

CSC552 – Advanced UNIX Programming

File Programming

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File Representation

- ▶ File descriptor
 - File descriptor table index
 - UNIX I/O functions
 - File pointer
- ▶ File pointer
 - FILE data structure
 - ISO C functions

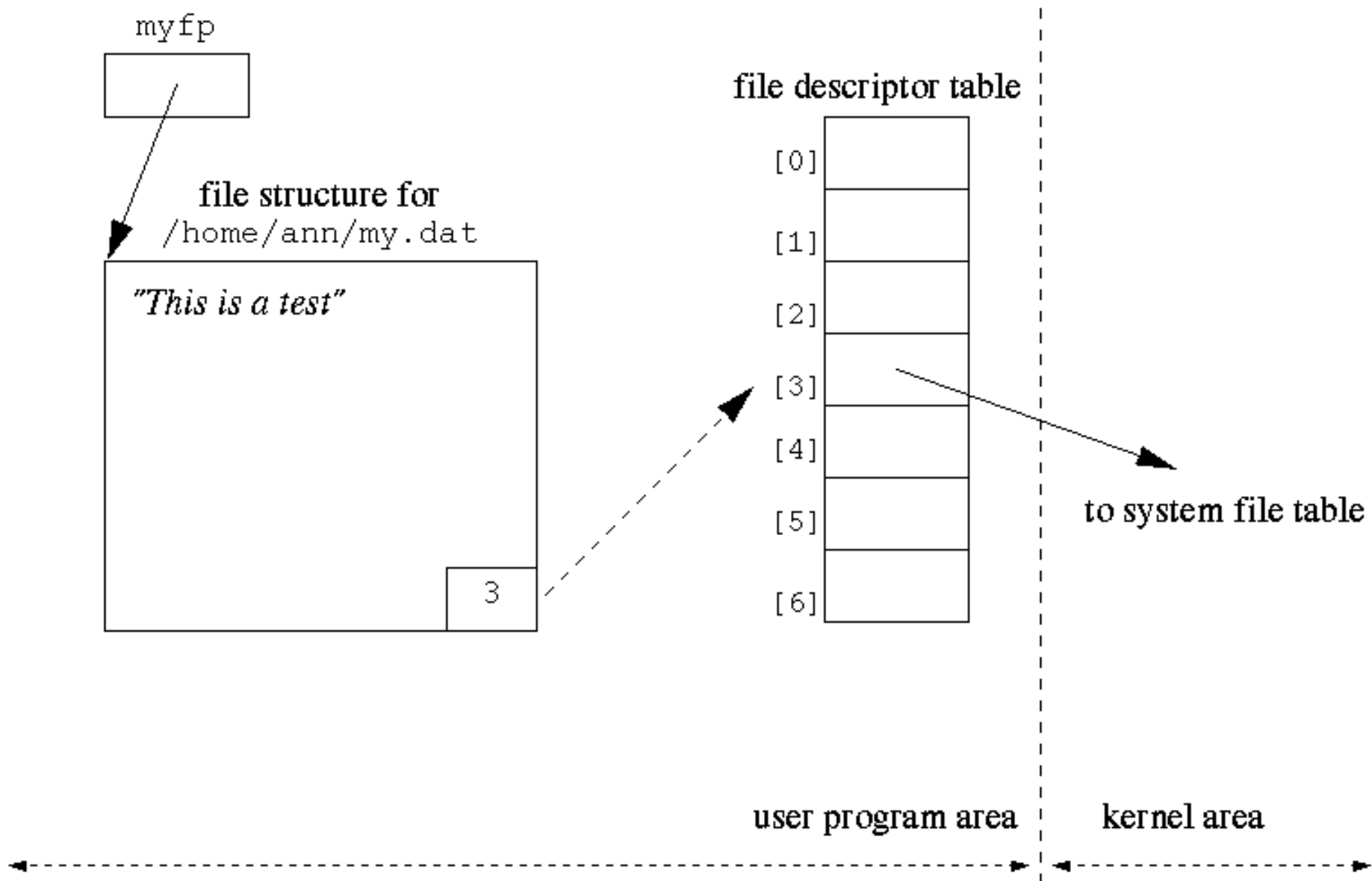
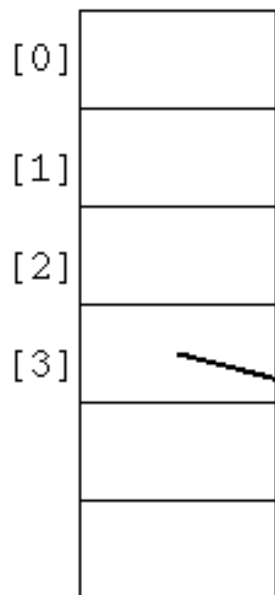
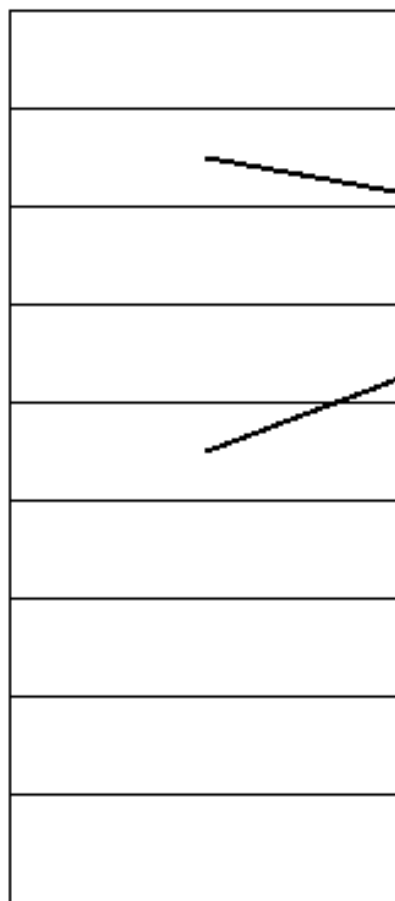


Figure 4.5 (page 122): Schematic use of a file pointer after `fopen`.

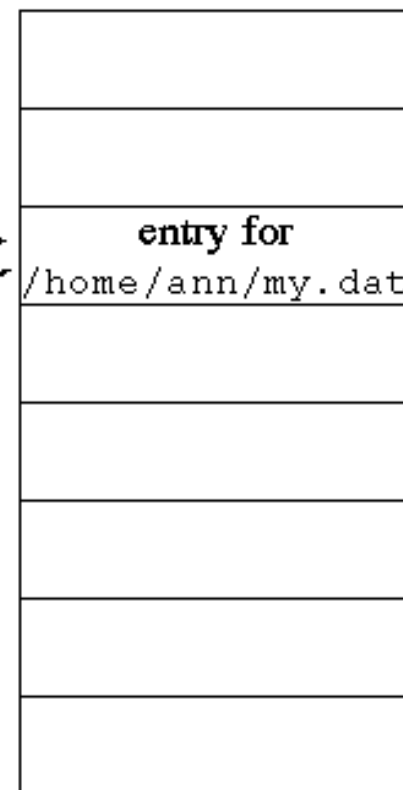
file descriptor table



system file table



in-memory inode table



myfd

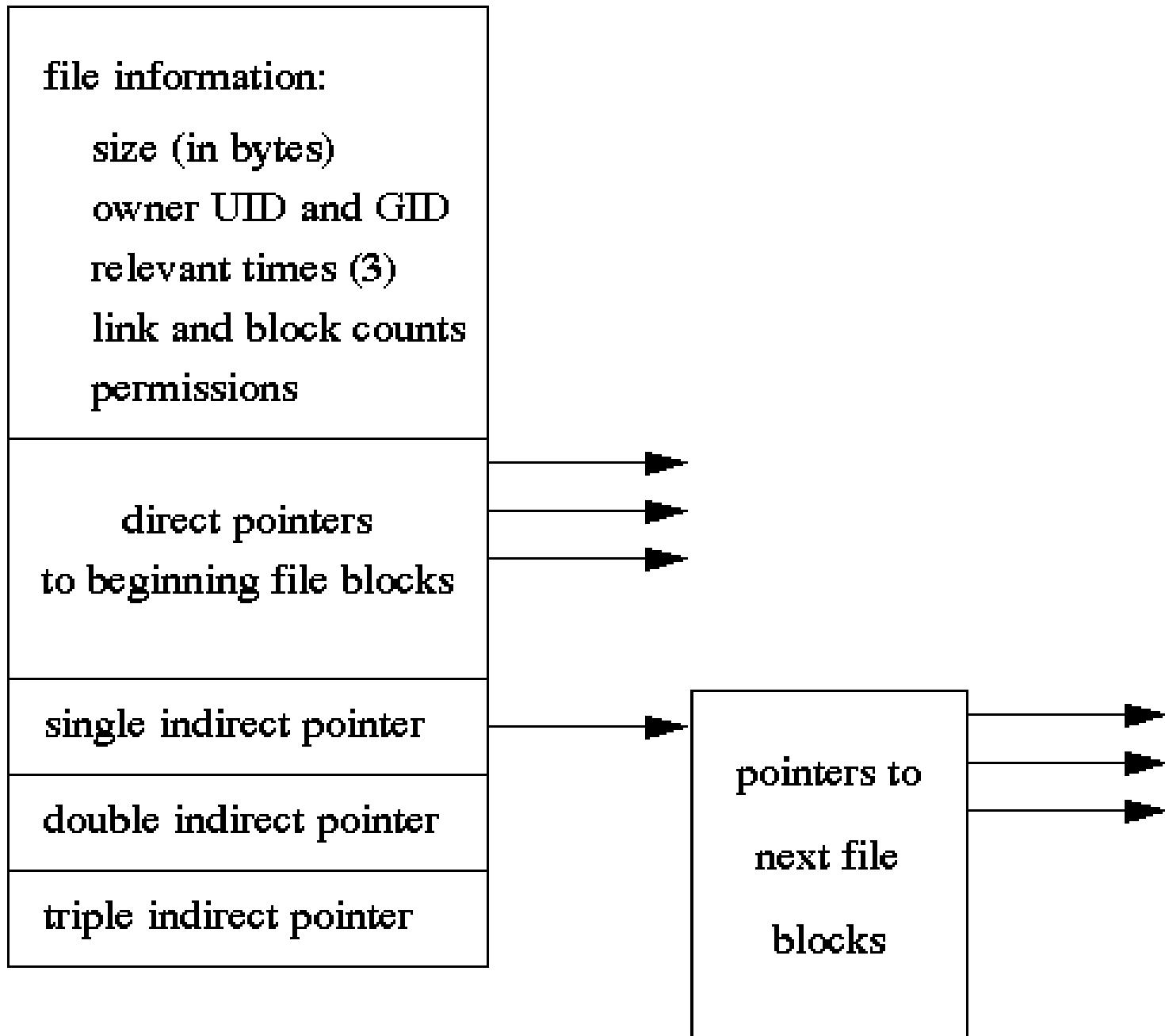
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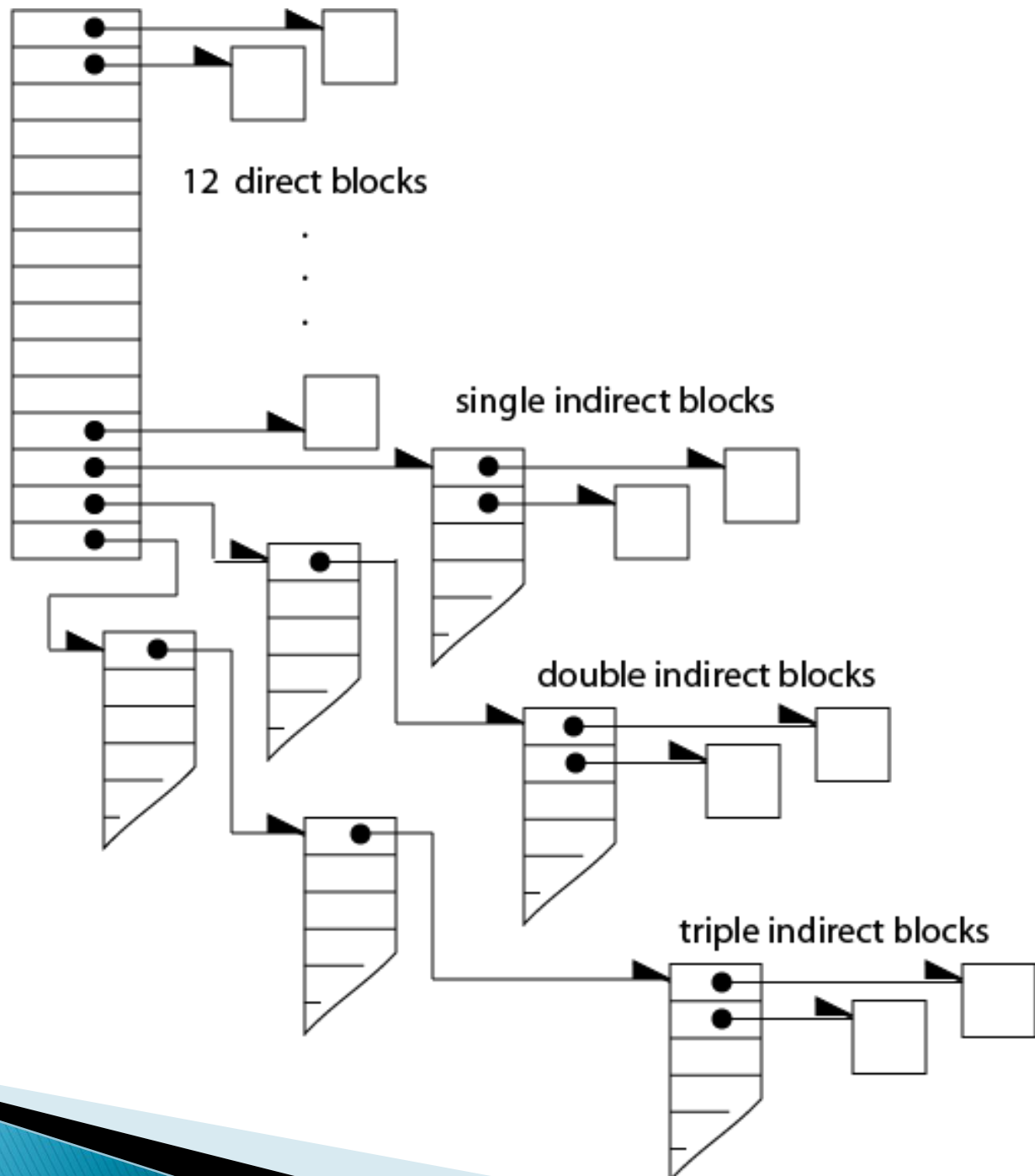
user program area

kernel area



inode





File Access

- ▶ System calls
 - open
 - close

 - read
 - write

- ▶ `files/copyfile.c`


More File Access

- ▶ System calls
 - lseek
 - unlink
 - remove

File Information

- ▶ System Calls
 - stat
 - Fstat
 - lstat
 - fcntl
 - Access

 - ▶ Structure: stat
 - man stat

 - ▶ files/lstat.c
- 

File Utility Functions

- ▶ More system calls
 - chmod
 - chown
 - link
 - symlink
 - readlink
 - rename

Directory Functions

▶ dirent structure

- `ino_t d_ino;` // inode number
- `char d_name[];` // filename

▶ System Calls

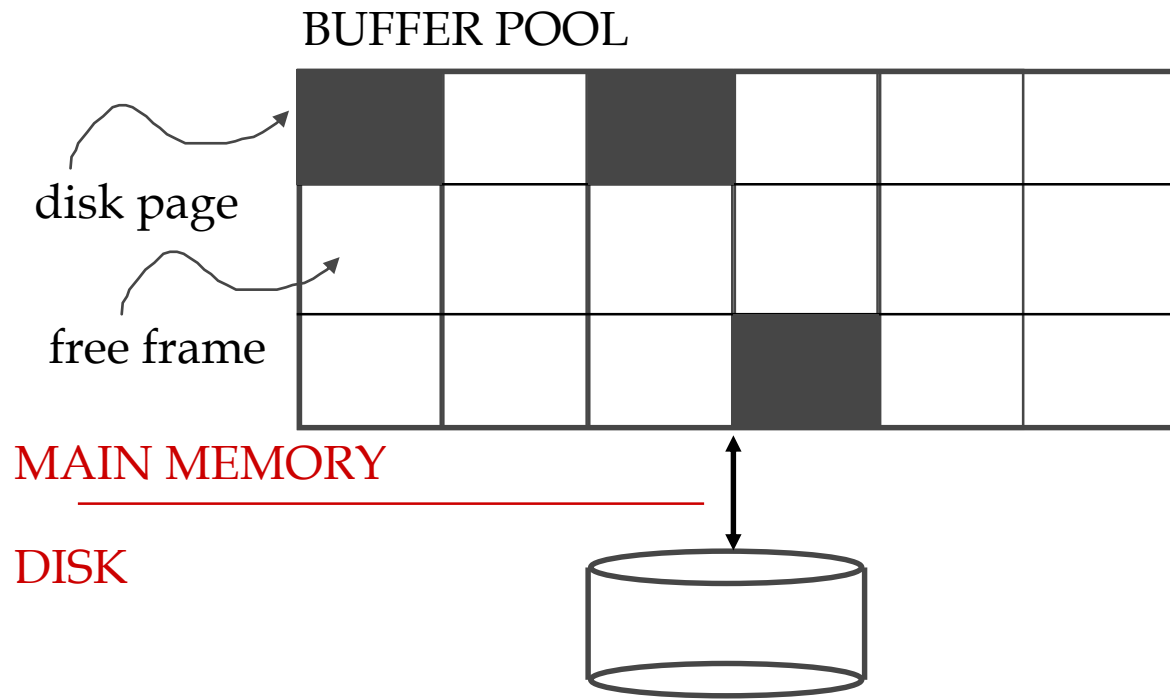
- `mkdir`
- `rmdir`
- `opendir`
- `closedir`
- `readdir`

More Directory Functions

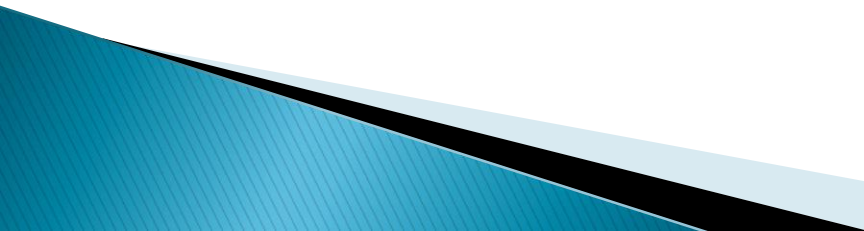
- ▶ System Calls
 - getdents
 - rewinddir
 - chdir
 - getcwd
 - sync
 - fsync

- ▶ `files/shownames.c`

I/O Internals



File Open

- ▶ `fd = open("/home/frye/data.txt", O_RDONLY)`
 - ▶ Filename → directory lookup
 - ▶ Directory entry → inode number
 - ▶ Active inode table entry
 - ▶ Open file table entry
 - ▶ Process file descriptor table
- 

File Close

- ▶ Mark as free or decrement *reference count*
 - Open file table entry
 - Active inode table entry

- ▶ Directory creation
 - New inode allocated
 - Add to directory
 - Default entries → . and ..