Getting Information on Files

- All files have metadata
- Know attributes of a file - name, size, permissions, ownership, access time, etc
- Can view metadata for files with `ls -l` command, the `-l` option for long-form
- When viewing a file metadata this way, the first character indicates the file type

Character	Type
l	Symbolic Link
n	Network File
p	FIFO (pipe)
s	Socket

```
-rw-rw-r-- 1 michael michael 2533 Feb 26 18:10 files.md
-rw-rw-r-- 1 michael michael  424 Feb 26 18:54 getting-information-on-
files.md
```

- Above is the output of `ls -l`
- from left to right, you see file type, permissions, owner, group, number of inodes, file size in bytes (use the `-h` option for human readable file sizes), last modified data/time, file name
- inodes stores file metadata and a pointer to the data blocks on disk
- inodes don't store file names, directory inodes store file names and file inode numbers
- YouTube video on inodes
- view hidden files with the `-a` option
- in Linux, file are hidden if they start with `.`
- To see file type, use the command `file [path to file]`
- The `file` command doesn't read file extensions, it reads the actual data of the file so renaming a jpeg to a txt file for instance won't make a difference
- use the `state [file]` command to view metadata on a file in more detail

About extended attributes

- If the OS supports it files can have extended attributes - most OSes support this
- extensions to normal attributes, stored on disk
- Three major types
    - System
        - Store access control lists (ACLs)
        - additional layer of discretary access control
        - access to the file is at discretion of owner, set by owner
        - permissions can be set for multiple users and groups
        - Provide inheritance for directories
        - Backup and restore permissions easily

    - Security
        - SELinux mandatory access control system
            - Layered over discretionary access control
            - system-wide rules restricting all users including root
            - SELinux modes
                - Multi-level security that mimicks gov't security levels
                - Role-based access control
                - Type enforcement - all files, processes and users tagged with a type, permissions set on the basis of types
    - User
        - Store additional flags on files aptly named extended attributes
        - flags like "append only", "compress", "immutable", "backup"

Getting extended attributes

Task	Command
Verify existence of ACL	`ls -l`
Show ACL information	`getfacl`
Show SELinux security context	`-Z` option
Show extended attributes	`lsattr`

- Use `setfacl -m user:[user]:[permission] file` to set an access control list
- Use `getfacl -t` to get access control list on a file
- To see SELinux security context use `ls -Z file`
- To add a user attribute run `sudo chattr +[flag] file`
- To see user attributes on a file run `lsattr -l file`

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