

Linux File System Hierarchy

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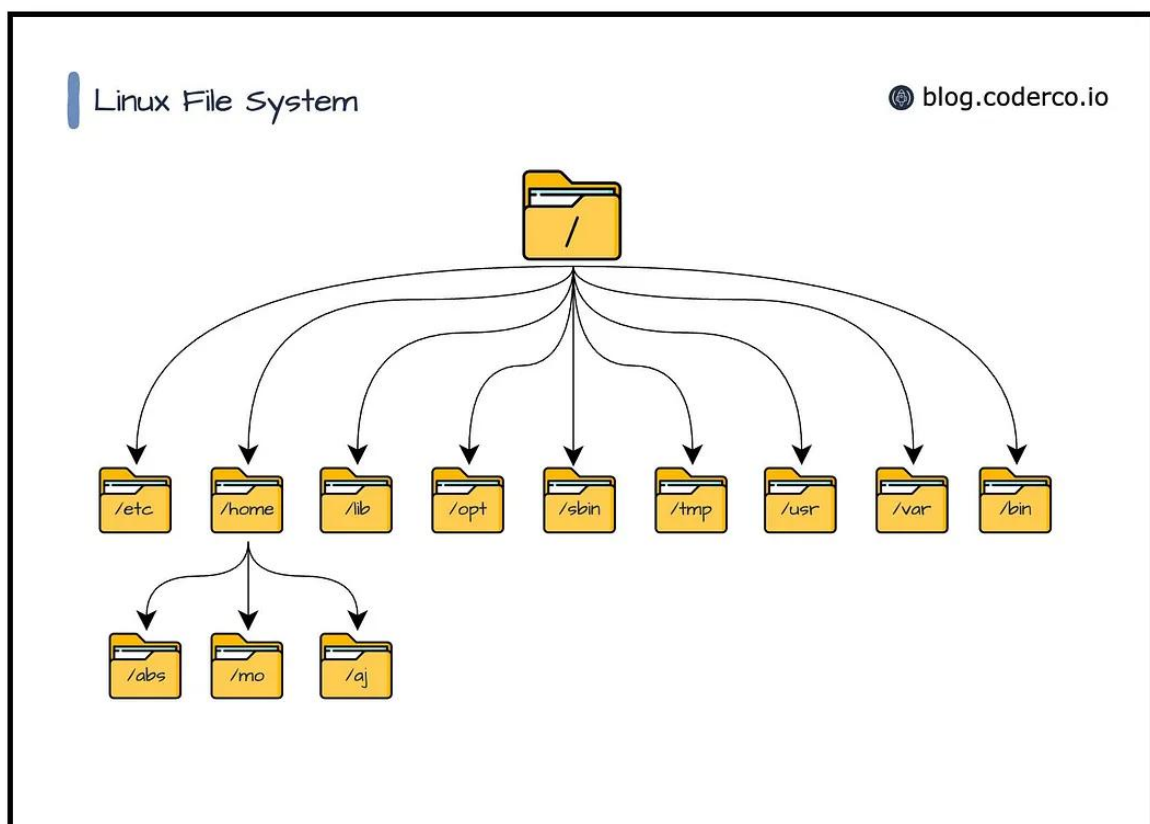
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✦ Introduction

The Linux file system follows a well-defined hierarchy that organizes files and directories efficiently. Understanding this structure is crucial for **system administration, troubleshooting, and automation** in DevOps and Linux-based environments.

📁 Linux File System Structure

Linux adheres to the **Filesystem Hierarchy Standard (FHS)**, defining the purpose of each directory. Below is a breakdown of essential directories and their functions:



◆ 1. Root Directory (/)

- The top-level directory in Linux.
- All other directories and files stem from here.

◆ 2. /bin (Binary Executables)

- Contains essential user binaries like ls, cp, mv, cat, and bash.

◆ 3. /sbin (System Binaries)

- Stores essential system administration commands like shutdown, fdisk, and ifconfig.

◆ 4. /etc (Configuration Files)

- Holds system-wide configuration files such as /etc/passwd, /etc/fstab, and /etc/hosts.
- **Use Case:** Network settings, authentication details, and system configurations.

◆ 5. /home (User Home Directories)

- Contains personal directories for each user (/home/username).
- Stores user data, settings, and personal files.

◆ 6. /root (Root User Home Directory)

- Home directory for the root user, separate from /home.

◆ 7. /var (Variable Data Files)

- Stores log files (/var/log), caches, and frequently changing data.
- **Use Case:** Logs are critical for monitoring and troubleshooting system activity.

◆ 8. /tmp (Temporary Files)

- Used for storing temporary files created by applications and users.
- Gets cleared upon reboot.

◆ 9. /usr (User System Resources)

- Contains user-related programs, libraries, and documentation.
 - /usr/bin/ – Common binaries for users.
 - /usr/sbin/ – System administration binaries.
 - /usr/lib/ – Shared libraries.
 - /usr/share/ – Shared data like icons and documentation.

◆ 10. /lib & /lib64 (System Libraries)

- Contains essential shared libraries required by binaries in /bin and /sbin.

◆ 11. /dev (Device Files)

- Represents hardware devices as files (e.g., /dev/sda1 for a disk, /dev/null for a null device).

◆ 12. /mnt & /media (Mount Points)

- /mnt/ – Temporary mount point for external filesystems.
- /media/ – Auto-mounted devices like USB drives and CDs.
- **Use Case:** Mounting remote filesystems, external drives, or ISO images.

◆ 13. /opt (Optional Software)

- Used for third-party software installations.

◆ 14. /proc & /sys (System Information)

- /proc/ – Virtual filesystem containing system and process information (/proc/cpuinfo).
- /sys/ – Provides information about kernel, hardware, and devices.

◆ 15. /swap (Swap Space – Not a Directory)

- Virtual memory used when RAM is full.
- Exists as a partition or file, not a directory.

✅ Best Practices for Managing Linux File System

- **Monitor** /var/log regularly to prevent logs from filling up disk space.
- **Use symbolic links** (ln -s source target) to create quick access points.
- **Partition disks efficiently** to prevent system crashes and enhance security.

🔧 Important Linux Commands for File System Management

📌 Check disk space usage:

df -h

📌 View disk usage per directory:

du -sh /path




📌 List mounted file systems:

mount -l

📌 Check file system type:

df -T

Importance of Understanding Linux File Hierarchy

-  Efficient troubleshooting & system administration.
 -  Proper file organization & security management.
 -  Seamless automation & scripting in DevOps.
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Conclusion

Mastering the Linux file system hierarchy enhances **system efficiency, troubleshooting, and security**. Whether you're a **DevOps engineer, sysadmin, or Linux enthusiast**, understanding this structure helps in managing systems effectively.

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