

Nick Elias

Lab4-CS470

2.22.2023

- Instructions for Running a C Program in Ubuntu.

Create a file with `gedit <filename>.c`

Compile the code with `gcc <filename>.c -o <process name>`

and run the file with `./<process name>`

- In C, how can I make a thread?

Libraries such as POSIX can be implemented to create threads.

1. Define a function to run in the new thread.
2. Create `pthread_t` to store the thread ID.
3. Call `pthread_create()` function, passing in:
 - `pthread_t` address
 - thread attributes (default is NULL)
 - function to run in thread
 - any args to pass to function
4. Continue running code in main
5. `pthread_join()` after everything

- In Linux, How Do You Create Hard Links and Soft Links?

Hard Links:

1. Open a terminal window.
2. Navigate to the directory where the source file is located.
3. Use `ln <file>.txt <hardlinkname>.txt`
4. Verify link with `ls`

Soft Links:

1. Open a terminal window.
2. Navigate to the directory where the source file is located.
3. Use `ln -s <file>.txt <hardlinkname>.txt`

- Linux System Calls for Using Files and Directories.

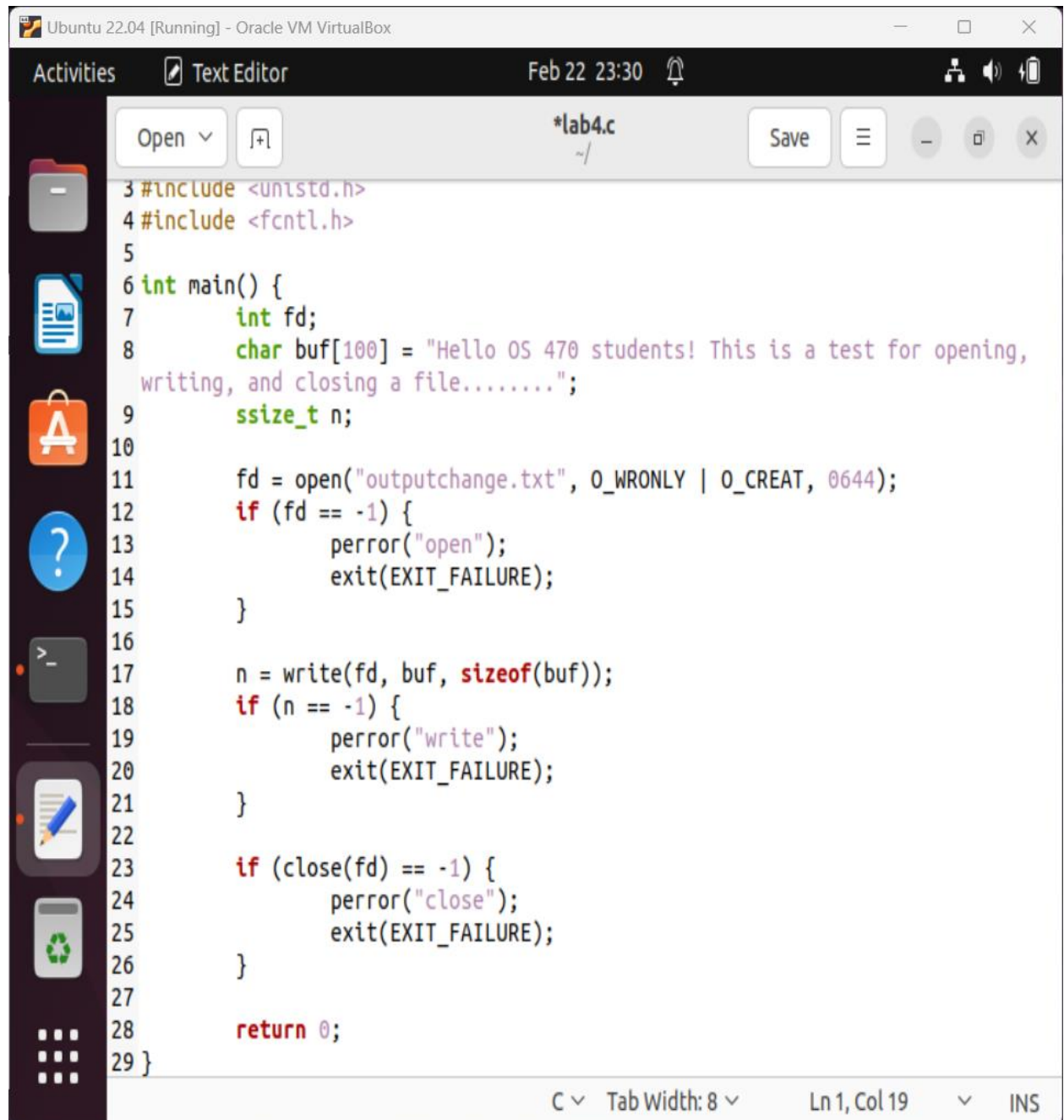
- Explanation of `open()`, `read()`, `write()`, and `close()` system calls

`Open()`: Open a file, returns a file descriptor. Takes two args: file name and flags

Read(): Read a file.

Write(): Write data to a file. Takes three args (file descriptor, buffer with write data, number of bytes to write)

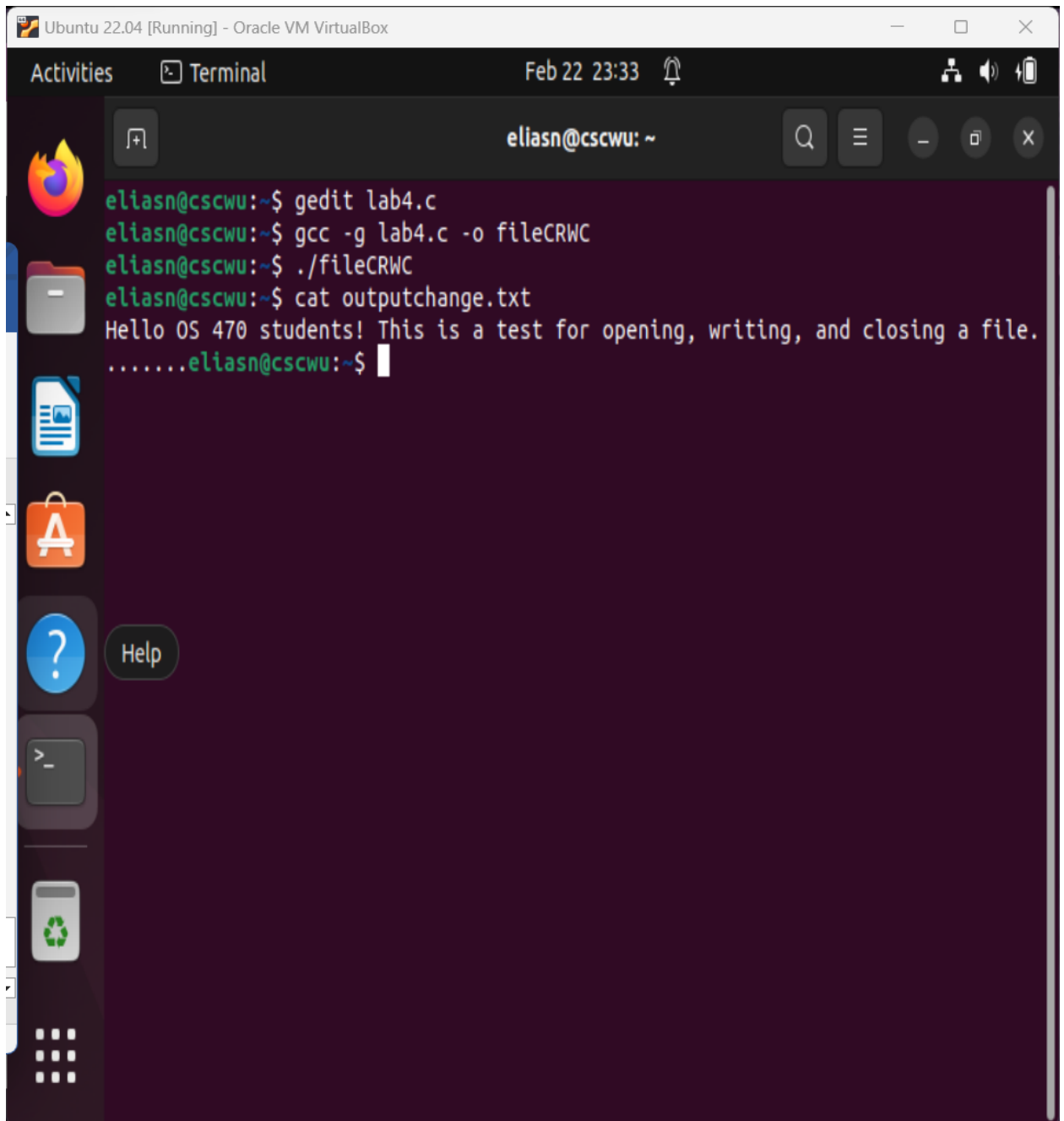
Close(): Close a file.



The screenshot shows a text editor window titled "Ubuntu 22.04 [Running] - Oracle VM VirtualBox". The editor is displaying a C program named "lab4.c". The code is as follows:

```
3 #include <unistd.h>
4 #include <fcntl.h>
5
6 int main() {
7     int fd;
8     char buf[100] = "Hello OS 470 students! This is a test for opening,
    writing, and closing a file.....";
9     ssize_t n;
10
11     fd = open("outputchange.txt", O_WRONLY | O_CREAT, 0644);
12     if (fd == -1) {
13         perror("open");
14         exit(EXIT_FAILURE);
15     }
16
17     n = write(fd, buf, sizeof(buf));
18     if (n == -1) {
19         perror("write");
20         exit(EXIT_FAILURE);
21     }
22
23     if (close(fd) == -1) {
24         perror("close");
25         exit(EXIT_FAILURE);
26     }
27
28     return 0;
29 }
```

The status bar at the bottom indicates "C", "Tab Width: 8", "Ln 1, Col 19", and "INS".



Ubuntu 22.04 [Running] - Oracle VM VirtualBox

Activities Text Editor Feb 22 23:53

lab4-2.c

```
52
53     if (rc) {
54         printf("Error: Unable to create thread.\n");
55         exit(-1);
56     }
57
58     rc = pthread_create(&threads[2], NULL, calc_min, NULL);
59
60     if (rc) {
61         printf("Error: Unable to create thread.\n");
62         exit(-1);
63     }
64
65     for (int i = 0; i < NUM_THREADS; i++) {
66         rc = pthread_join(threads[i], NULL);
67         if (rc) {
68             printf("Error: Unable to join thread.\n");
69             exit(-1);
70         }
71     }
72     printf("The average value is %.2f\n", average);
73     printf("The minimum value is %d\n", min);
74     printf("The maximum value is %d\n", max);
75
76     pthread_exit(NULL);
77 }
78
79 }
```

C Tab Width: 8 Ln 79, Col 2 INS

Ubuntu 22.04 [Running] - Oracle VM VirtualBox

Feb 22 23:57

Activities Terminal

eliasn@cscwu: ~

```
eliasn@cscwu:~$ cat outputchange.txt
Hello OS 470 students! This is a test for opening, writing, and closing a file.
.....eliasn@cscwu:~$ gedit lab4-2.c
eliasn@cscwu:~$ gcc lab4-2.c -o lab4
lab4-2.c: In function 'calc_average':
lab4-2.c:13:18: error: expected identifier or '(' before '=' token
    13 |         for (int = 0; i < num_count; i++) {
        |                  ^
lab4-2.c:13:23: error: 'i' undeclared (first use in this function)
    13 |         for (int = 0; i < num_count; i++) {
        |                        ^
lab4-2.c:13:23: note: each undeclared identifier is reported only once for each
function it appears in
lab4-2.c: At top level:
lab4-2.c:79:1: error: expected identifier or '(' before '}' token
    79 | }
        | ^
eliasn@cscwu:~$ gedit lab4-2.c
eliasn@cscwu:~$ gcc lab4-2.c -o lab4
lab4-2.c:79:1: error: expected identifier or '(' before '}' token
    79 | }
        | ^
eliasn@cscwu:~$ gedit lab4-2.c
eliasn@cscwu:~$ gcc lab4-2.c -o lab4
eliasn@cscwu:~$ ./lab4
The average value is 82.86
The minimum value is 72
The maximum value is 95
eliasn@cscwu:~$
```