

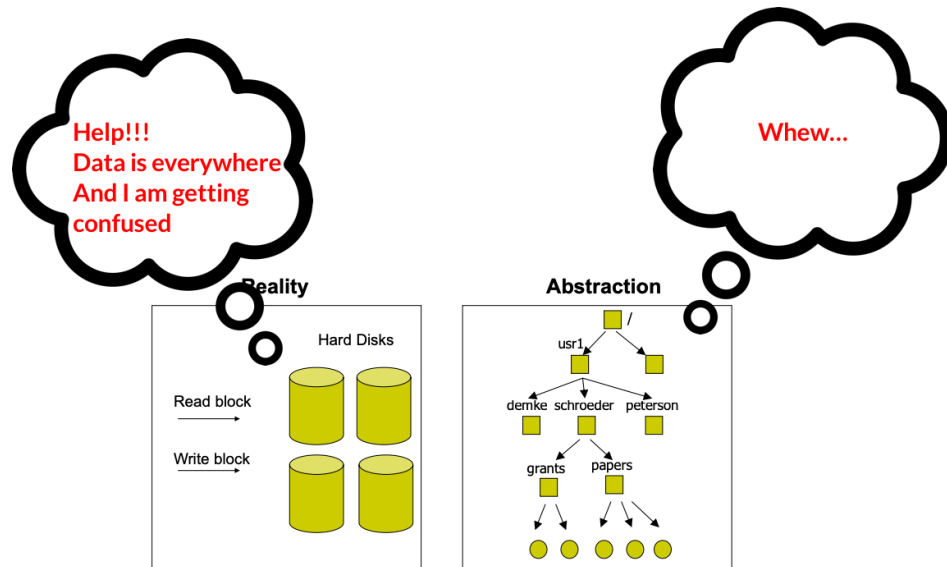
# CSC369 Week 8 Notes

Hyungmo Gu

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- File Systems

- Is the part of operating system dealing with files <sup>[2]</sup>
- Controls how data is stored and retrieved. <sup>[1]</sup>
  - \* Without a file system, data placed in a storage medium is one large body of data with no way to tell where it stops and the next begins



## Refernces:

- 1) Wikipedia: File Systems, link
- 2) Tanebaum AS, Boss H. 2015. Modern Operating Systems. 4th Edition. New Jersey: Pearson Education, Inc.

- File Concept

- Files

- \* Are logical units of information created by processes <sup>[1]</sup>
- \* Is named collection of data with some attributes
  1. Name
  2. Owner
  3. Location
  4. Size
  5. Protection
  6. Creation Time
  7. Time of Last Access

### References:

- 1) Tanenbaum AS, Bos H. 2015. Modern Operating Systems. 4th Edition. New Jersey: Pearson Education, Inc.

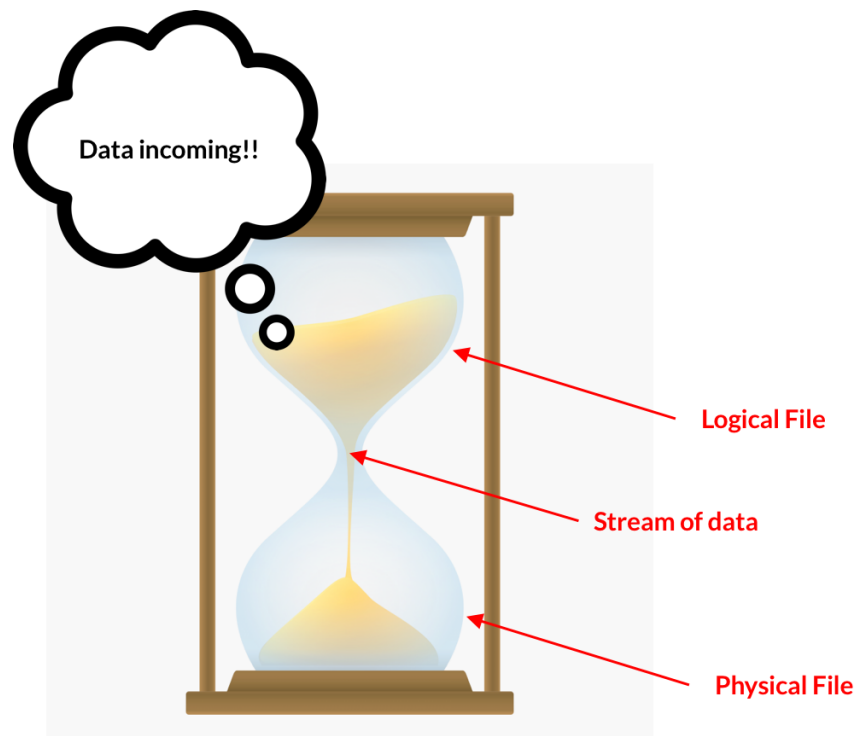
- Directories

- Are file system files for maintaining the structure of the file system <sup>[1]</sup>
- Serves multiple purposes
  - \* *All* → Stores information about files (owner, permission, etc)
  - \* *Users* → provides a structured way to organize files
  - \* *File System* → provides a convenient naming interface that allows the implementation to separate **logical file** organization from **physical file** placement on the disk
- **Logical files:** Is a channel that connects the program to the physical file (Stream) <sup>[2]</sup>
- **Physical files:** A collection of bits stored in the secondary storage <sup>[2]</sup>

### Example:

```
FILE* output;
output = fopen("sample.txt", "w");
```

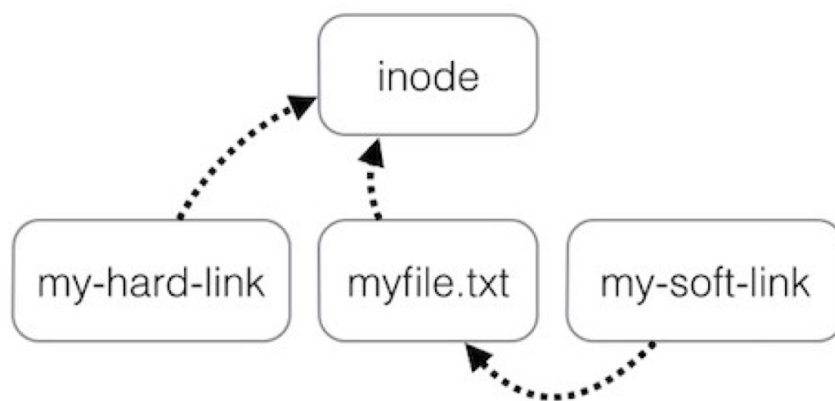
Here, output is the logical file and sample.txt is the physical file



### Refernces:

- 1) Tanebaum AS, Boss H. 2015. Modern Operating Systems. 4th Edition. New Jersey: Pearson Education, Inc.
- 2) Kumar, S. (2010). *File structures* [PowerPoint Slides]. Slide Share link

- Symbolic vs Hard Links



Andrew, Medium

### – Inode

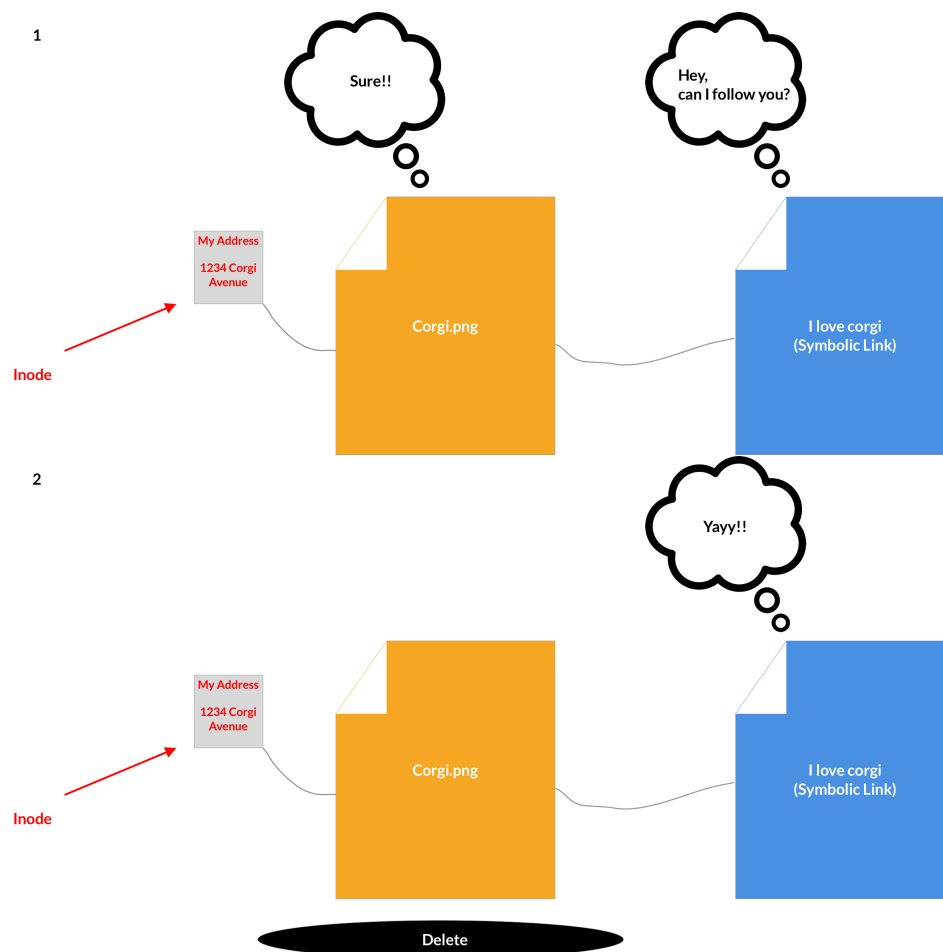
- \* Is a database structure in a UNIX-style file system that describes a file system object such as a file or a directory <sup>[1]</sup>
- \* Contains disk block location of the object's data <sup>[1]</sup>
- \* Is a numerical equivalent of a full address <sup>[2]</sup>

– **Symbolic Link:**

- \* Is directory entry containing "true" path to the file
- \* Is a shortcut that reference to a file instead of inode value <sup>[2]</sup>

– **Hard Link:**

- \* Is a direct reference to a file via its inode <sup>[2]</sup>
- \* Is second directory entry identical to first



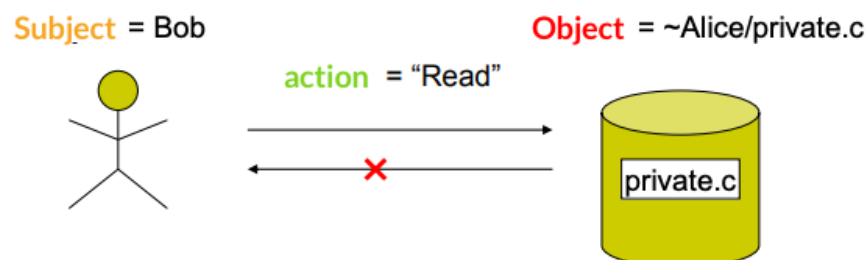
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### References:

- 1) Wikipedia: inode, link
- 2) Andrew. (2018, January 16). *Hard links and Symbolic links — A comparison*. Medium. link

- Protection
  - File systems implement some kind of protection system
    - \* Who can access a file
    - \* How they can access it
  - Protection system dictates whether given **action** by a given **subject** on a given **object** should be allowed
    - \* You can read and/or write your files, but others cannot
    - \* You can read "etc/motd", but you cannot write it



- Unix Inodes and Path Search
- File Buffer Cache