OS Project Report

Search in File System Call

Objective:

1. Add a system call in Linux kernel.
2. System call should search for a given phrase in a file and return the first occurrence in an array or search on a specific line and return line and line number.
3. Learn about system calls, kernel space and user space.

Code Explanation:

Methods in System Call:

- **int my_getLength_Fn(char * str):** This method takes a pointer to an array as an argument and returns the length of that array.
- **void my_to_lower_Fn(char * arr):** This method also takes a pointer to an array and converts every uppercase alphabet to lowercase.
- **int contains(char *container, char *query):** This method checks for the existence of query string in container string and returns 1 if query is found in container else it will return 0.
- **void copy(char *dest, char *src):** This method simply copies src string to dest string.
- **asmlinkage long sys_search_phrase(int fd, char *phrase, char *buffer, int line, int to_lower): asmlinkage** tells the compiler that the function should not expect to find any of its arguments in registers (a common optimization), but only on the CPU's stack. This method is where all of the above methods are used. It takes 5 arguments: **(1)int fd:** File descriptor. **(2)char *phrase:** The text you want to search in the file. **(3)char *buffer:** This will contain the line which has the search phrase in it. **(4)int line:** This will contain the line number you want to search on. **(5)int to_lower:** This argument is for case sensitivity. 1 is for case sensitivity on and 0 is for case sensitivity off. In this method the file is read character by character until a whole line is read and then it checks if that line contains the search phrase, if the phrase is found this method returns the number of that line and the line is saved in **char *buffer** argument. And if the

phrase is not found the function reads another line and checks again until the end of the file. If phrase does not exist in the file then system call will return -1.

How to use:

1. In github repository go to Code/search/. The search folder contains a header file(my headers.h), a source code file(search_in_file.c) for the system call and a make file(Makefile).
2. Add the search folder to linux kernel source and compile it.
3. In github repository go to Code folder there is a file named using-syscall.c which is using the system call.
4. To use the system call in any file type long int ret = syscall(SYS_search_phrase, fd, phrase, buffer, lineNo, case_sensitivity); where SYS_search_phrase is the number at which the system call is listed in syscall_64.tbl file.

Screenshots:

```
                              history.txt                    ×
total 76
drwxrwxr-x 8 compro compro 4096 Nov 28 01:28 clion-2019.2.5
drwxrwxr-x 3 compro compro 4096 Nov 28 01:45 CLionProjects
drwxr-xr-x 5 compro compro 4096 Nov 29 17:22 Desktop
drwxr-xr-x 2 compro compro 4096 Nov 24 19:58 Documents
drwxr-xr-x 3 compro compro 4096 Nov 29 17:24 Downloads
-rw-r--r-- 1 compro compro 8980 Nov 25 00:38 examples.desktop
drwxr-xr-x 2 compro compro 4096 Nov 24 19:58 Music
drwxr-xr-x 2 compro compro 4096 Nov 24 19:58 Pictures
drwxrwxr-x 3 compro compro 4096 Nov 28 21:01 Postman
drwxr-xr-x 2 compro compro 4096 Nov 24 19:58 Public
drwxr-xr-x 3 compro compro 4096 Nov 29 02:38 snap
drwxr-xr-x 2 compro compro 4096 Nov 24 19:58 Templates
-rwxrwxr-x 1 compro compro 8664 Nov 26 02:38 userspace
-rw-rw-r-- 1 compro compro  226 Nov 26 02:37 userspace.c
drwxr-xr-x 2 compro compro 4096 Nov 24 19:58 Videos
```

Note that the output will depend on how you use the system call in user space.

```
compro@ubuntu:~/Desktop/project-fall-2019-102539-62722_62462/Code$ ./using-syscall
Enter Your search phrase:
postman
Enter line No(Enter 0 to search all lines):
0
Turn case sensitivity on/off 1|0:
1
Sys call returned: -1

compro@ubuntu:~/Desktop/project-fall-2019-102539-62722_62462/Code$ ./using-syscall
Enter Your search phrase:
postman
Enter line No(Enter 0 to search all lines):
0
Turn case sensitivity on/off 1|0:
0
Sys call returned: 10
drwxrwxr-x 3 compro compro 4096 Nov 28 21:01 Postman
compro@ubuntu:~/Desktop/project-fall-2019-102539-62722_62462/Code$ 
```

```
compro@ubuntu:~/Desktop/project-fall-2019-102539-62722_62462/Code$ ./using-syscall
Enter Your search phrase:
Videos
Enter line No(Enter 0 to search all lines):
0
Turn case sensitivity on/off 1|0:
1
Sys call returned: 16
drwxr-xr-x 2 compro compro 4096 Nov 24 19:58 Videos
compro@ubuntu:~/Desktop/project-fall-2019-102539-62722_62462/Code$ ./using-syscall
Enter Your search phrase:
Videos
Enter line No(Enter 0 to search all lines):
0
Turn case sensitivity on/off 1|0:
0
Sys call returned: 16
drwxr-xr-x 2 compro compro 4096 Nov 24 19:58 Videos
compro@ubuntu:~/Desktop/project-fall-2019-102539-62722_62462/Code$
```