

# Simple Unix Shell

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## Introduction

A **Unix shell** is a command-line interpreter or **shell** that provides a command line user interface for **Unix**-like operating systems. The **shell** is both an interactive command language and a scripting language, and is used by the operating system to control the execution of the system using **shell** scripts.

## Requirements

It is required to implement a Unix shell program. A shell is simply a program that conveniently allows you to run other programs.

Your shell must support the following:

### 1. The internal shell command "exit" which terminates the shell

- **Concepts:** shell commands, exiting the shell.
- **System** calls: `exit()`

### 2. A command with no arguments

- **Example:** `ls`, `cp`, `rm` ...etc
  - **Details:** Your shell must block until the command completes and, if the return code is abnormal, print out a message to that effect.
  - **Concepts:** Forking a child process, waiting for it to complete and synchronous execution.
  - **System calls:** `fork()`, `execvp()`, `exit()`, `wait()`
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3. A command with arguments

- **Example:** ls -l
- **Details:** Argument 0 is the name of the command.
- **Concepts:** Command-line parameters.

4. A command, with or without arguments, executed in the background using &.

- **Example:** firefox &
- **Details:** In this case, your shell must execute the command and return immediately, not blocking until the command finishes.
- **Concepts:** Background execution, signals, signal handlers, processes and asynchronous execution.

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## Organization of Code

There are three parts of the project :

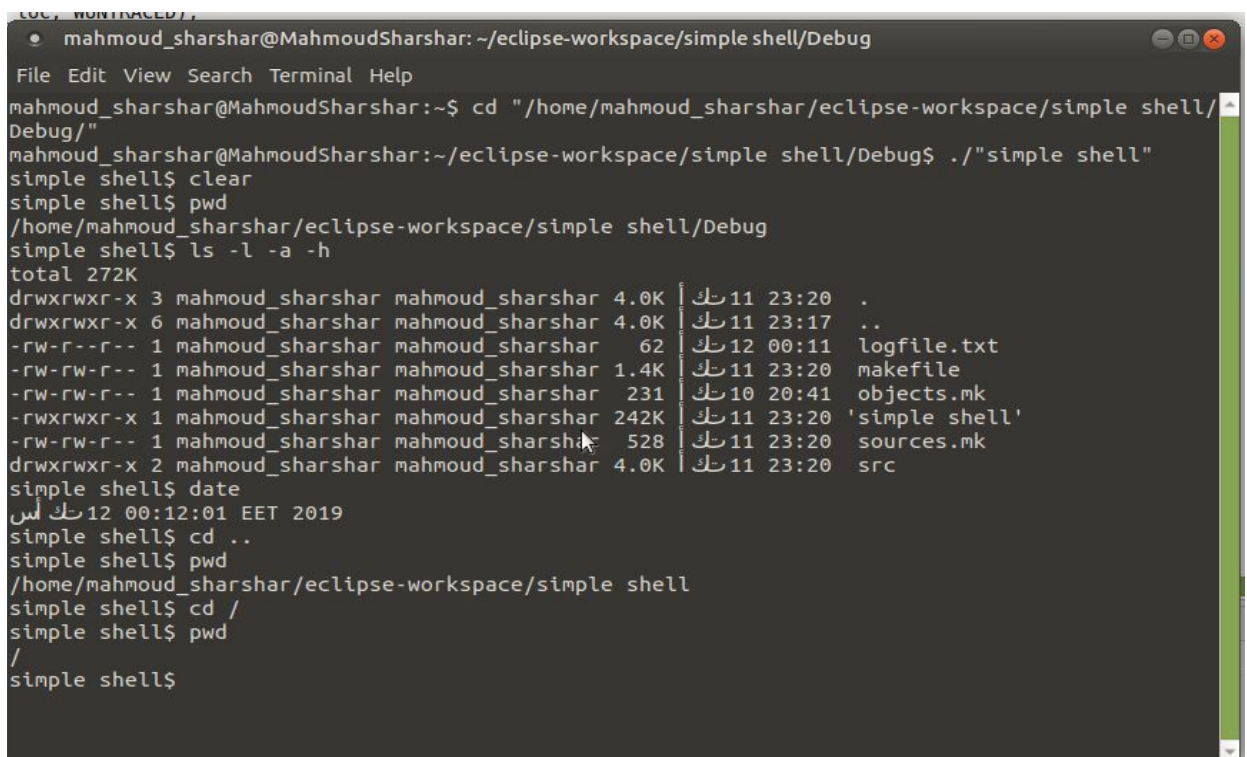
1. UnixShell.h : declares class Shell and all its associated functions without implementation, acts like an interface.
2. UnixShell.cpp : defines the class Shell and all its methods with detailed implementation and commented code.
3. Main.cpp : creates an object from the Class Shell and execute the Shell program.

The Class Shell represents the core part of my Code and includes the following functions :

1. ParseInput method : takes a user input and split it into different parts to represent the appropriate command form and return the array of all parts.

2. ExecuteCommand method: takes a command as an argument and execute it by creating a new process via fork and pass the command to `execvp` method to execute the command.
3. Cd method : handle cd command that is built-in command and isn't exist in system path.
4. runShell method : the controller of the Shell ,it waits for a user input,then calls the appropriate functions based on the current state of the Shell.
5. signalHandler method : handle interrupt that come from terminating a child process that runs in the background.

## Sample Run



```
mahmoud_sharshar@MahmoudSharshar: ~/eclipse-workspace/simple shell/Debug
File Edit View Search Terminal Help
mahmoud_sharshar@MahmoudSharshar:~$ cd "/home/mahmoud_sharshar/eclipse-workspace/simple shell/Debug/"
mahmoud_sharshar@MahmoudSharshar:~/eclipse-workspace/simple shell/Debug$ ./"simple shell"
simple shell$ clear
simple shell$ pwd
/home/mahmoud_sharshar/eclipse-workspace/simple shell/Debug
simple shell$ ls -l -a -h
total 272K
drwxrwxr-x 3 mahmoud_sharshar mahmoud_sharshar 4.0K 11 23:20 .
drwxrwxr-x 6 mahmoud_sharshar mahmoud_sharshar 4.0K 11 23:17 ..
-rw-r--r-- 1 mahmoud_sharshar mahmoud_sharshar 62 12 00:11 logfile.txt
-rw-rw-r-- 1 mahmoud_sharshar mahmoud_sharshar 1.4K 11 23:20 makefile
-rw-rw-r-- 1 mahmoud_sharshar mahmoud_sharshar 231 10 20:41 objects.mk
-rwxrwxr-x 1 mahmoud_sharshar mahmoud_sharshar 242K 11 23:20 'simple shell'
-rw-rw-r-- 1 mahmoud_sharshar mahmoud_sharshar 528 11 23:20 sources.mk
drwxrwxr-x 2 mahmoud_sharshar mahmoud_sharshar 4.0K 11 23:20 src
simple shell$ date
12 00:12:01 EET 2019
simple shell$ cd ..
simple shell$ pwd
/home/mahmoud_sharshar/eclipse-workspace/simple shell
simple shell$ cd /
simple shell$ pwd
/
simple shell$
```

```
mahmoud_sharshar@MahmoudSharshar: ~/eclipse-workspace/simple shell/Debug
File Edit View Search Terminal Help
mahmoud_sharshar@MahmoudSharshar:~/eclipse-workspace/simple shell/Debug$ ./"simple shell"
simple shell$ ls
empty logfile.txt makefile objects.mk 'simple shell' sources.mk src
simple shell$ mv empty src
simple shell$ ls src
empty main.d main.o subDir.mk UnixShell.d UnixShell.o
simple shell$ cp src/empty .
simple shell$ ls
empty logfile.txt makefile objects.mk 'simple shell' sources.mk src
simple shell$ pwd
/home/mahmoud_sharshar/eclipse-workspace/simple shell/Debug
simple shell$ mkdir newDir
simple shell$ ls
empty logfile.txt makefile newDir objects.mk 'simple shell' sources.mk src
simple shell$ rm newDir
rm: cannot remove 'newDir': Is a directory
simple shell$ rm -R newDir
simple shell$ ls -a
. .. empty logfile.txt makefile objects.mk 'simple shell' sources.mk src
simple shell$ ls -alh
total 272K
drwxrwxr-x 3 mahmoud_sharshar mahmoud_sharshar 4.0K 12 00:28 .
drwxrwxr-x 6 mahmoud_sharshar mahmoud_sharshar 4.0K 12 00:28 ..
-rw-r--r-- 1 mahmoud_sharshar mahmoud_sharshar 0 12 00:28 empty
-rw-r--r-- 1 mahmoud_sharshar mahmoud_sharshar 341 12 00:29 logfile.txt
-rw-rw-r-- 1 mahmoud_sharshar mahmoud_sharshar 1.4K 11 23:20 makefile
-rw-rw-r-- 1 mahmoud_sharshar mahmoud_sharshar 231 10 20:41 objects.mk
-rwxrwxr-x 1 mahmoud_sharshar mahmoud_sharshar 242K 11 23:20 'simple shell'
-rw-rw-r-- 1 mahmoud_sharshar mahmoud_sharshar 528 11 23:20 sources.mk
drwxrwxr-x 2 mahmoud_sharshar mahmoud_sharshar 4.0K 12 00:27 src
simple shell$
```

Menu  
mahmoud\_sharshar@MahmoudSharshar: ~/eclipse-workspace/simple shell/Debug  
File Edit View Search Terminal Help  
simple shell\$ gedit &  
simple shell\$ gedit: No such file or directory  
simple shell\$ exit  
mahmoud\_sharshar@MahmoudSharshar:~/eclipse-workspace/simple shell/Debug\$ clear  
mahmoud\_sharshar@MahmoudSharshar:~/eclipse-workspace/simple shell/Debug\$ ./"simple shell"  
simple shell\$ ls  
empty logfile.txt makefile objects.mk 'simple shell' sources.mk src  
simple shell\$ firefox &  
simple shell\$ firefox &  
simple shell\$ cd ..  
simple shell\$ pwd  
/home/mahmoud\_sharshar/eclipse-workspace/simple shell  
simple shell\$ firefox &  
simple shell\$

System Monitor  
Monitor Edit View Help  
System Processes Resources File Systems  
Load averages for the last 1, 5, 15 minutes: 1.50, 1.18, 0.98  

Process Name	Stat	%	Nice	ID	Memo	Waitin	Unit	Priority
clock-applet	Sleep	0	0	1691	32.4 M	poll	sc user@100	Normal
dbus-daemon	Sleep	0	0	1376	5.4 M	poll	ep_pol user@100	Normal
dconf-service	Sleep	0	0	1644	5.2 M	poll	sc user@100	Normal
gvfs-afc-volume-monit	Sleep	0	0	1774	7.5 M	poll	sc user@100	Normal
gvfsd	Sleep	0	0	1621	7.2 M	poll	sc user@100	Normal
gvfsd-fuse	Sleep	0	0	1626	5.1 M	poll	futex_user@100	Normal
gvfsd-metadata	Sleep	0	0	1741	6.0 M	poll	sc user@100	Normal
gvfs-goa-volume-monit	Sleep	0	0	1853	5.8 M	poll	sc user@100	Normal
gvfs-gphoto2-volume-m	Sleep	0	0	1790	6.4 M	poll	sc user@100	Normal
gvfs-mtp-volume-monit	Sleep	0	0	1844	5.8 M	poll	sc user@100	Normal
gvfs-udisks2-volume-m	Sleep	0	0	1764	8.1 M	poll	sc user@100	Normal
mate-indicator-applet	Sleep	0	0	1696	31.5 M	poll	sc user@100	Normal
mate-system-monitor	Runn	63	0	9996	48.9 M	0	user@100	Normal
mate-terminal	Sleep	0	0	9979	38.2 M	poll	sc user@100	Normal
bash	Sleep	0	0	9987	5.1 M	poll	do_wa user@100	Normal
simple shell	Sleep	0	0	10168	3.1 M	poll	wait_w user@100	Normal
firefox	Zoml	0	0	10257	N/A	0	user@100	Normal
firefox	Zoml	0	0	10215	N/A	0	user@100	Normal
firefox	Zoml	0	0	10170	N/A	0	user@100	Normal
notification-area-applet	Sleep	0	0	1695	23.1 M	poll	sc user@100	Normal
obexd	Sleep	0	0	1988	6.7 M	poll	sc user@100	Normal
sd-pam	Sleep	0	0	1164	2.7 M	poll	0	Normal
trashapplet	Sleep	0	0	1693	31.9 M	poll	sc user@100	Normal
wnck-applet	Sleep	0	0	1686	35.9 M	poll	sc user@100	Normal
VBoxClient	Sleep	0	0	1531	316.0	poll	do_wa session-c2	Normal
VBoxClient	Sleep	0	0	1532	2.2 M	poll	futex_session-c2	Normal
VBoxClient	Sleep	0	0	1526	316.0	poll	do_wa session-c2	Normal

End Process