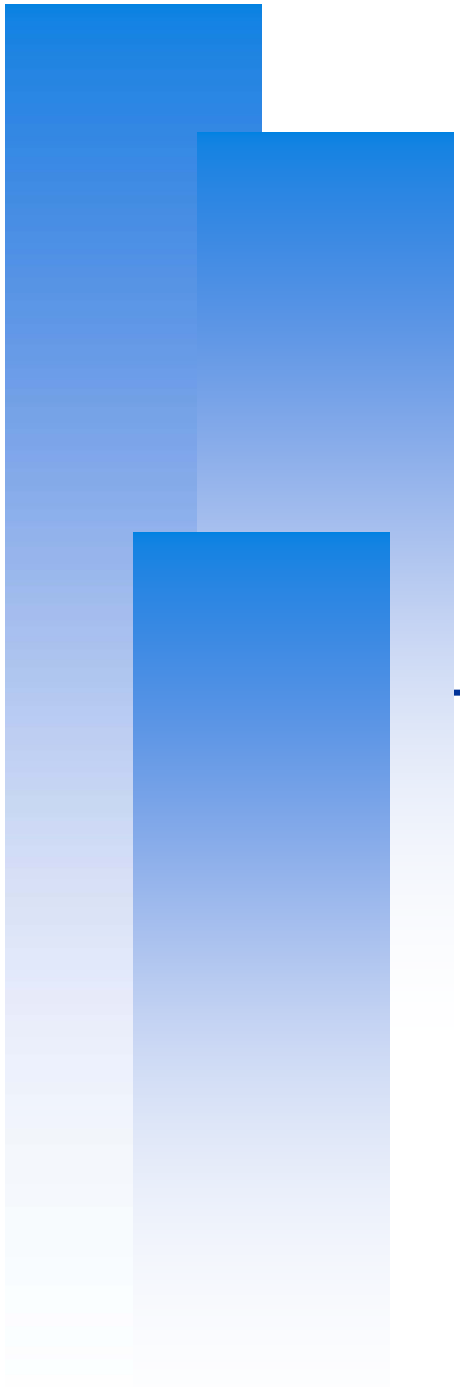


UNIX Introduction

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**

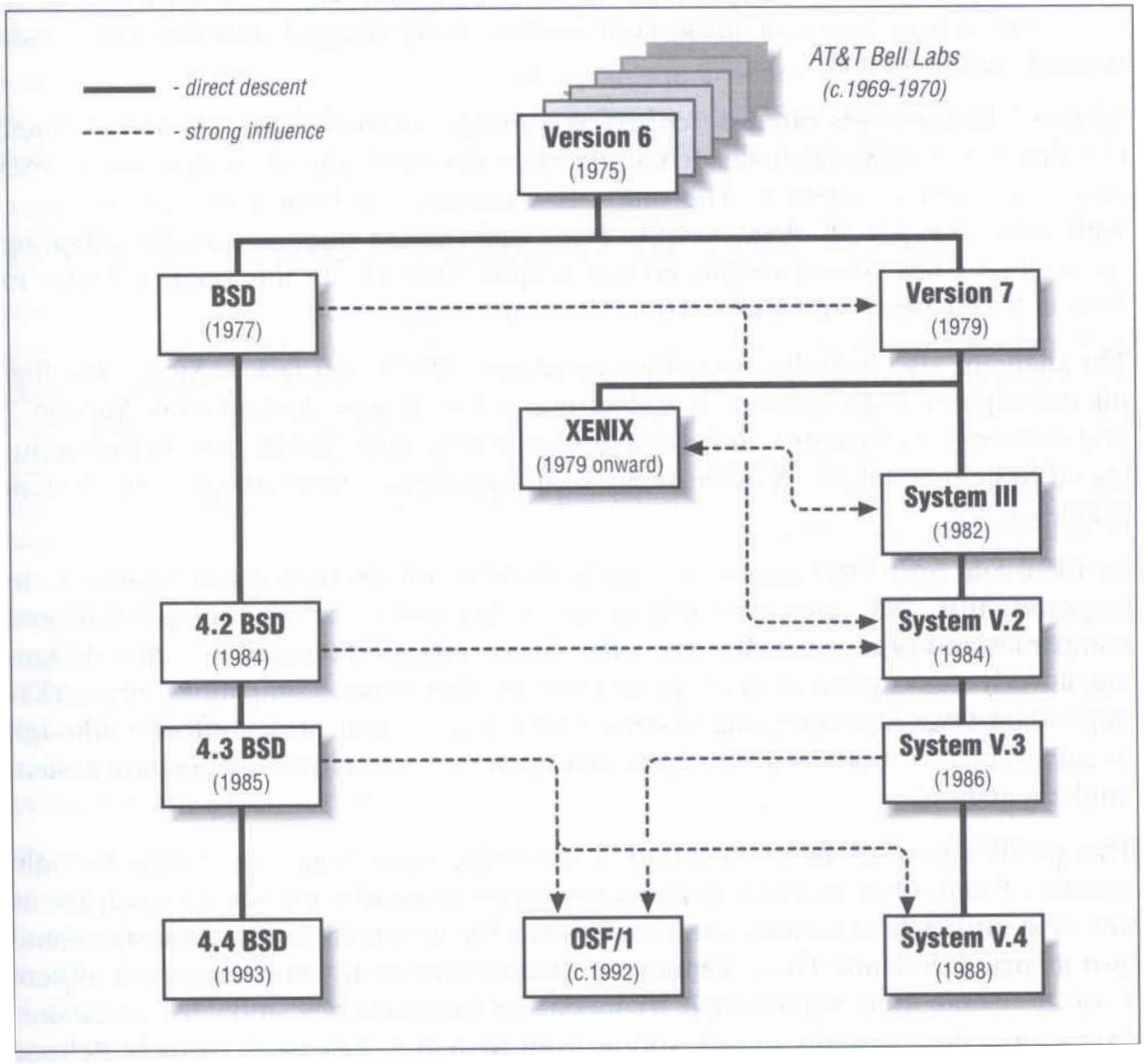
Lucent Technologies
Bell Labs Innovations

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

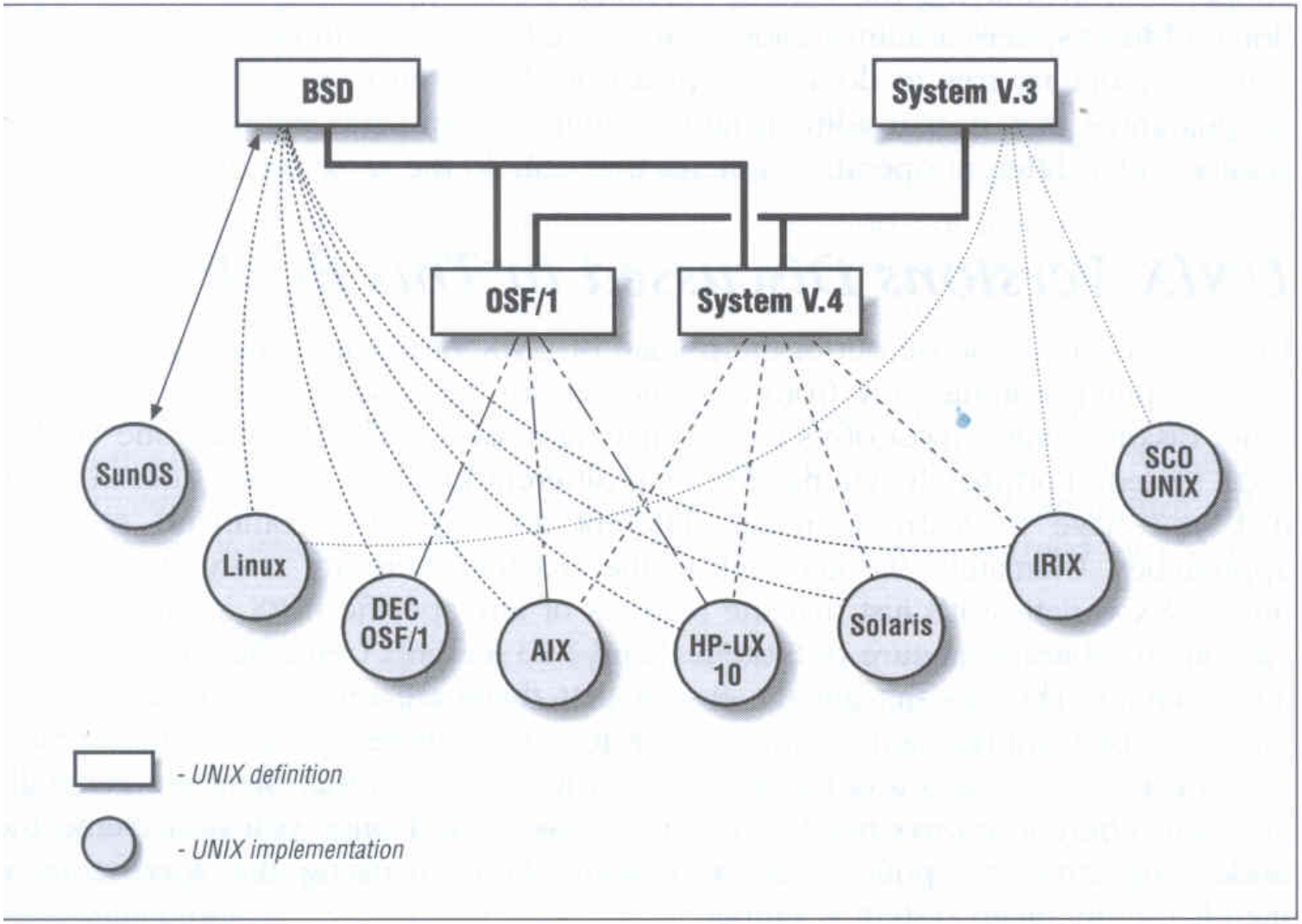


Figure 2: UNIX versions discussed in this book

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
    - File format.
      - % 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 pages organization

%man man

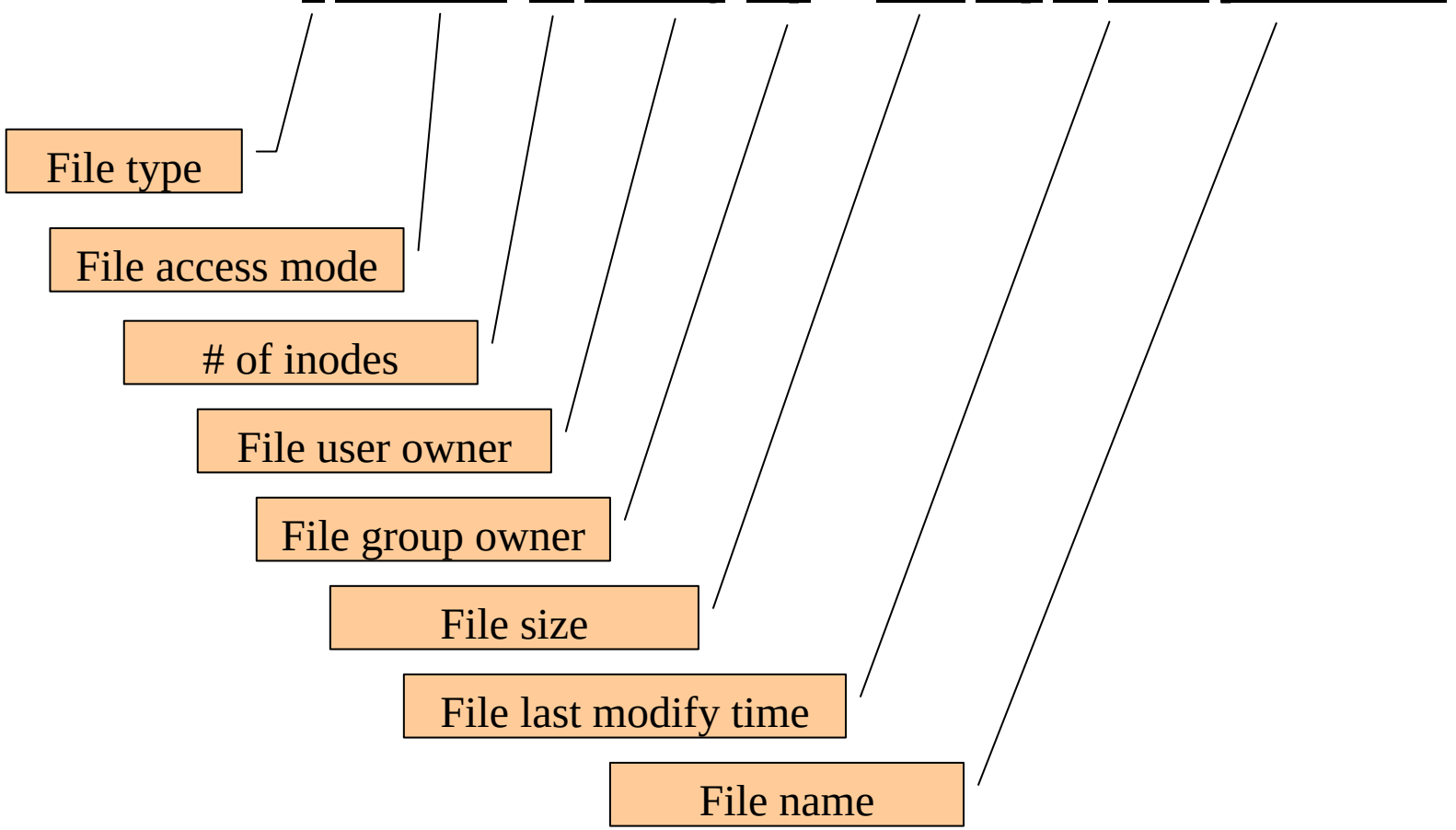
AT&T	BSD	Contents
1	1	User-Level **commands** and applications
2	2	**System calls** and kernel error code
3	3	**Library** calls
4	5	Standard file format
5	7	Miscellaneous files and documents
6	6	Games and demonstrations
7	4	Device Drivers and network protocols
1m	8	System administration commands
9	9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

UNIX Concepts - ID

- User ID, Group ID
  - % **id** chwong
    - uid=13029(chwong) gid=200(dcp) groups=200(dcp), 800(security), 700(ta)
  - % **id** 13029
    - uid=13029(chwong) gid=200(dcp) groups=200(dcp), 800(security), 700(ta)
- Super user
  - root
    - uid=0(root) gid=0(wheel) groups=0(wheel), ...
- Other Important Users
  - daemon: owner of unprivileged software
  - bin: owner of system commands
  - sys: owner of the kernel and memory images
  - nobody: owner of nothing

UNIX Concepts - Files

- % ls –l
  - d rwx--x--x 12 chwong dcp 1024 Sep 12 16:47 public_html/



UNIX Concepts - File types

❑File types

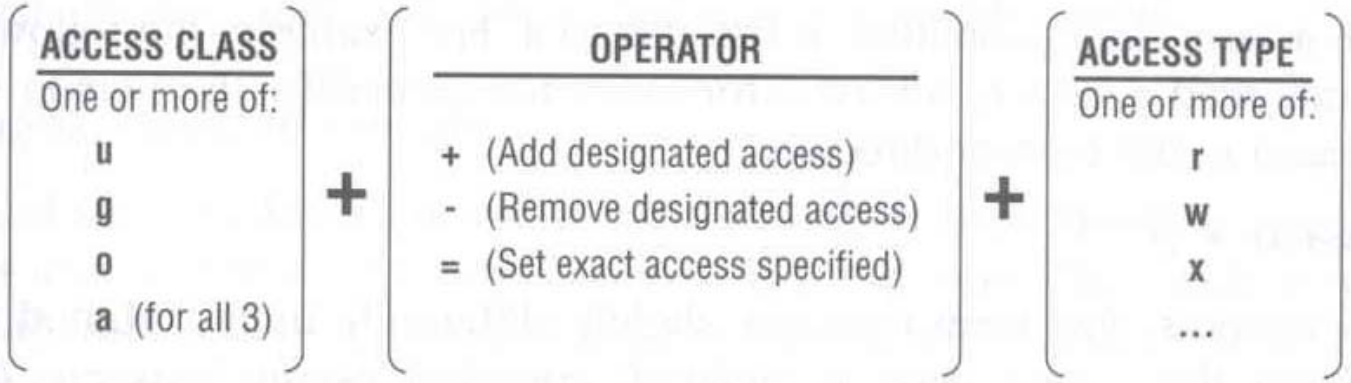
symbol	File types
b	Block device file
c	Character device file
d	Directory
l	symbolic Link
s	Socket
p	named Pipe
-	Regular file

❑**file** command

- determine file type
  - % file .tcshrc ➔ .tcshrc: ASCII text
  - % file /bin ➔ /bin: directory
  - % file /bin/sh ➔ /bin/sh: ELF 32-bit LSB executable, Intel 80386, version 1 (FreeBSD), dynamically linked (uses shared libs), stripped
- /usr/share/misc/magic

UNIX Concepts - File Access Mode

- rwx r-x r-x
  - 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/**

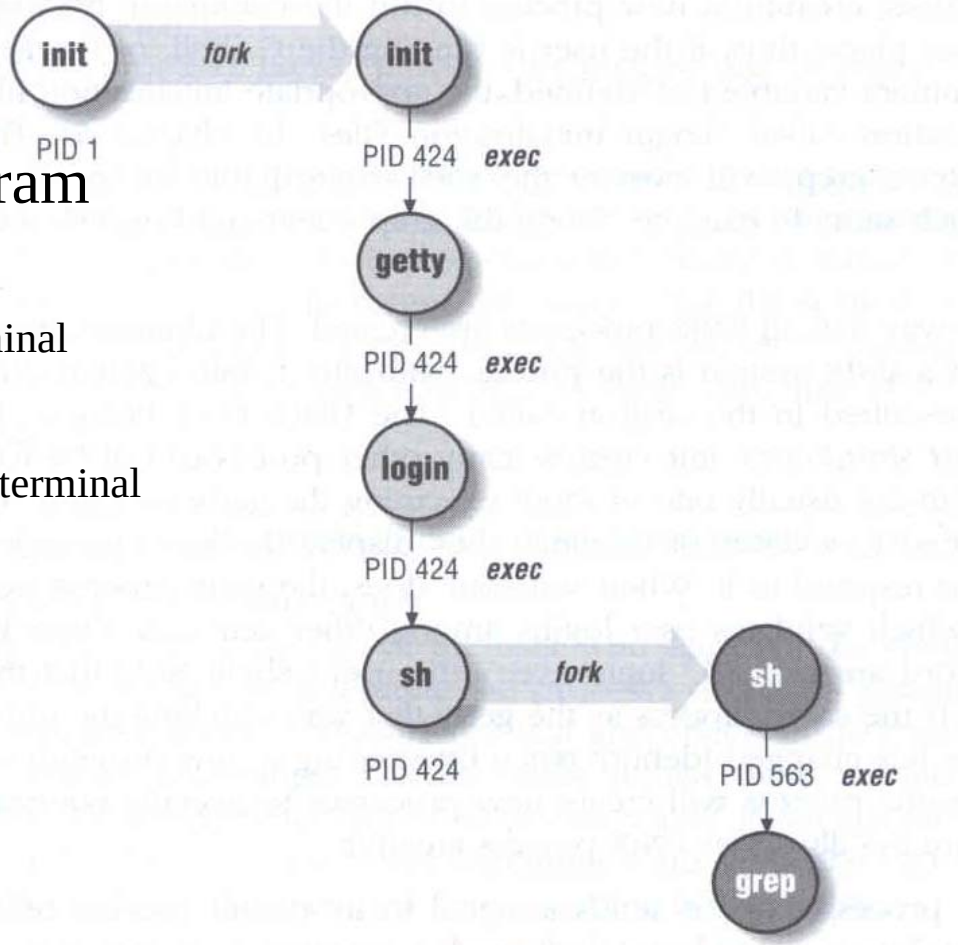


UNIX Concepts - File Protection

Command	Minimum Access Needed	
	On file itself	On directory file is in
cd /home/test		x
ls /home/test/*.c		r
ls –s /home/test/*.c		rx
cat runme	r	x
cat >> runme	w	x
run-binary	x	x
run-script	rx	x
rm rumme		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
      - T: sTopped
      - Z: Zombie
      - man ps...

```
USER      PID %CPU %MEM   VSZ   RSS  TT  STAT STARTED      TIME COMMAND
root        0  0.0  0.0     0     0  ??  WLs  30Jul06   0:00.01 [swapper]
chwong  83736  0.0  0.5  1416   812  p4  R+    2:30PM   0:00.00 ps auxww
```

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**