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Nachos file system report

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1 abstract

This report is about the phase of file system in nachos operating system.

2 keywords

Operating system, Nachos, Java, File system.

3 Introduction

Basically, I followed the code structure that is given to us because it is already a good one. But since there is little comments in the code, I do not know the exactly the function of every class and function. So my understanding may be different from the structure's original author.

I will introduce classes' functions in my code in the following sections.

4 INode

INode has the information of a specific file.

- *addr*: the first sector that INode's information is stored in.
- $file\_size$: number of bytes this file has.
- *link_count*: number of hard links this file has. i.e. this file can be accessed by how many names.
- *sec_addr*: the list of sectors this file owns.
- *addr_ext*: the list of sectors this INode occupies except for *addr*.

Every first integer in a sector is the address of the next sector of INode if it is not -1. This design do not suffers from extending problem when more sectors are added to *addr_ext*. And other spaces in INode's sectors are used to store *sec_addr* in bitmap.

5 File

File support read and write majorly. Note that it is important to keep file names in a form with absolute path in compatibility with codes written in phase 2.

6 Folder

Every folder is a file except for the information kept in this particular file is the mapping of file name and its address.

We can figure out some kind of encoding way to store these mappings. The first number in my file is the number of mappings. The second number is the father folder's address. Then mappings are stored one by one, beginning with a number indicating the address of a file, followed by the length of a file's name and the file's name.

We can use write function in File to store these coding.

7 FreeList

FreeList is used to store the sectors which are not used now in bitmap. My FreeList occupies sectors $0, 2, 3, \ldots$ if there are more than 512 sectors, assuming a more general condition.

8 RealFileSystem

RealFileSystem is the main class that is used to do file operations. There are a lot of details considered here, such as translating relative path to absolute path, the order of saving inode and saving file and so on.

9 FileStat

The class to depict the states of a file. Nothing special.

10 FilesysKernel

The class extended from VMKernel. Nothing special.

11 FilesysProcess

The class extended from VMProcess. It can handle syscalls given by processes.

12 My Thoughts

It is hard to begin coding with no picture of what may be ahead. But once you start your scratch code, it is easy to complete it and mend it with a more specific vision. It is different from writing codes in ACM contest, when you have to think over all the details before you start coding.

I learned that starting coding is the first step of work out it in nachos.