

CSc 352

System Calls

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System Calls

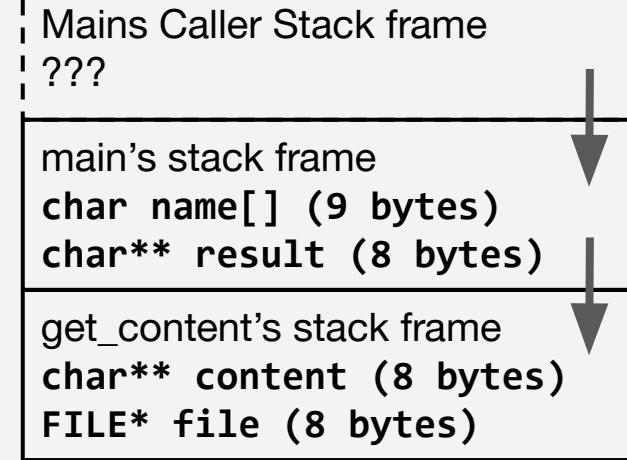
- There are some tasks that a “regular” user process does not have the privileges to do
 - Communicate with the hard drive / ssd
 - Communicating with the network hardware
 - Create a new process
- User programs can use **system calls** to request these things

The Stack

```
#include <stdio.h>

char** get_content(char* file_name) {
    char** content;
    FILE* file = fopen(file_name, "r");
    // Load file contents into content variable
    return content;
}

int main() {
    char name[] = "file.txt";
    char** result = get_content(name);
    // other stuff
    return 0;
}
```

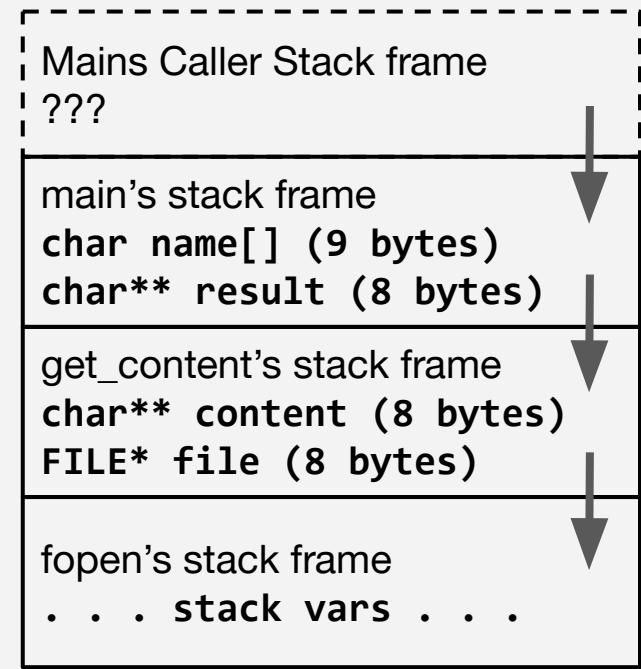


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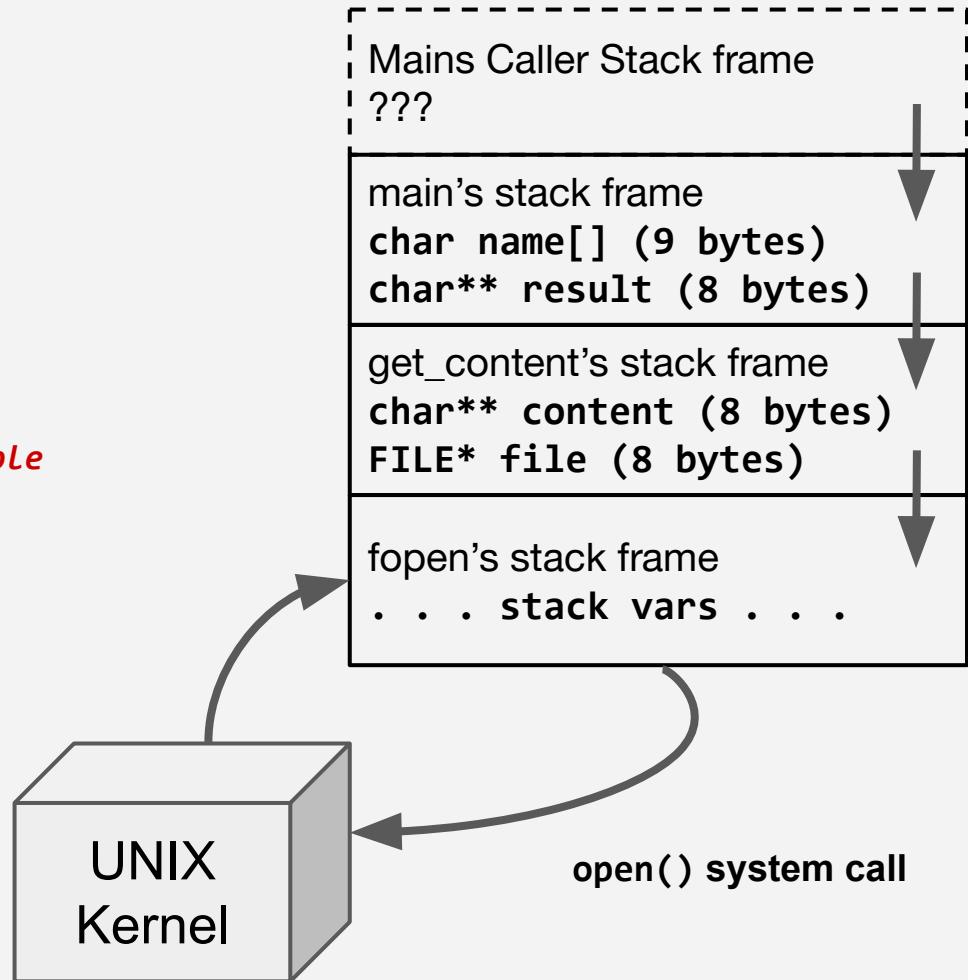


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System Calls

Each process (and even each thread) gets a:

- **User stack** - for executing the user code
- **Kernel stack** - for executing things at the kernel level, such as a system call

System Calls

<https://www.cs.miami.edu/home/geoff/Courses/CSC521-04F/Content/UNIXProgramming/UNIXSystemCalls.shtml>

Many calls available

Generally, call these via library calls as intermediary / abstraction rather than directly

Library Functions Abstracting Sys Calls

- **fopen** is a standard library function, may invoke the **open** sys call
- **fscanf** is a standard library function, may invoke the **read** sys call
- **fclose** is a standard library function, may invoke the **close** sys call
- **printf** is a standard library function, may invoke the **write** sys call
-

Strace

the **strace** command can be used to see what system calls a process invokes

```
$ strace ./a.out 2> out
```

```
#include <stdio.h>
#include <stdlib.h>

int main() {
    char buffer[256];
    FILE* test_file = fopen("test.txt", "r");
    while (fgets(buffer, 255, test_file) != NULL) {
        printf("LINE: %s\n", buffer);
    }
    fclose(test_file);
    return 0;
}
```

Strace

Go to your home directory

Use **strace** and determine what system calls are used the most if you run ls