Operating Systems
CSCI 5806

Spring Semester 2021 — CRN 21176

Term Project — Steps 7 / 8 — Directory Access
Target completion date: Friday, April 30

Goals

- Provide functions to traverse a file path and copy a file to the host.

Details

In these steps, we provide the final steps to copy a file from the VDI file to the host system.

▹*A Quick Note On Coding*

There may be some confusion at points on code examples I provide. I've written the steps in C, not C++. While not much changes from one language to the other, there are some differences. For example, I use structures everywhere instead of classes. Thus, where I am always passing pointers to various file structures, you may be using classes instead and the functions I present are implemented as methods.

Also, C lacks pass by reference, so in the step 6 example I have **`&iNum`** as a parameter instead of just **`iNum`**. To emulate pass by reference in C, you have to pass an address.

▹*File Paths*

A file path consists of the sequence of directories to follow from the root directory to the desired file. For example, this document has the path **`/home/bob/School/Courses/5806.Course/Projects/Ext2Copy/ext2-cp-7.base.tex`**. The goal in step 7 is to split the path into its component names and then search the sequence of directories for the inode number corresponding to the file at the end of the path.

▹*Searching a Directory*

To search a directory, you'll want to create a function **`uint32_t searchDir(struct Ext2File *f,uint32_t iNum,char *target)`** with the following parameters:

- **`f`**
  Pointer to an opened Ext2File
- **`iNum`**
  Inode number of the directory to be searched
- **`target`**
  C-string with the name of the file to look for

The function should return the inode number of the target file if found, or 0 otherwise.

▹*Splitting a Path*

Create a function **`uint32_t traversePath(Ext2File *f,char *path)`** that takes a full path and returns the inode number of the file at the end of the path. The algorithm for the function follows.

Algorithm 1 Traversing a directory path

```
1:  procedure TraversePath(Ext2File * f, char * path)
2:      start ← 1
3:      len ← strlen(path)
4:      iNum ← 2

5:      while start < len and iNum ≠ 0 do
6:          end ← location of next '/'
7:          path[end] ← 0
8:          iNum ← searchDir(f, iNum, path + start)
9:          start ← end + 1
10:     end while

11:     return iNum
12: end procedure
```

▹*Copying the file*

Step 8 is copying the file out of the VDI disk image and onto the host system.

Your program should get the names of the VDI file, the file in the virtual disk and the destination file. Open the destination file like a normal file — use the **`open()`** system call with **`O_WRONLY|O_CREAT`** parameters and mode 0666 — and loop through all of the blocks in the file on the virtual disk and copy the data into the destination file.

Example

Examples here by Friday.