

THE LINUX FILESYSTEM

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While many users may interact with systems using Windows systems, most servers run on Linux servers of one kind or another. Therefore this filesystem is important to understand.

On 2-2-2025, I asked *ChatGPT* the following:

provide a general description of the linux filesystem and its layout. Describe each of its major folders and give an example of what their general purpose is and how each are used by most users.

ChatGPT:

“The **Linux filesystem** is a hierarchical structure where everything is organized under a single root directory (/). Unlike Windows, which uses drive letters (e.g., C:\), Linux has a unified directory tree, where all files and directories stem from the root. Here’s a breakdown of the **major directories** in a standard Linux filesystem:

1. / (Root)

- The top-level directory from which all other directories branch out.
- Example: Running `cd /` brings you to the root of the filesystem.

2. /bin (Essential Binaries)

- Contains essential command-line binaries (executables) needed for system operation.
- Example: Common commands like `ls`, `cp`, `mv`, and `cat` are stored here.

3. /sbin (System Binaries)

- Stores essential system administration commands, usually requiring root privileges.
- Example: `shutdown`, `fdisk`, `fsck`, and `ifconfig` are located here.

4. /etc (Configuration Files)

- Houses system-wide configuration files and scripts.
- Example: `/etc/passwd` stores user account details, and `/etc/fstab` configures filesystems.

5. /home (User Home Directories)

- Contains personal files and settings for each user.
- Example: A user `john` has `/home/john/` for personal documents, downloads, and settings.

6. /root (Root User's Home)

- The home directory for the superuser (root).
- Example: Used when logging in as root for administrative tasks.

7. /var (Variable Data)

- Stores logs, spool files, databases, and temporary files.
- Example: System logs are in /var/log/, and web server files (like Apache logs) are in /var/www/.

8. /tmp (Temporary Files)

- Used for temporary storage, typically cleared on reboot.
- Example: Applications use /tmp to store temporary files during execution.

9. /usr (User System Resources)

- Contains shared system resources, like additional software and libraries.
- Example: /usr/bin/ has non-essential executables, and /usr/lib/ contains libraries.

10. /lib and /lib64 (System Libraries)

- Houses essential shared libraries required for system operation.
- Example: libc.so (C standard library) is located here.

11. /opt (Optional Software)

- Used for third-party and optional software installations.
- Example: Custom software packages may be installed in /opt/myapp/.

12. /mnt (Mount Point)

- Temporary mount point for filesystems, like external drives or network shares.
- Example: Mount a USB drive with mount /dev/sdb1 /mnt/usb.

13. /media (Removable Media)

- Automatically mounts external media like USB drives and CDs.
- Example: When plugging in a USB, it might be accessible at /media/user/usbdrive.

14. /dev (Device Files)

- Represents hardware devices as files.
- Example: /dev/sda represents the first hard disk, and /dev/null discards output.

15. /proc (Process Information)

- Virtual filesystem containing information about system processes and kernel.
- Example: /proc/cpuinfo contains CPU details.

16. /sys (Kernel Information)

- Provides system and hardware information similar to /proc.
- Example: /sys/class/net/ shows network interfaces.

17. /boot (Boot Loader Files)

- Contains bootloader-related files, like kernels and GRUB settings.
- Example: The Linux kernel (vmlinuz) and bootloader configurations (grub.cfg) are stored here.

How Users Interact with the Filesystem

- **Regular Users:** Mostly use /home/, where they store personal files, documents, and downloads.
- **System Administrators:** Work with /etc/, /var/log/, and /root/ for configurations, logging, and system maintenance.
- **Developers:** May interact with /usr/local/ for custom software installations.
- **Servers:** Web servers use /var/www/, databases store data in /var/lib/, and logs go to /var/log/."