

Chapter 1

UNIX Introduction

UNIX History (1)



- ◉ Before Multics there was chaos, and afterwards, too
 - > Multics:
 - Multiplexed information and Computing Service
 - 1965 ~ 1969
 - Bell labs, GE, MIT
 - Ken Thompson, Dennis Ritchie

Lucent Technologies
Bell Labs Innovations



UNIX History (2)

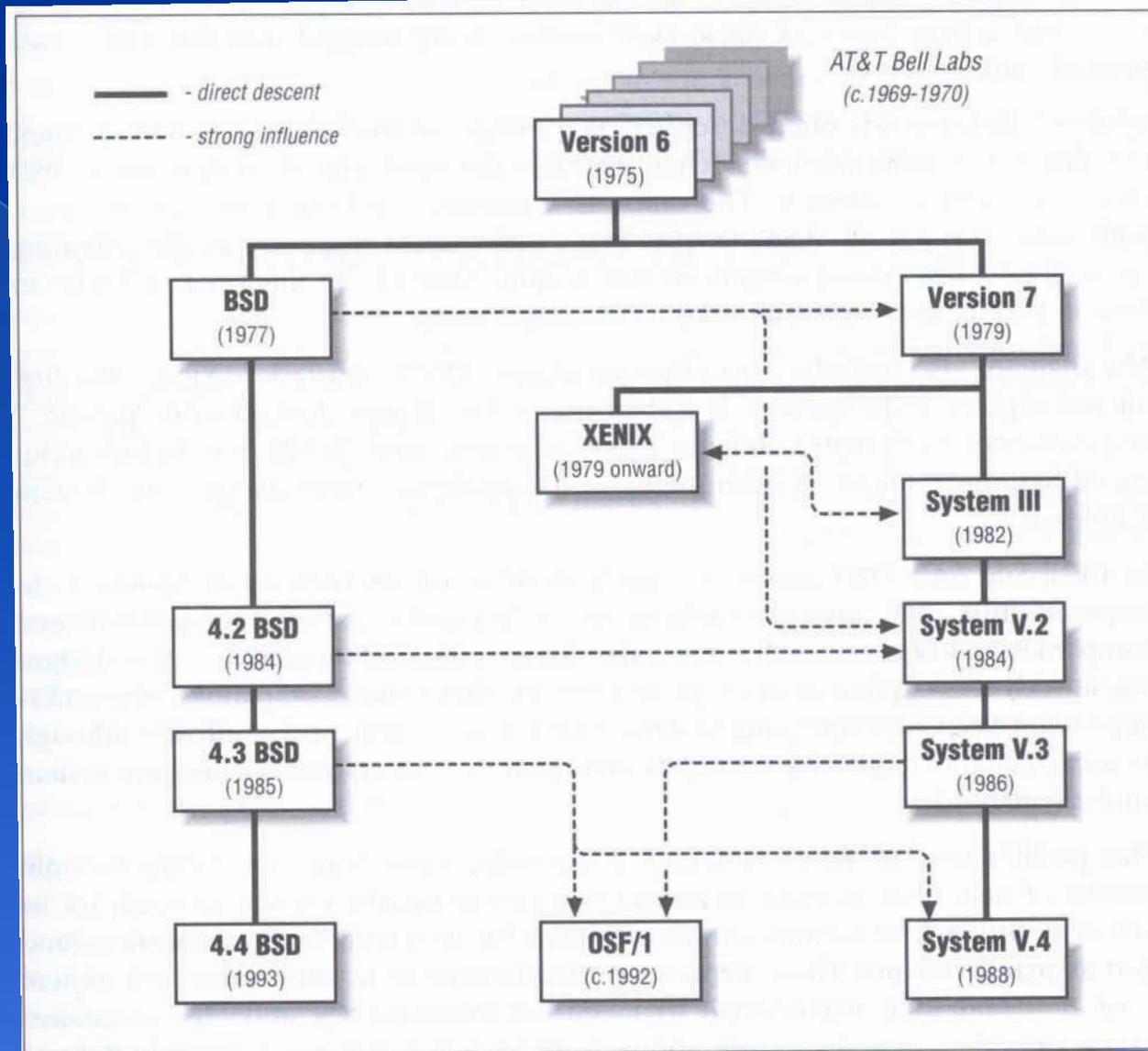
◎ From Multics to something else

- > Ken Thompson first written a game called “Space Travel” on Multics on GE machine in 1969.
- > Implement “Space Travel” on PDP-7 again.
- > Thompson began to design the shell, the editor and the assembler on PDP-7.
- > In 1970, Brian Kernighan suggested the name “UNIX”



UNIX Genealogy

- AT&T
 - > Version 7~10
 - > System III ~ V
- UCB
 - > BSD
- IBM、DEC、HP
 - > OSF/1



UNIX versions

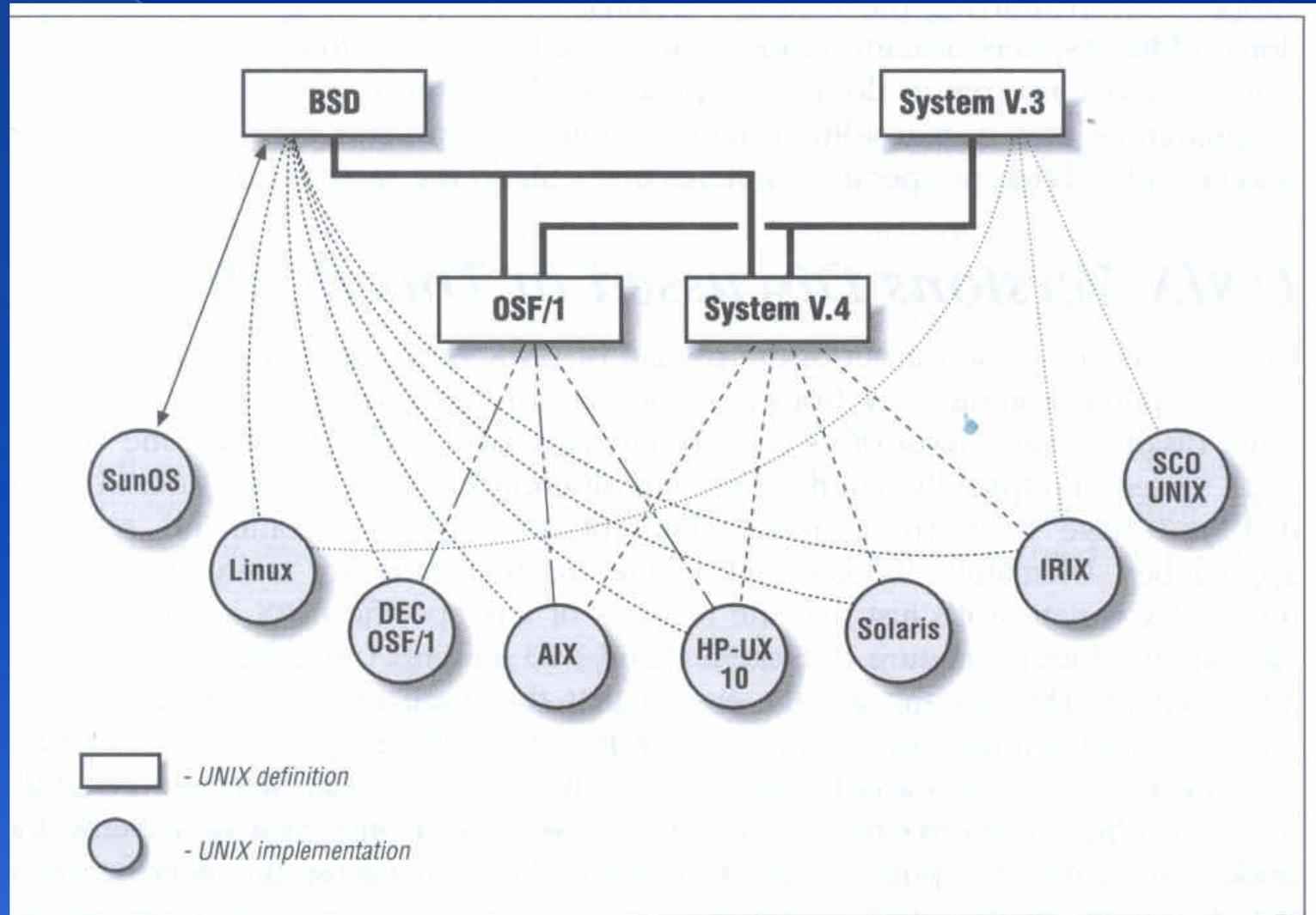


Figure 2: UNIX versions discussed in this book

Conventions

- Syntax of commands:

- > Anything between “[” & “]” – are optional.
- > Anything followed by “...” – can be repeated.
- > {a | b} – you should choose one of them.
- > Example:

- bork [-x] { on | off } filename ...

bork on /etc/hosts ○

bork -x /etc/hosts /etc/passwd ○

bork -x /etc/hosts X

bork -h /etc/hosts X

- Globing characters

- > “*” matches zero or more characters.
- > “?” match one character.
- > “~” means home directory
- > “~user” means home directory of user

Man Pages (manual)

- ◎ man pages (manual)
 - > Contain descriptions of
 - Individual command.
 - \$ man cp
 - Configuration File
 - \$ man rc.local
 - Library routines
 - \$ man strcpy

Man command

◉ Command

- > \$ man [-s section] *title* (AT&T)
- > \$ man [section] *title* (BSD)
 - \$ man printf (bash printf command)
 - \$ man 3 printf (C Standard printf func.)
 - \$ man -k exit (keyword search)
 - \$ man 3 intro (section introduction)

◉ Man pages organization

AT&T	BSD	Contents
1	1	User-Level commands and applications
2	2	System calls and kernel error code
3	3	Library calls
4	5	Standard file format
5	7	Miscellaneous files and documents
6	6	Games and demonstrations
7	4	Device Drivers and network protocols
1m	8	System administration commands
9	9	Obscure kernel specs and interfaces

UNIX Concepts - ID

- User ID, Group ID

- > `$ id lwhsu`

- `uid=13115(lwhsu) gid=300(gcs) groups=300(gcs),0(wheel),100(faculty),800(security),700(ta),888(wwwadm)`

- > `$ id 13115`

- `uid=13115(lwhsu) gid=300(gcs) groups=300(gcs),0(wheel),100(faculty),800(security),700(ta),888(wwwadm)`

- Super user

- > `root`

- `uid=0(root) gid=0(wheel) groups=0(wheel), ...`

- Other Important Users

- > `daemon`: Owner of many system processes

- > `operator`: System &

- > `bin`: Binaries Commands and Source

- > `nobody`: Unprivileged user

UNIX Concepts - Files

● \$ ls -l

```
> d rwx--x--x 12 lwhsu gcp 1024 Sep 23 16:47 public_html/
```

File type

File access mode

Inode count

File user owner

File group owner

File size

Last modify time (mtime)

Name

UNIX Concepts - File types

File types

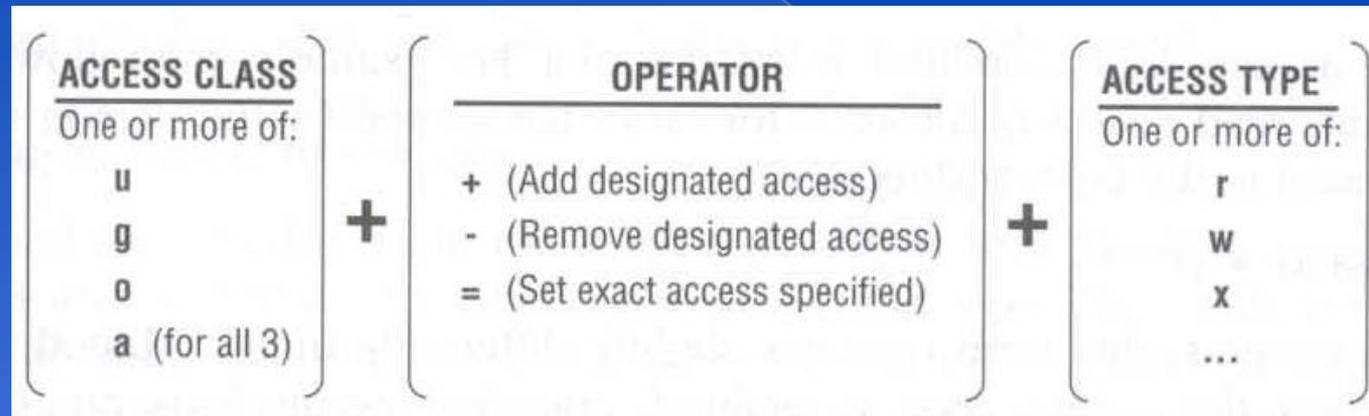
symbol	File types
b	Block device file
c	Character device file
d	Directory
l	symbolic Link
s	Socket
p	named Pipe
-	Regular file

file command

- > determine file type
 - \$ file .tcshrc → .tcshrc: ASCII text
 - \$ file /bin → /bin: directory
 - \$ file /bin/sh → /bin/sh: ELF 64-bit LSB executable, x86-64, version 1 (FreeBSD), for FreeBSD 8.0 (800049), dynamically linked (uses shared libs), FreeBSD-style, stripped
- > /usr/ports/sysutils/file

UNIX Concepts - File Access Mode

- rwX r-x r-x
- 421 421 421
 - > user, group, other privileges
- chmod command
 - > % **chmod** *access-string* *file*
 - % **chmod** u+x test.sh
 - % **chmod** go-w .tcshrc
 - % **chmod** u+w,r-w hehe haha
 - % **chmod** -R 755 public_html/



UNIX Concepts - File Protection

Command	Minimum Access Needed	
	On file itself	On directory file is in
<code>cd /home/test</code>		X
<code>ls /home/test/*.c</code>		r
<code>ls -s /home/test/*.c</code>		rx
<code>cat runme</code>	r	X
<code>cat >> runme</code>	w	X
<code>run-binary</code>	x	X
<code>run-script</code>	rx	X
<code>rm runme</code>		wX

UNIX Concepts - Process

◎ Process: A working program

> Foreground

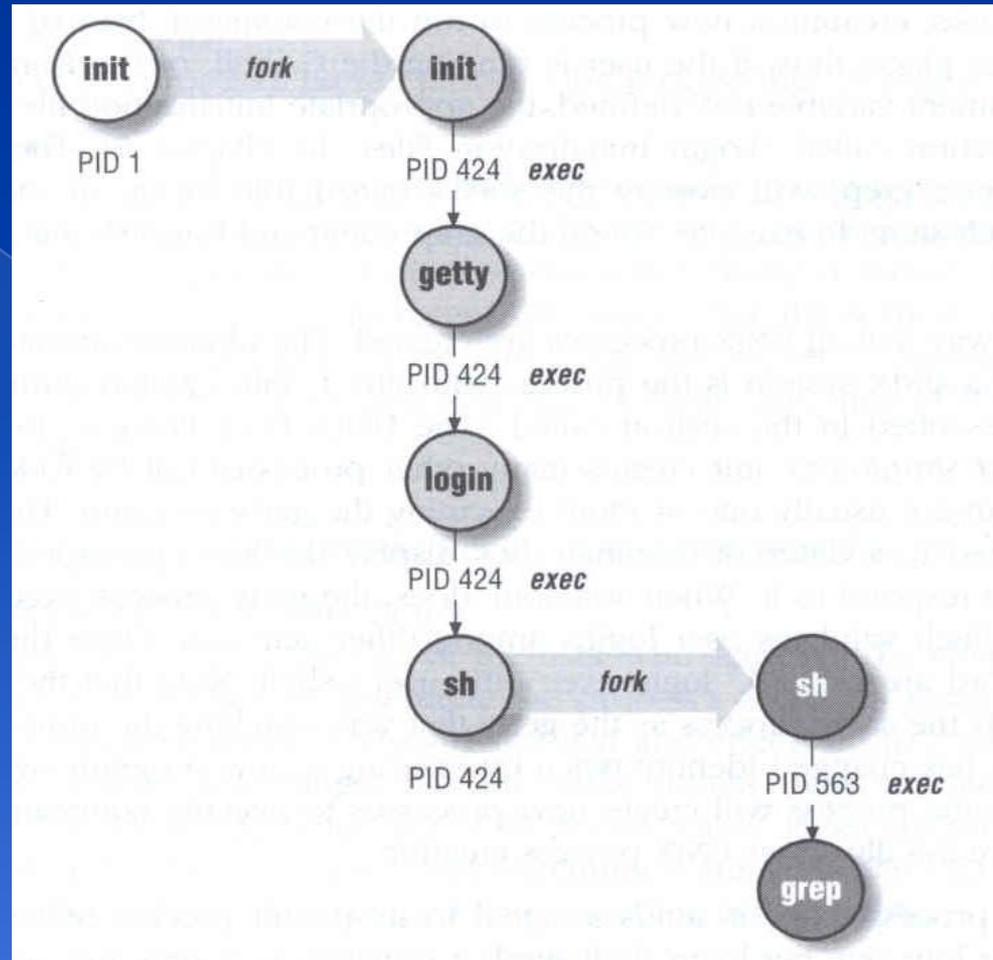
- Remain attached to the terminal

> Background

- Can not communicate with terminal

◎ Process Life Cycle

> fork, exec



UNIX Concepts - Watching Process

◎ ps command

> ps -aux, ps -auxww

- USER, PID, %CPU, %MEM, VSZ RSS, TTY, STAT, START, TIME, COMMAND
 - D: in Disk
 - I: Idle
 - R: Running
 - S: Sleeping

USER	PID	%CPU	%MEM	VSZ	RSS	TT	STAT	STARTED	TIME	COMMAND
root	0	0.0	0.0	0	0	??	Wls	30Aug08	0:00.01	[swapper]
lwhsu	83736	0.0	0.5	1416	812	p4	R+	2:30PM	0:00.00	ps auxww

- man ps...

UNIX Concepts - Kill Process

◎ kill command

> % **kill** *—[signal_name]* pid

> % **kill** *—[signal_number]* pid

• % **kill** **—HUP** 88192

(hang up, reset)

• % **kill** **-1** 88192

• % **kill** **—TERM** 12345

(software termination)

• % **kill** **—15** 12345

• % **kill** **—KILL** 3456

(kill program at OS level)

• % **kill** **-9** 3456