

# UNIX Basics + shell commands

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2019/02/25

# Where UNIX started



Ken Thompson & Dennis Ritchie

- Multics OS project (1960s) @ Bell Labs
- UNIX on scavenged PDP-7 (1969)
- Space Travel game
- Good environment to do programming + a “fellowship” could form.
- B  $\rightarrow$  C (1971 - 1973)




DEC PDP-7

# Where LINUX

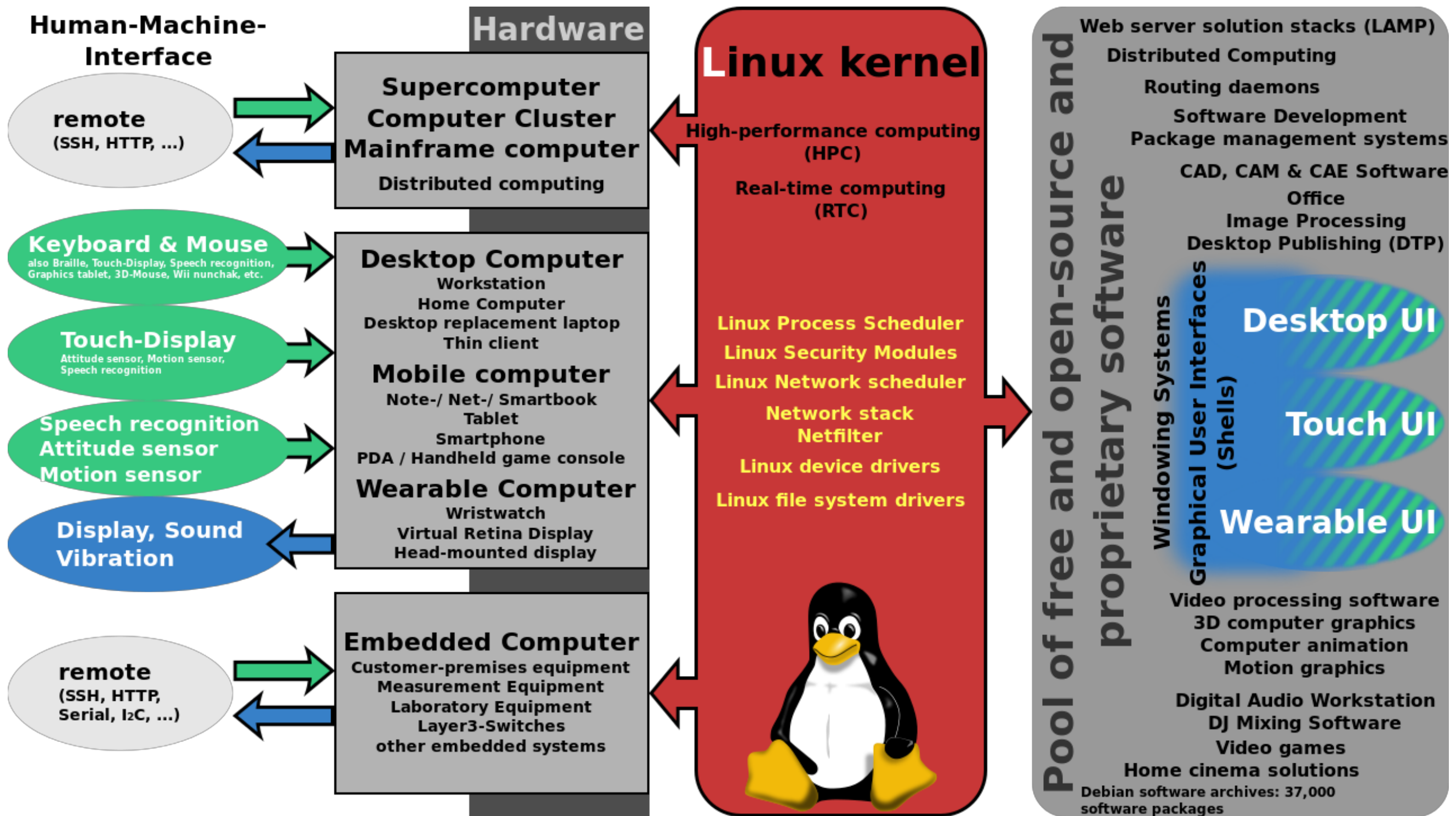


# started

- Linus Torvalds: announced the Linux project (1991)
  - high cost of Sun's Unix
- Parallel: 386BSD
- Linux has Internet capability & X (1993)
- GNU toolkit  Richard Stallman & FSF
- “20 years of open-source software in different UNIX platforms”
- A “cheap UNIX system for everyone”

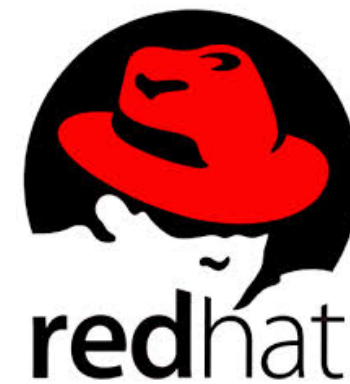


Linus Benedict Torvalds





# Linux flavors



Linux族譜:

[http://upload.wikimedia.org/wikipedia/commons/1/1b/Linux\\_Distribution\\_Timeline.svg](http://upload.wikimedia.org/wikipedia/commons/1/1b/Linux_Distribution_Timeline.svg)

# SSH to remote system

- [https://wslab.csie.ntu.edu.tw/SSH\\_tutorial.html](https://wslab.csie.ntu.edu.tw/SSH_tutorial.html)
- Make sure your terminal handles 中文 well  
keyword: **encoding**, UTF-8, or Big5
- Choose a good font. Make the font size larger.

# Exercise 1: SSH login without password

- Make sure 中文 is displayed correctly.
- Answer the question on zuvio:  
terminal font and size.
- Disclaimer:  
do NOT copy your private key over the network!  
do this ONLY on your own computer!
- keyword: ssh-keygen

# MAN: your online manual

- Your first man: `man man`
- Sections 1-9 of the man pages
- `[]` 可有可無
- `|` 選一個
- `...` 重複
- `man -k` 要找的東西 —> 列出所有相關的



# Choose your editor

- Standard editor: Vim
- For beginner: nano or joe

# Pipes and redirection

- 0 (STDIN), 1 (STDOUT), 2 (STDERR)
- > : STDOUT 到檔案 (覆蓋)  
>>: STDOUT 到檔案 (加到尾巴)  
>&: STDOUT + STDERR 到檔案  
2>: STDERR 到檔案  
<: 檔案餵給STDIN  
|:
- Example: `echo "test message" > /tmp/blahblah`
- Example: `find / -name core 2> /dev/null`

# 路徑

- 樹狀的結構
- /：根目錄, 以及分隔. e.g., /home/hsinmu
- ~：我的家目錄
- ~hsinmu: hsinmu這個帳號的家目錄

# Some commands to learn

- 檔案管理: ls, cd, mkdir, rm, mv, cp, find, pwd
- 文字檔案處理: cat, less, tail
- 程序管理: ps, kill, top
- 寫shell script常用: grep, sort, wc, cut, echo, tee

# File attributes

Example:

```
ls -ld dsa/
```

```
drwxr-xr-x  2 hsinmu users          4096 10月 14  2010 dsa1/
```

```
ld -l tmp
```

```
-rw-r--r--  1 hsinmu users          12  3月  9 16:08 tmp
```

- Role: owner, group owner, and others
- 檔案: x: 執行, w: 寫入, r: 讀取
- 對目錄來說:
  - x: 可以進去, r: 列出裡面的檔案,
  - w: 新建、刪掉目錄中的檔案或改名

# Change file permission/ ownership

- `chmod`: change file permission
- Examples:
  - `chmod u+w blah`
  - `chmod 755 blah` (7=rwx, 5=r-x)
  - `chmod ug=rw,o=r blah`
  - `chmod a-x blah`
  - `chmod g=u blah`
- `chown`: change file ownership
- Example:
  - `chown nobody:nobody blah`



# More advanced permission control: access control list (ACL)

- OS & filesystem dependent
- Identify user/group and then apply the permission
- POSIX-style ACLs are supported by ext\* + a few other filesystems on Linux

# Possible ACL entries

Format	Example	Sets permissions for
user::perms	user::rw-	The file's owner
user:username:perms	user:htlin:rw-	A specific user
group::perms	group::r-x	The group that owns the file
group:groupname:perms	group:users:rw-	A specific group
other::perms	others::---	All others
mask::perms	mask::rwx	All but owner and other

# ACL examples

- getfacl: get file access control lists

Example: `getfacl tmp`

- setfacl: set file access control lists

Example:

`setfacl -m user::r,user:htlin:---,group:users:rw tmp`

`setfacl -x user:htlin tmp`