



**Faculty of Engineering & Applied Science**

**SOF3950U – Operating Systems**

**Group 6**

**Lab 2 – C Shell**

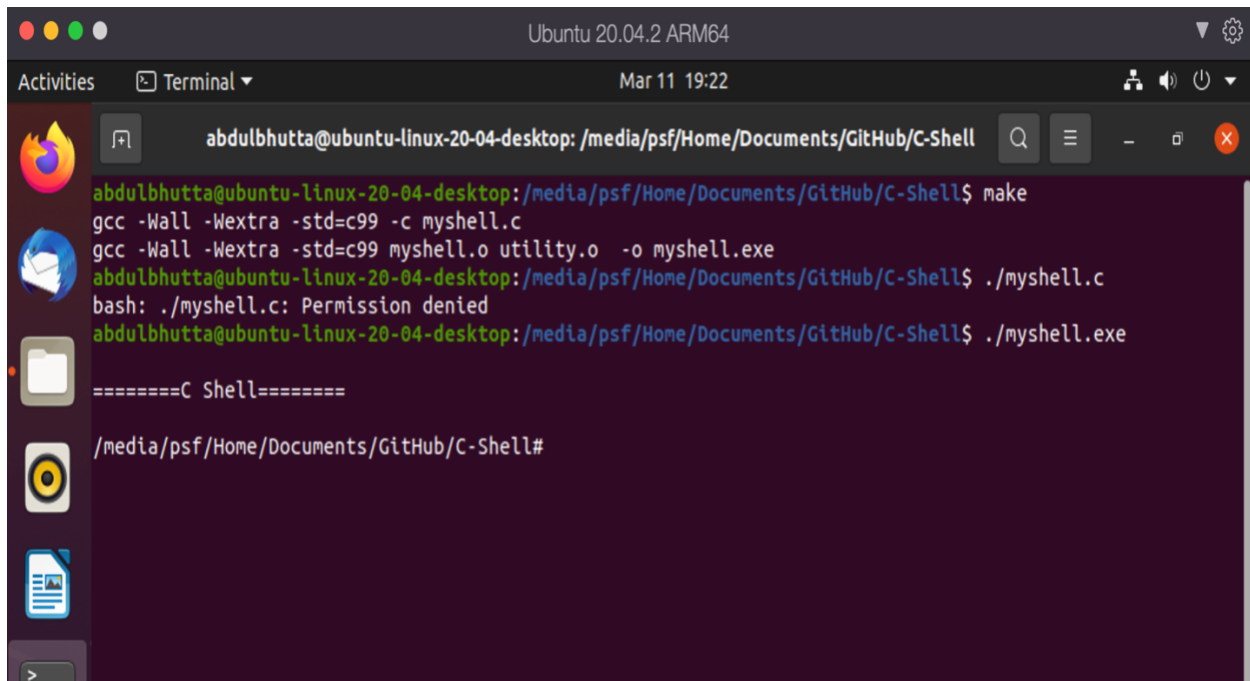
**Due Date: 02/11/2022**

**CRN: 74026**

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## Deliverables

### 1. Run Shell



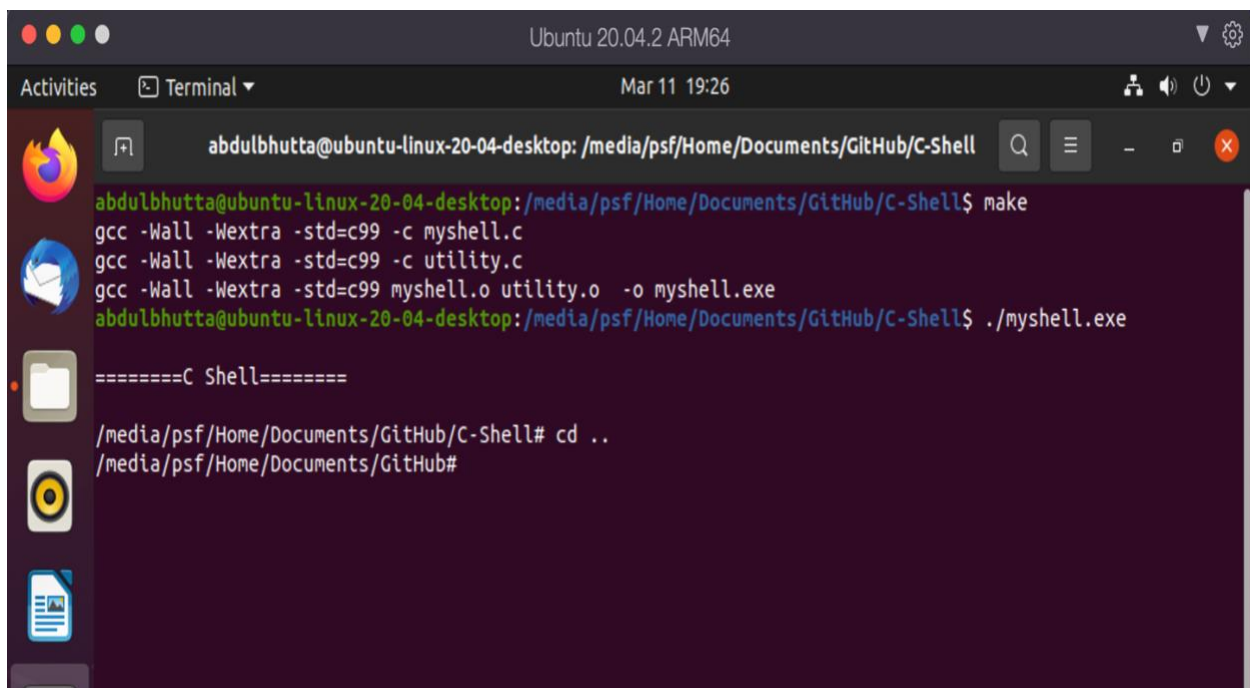
A terminal window on Ubuntu 20.04.2 ARM64. The user is in the directory `/media/psf/Home/Documents/GitHub/C-Shell`. They run `make` to compile `myshell.c` into `myshell.o` and `utility.o` into `myshell.exe`. Then they run `./myshell.c`, which fails with a permission error. Finally, they run `./myshell.exe`, which successfully starts a C shell, displaying `====C Shell=====` and the prompt `/media/psf/Home/Documents/GitHub/C-Shell#`.

```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ make
gcc -Wall -Wextra -std=c99 -c myshell.c
gcc -Wall -Wextra -std=c99 myshell.o utility.o -o myshell.exe
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.c
bash: ./myshell.c: Permission denied
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.exe

====C Shell=====

/media/psf/Home/Documents/GitHub/C-Shell#
```

#### 1. i) Run `cd ..`



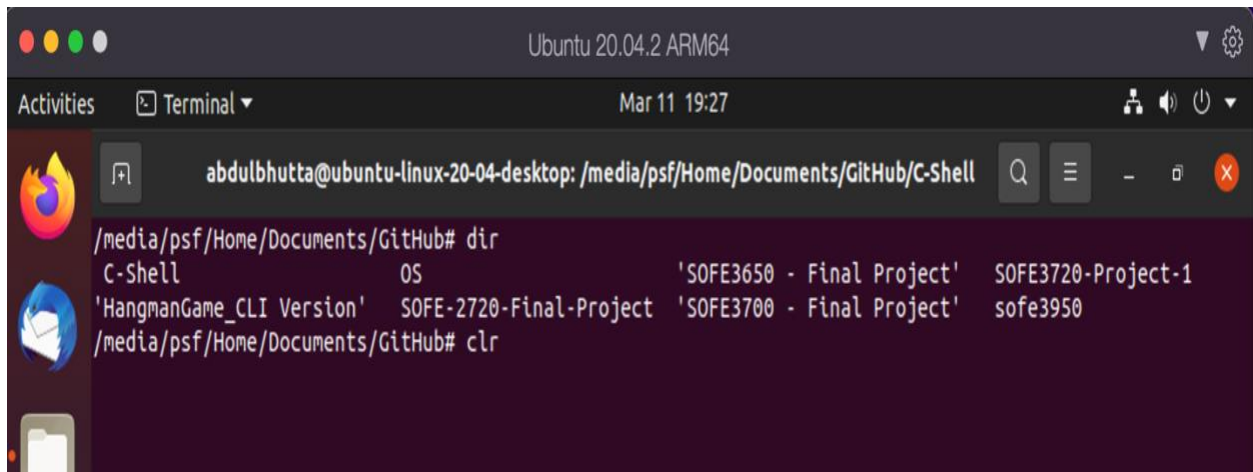
A terminal window on Ubuntu 20.04.2 ARM64. The user is in the directory `/media/psf/Home/Documents/GitHub/C-Shell`. They run `make` to compile `myshell.c` into `myshell.o` and `utility.c` into `myshell.exe`. Then they run `./myshell.exe`, which successfully starts a C shell, displaying `====C Shell=====` and the prompt `/media/psf/Home/Documents/GitHub/C-Shell#`. They then run `cd ..`, which changes the directory to `/media/psf/Home/Documents/GitHub#`.

```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ make
gcc -Wall -Wextra -std=c99 -c myshell.c
gcc -Wall -Wextra -std=c99 -c utility.c
gcc -Wall -Wextra -std=c99 myshell.o utility.o -o myshell.exe
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.exe

====C Shell=====

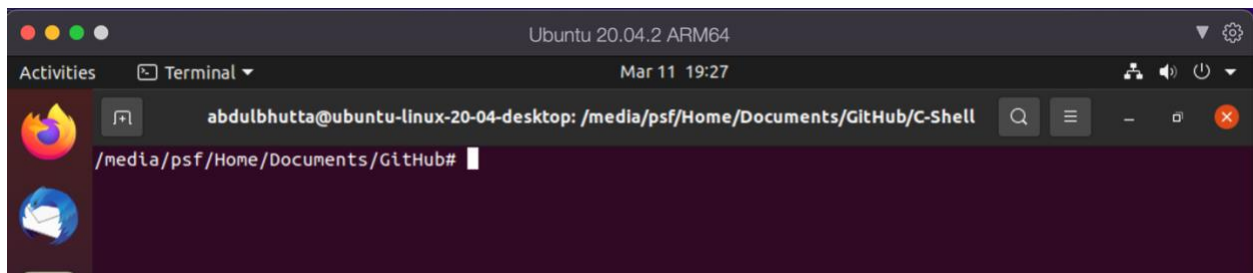
/media/psf/Home/Documents/GitHub/C-Shell# cd ..
/media/psf/Home/Documents/GitHub#
```

### 1. ii) Run clr



A terminal window titled 'Ubuntu 20.04.2 ARM64' with a date and time of 'Mar 11 19:27'. The terminal shows the user 'abdulbhutta@ubuntu-linux-20-04-desktop' in the directory '/media/psf/Home/Documents/GitHub/C-Shell'. The user has entered the command 'dir', and the output lists several files and directories: 'C-Shell', 'OS', 'SOFE3650 - Final Project', 'SOFE3720-Project-1', 'HangmanGame\_CLI Version', 'SOFE-2720-Final-Project', 'SOFE3700 - Final Project', and 'sofe3950'. The prompt is now '/media/psf/Home/Documents/GitHub#'.

```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell
/media/psf/Home/Documents/GitHub# dir
C-Shell          OS              'SOFE3650 - Final Project'  SOFE3720-Project-1
'HangmanGame_CLI Version'  SOFE-2720-Final-Project  'SOFE3700 - Final Project'  sofe3950
/media/psf/Home/Documents/GitHub#
```



The same terminal window as above, but now the prompt is '/media/psf/Home/Documents/GitHub#' and the cursor is at the end of the line, indicating that the 'clr' command has been executed successfully.

```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell
/media/psf/Home/Documents/GitHub#
```

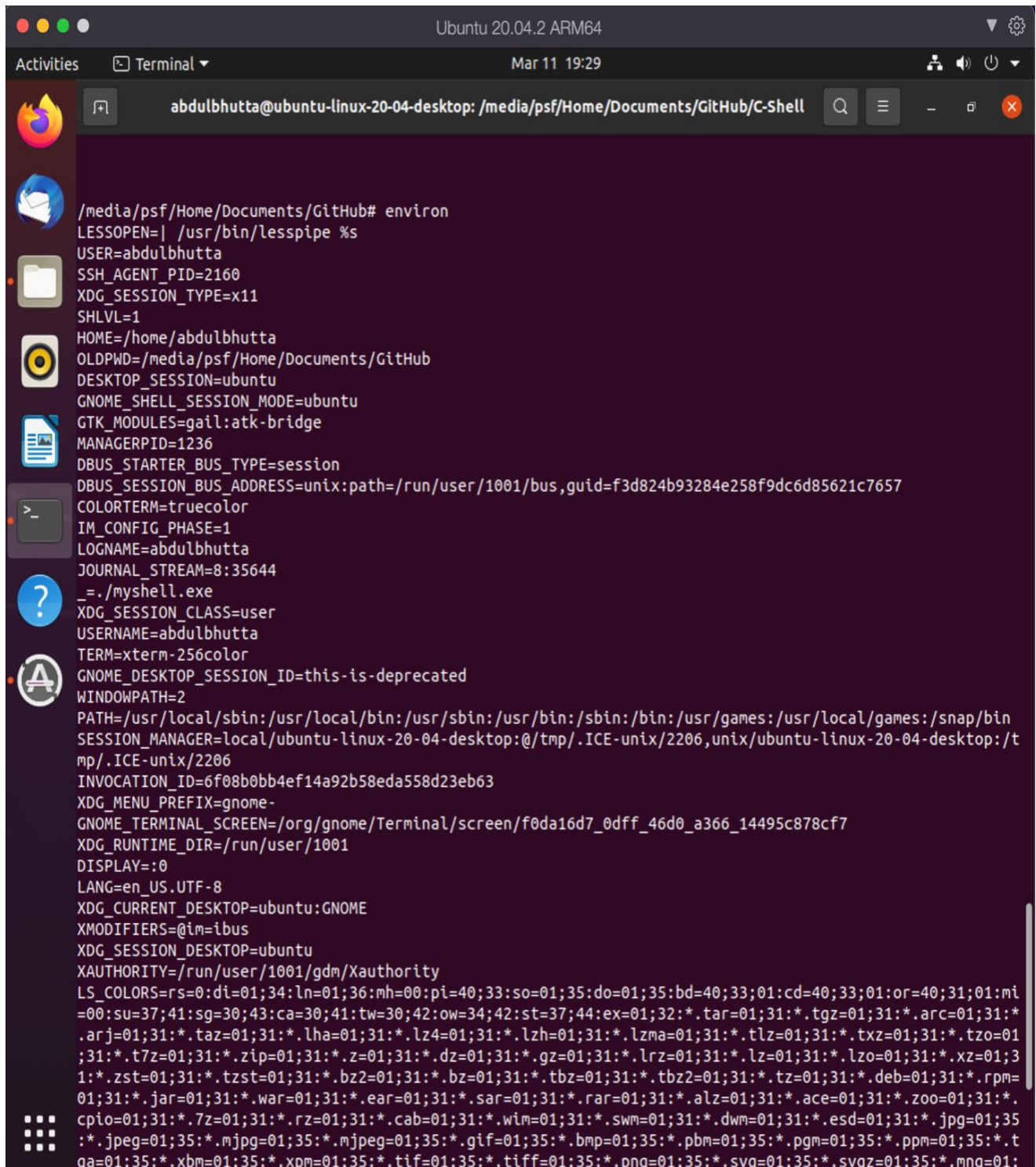
### 1. iii) Run dir



The terminal window shows the user 'abdulbhutta@ubuntu-linux-20-04-desktop' in the directory '/media/psf/Home/Documents/GitHub/C-Shell'. The user has entered the command 'make', and the output is 'make: 'myshell.exe' is up to date.' The user then enters the command './myshell.exe', and the output is '====C Shell===='. The prompt is now '/media/psf/Home/Documents/GitHub/C-Shell#'. The user then enters the command 'dir', and the output lists several files and directories: 'batchFile.txt', 'Makefile', 'myshell.c', 'myshell.exe', 'myshell.o', 'readme', 'README.md', 'shell', 'utility.c', 'utility.h', and 'utility.o'. The prompt is now '/media/psf/Home/Documents/GitHub/C-Shell#'.

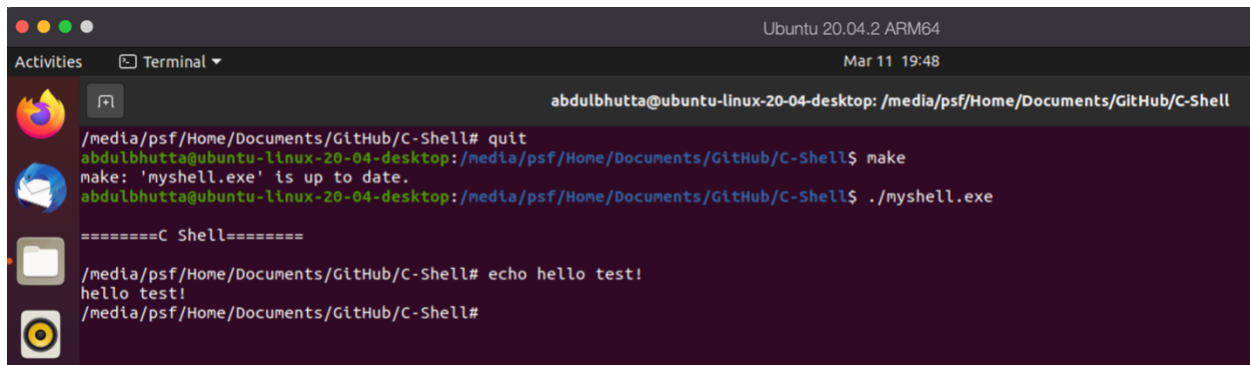
```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ make
make: 'myshell.exe' is up to date.
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.exe
====C Shell====
/media/psf/Home/Documents/GitHub/C-Shell# dir
batchFile.txt Makefile myshell.c myshell.exe myshell.o readme README.md shell utility.c utility.h utility.o
/media/psf/Home/Documents/GitHub/C-Shell#
```

## 1. iv) run environ



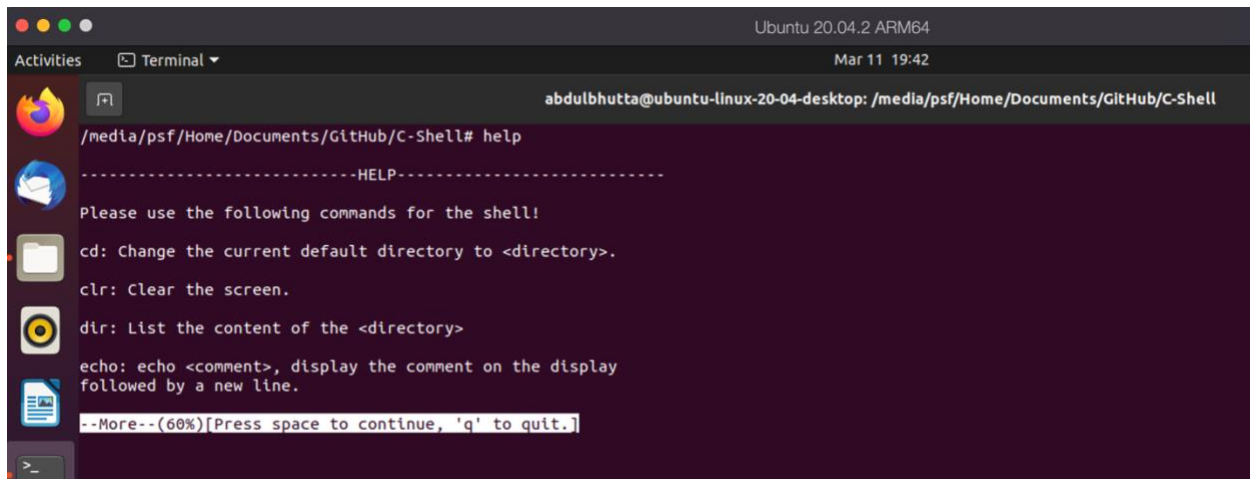
```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell
/media/psf/Home/Documents/GitHub# environ
LESSOPEN=| /usr/bin/lesspipe %s
USER=abdulbhutta
SSH_AGENT_PID=2160
XDG_SESSION_TYPE=x11
SHLV=1
HOME=/home/abdulbhutta
OLDPWD=/media/psf/Home/Documents/GitHub
DESKTOP_SESSION=ubuntu
GNOME_SHELL_SESSION_MODE=ubuntu
GTK_MODULES=gail:atk-bridge
MANAGERPID=1236
DBUS_STARTER_BUS_TYPE=session
DBUS_SESSION_BUS_ADDRESS=unix:path=/run/user/1001/bus,guid=f3d824b93284e258f9dc6d85621c7657
COLORTERM=truecolor
IM_CONFIG_PHASE=1
LOGNAME=abdulbhutta
JOURNAL_STREAM=8:35644
_=./myshell.exe
XDG_SESSION_CLASS=user
USERNAME=abdulbhutta
TERM=xterm-256color
GNOME_DESKTOP_SESSION_ID=this-is-deprecated
WINDOWPATH=2
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
SESSION_MANAGER=local/ubuntu-linux-20-04-desktop:@/tmp/.ICE-unix/2206,unix/ubuntu-linux-20-04-desktop:/tmp/.ICE-unix/2206
INVOCATION_ID=6f08b0bb4ef14a92b58eda558d23eb63
XDG_MENU_PREFIX=gnome-
GNOME_TERMINAL_SCREEN=/org/gnome/Terminal/screen/f0da16d7_0dff_46d0_a366_14495c878cf7
XDG_RUNTIME_DIR=/run/user/1001
DISPLAY=:0
LANG=en_US.UTF-8
XDG_CURRENT_DESKTOP=ubuntu:GNOME
XMODIFIERS=@im=ibus
XDG_SESSION_DESKTOP=ubuntu
XAUTHORITY=/run/user/1001/gdm/Xauthority
LS_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:or=40;31;01:mi=00:su=37;41:sg=30;43:ca=30;41:tw=30;42:ow=34;42:st=37;44:ex=01;32:*.tar=01;31:*.tgz=01;31:*.arc=01;31:*.arj=01;31:*.taz=01;31:*.lha=01;31:*.lz4=01;31:*.lzh=01;31:*.lzma=01;31:*.tlz=01;31:*.txz=01;31:*.tzo=01;31:*.t7z=01;31:*.zip=01;31:*.z=01;31:*.dz=01;31:*.gz=01;31:*.lrz=01;31:*.lz=01;31:*.lzo=01;31:*.xz=01;31:*.zst=01;31:*.tzt=01;31:*.bz2=01;31:*.bz=01;31:*.tbz=01;31:*.tbz2=01;31:*.tz=01;31:*.deb=01;31:*.rpm=01;31:*.jar=01;31:*.war=01;31:*.ear=01;31:*.sar=01;31:*.rar=01;31:*.alz=01;31:*.ace=01;31:*.zoo=01;31:*.cpio=01;31:*.7z=01;31:*.rz=01;31:*.cab=01;31:*.wim=01;31:*.swm=01;31:*.dwm=01;31:*.esd=01;31:*.jpg=01;35:*.jpeg=01;35:*.mjpg=01;35:*.mjpeg=01;35:*.gif=01;35:*.bmp=01;35:*.pbm=01;35:*.pgm=01;35:*.ppm=01;35:*.tga=01;35:*.xbm=01;35:*.xpm=01;35:*.tif=01;35:*.tiff=01;35:*.png=01;35:*.svg=01;35:*.svgz=01;35:*.mng=01;
```

### 1. v) run echo



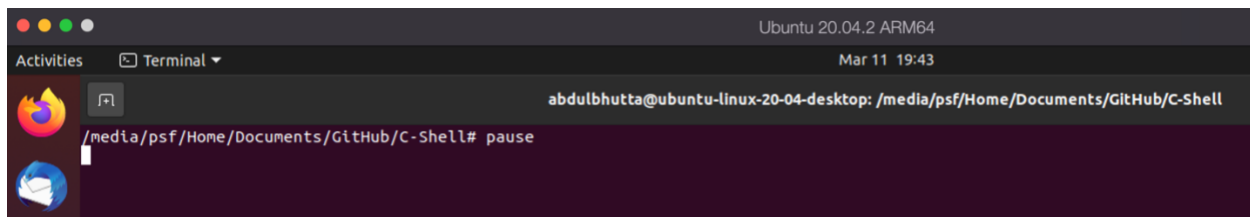
```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell
/media/psf/Home/Documents/GitHub/C-Shell# quit
abdulbhutta@ubuntu-linux-20-04-desktop:/media/psf/Home/Documents/GitHub/C-Shell$ make
make: 'myshell.exe' is up to date.
abdulbhutta@ubuntu-linux-20-04-desktop:/media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.exe
=====C Shell=====
/media/psf/Home/Documents/GitHub/C-Shell# echo hello test!
hello test!
/media/psf/Home/Documents/GitHub/C-Shell#
```

### 1. vi) run help with more filter



```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell
/media/psf/Home/Documents/GitHub/C-Shell# help
-----HELP-----
Please use the following commands for the shell!
cd: Change the current default directory to <directory>.
clr: Clear the screen.
dir: List the content of the <directory>
echo: echo <comment>, display the comment on the display
followed by a new line.
--More--(60%)[Press space to continue, 'q' to quit.]
```

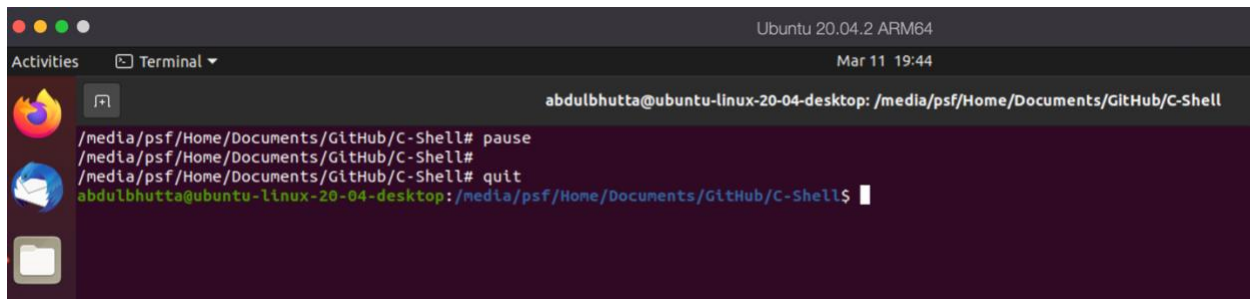
### 1. vii) pause the shell until



```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell
/media/psf/Home/Documents/GitHub/C-Shell# pause
```



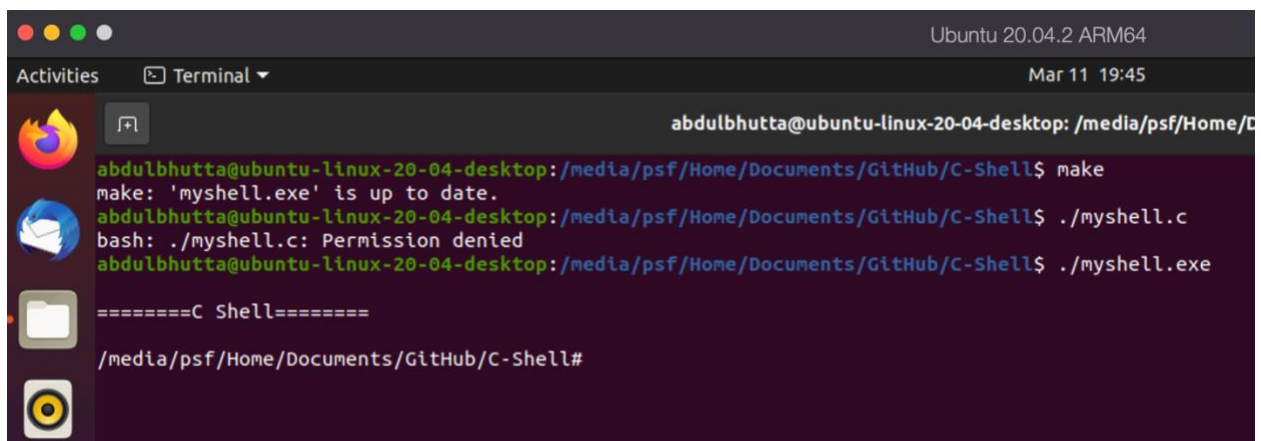
### 1. viii) run quit to exit the shell



A terminal window titled 'Ubuntu 20.04.2 ARM64' with a date of 'Mar 11 19:44'. The prompt is 'abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell'. The user enters 'pause', then 'quit', and the prompt returns to the shell. The user then enters 'quit' again, and the prompt returns to the shell.

```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell# pause
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell# quit
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$
```

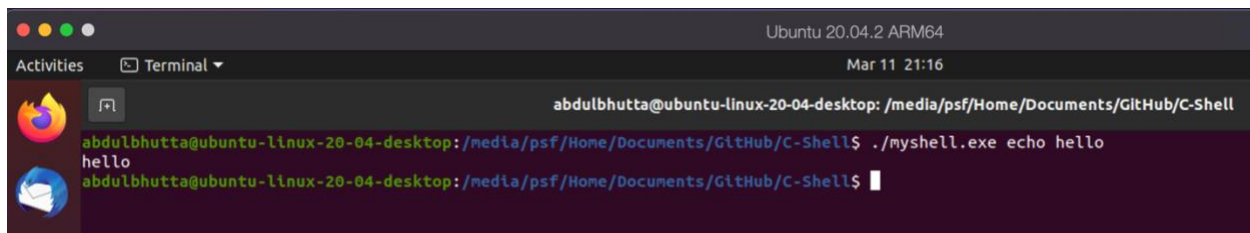
### 1. ix) Full path not hardcoded



A terminal window titled 'Ubuntu 20.04.2 ARM64' with a date of 'Mar 11 19:45'. The prompt is 'abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell'. The user enters 'make', which outputs 'make: 'myshell.exe' is up to date.'. The user then enters './myshell.c', which outputs 'bash: ./myshell.c: Permission denied'. The user then enters './myshell.exe', which outputs '====C Shell====' and the prompt returns to the shell.

```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ make
make: 'myshell.exe' is up to date.
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.c
bash: ./myshell.c: Permission denied
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.exe
====C Shell====
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell#
```

### 2. Running a command at run



A terminal window titled 'Ubuntu 20.04.2 ARM64' with a date of 'Mar 11 21:16'. The prompt is 'abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell'. The user enters './myshell.exe echo hello', which outputs 'hello'.

```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.exe echo hello
hello
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$
```

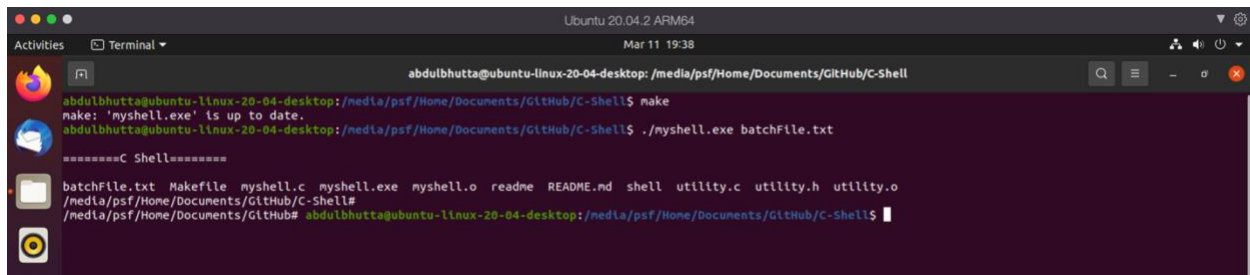
### 3. Running commands from Batch file



A terminal window titled 'batchFile'. The user enters 'dir' and 'cd ..'.

```
dir
cd ..
```

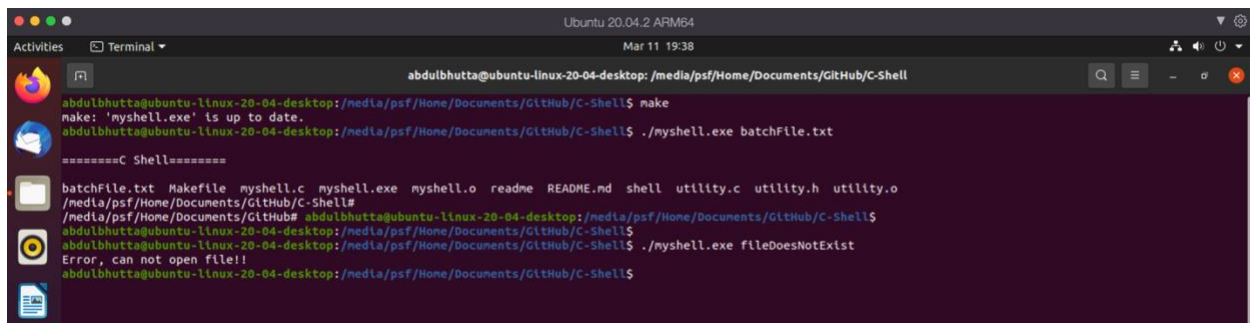
## Run the batch file



A terminal window titled 'Ubuntu 20.04.2 ARM64' showing a user running a 'make' command to build a project. The output shows that 'myshell.exe' is up to date. The user then runs './myshell.exe batchFile.txt', which outputs '\*\*\*\*\*C Shell\*\*\*\*\*' and a list of files: 'batchFile.txt Makefile myshell.c myshell.exe myshell.o readme README.md shell utility.c utility.h utility.o'. The terminal prompt is '/media/psf/Home/Documents/GitHub/C-Shell\$'.

```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ make
make: 'myshell.exe' is up to date.
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.exe batchFile.txt
*****C Shell*****
batchFile.txt Makefile myshell.c myshell.exe myshell.o readme README.md shell utility.c utility.h utility.o
/media/psf/Home/Documents/GitHub/C-Shell$
```

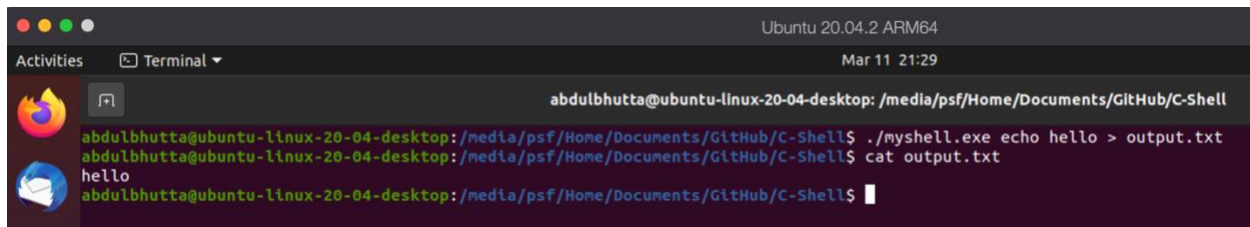
## Run the shell with a file that does not exist



A terminal window titled 'Ubuntu 20.04.2 ARM64' showing a user running a 'make' command to build a project. The output shows that 'myshell.exe' is up to date. The user then runs './myshell.exe batchFile.txt', which outputs '\*\*\*\*\*C Shell\*\*\*\*\*' and a list of files: 'batchFile.txt Makefile myshell.c myshell.exe myshell.o readme README.md shell utility.c utility.h utility.o'. The user then runs './myshell.exe fileDoesNotExist', which outputs 'Error, can not open file!!'. The terminal prompt is '/media/psf/Home/Documents/GitHub/C-Shell\$'.

```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ make
make: 'myshell.exe' is up to date.
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.exe batchFile.txt
*****C Shell*****
batchFile.txt Makefile myshell.c myshell.exe myshell.o readme README.md shell utility.c utility.h utility.o
/media/psf/Home/Documents/GitHub/C-Shell$
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.exe fileDoesNotExist
Error, can not open file!!
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$
```

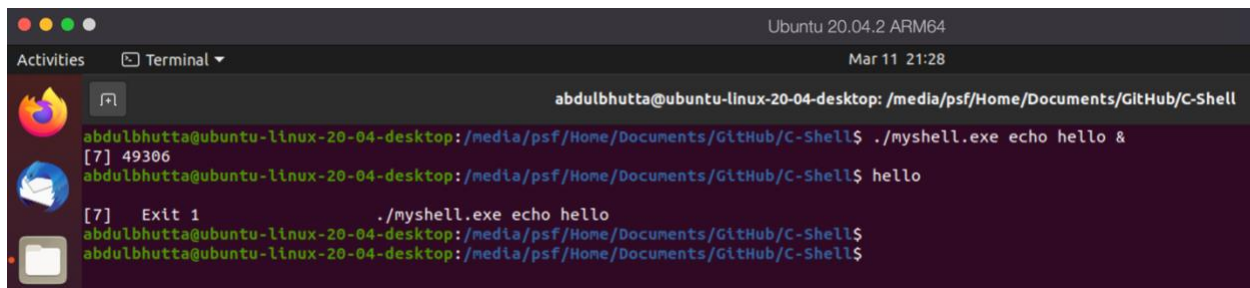
## 4. Output redirection



A terminal window titled 'Ubuntu 20.04.2 ARM64' showing a user running a './myshell.exe echo hello > output.txt' command. The output is 'hello'. The user then runs 'cat output.txt', which outputs 'hello'. The terminal prompt is '/media/psf/Home/Documents/GitHub/C-Shell\$'.

```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.exe echo hello > output.txt
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ cat output.txt
hello
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$
```

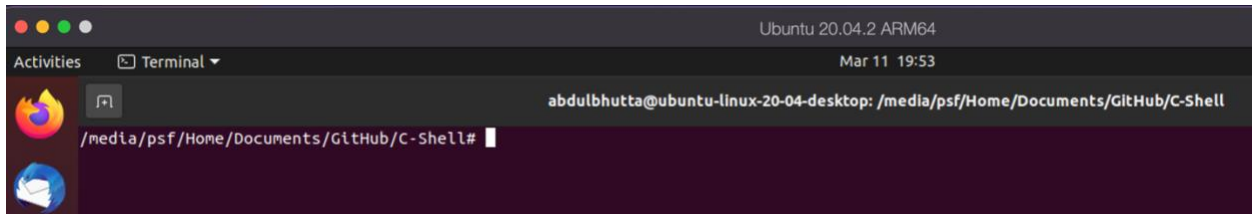
## 5. Shell support background execution



A terminal window titled 'Ubuntu 20.04.2 ARM64' showing a user running a './myshell.exe echo hello &' command. The output is '[7] 49306'. The user then runs 'hello', which outputs '[7] Exit 1'. The user then runs './myshell.exe echo hello', which outputs 'hello'. The terminal prompt is '/media/psf/Home/Documents/GitHub/C-Shell\$'.

```
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.exe echo hello &
[7] 49306
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ hello
[7] Exit 1
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$ ./myshell.exe echo hello
hello
abdulbhutta@ubuntu-linux-20-04-desktop: /media/psf/Home/Documents/GitHub/C-Shell$
```

## 6. Command line shows the current directory



### Contribution Matrix

Team Members	Contribution	Questions
Abdul Bhutta	25%	1,2,3,6
Adam Tharani	25%	1,2,3,6
Rubbia Pasha	25%	4,5,6
Waleed El Alwai	25%	4,5,6