SBFS

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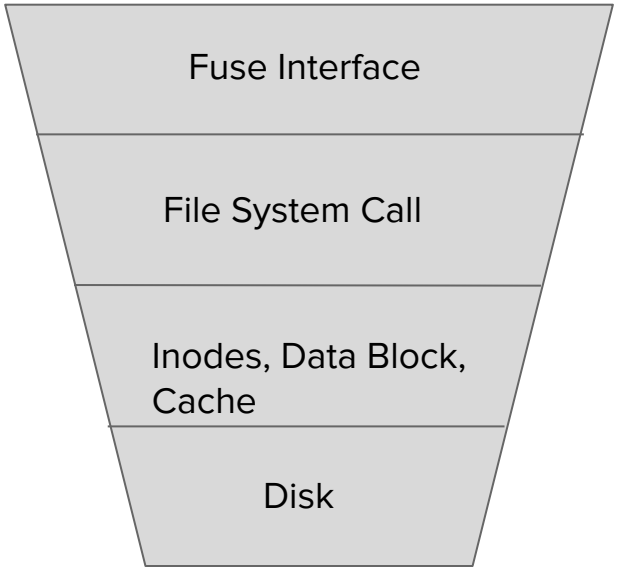
4-Layer Structure

Layer 1

Layer 2

Layer 3

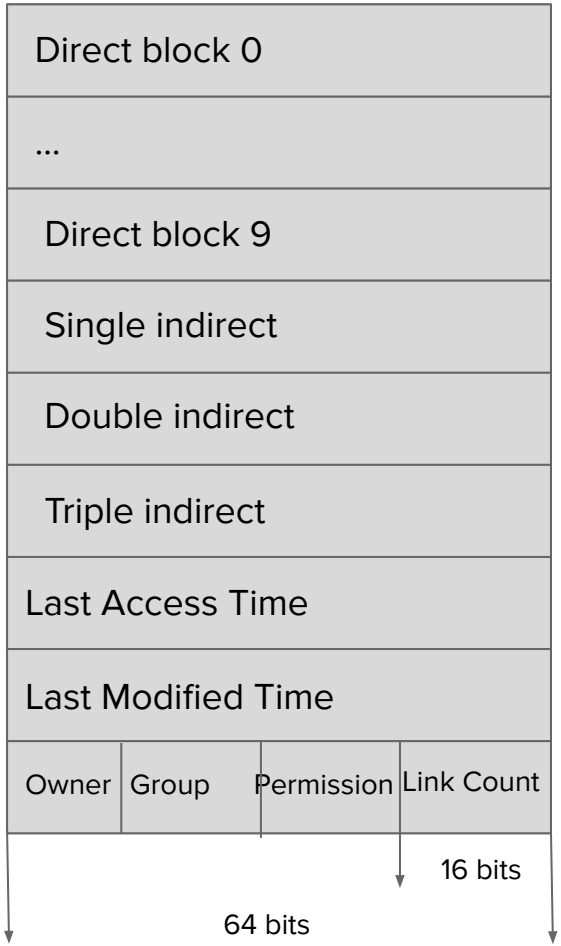
Layer 4



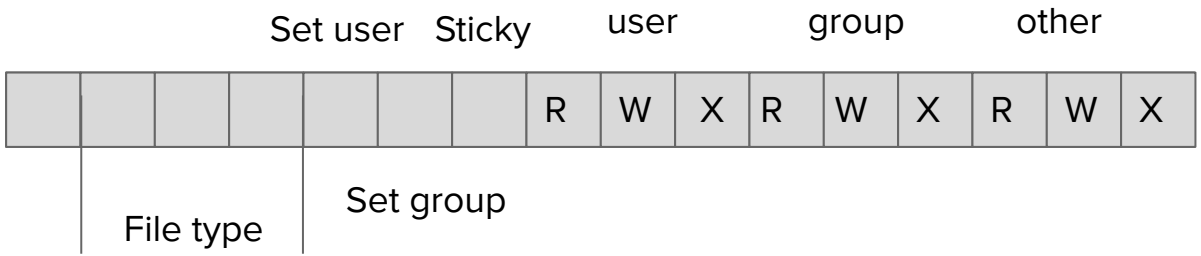
Layer 4 Disk

- Read a block
- Write a block

Layer 3 Inode



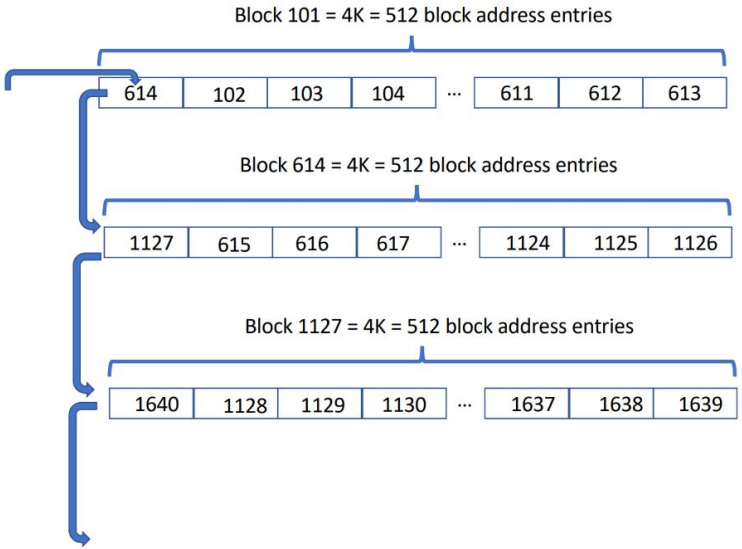
Permission (16-bit)



0 - 11 bit is exactly the same as Fuse passes, so reducing mapping effort

Layer 3 Blocks

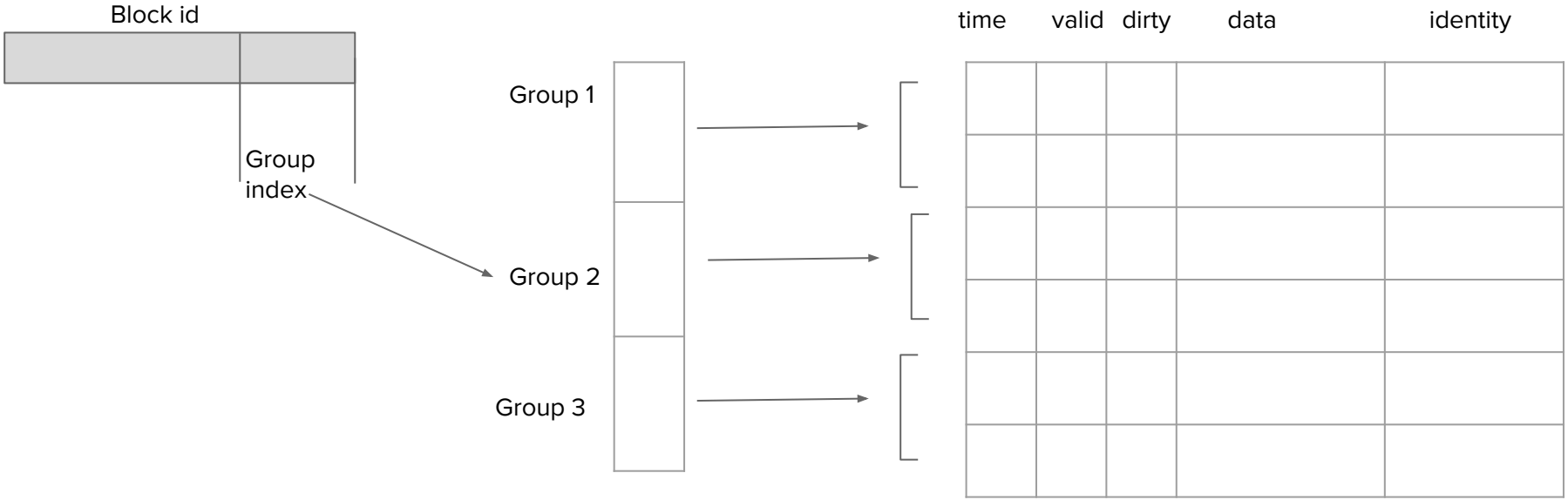
- Super: 101



Layer 3 does not have superblock abstraction

Layer 3 Caching (Write Back)

We took a very standard approach similar to caching in architecture.



Only data blocks are cached, inodes are all loaded into memory, when file system needs to write inode, write through

Layer 3 Interface

Layer 3 provides read write allocate and free operation for both inode and data block

Layer 2-System Calls

- readlink
- namei
- open
- read
- write
- mkdir
- mknod
- rmdir
- unlink
- close
- readdir
- truncate
- symlink
- link
- chmod
- chown
- opendir
- rename

System Call Examples- namei

- locate the directories split by `/`
- find matched filename in parent directory
- read the inode content by previous layer interface
- check file type:
    - deal with symlink and non-directory file

System Call Examples- mknod

- split path into parent directory and filename
- call namei to get inum of parent dir
- call previous layer read inode function to get the content of parent dir
- check parent dir type
- call previous layer allocate inode function
- set default attribute by write inode function in previous layer

Permissions

- check permissions when open a file or remove a file
- Remove a file or folder needs to have write access to the parent directory.

Symlink

- The full path is needed instead of chroot. We open /proc/mounts to manually read the mountpoint and adds to the chroot path.

Layer 1-Fuse

- Reimplemented most of the fuse operations, except for some special methods, such as .flush, .fsync. and xattr functions.

- Stored inum in file descriptor: file handler in .open and .opendir to avoid multiple namei calls