

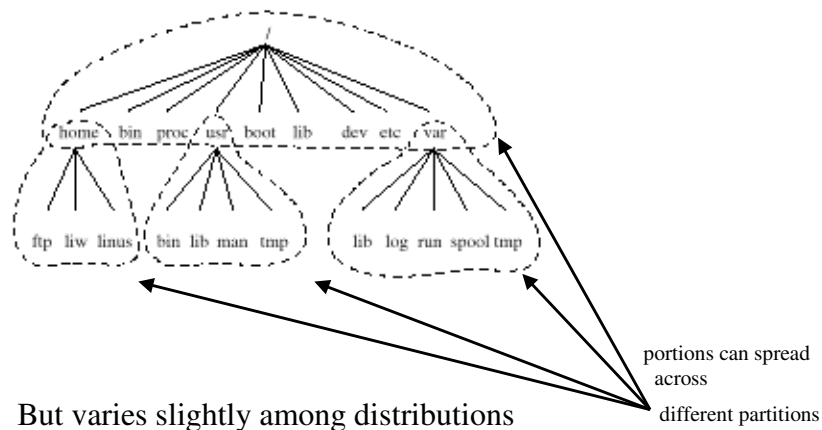
The landscape

David Morgan

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File hierarchy overview

- A tree structure of directories
- The directory tree is standardized



- But varies slightly among distributions

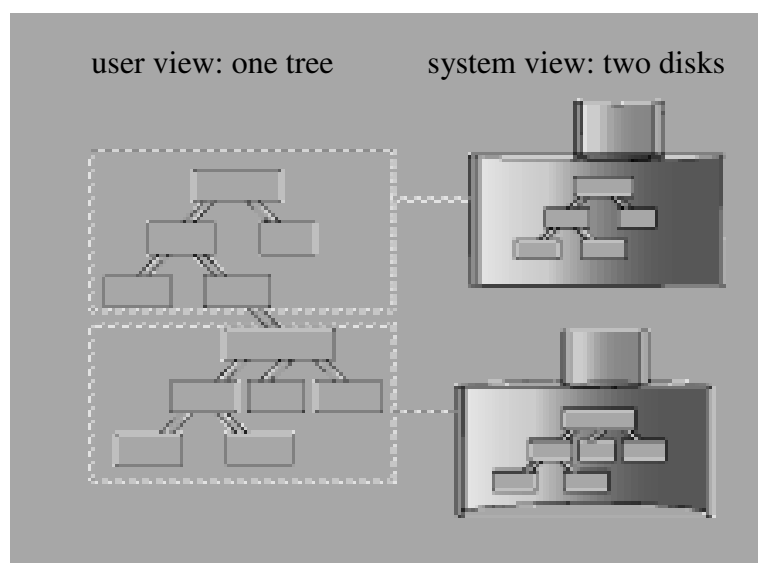
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Mounting file systems

- Grafting “subdirectories” onto file tree
- Integrates different devices’ subtrees into a single hierarchy
- Grafting location in tree called “mount point”
- Examples
 - transient mount of diskette drive to access floppy
 - mount a new hard drive to incorporate its capacity
- /etc/fstab for mount persistency

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mounting



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Toplevel directories

/bin	essential user command binaries (for use by all users)
/sbin	system binaries
/etc	host-specific system configuration
/root	home directory for the root user
/lib	essential shared libraries and kernel modules
/dev	device files
/tmp	temporary files
/boot	static files of the boot loader
/mnt	mount point for a temporarily mounted filesystem
/proc	pseudo filesystem exposing OS data structures
/usr	most installed programs
/var	dynamic system data
/home	users' home directories

A few important files

/etc/passwd	list of user accounts (without passwords!)
/etc/shadow	list of encrypted passwords for accounts
/etc/group	list of named groupings of accounts
/etc/inittab	init process's config file
/etc/fstab	what gets mounted where at boot
/etc/hosts	static table for host/address lookups
/etc/profile	script auto-run whenever a user logs in
/etc/resolv.conf	list of nameservers to use
/var/log/messages	“public” log file used by many apps

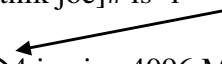
config for individual servers:

/etc/httpd/conf/httpd.conf	apache
/etc/samba/smb.conf	samba
/etc/ssh/sshdconfig	ssh

Permissions: ls -l shows them

```
[root@sputnik joe]# ls -l
total 52
drwxr-xr-x 4 joe joe 4096 Mar 13 06:05 Desktop/
-rw-r--r-- 1 david sales 524 Apr 8 21:30 adbudget
-rw-r--r-- 1 root root 30720 Apr 8 21:12 classifications.tar
-rw-r--r-- 1 joe sales 1620 Apr 8 21:29 mycalendar
-rw----- 1 joe joe 3302 Apr 8 21:29 mypaystubs
drwx----- 2 joe joe 4096 Mar 13 06:05 tmp/
[root@sputnik joe]#
```

permission set

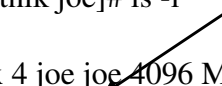


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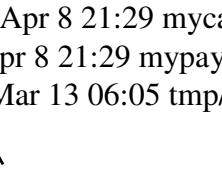
ls -l shows a user & group associated with each file

```
[root@sputnik joe]# ls -l
total 52
drwxr-xr-x 4 joe joe 4096 Mar 13 06:05 Desktop/
-rw-r--r-- 1 david sales 524 Apr 8 21:30 adbudget
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drwx----- 2 joe joe 4096 Mar 13 06:05 tmp/
[root@sputnik joe]#
```

user associated with file adbudget



group associated with file mycalendar



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File system - permissions

-rwxr-x---

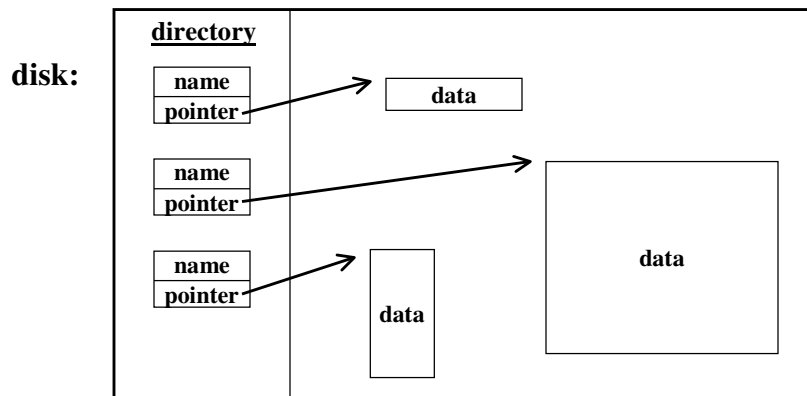
- **File type** (file, directory, device,...)
- Accesses granted to **file's associated User**
- Accesses granted to members of **file's Group***
- Accesses granted to all **Other users**

*other than the associated user

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Logic of a filesystem structure

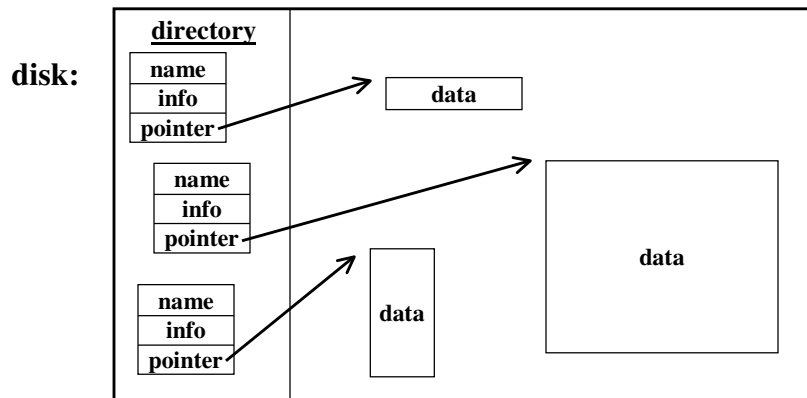
- purpose: associate names with bodies of data
- method: reserve part of the disk for a directory
- analogous to book's table of contents on first few pages



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Logic of a filesystem structure

- directory entries may include characteristic file info
 - size, timestamp, filetype, etc.



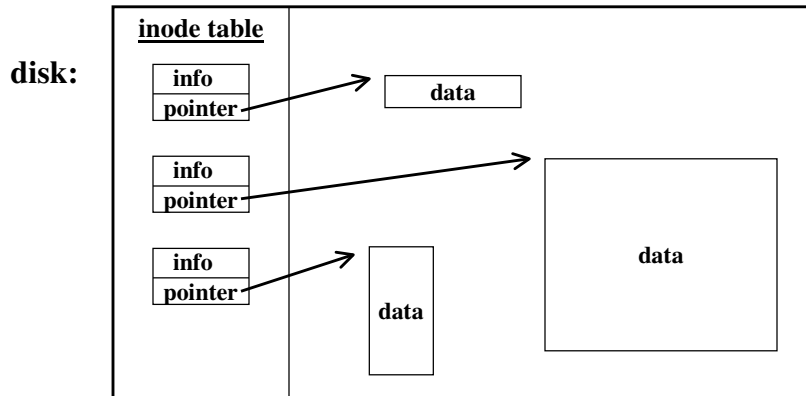
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Linux (ext2) filesystem structure

- directory portion called “inode table”
- table entries (inodes) lack files’ names!
- a “directory” is a regular file
- files’ names appear in directory files

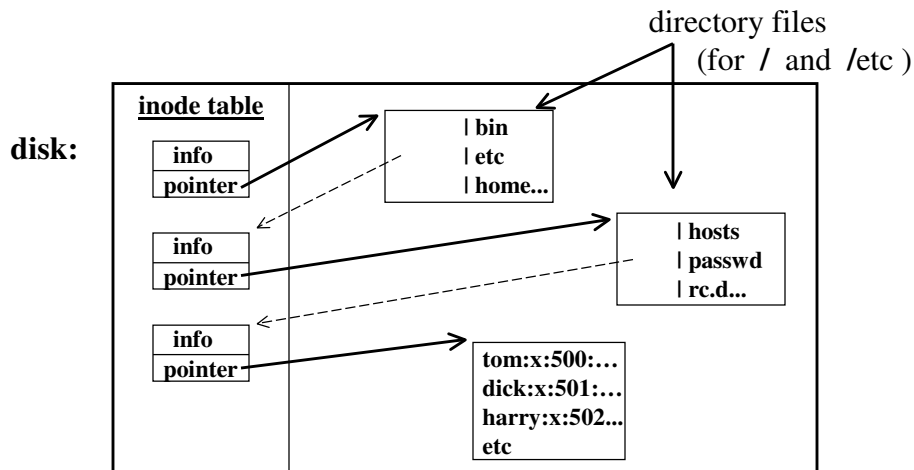
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Linux (ext2) filesystem structure -- but where are the filenames?



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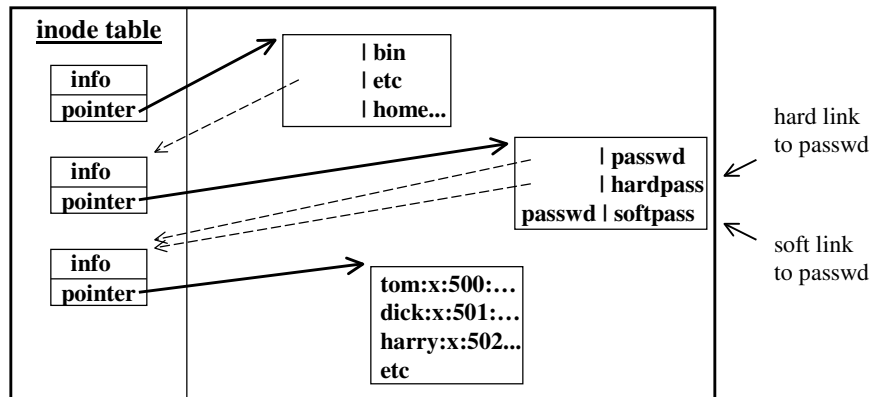
Directories, names -- finding /etc/passwd



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Hard and soft links

- hard: inode pointer values identical (In passwd hardpass)
- soft: filename occupies inode pointer (In -s passwd softpass)



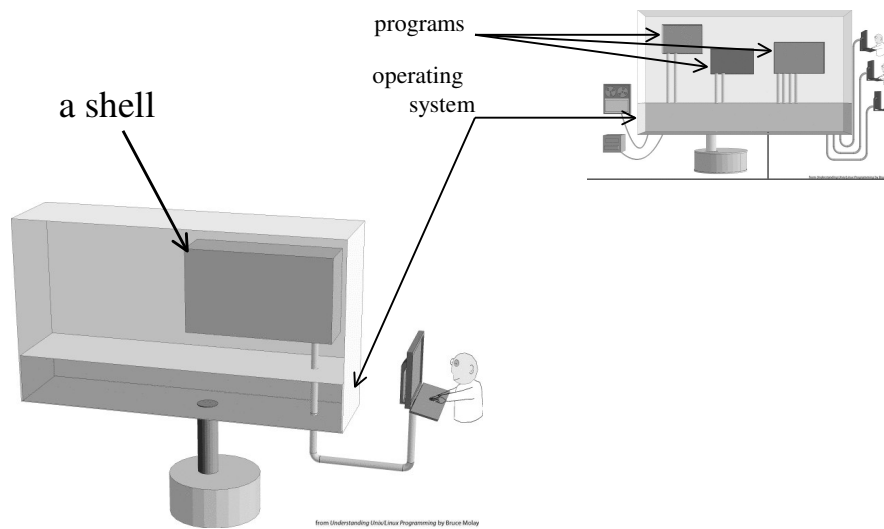
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What is “the shell?”

- A program
- /bin/sh
- or maybe /bin/bash or /bin/csh or /bin/zsh
 - or some other executable
 - determined for each user in /etc/passwd

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Not the operating system

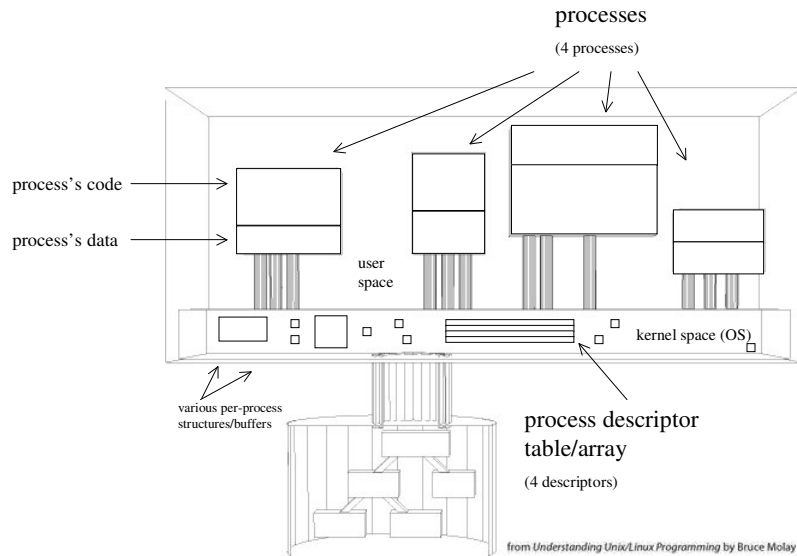


What does the shell do?

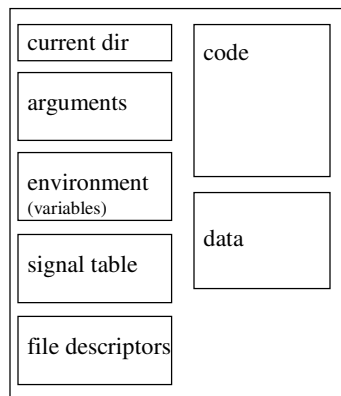
- Command processing
 - parse
 - expand
 - execute
- I/O redirection
- Piping
- Environment control
- Background processing
- Shell scripts

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Process table tracks the processes



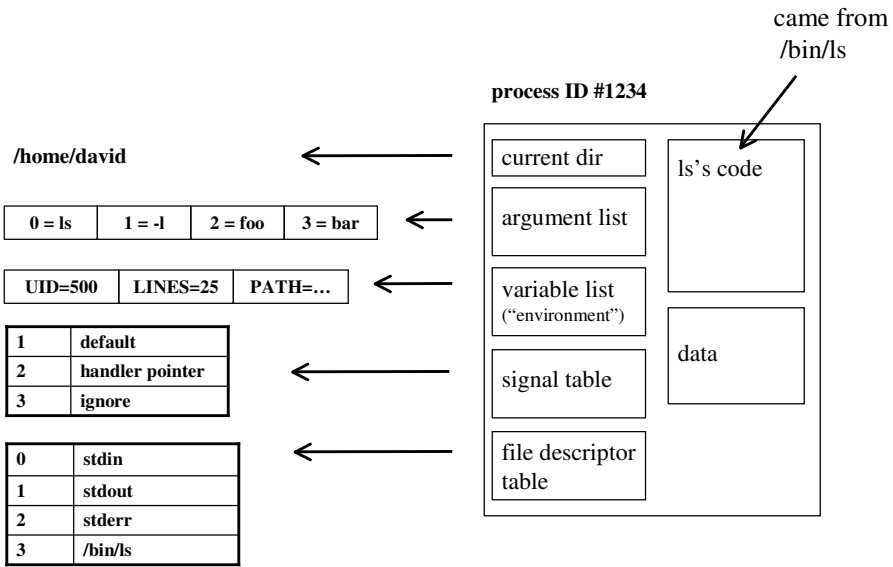
Single process in unix, consolidated view



Some important components

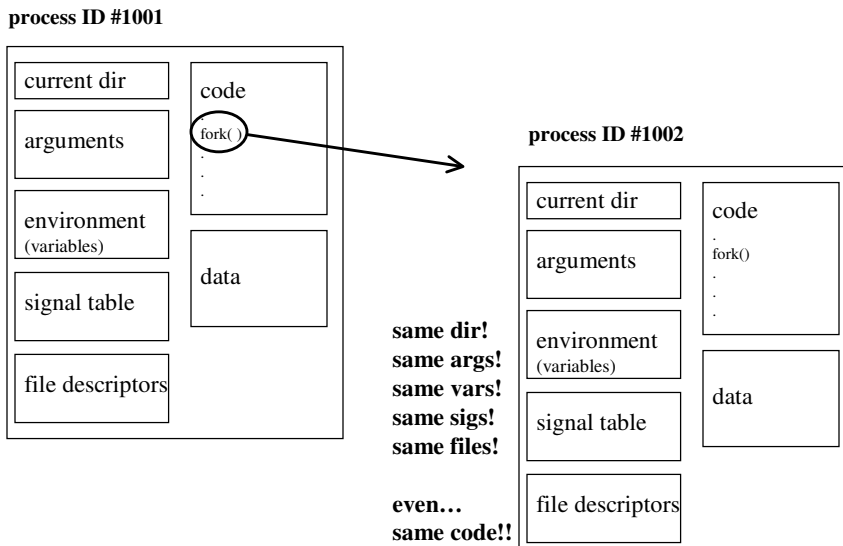
- code
- data
- current directory
- argument list
 - tokens from command line
- environment (variable) list
 - name=value pairs
- responses to signals
- list of open files

ls -l foo bar



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New process creation - fork()



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