【OS】Day45

Class	Operating System: Three Easy Pieces
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【Ch39】Interlude: Files and Directories

39.14 Hard Links

We now come back to the mystery of *why removing a file is performed via* `unlink()`, by understanding a new way to make an entry in the file system tree, through a system call known as `link()`.

The `link()` system call takes two arguments, an old pathname and a new one; when we "link" a new file name to an old one, we essentially create another way to refer to the same file.

The command-line program ln is used to do this, as we see in this example:

```
prompt> echo hello > file
prompt> cat file
hello
prompt> ln file file2
prompt> cat file2
hello
```

Here we created a file with the work "hello" in it, and called the file `file`. We then create a hard link to that file using the ln program. After this, we can examine the file by either opening `file` or `file2`.

The way that `link()` works is that it simply creates another name in the directory we are creating the link to, and refers it to the same inode number of the original file.

The file is not copied in any way; rather, we now just have two human-readable names(`file` and `file2`) that both refer to the same file.

```
prompt> ls -i file file2
67158084 file
67158084 file2
```

By now we might start to see why `unlink()` is called `unlink()`. When we create a file, we are really doing two things:

1. First, we are making a structure(the inode) that will track virtually all relevant information about the file, including its size, where its blocks are on disk, and so forth.
2. Second, we are linking a human-readable name to that file, and putting that link into a directory

Thus, to remove a file from the file system, we call `unlink()`. In the example above, we could remove the file named `file` and still access the file without difficulty

```
prompt> rm file
remove 'file
prompt> cat file2
hello
```

Every time `unlink()` is called, the OS checks the reference count in the inode. Only when the reference count reaches 0, the file is truly deleted.