
drwxr-xr-x  3 alielsharawy alielsharawy 4096 Mar 23 23:45 .
drwxr-xr-x 19 alielsharawy alielsharawy 4096 Mar 24 14:18 ..
drwxrwxr-x  6 alielsharawy alielsharawy 4096 Mar 21 23:27 OS
```

```
we are on home .. directory

which which
/usr/bin/which

which ls
/bin/ls

which cd

which re

which rm
/bin/rm
```
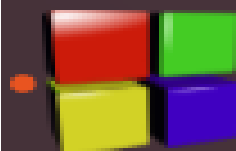
```
we are on home .. directory

ls --
'lab 1 shell OS'    login.txt

ls --help
```

```
-Q, --quote-name              enclose entry names in double quotes
    --quoting-style=WORD      use quoting style WORD for entry names:
                                literal, locale, shell, shell-always,
                                shell-escape, shell-escape-always, c, escape
-r, --reverse                 reverse order while sorting
-R, --recursive               list subdirectories recursively
-s, --size                    print the allocated size of each file, in blocks
-S                            sort by file size, largest first
    --sort=WORD               sort by WORD instead of name: none (-U), size (-S),
                                time (-t), version (-v), extension (-X)
    --time=WORD               with -l, show time as WORD instead of default
                                modification time: atime or access or use (-u);
                                ctime or status (-c); also use specified time
                                as sort key if --sort=time (newest first)
    --time-style=STYLE        with -l, show times using style STYLE:
                                full-iso, long-iso, iso, locale, or +FORMAT;
                                FORMAT is interpreted like in 'date'; if FORMAT
                                is FORMAT1<newline>FORMAT2, then FORMAT1 applies
                                to non-recent files and FORMAT2 to recent files;
                                if STYLE is prefixed with 'posix-', STYLE
                                takes effect only outside the POSIX locale
-t                            sort by modification time, newest first
-T, --tabsize=COLS            assume tab stops at each COLS instead of 8
-u                            with -lt: sort by, and show, access time;
                                with -l: show access time and sort by name;
                                otherwise: sort by access time, newest first
-U                            do not sort; list entries in directory order
-v                            natural sort of (version) numbers within text
-w, --width=COLS              set output width to COLS.  0 means no limit
-x                            list entries by lines instead of by columns
-X                            sort alphabetically by entry extension
-Z, --context                 print any security context of each file
-1                            list one file per line.  Avoid '\n' with -q or -b
    --help     display this help and exit
    --version  output version information and exit

The SIZE argument is an integer and optional unit (example: 10K is 10*1024).
Units are K,M,G,T,P,E,Z,Y (powers of 1024) or KB,MB,... (powers of 1000).

Using color to distinguish file types is disabled both by default and
with --color=never.  With --color=auto, ls emits color codes only when
standard output is connected to a terminal.  The LS_COLORS environment
variable can change the settings.  Use the dircolors command to set it.

Exit status:
 0  if OK,
 1  if minor problems (e.g., cannot access subdirectory),
 2  if serious trouble (e.g., cannot access command-line argument).

GNU coreutils online help: <http://www.gnu.org/software/coreutils/>
Full documentation at: <http://www.gnu.org/software/coreutils/ls>
or available locally via: info '(coreutils) ls invocation'
```

main.c [lab 1 shell OS] - Code::Blocks 16.01

lab 1 shell OS

```
-Z, --context          print any security context of each file
-1                     list one file per line.  Avoid '\n' with -q or -b
    --help     display this help and exit
    --version  output version information and exit

The SIZE argument is an integer and optional unit (example: 10K is 10*1024).
Units are K,M,G,T,P,E,Z,Y (powers of 1024) or KB,MB,... (powers of 1000).

Using color to distinguish file types is disabled both by default and
with --color=never.  With --color=auto, ls emits color codes only when
standard output is connected to a terminal.  The LS_COLORS environment
variable can change the settings.  Use the dircolors command to set it.

Exit status:
 0  if OK,
 1  if minor problems (e.g., cannot access subdirectory),
 2  if serious trouble (e.g., cannot access command-line argument).

GNU coreutils online help: <http://www.gnu.org/software/coreutils/>
Full documentation at: <http://www.gnu.org/software/coreutils/ls>
or available locally via: info '(coreutils) ls invocation'

firefox
```

C Write Text File
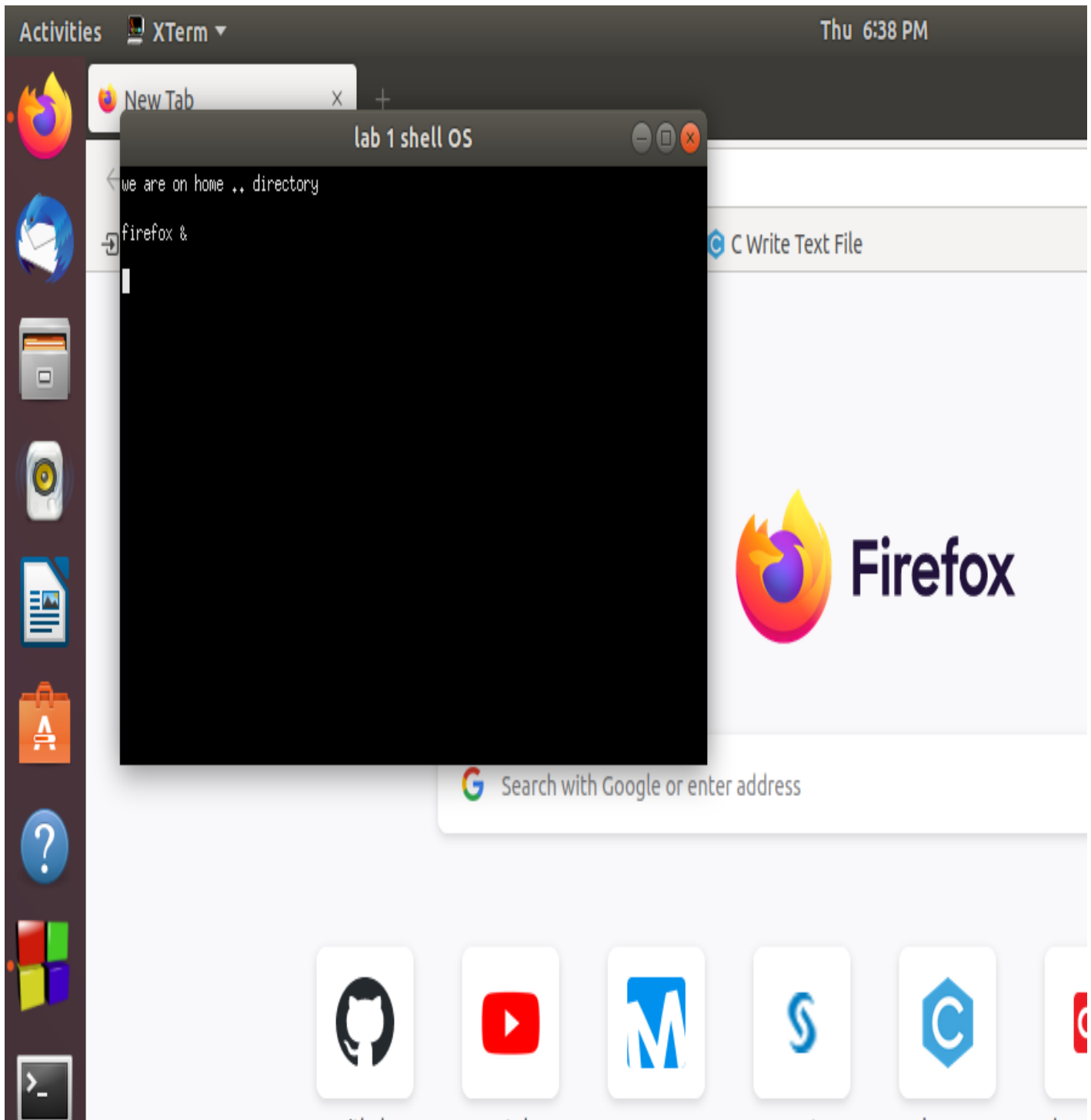
Firefox

Search with Google or enter address

github   youtube   man7   support.sas   learnc   docs.oracle   devopedia   tutorialsp...

/home/alielsharawy/Desktop/OS/OS labs/lab 1 shell OS/lab 1 shell OS/...   Unix (LF)   UTF-8   Line 106, Column 24   Insert   Read/Wri... default

processes hierarchy during execution shell program:

Processes   Resources   File Systems

🔍 fire

Process Name	User	% CPU	ID	Memory	Disk read tota	Disk write tot	Disk read	Disk write	Priority
▾ systemd	root	0	1	2.0 MiB	N/A	N/A	N/A	N/A Normal
▾ systemd	alielsharawy	0	3728	1.5 MiB	266.4 MiB	318.5 MiB	N/A	N/A Normal
▾ codeblocks	alielsharawy	4	18298	93.1 MiB	N/A	212.0 KiB	N/A	N/A Normal
▾ xterm	alielsharawy	0	18860	3.9 MiB	N/A	N/A	N/A	N/A Normal
▾ cb_console_runner	alielsharawy	0	18861	144.0 KiB	N/A	N/A	N/A	N/A Normal
▾ sh	alielsharawy	0	18862	68.0 KiB	N/A	N/A	N/A	N/A Normal
▾ lab 1 shell OS	alielsharawy	0	18863	64.0 KiB	N/A	N/A	N/A	N/A Normal
▾ firefox	alielsharawy	0	18864	114.1 MiB	N/A	332.0 KiB	N/A	N/A Normal
Privileged	alielsharawy	0	18940	25.3 MiB	N/A	N/A	N/A	N/A Normal
Socket Prc	alielsharawy	0	18904	7.1 MiB	N/A	N/A	N/A	N/A Normal
Web Conte	alielsharawy	0	19026	10.1 MiB	N/A	N/A	N/A	N/A Normal
Web Conte	alielsharawy	0	19027	10.0 MiB	N/A	N/A	N/A	N/A Normal
Web Conte	alielsharawy	0	19058	10.0 MiB	N/A	N/A	N/A	N/A Normal
WebExten	alielsharawy	0	18987	18.3 MiB	N/A	N/A	N/A	N/A Normal

End Process

Processes　Resources　File Systems
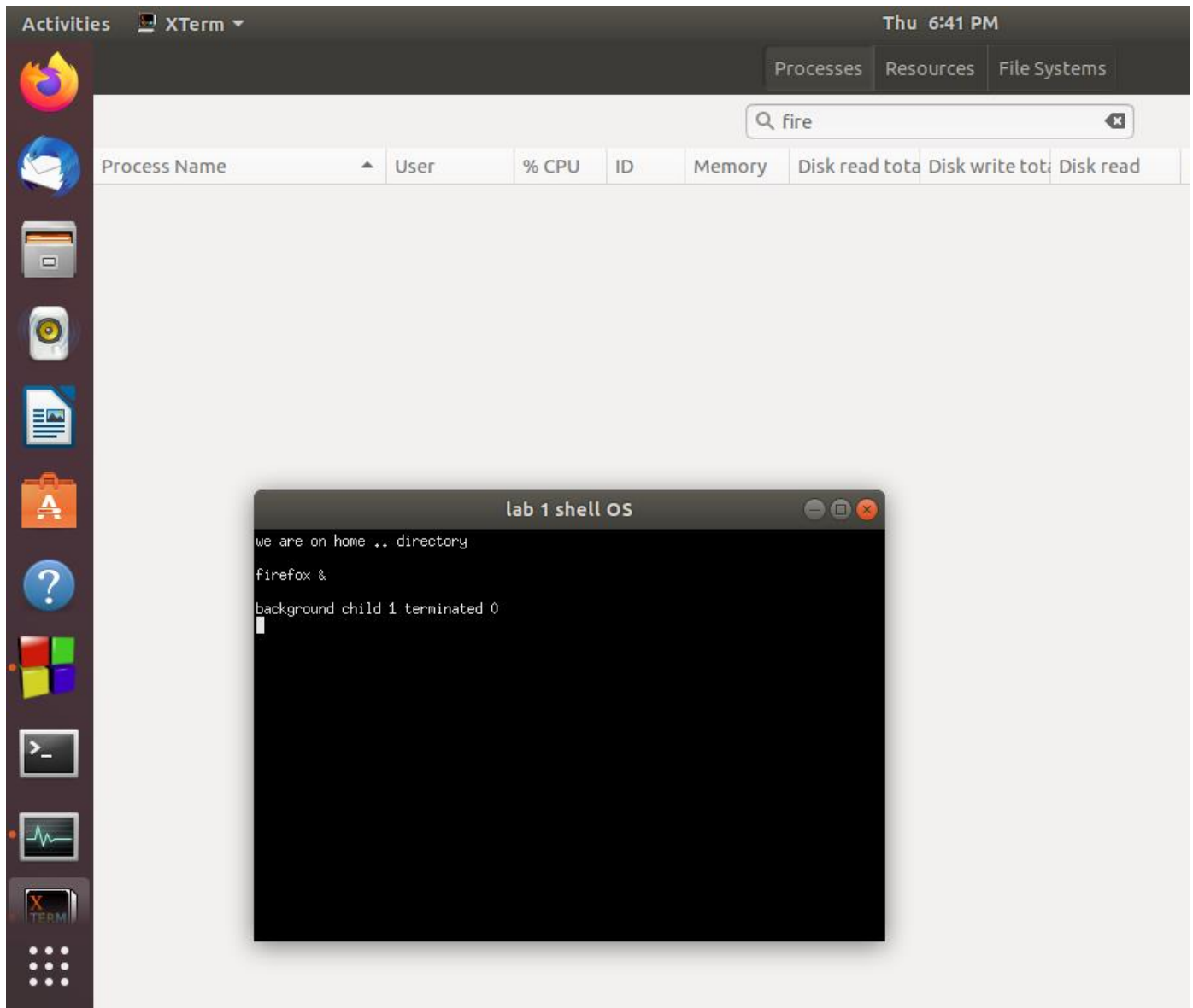
🔍 fire　　　　　　　　　　　　　　　　　　❌

Process Name	▲	User	% CPU	ID	Memory	Disk read tota	Disk write tota	Disk read	Disk wri

lab 1 shell OS　　　　　　　　　　➖▢❌

```
we are on home .. directory

firefox &

background child 1 terminated 0
```

Processes   Resources   File Systems

Q fire

Process Name	▲	User	% CPU	ID	Memory	Disk read tota	Disk write tota	Disk read

lab 1 shell OS

```
we are on home .. directory

firefox &

background child 1 terminated 0
```

New Tab   ×   +

← → C   Search with Google or enter address

⊟ Import bookmarks...   Getting Started   UT How to Install and Us...   C Write Text File

lab 1 shell OS   — ▢ ✕

we are on home .. directory

firefox

Firefox

enter address

github   youtube   man7   support.sas   learnc

main.c [lab 1 shell OS] - Code::Blocks 16.01

File　Edit　View　Search　Project　Build　Debug　wxSmith　Tools　Tools+　Plugins　DoxyBlocks　Settings　Valgrind　Help

Debug

<global>

executeBuiltInCommand(char str[50][100], int noWords) : void

lab 1 shell OS

```
we are on home .. directory

firefox
```

```
e[tempArrIndex],0,30);
trlen(str[1])){
empArrIndex][j] = str[1][i];



r str[50][100],int noWords){
                o determine background or foreground
114        // we adjust flag and remove & if it is background
```

Logs & others

DoxyBlocks ✖　Valgrind ✖　Valgrind messages ✖　Thread search ✖　Cccc ✖　Build log ✖　Build messages ✖　Cscope ✖

```
...rget is up to date.
Nothing to be done (all items are up-to-date).


-------------- Run: Debug in lab 1 shell OS (compiler: GNU GCC Compiler)---------------

Checking for existence: /home/alielsharawy/Desktop/OS/OS labs/lab 1 shell OS/lab 1 shell OS/bin/Debug/lab 1 shell OS
Executing: xterm -T lab\ 1\ shell\ OS -e /usr/bin/cb_console_runner LD_LIBRARY_PATH=$LD_LIBRARY_PATH:. /home/alielsharawy/Desktop/OS/OS\ labs/lab\ 1\ shell\ OS/lab\ 1\ shell\
OS/bin/Debug/lab\ 1\ shell\ OS  (in /home/alielsharawy/Desktop/OS/OS labs/lab 1 shell OS/lab 1 shell OS/.)
```

/home/alielsharawy/Desktop/OS/OS labs/lab 1 shell OS/lab 1 shell OS/...　　Unix (LF)　　UTF-8　　Line 106, Column 24　　Insert　　Read/Wri...　default