



O08

## Linux Installation Part 1 of 2

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# Objectives

What you will learn:

- Prepare a system for installation
- Install Linux from CD-ROM
- Understand the hierarchical tree structure of Linux

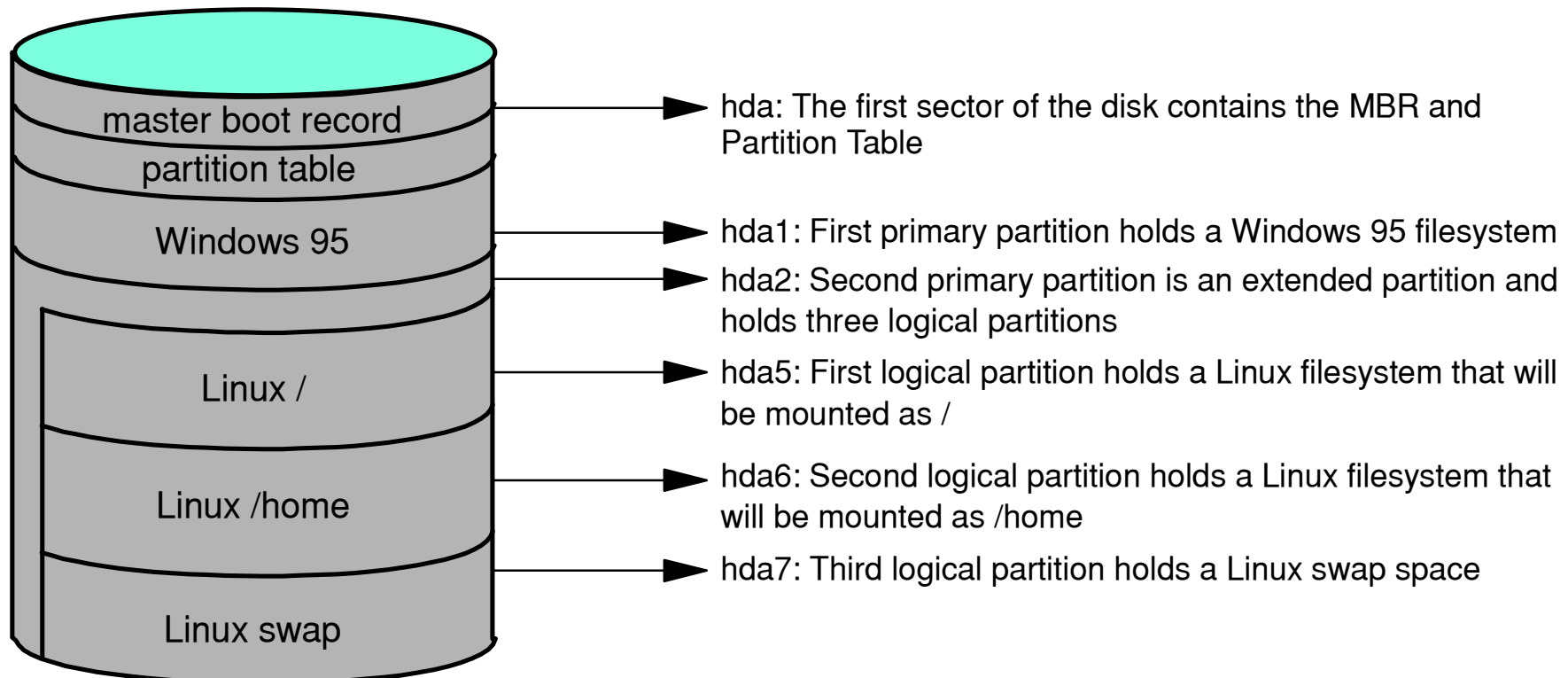
# Preparing a System for Installation

- Know your hardware
  - CPU, memory, keyboard, mouse
  - Hard disks, CD-ROM players
  - Graphical adapters, monitor capabilities
  - Network adapters, IP addresses
  - Printers
- Is all your hardware supported?
  - Linux Hardware-HOWTO
  - Distributors Hardware Compatibility List
  - Hardware manufacturer
  - If unsure, just try it!
- Make space for Linux partitions

Notes:

# Partitioning Theory

- Partitioning is necessary on Intel-based computers
- Maximum of four primary partitions
- One primary partition may be an extended partition
- An extended partition can hold an unlimited amount of logical partitions (Linux: max 59)



Notes:

# Partitioning Tools

- PartitionMagic
  - Commercial program from PowerQuest
  - Runs under MS-DOS and Windows
  - Can create/resize/move/delete partitions
- GNU parted
  - Can create/resize/move/delete partitions
- fdisk
  - Virtually every PC OS (Windows, OS/2, Linux) comes with a tool "fdisk" to create partitions for that OS
- Disk Druid, YaST and others
  - Partitioning programs integrated in install program

Notes:



# Installation Steps

- All installation programs need to perform essentially the same steps:
  1. Choose language, keyboard type, mouse type
  2. Create partitions
  3. Set up a boot loader
  4. Configure network
  5. Configure users and authentication
  6. Select package groups
  7. Configure X
  8. Install Packages
  9. Create Boot Disk
- Order of steps may vary from distribution to distribution
- Other steps may also be included
  - e.g. firewall, printers, sound

Notes:

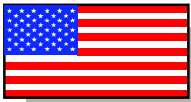
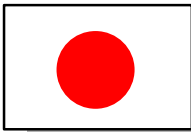
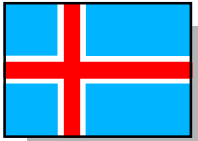
# Installing Linux

- Boot system from bootable media
  - Most systems can boot from CD-ROM directly
    - Must be enabled in BIOS
  - Otherwise boot from floppy
- Some distributions require additional disks
  - All disk images are usually stored on the CD-ROM
- After booting, install from:
  - Local CD-ROM/DVD
  - Local Hard Disk
  - Network

Notes:

# Select Language, Keyboard, Mouse

- Select the language to be used during installation process
  - Different distributions support different languages
- Select the keyboard layout
  - Different countries use different keyboard layouts
  - Dead (compose) keys allow you to input accented or special characters such as é, ç, ß and so forth.
- Select your mouse
  - A mouse can be connected using a PS/2, USB or serial connector
  - If your mouse has only 2 buttons, you can emulate the third (middle) button by clicking both buttons simultaneously



Notes:

# Install Class

- Most distributions have default installation "classes" for typical users

- Workstation

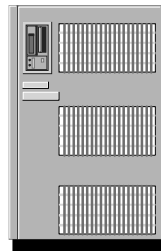


- Laptop



- Server

- ...



- A "custom" class allows you to make all decisions yourself

- Packages to be installed
- Various configuration options

## Notes:

Space comparison for the different types of installations:

### Personal Desktop:

A personal desktop installation includes a graphical desktop environment and requires at least 1.7GB of free space. If you choose both desktop environments, GNOME and KDE your total free disk requirement will be 1.8 GB.

### Workstation:

If you decide to install a workstation and include a desktop environment and software development tools your installation will require at least 2.1GB of free space. If you choose both desktop environments GNOME and KDE you will need at least 2.2GB of free disk space.

### Server:

For this type of installation you need at least 850MB of space. That doesn't include any support for a graphical environment. If you wish to install all package groups aside from the graphical components your installation will require 1.5GB of free space. Your third option is to install support for both desktop environments, GNOME and KDE you will need 5.0GB of free space to install everything.

### Custom:

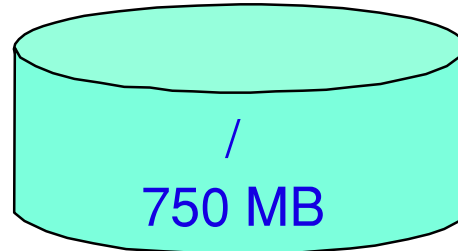
A custom installation requires a minimum of 475MB and at least 5.0GB if every package is installed.



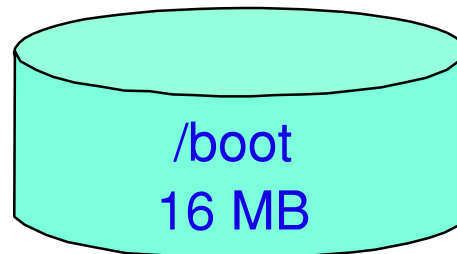
# Disk Partitioning

- Linux installation requires you to create Linux partitions

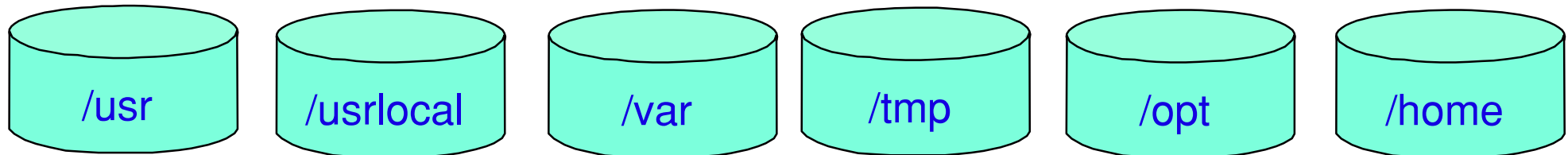
- At a minimum, create:



- Recommended:



- May need/want to create other partitions:

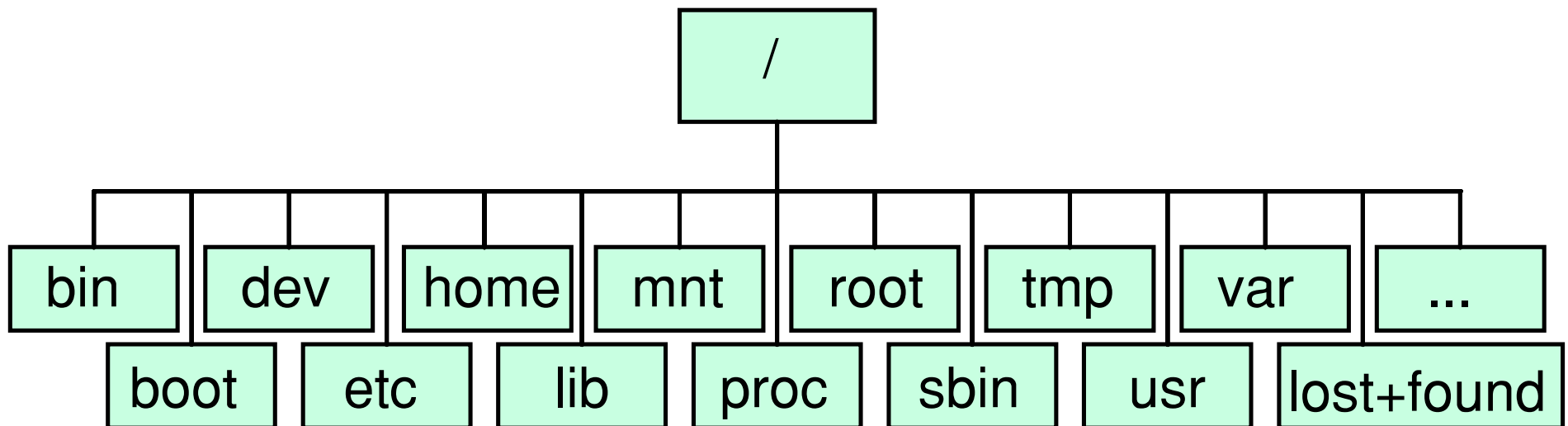


- Default partitioning program under Linux is **fdisk**
  - Distributions may add their own partitioning programs

Notes:

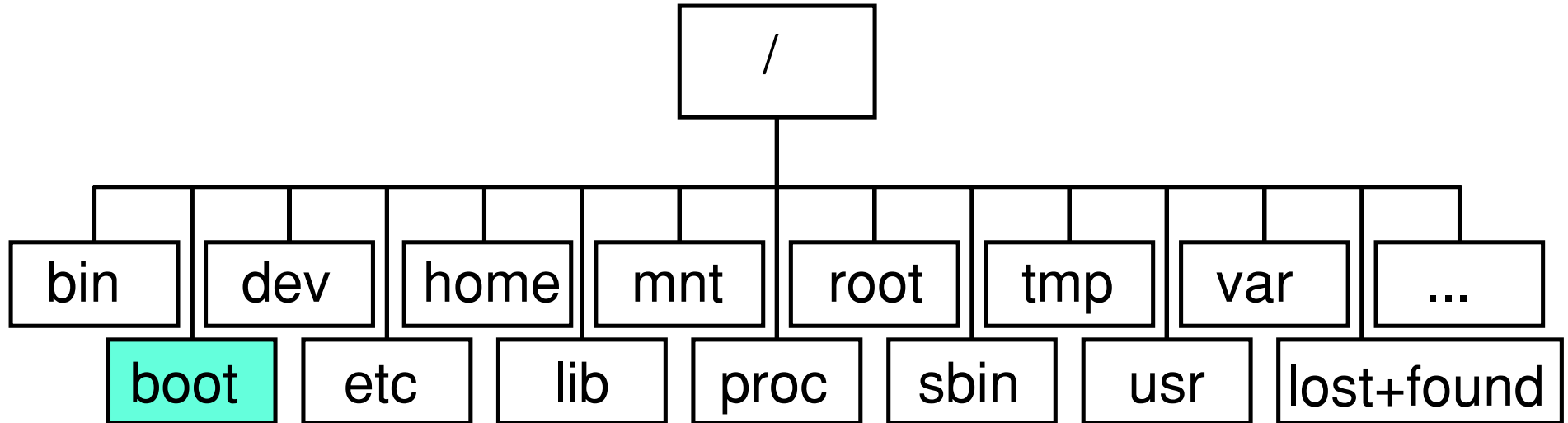
# Directory Structure

- All Linux directories are contained in one, virtual, "unified filesystem"
- Physical devices are mounted on mount points
  - Floppy disks
  - Hard disk partitions
  - CD-ROM drives
- No drive letters like A:, C:, ...



Notes:

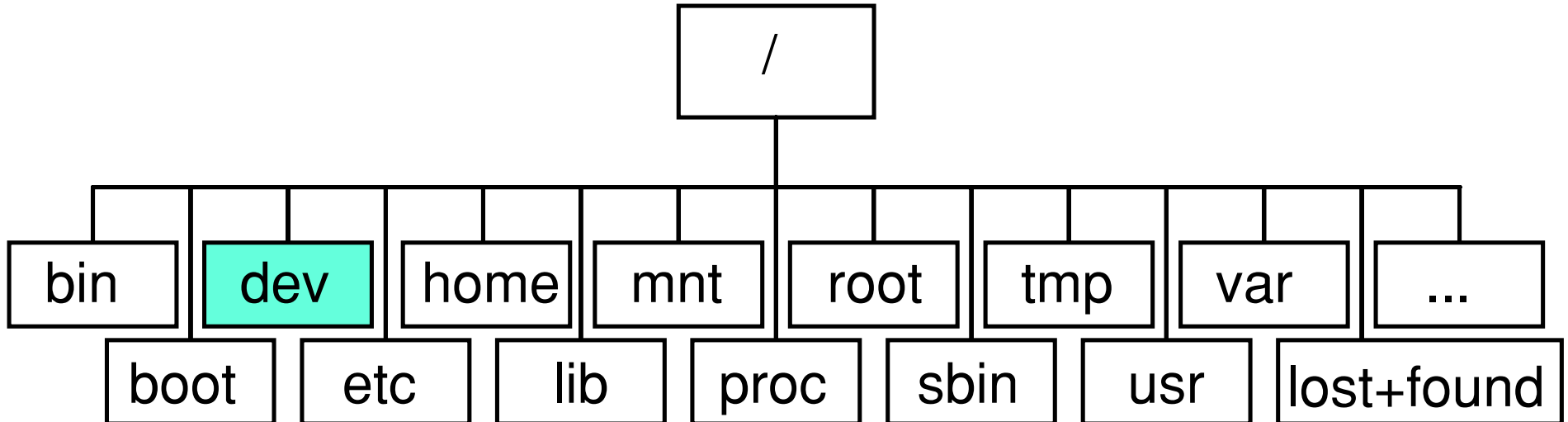
# /boot



- Contains kernel image and some other goodies
- Should be located below cylinder 1023 and/or 8 Gb
  - Good habit to always make it a separate filesystem

Notes:

# /dev

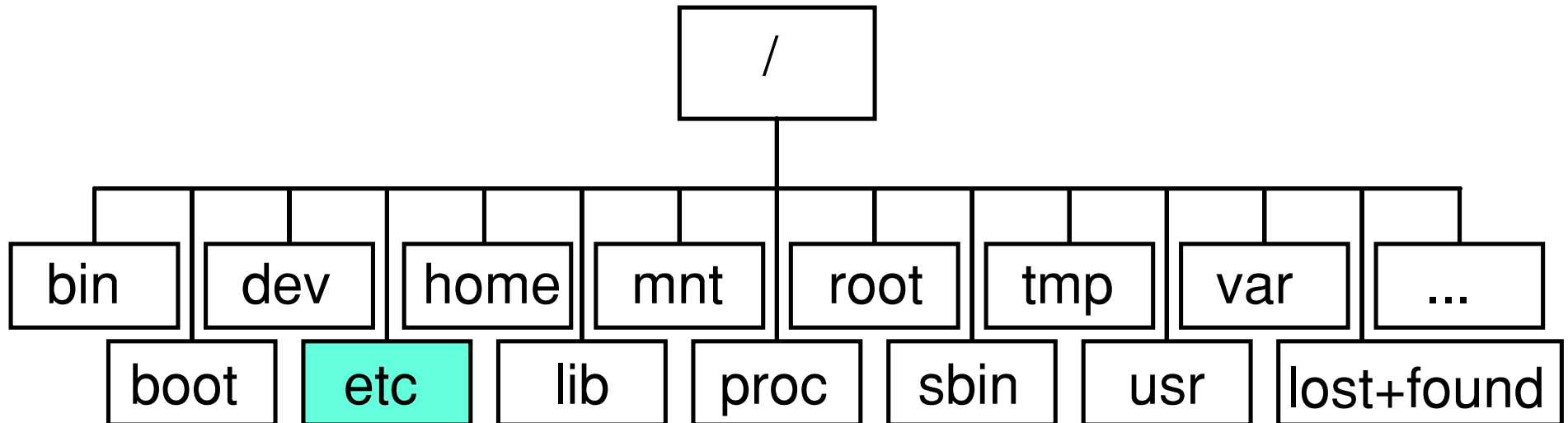


- Contains special files that represent hardware devices
  - Block special device, for example, a hard disk
  - Character special device, for example, mouse and keyboard
- Each device has a major and minor number
  - Identification within the kernel
- Can not be a separate filesystem

Notes:



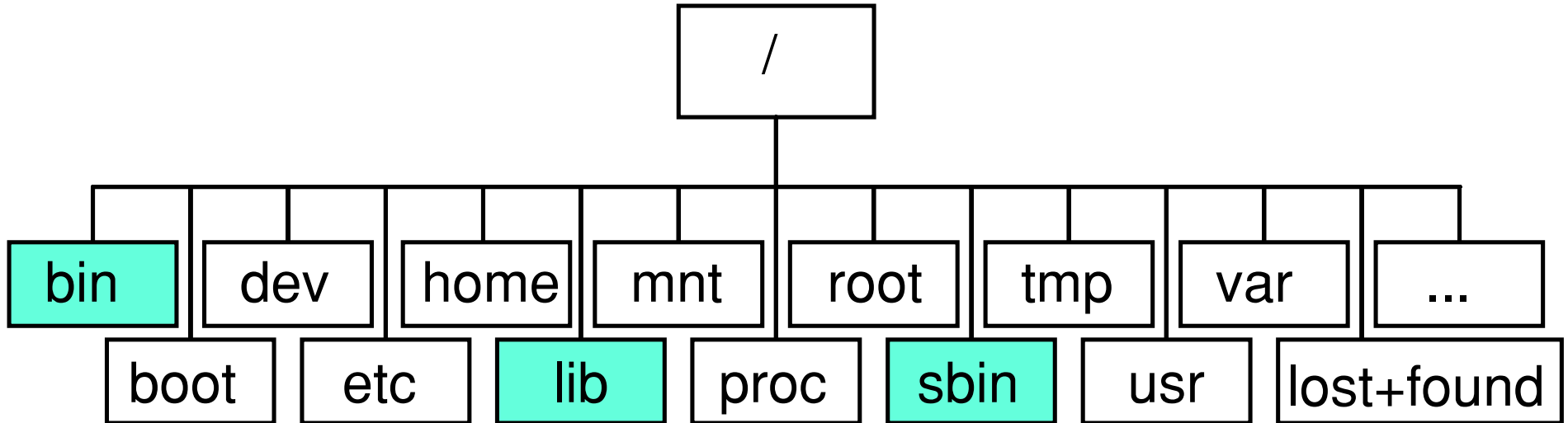
# /etc



- Contains system-wide configuration files
- Some subsystems have multiple files and therefore use a separate directory
  - /etc/X11 contains X Window System configuration
  - /etc/skel contains default user configuration files
  - /etc/sysconfig contains system configuration
- Can not be a separate filesystem

Notes:

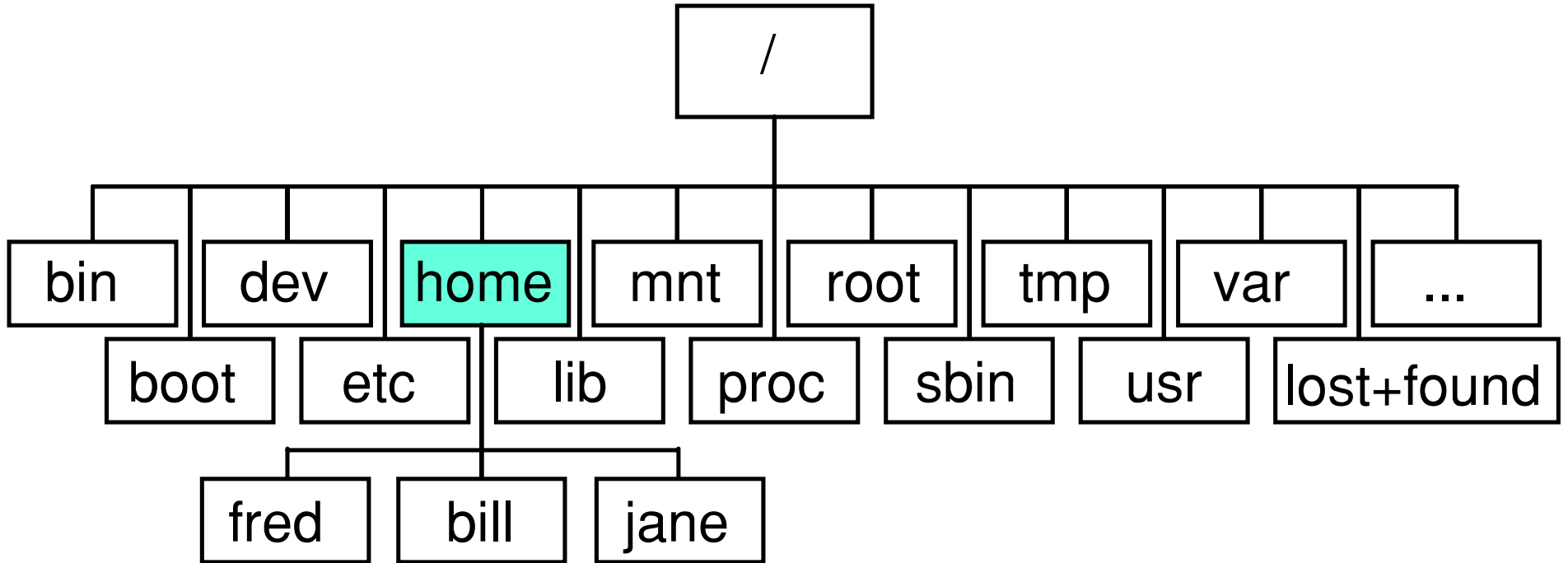
# /bin, /lib, /sbin



- /bin contains executables for every user
- /sbin contains system administration executables
- /lib contains libraries
- Should always be available
  - At system boot
  - In single user mode
  - When booting from rescue disk
- Can not be in separate filesystems

Notes:

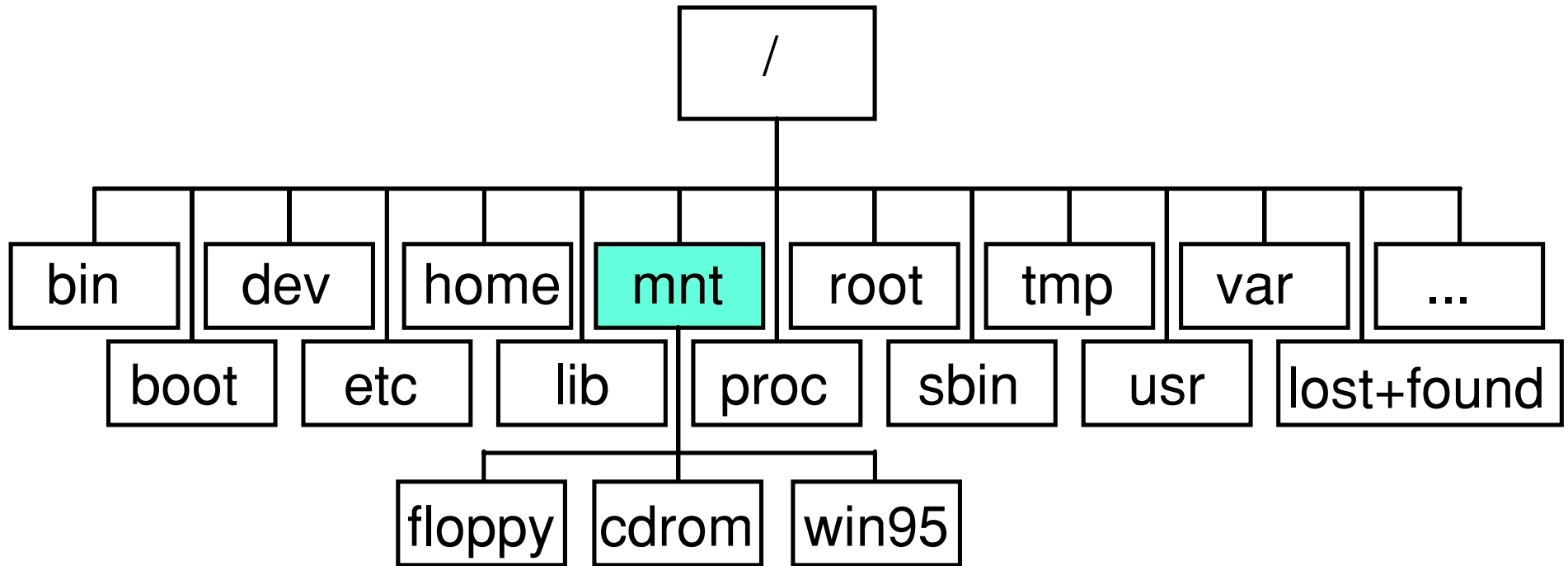
# /home



- Home directories of users
- Can be a separate filesystem

Notes:

# /mnt

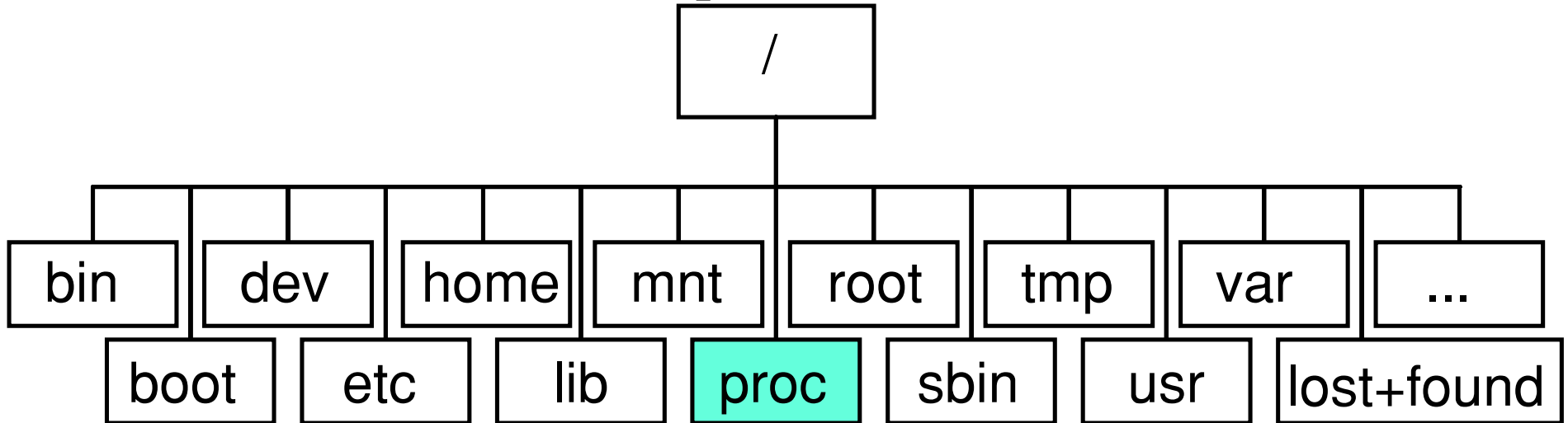


- Mount points for other filesystems
- Can be a separate filesystem
- Note: SuSE uses /media instead of /mnt for floppy and cdrom mountpoints

Notes:



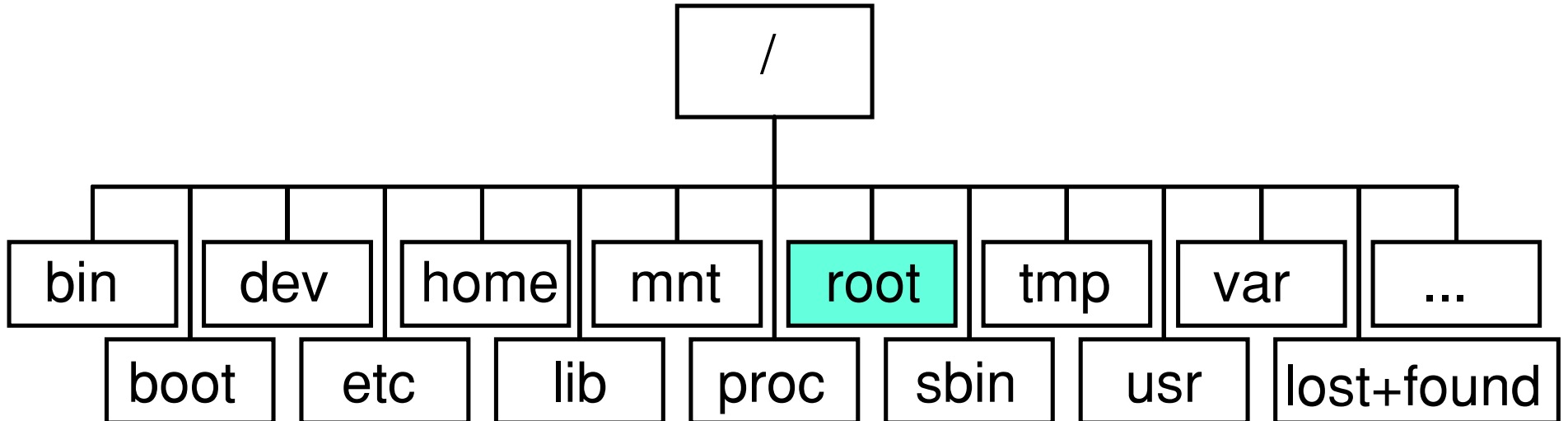
# /proc



- Virtual filesystem
- Represents kernel and process information

Notes:

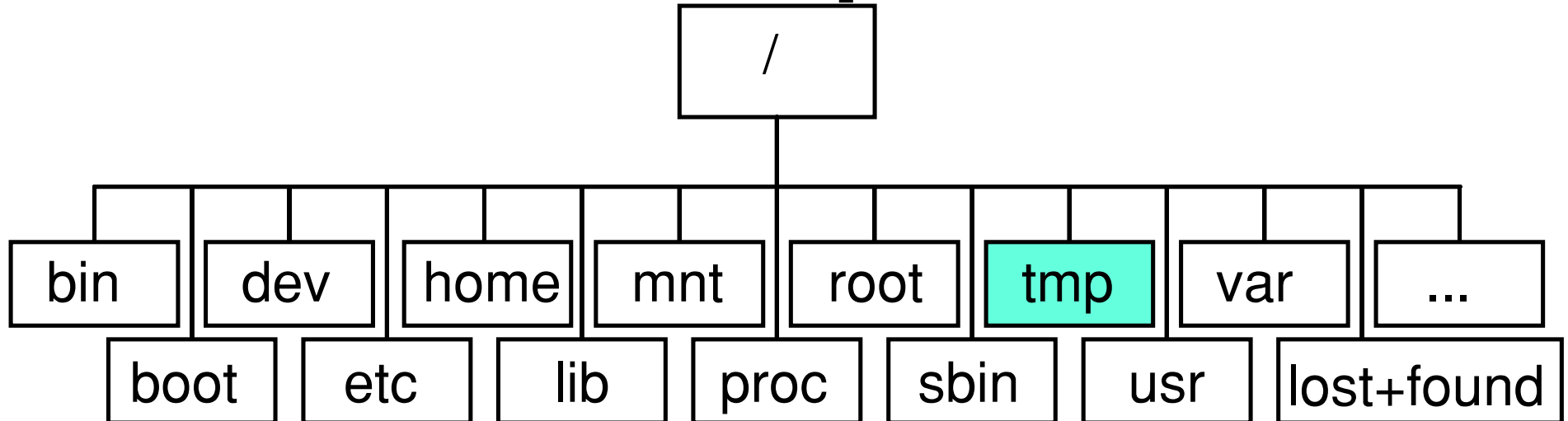
# /root



- Home directory of the root user
- Should not be a separate filesystem

Notes:

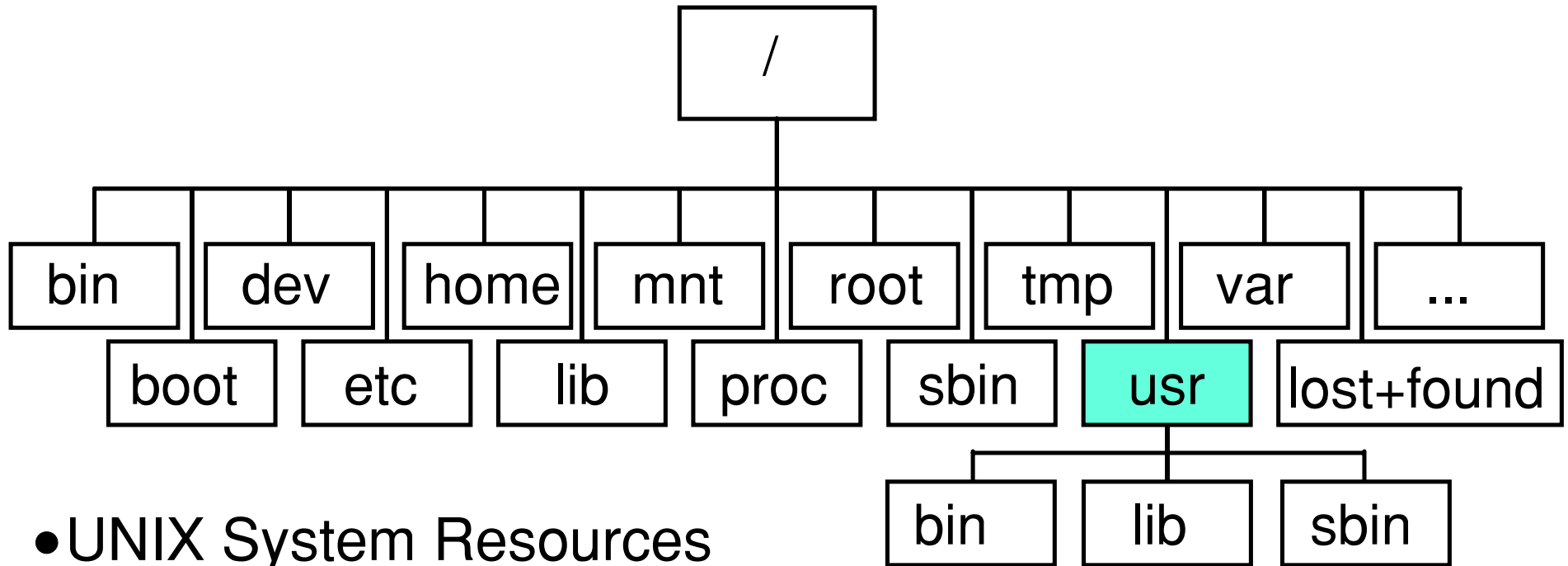
# /tmp



- Temporary storage space for programs, users
- Can be a separate filesystem
- Sometimes automatic cleanup mechanism active

Notes:

# /usr

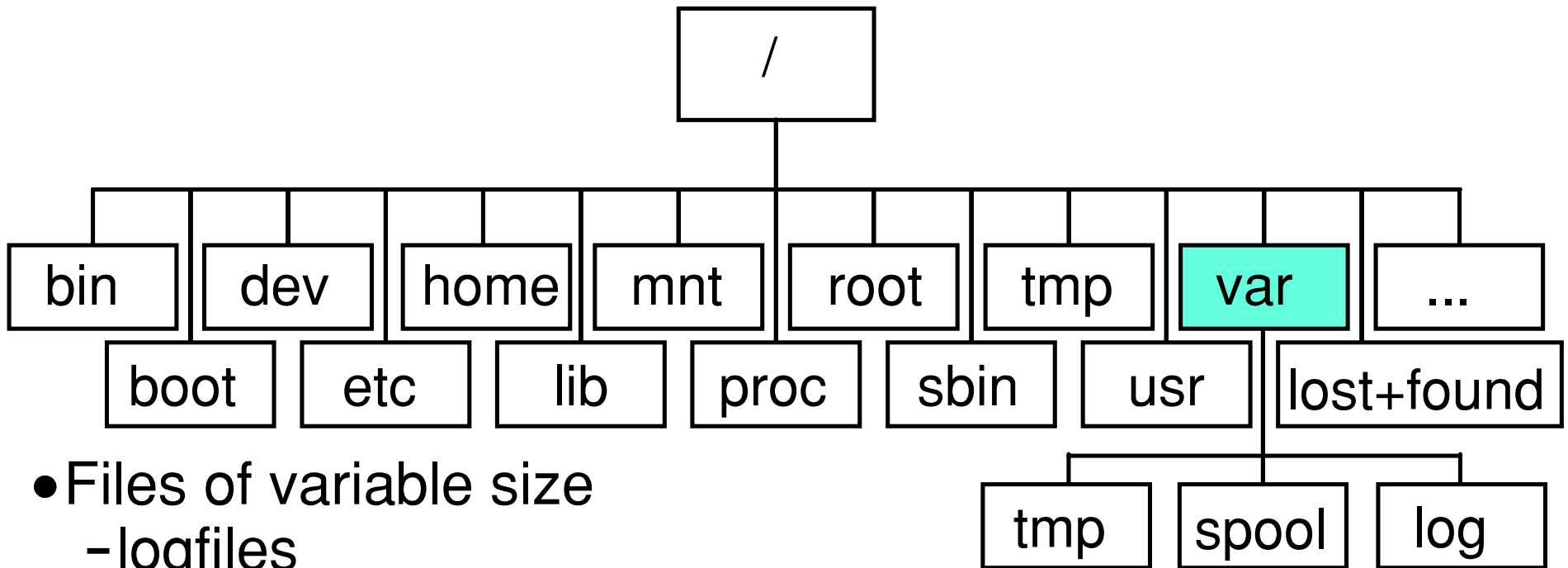


- UNIX System Resources
- Contains all programs, libraries and so on which are not essential for system boot and emergency operations
- Can be a separate filesystem
  - Can be mounted over NFS
  - Can be read-only
- /usr/local intended for programs not in the distribution
  - May be a separate filesystem too

Notes:



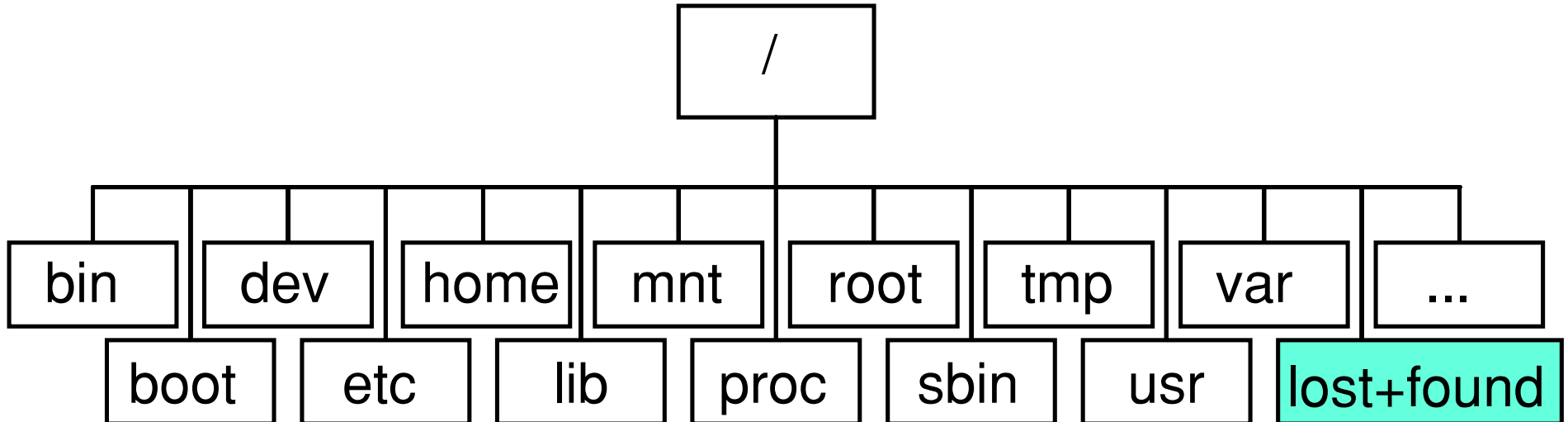
# /var



- Files of variable size
  - logfiles
  - lockfiles
- Directories with variable content
  - mail
  - scheduling
  - printing
- Temporary storage space, longer than /tmp
- Can be a separate filesystem

Notes:

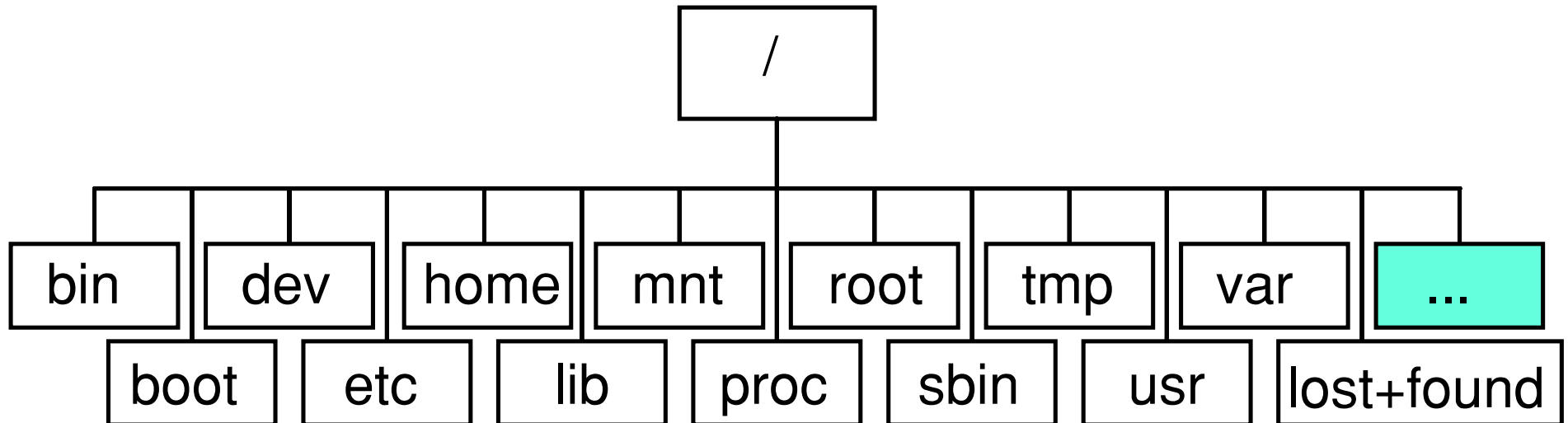
# /lost+found



- Exists in every filesystem
- Place where lost+found files are stored after a crash recovery by fsck.

Notes:

# Other directories in /



- /opt: used for some software from external providers
  - Separate filesystem advisable
- Whatever you create yourself.

Notes:

# Configure a Boot Loader

- A Boot Loader loads and starts the Linux kernel
- Can boot other operating systems as well
  - OS/2, Windows, BeOS, ...
  - Give each OS a unique label!
- Can be password protected
  - Prevents users from passing boot parameters to Linux or booting any OS
- Should generally be configured in the MBR, unless another boot loader is used
- Common Boot Loaders:
  - **LILO**: Linux Loader
  - **GRUB**: GRand Unified Boot Loader

Notes:

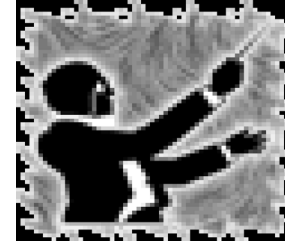


# Configure Network

- Most distributions configure your network adapter as part of the installation process
  - Ethernet
  - Token Ring
- Need the following information:
  - IP address
  - Subnetmask
  - Network address
  - Broadcast address
  - Hostname
  - Default router/gateway
  - DNS server addresses
- May also be configured to use DHCP

Notes:

# Configure Root and User Accounts



- **root** is the superuser of the system
  - Can do anything
  - Needs a strong password
  - **Do not use your system as root unless you need to!**
- Most distributions allow you to add user accounts during installation too:
  - Create a user account for every individual user that is going to use the system
- Hint: You should enable shadow passwords and MD5 encryption if available for additional security





Notes:

# Select Package Groups

- Most distributions have grouped individual packages in package groups
- Only select the package groups you need on your workstation
- Selecting individual software packages is usually still possible but tedious
  - A typical distribution has over 1000 packages...

Notes:

# Other (Optional) Installation Screens

- Some distributions offer additional installation screens:
  - Printer configuration 
  - Firewall configuration 
  - Sound card configuration 
  - Modem configuration 
  - Time Zone configuration
- Usually straightforward

Notes:



# Installing Packages

- Installing packages may take 5 mins to several hours
  - Most distributions provide a progress bar and/or total time indication
  - Some distributions provide some entertainment while installing
- While installation is going on, various virtual terminals provide information on the progress
  - Switch between VTs using Ctrl-Alt-F1, Ctrl-Alt-F2, ...
- Feed additional CD's when asked for

Notes:

# Configure X

- X (X Window System) is the graphical user interface of Linux
- Needs to be configured for your system
  - Graphical adapter
  - Monitor
- Most adapters and monitors can be autodetected
  - If not autodetected, select manually or use a "Generic" adapter or monitor
- Usually customization allowed:
  - Resolution, Refresh rate
  - Color Depth
- Test settings if possible!
- If nothing works, skip X configuration

# Reboot system

- After installation has finished, you should reboot your system
- Most distributions are completely configured after reboot
- Use the shutdown - command for reboot

`shutdown -r now` -> reboots the system now

`shutdown -h now` -> halts the system now