

System Software

Or, What the heck is a hardware triple?

Outline for Today

- ▶ Filesystem Hierarchy Standard
- ▶ Online Demo
 - ▶ compiling GNU software
 - ▶ cross-compilers

System Software Overview

- ▶ Filesystem Hierarchy Standard
- ▶ Compiling GNU Software
- ▶ Cross-Compiler and other tools
- ▶ Bootloaders
- ▶ OS and Linux kernel
- ▶ Root File Systems
- ▶ Device Drivers

System Software Overview

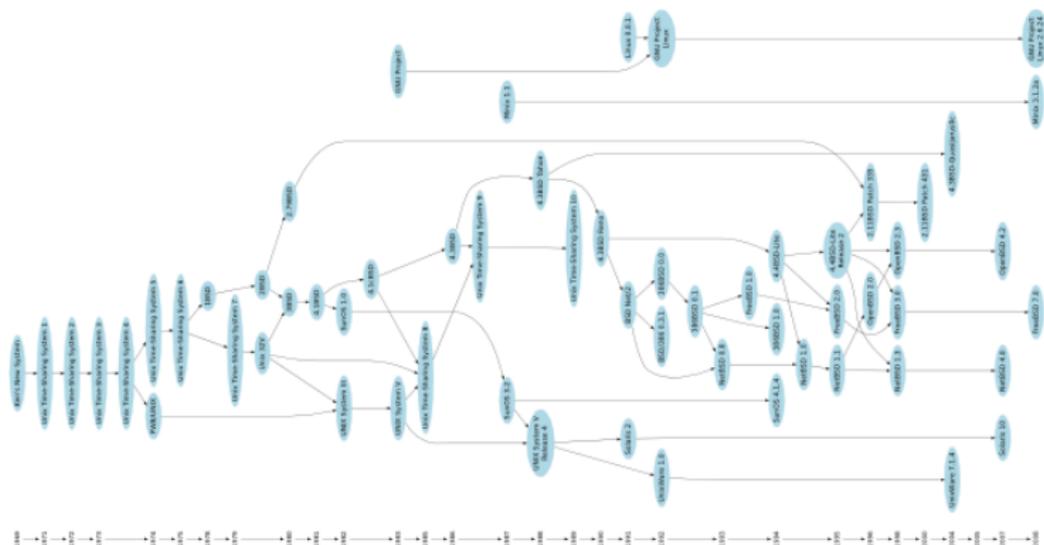
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Six Weeks!?!

Filesystem Hierarchy Standard

- ▶ Unix began in late '60s and many of the names/conventions came from practical concerns
- ▶ Berkeley made numerous improvements (BSD) and added names
- ▶ 1994-2004, Filesystem Hierarchy Standard (FHS) has become de facto standard

Evolution of UNIX



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File System Shortcuts

- ▶ root of file system tree is `/`
- ▶ current directory is `.`
- ▶ parent directory is `..`
- ▶ personal home directory is `~`
- ▶ another user's home directory is `~user`
- ▶ typing `cd` (and return) will always take you to your home directory

A Few Common Filesystem Commands

- ▶ `ls` — list files (in current directory)
- ▶ `mkdir X` — make a subdirectory `X`
- ▶ `rmdir X` — remove an empty subdirectory `X`
- ▶ `cd X` — change current directory `X`
- ▶ `more X` — view (read-only) file `X`
- ▶ `vi X` — edit file `X`
- ▶ *Or*, `emacs X` — edit file `X`

Requirements of File System

standards for the location of...

- ▶ a subset of files that needs to be available while booting
- ▶ network-wide configuration files
- ▶ machine-specific configuration files
- ▶ user home directories
- ▶ executables (called binaries in Unix)
- ▶ and others

Sample of FHS Tree

- ▶ /bin — essential binaries (for all)
- ▶ /lib — essential libraries (for all)
- ▶ /boot — files needed prior to boot
- ▶ /dev — location for device drivers
- ▶ /etc — machine-specific configurations
- ▶ /home — edit file X
- ▶ /tmp — you can guess

Sample of FHS Tree (cont'd)

`/usr` (pronounced *user*) tree is the location of “full system”

- ▶ `/usr/bin` — most binaries (for all)
- ▶ `/usr/lib` — most libraries (for all)
- ▶ `/usr/include` — standard C header files
- ▶ `/usr/share` — architecture independent data

we will encounter more...

GNU Software

- ▶ widely used Unix-like software (GNU's Not Unix)
 - ▶ embedded systems
 - ▶ (with Linux kernel) basis of most supercomputers
 - ▶ increasing number of desktops

GNU Software

- ▶ widely used Unix-like software (GNU's Not Unix)
 - ▶ embedded systems
 - ▶ (with Linux kernel) basis of most supercomputers
 - ▶ increasing number of desktops
- ▶ key concepts
 - ▶ open source license
 - ▶ distributed as source code

Distributed As Source

- ▶ user: source → executable
- ▶ tools needed:
 - ▶ Internet access
 - ▶ (un)compression software (gzip or bzip2)
 - ▶ archive software (tar)
 - ▶ build tools (make)
 - ▶ compilers (gcc, g++, etc.)

Demo: Compile gtkterm

- ▶ (switch to Linux)

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- ▶ Summary:
 1. google "gtkterm-0.99.5"
 2. wget <http://www.jls-info.com/julien/linux/gtkterm-0.99.5.tar.gz>
 3. gunzip gtkterm-0.99.5.tar.gz
 4. tar xf gtkterm-0.99.5.tar
 5. cd gtkterm-0.99.5
 6. ./configure
 7. make
 8. (check)
 9. make install