CS 340
Computer Systems

**#17: Data Storage and Caching / Local File Storage**

Oct 24, 2023 · G Carl Evans

## Data Storage and Caching

Throughout every program you have ever written, you have had to handle data storage in some way. Let's explore our options for data storage:

**[1]:** _____
Why? How?

**[2]:** _____
Why? How?

**[3]:** _____
Why? How?

**[4]:** _____
Why? How?

**[5]:** _____
Why? How?

**[6]:** _____
Why? How?

**[7]:** _____
Why? How?

## File Systems

All modern systems utilize an Operating System to facilitate the storage of data in units called "files":

```
waf@sp22-cs340-001:~$ ls -la
drwxr-xr-x 7 waf  csvm340-cls 4096 Oct 22 11:25 .
drwxr-xr-x 3 root root        4096 Oct 10 13:42 ..
-rw------- 1 waf  csvm340-cls   19 Oct 10 13:56 .bash_history
-rw-r--r-- 1 waf  csvm340-cls  220 Oct 10 13:42 .bash_logout
-rw-r--r-- 1 waf  csvm340-cls 3771 Oct 10 13:42 .bashrc
drwx------ 2 waf  csvm340-cls 4096 Oct 10 13:42 .cache
drwxr-xr-x 2 waf  csvm340-cls 4096 Oct 22 11:22 cs340
drwxr-xr-x 2 waf  csvm340-cls 4096 Oct 21 14:35 docker
```

| Permission Bits [1] | [3] | File Owner and Group [2] | File Size (bytes) [4] and Date Modified [5] | File Name [6] |
|---|---|---|---|---|

**[1]**: Permission Bits:

| d | r | w | x | r | w | x | r | w | x |
|---|---|---|---|---|---|---|---|---|---|
| Dir | User | | | Group | | | Other | | |

**[2]**: File Owner and File Group

**[5]**: Last Modified Date:

- Almost all modern operating systems store three different date fields for every single file:
  a.
  b.
  c.
- The date/time fields are always based on **your local computer clock** -- easily modified, easily faked.

**[6]**: File Name

- "dot" files and directories:

**Q:** Why does local file storage not work on a cloud-scale system?