

MP4

r09922136 廖婕吟

1. Large files

Change the xv6 file system code to support large files by implementing ten direct blocks, one “singly-indirect” block and two “doubly-indirect” blocks in each file. A file will be able to consist of up to 131338 blocks ($2 \times 256 \times 256 + 256 + 10$) which are larger than 66666. Modify `bmap()` to support “doubly-indirect” blocks and `itrunc()` to frees all blocks of a file using function `bfree()`;

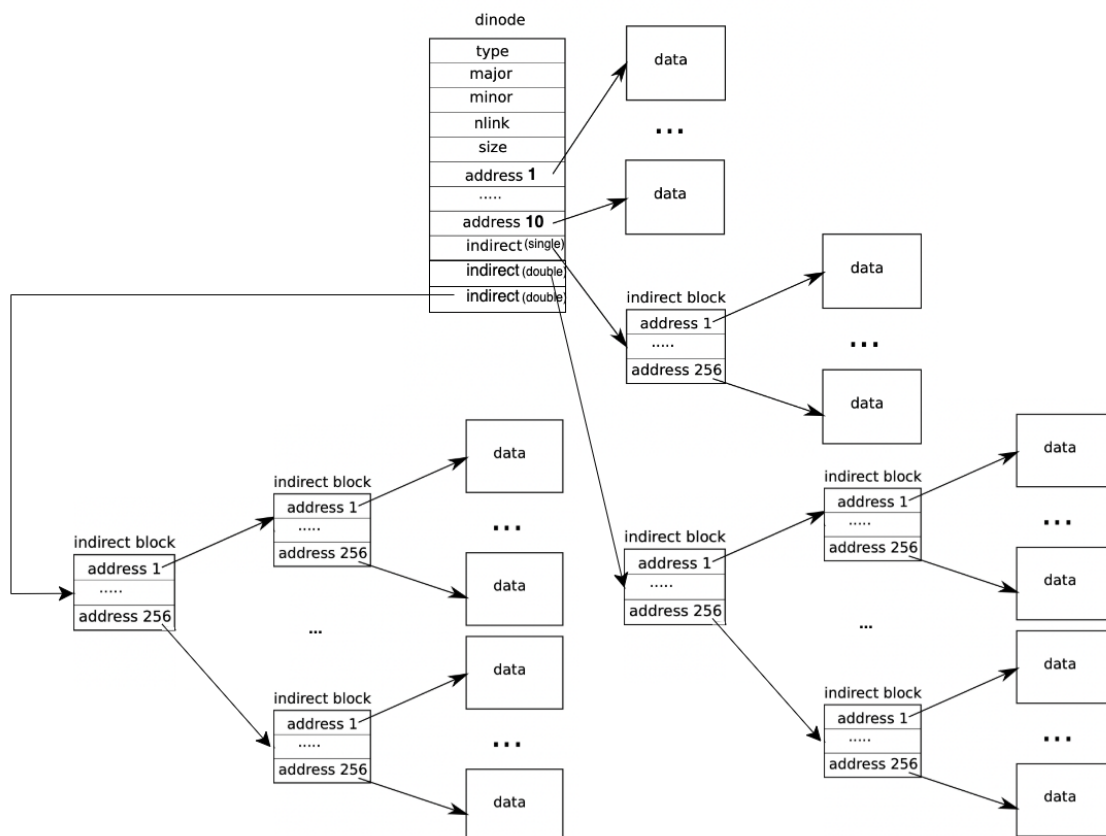


Figure 1: The representation of a file on disk.

2. Symbolic links to files

In system call `sys_symlink()`, we use function `create` to create a new inode for symbolic link at path and use function `writew` to write target's path to the created inode. This system call creates a new symbolic link at path that refers to a file named target.

In addition, we handle `sys_open` when encountering symbolic links. When a process specifies `O_NOFOLLOW` flags, `open` should open symlinks (not targets). Otherwise, we open the target. But if the target is also a symbolic link, we recursively follow the target until a non-link file is reached. We use `namei(path)` to determine if the file is exist or not, if the file is not exist `sys_open` will fail by returning an error code.

We approximate the links form a cycle by the depth of links reaches the threshold 10. If there form a cycle while following the target, `sys_open` will fail by returning an error code.

3. Symbolic links to directories

We modify system call `sys_chdir()` that we can `cd` into a symbolic link. The implementation is familiar with `sys_open` that when `cd` into a symbolic link, we recursively follow the link until a non-link folder is reached. And will return error if the file does not exist or the links form a cycle.

In `namex` when uses `skipelem` to consider each element of the path in turn, if the element is not the last path element and it is a symbolic element, we change the path to the target's path which the link refers to, then set the `ip` to the root to run all the elements in the target's path to get the targets's `ip`. In addition, we use a counter to keep track of the link times just in case the links form a cycle.