Lecture 1: Introduction to UNIX

CS2042 - UNIX Tools

September 29, 2008

Lecture Outline

What is UNIX?

- One of the first widely-used operating systems
- Basis for many modern OSes
- Helped set the standard for multi-tasking, multi-user systems
- Strictly a teaching tool (in its original form)

A Brief History of UNIX

Origins

The first version of UNIX was created in 1969 by a group of guys working for AT&T's Bell Labs. It was one of the first big projects written in the emerging C language. It gained popularity throughout the '70s and '80s, although non-AT&T versions eventually took the lion's share of the market.

- Predates Microsoft's DOS by 12 years!

Lecture Outline

Current Incarnations of UNIX

- Berkeley Software Distribution (BSD)
- Sun's Solaris
- GNU/Linux
- Apple's OSX

Berkeley Software Distribution

- Developed by students and faculty at UC Berkeley
- Forked from the proprietary version back in the '80s
- Has since split into many additional "flavors" - namely, NetBSD, OpenBSD, and FreeBSD
- Spawned a popular open-source software license (the BSD License!)
- Primary competitor to Linux among free OSes

Sun Solaris

- Commercial offshoot of BSD
- Designed to run on Sun's SPARC servers, since ported to x86
- Most of the source code was recently released for the OpenSolaris project

Linux

- Pieced together by a Finnish guy named Linus Torvalds starting in 1991
- Built over the internet using message boards (Usenet)
- Designed to a UNIX-like standard, but not a direct descendant

Nitpicker's Corner

"Linux" technically only refers to the OS's core, or "kernel" - without other programs it can't really do anything.

GNU

GNU = Gnu is Not Unix

- Movement in the 80s to build a free OS
- Created many very popular tools

Stallman Says:

There really is a Linux, and these people are using it, but it is just a part of the system they use. Linux is the kernel: the program in the system that allocates the machine's resources to the other programs that you run. Linux is normally used in combination with the GNU operating system: the whole system is basically GNU with Linux added, or GNU/Linux.

GNU/Linux

Like BSD, GNU/Linux has created offspring, known as "distributions." These versions generally have different design goals (security, speed, desktop use) and package a unique set of tools with the kernel to achieve them.

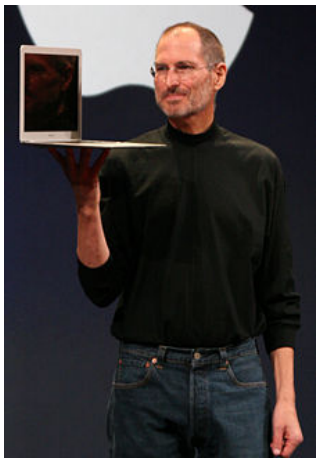
- Literally hundreds of distributions
- Popular distributions include RedHat, SuSE, Debian/Ubuntu, Slackware, Gentoo....

Saying "GNU/Linux" every time is tedious - can we all agree to refer to the entire system as "Linux" instead?

Apple's OSX

Built using a BSD-based kernel which they renamed "Darwin"

- Arguably the most popular desktop version of UNIX
- Puts a pretty face on a powerful frame



Steve Jobs Says:

What can the fully compliant UNIX technology in Leopard do? It can run any POSIX-compliant source code. Help you make the most of multicore systems. Put a new tabbed-interface Terminal at your fingertips. Introduce a whole host of new features that make life easier for every developer. Really, what can't it do?

Lecture Outline

BSD

Pros

- Reliable and very secure
- Useable on almost anything that uses electricity
- Most flexible license
- Free!

Cons

- Least community/professional support
- Many flavors to choose from
- You thought Linux was for nerdy outsiders?!

Solaris

Pros

- Built specifically for the hardware it runs on
- Scales really well as system size/load increases
- Lots of support from Sun as well as the community

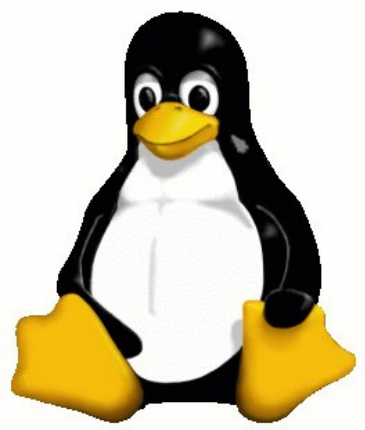
Cons

- You are paying for Sun's support and probably the hardware!
- Intended primarily for server use, not super desktop-friendly

Linux

Pros

- Arguably the largest community support base
- You can run it on a wristwatch
- Free, unless you want professional support
- Can mix business with pleasure...



Cons

- ...As long as you don't play games!
- Dizzying array of distribution choices
- Lacks some widely-used software (Office, Photoshop, etc.)

OSX

Pros

- Who needs support?
- Fully-featured GUI with a powerful terminal
- Supports most of the software the others lack

Cons

- You're definitely paying for this one!
- Closed-source, not as flexible as Linux/BSD

So, Why Linux?

- IT'S FREE!
- More widely used than BSD or OpenSolaris
- Easy to find beginner guides online if you need them
- Basic tools are pretty much standardized

Lecture Outline

Everything you need to know....

Examine the Syllabus

Lecture Outline

Your Linux Account

See `http://www.csuglab.cornell.edu/` for lots of info.

- You have all received accounts on csugXX.csuglab.cornell.edu
  - XX is 01, 02, 03, 04, 05, or 06
  - 01-04 is your undergraduate year, 05 for Masters, 06 for Ph.D.
- Your username is your netid.

Example: Logging in as me

```
ssh mjm458@csug06.csuglab.cornell.edu
```

- See `http://www.csuglab.cornell.edu/userinfo/` for your *password*.

Logging In

- If you are logging in from Windows, use Putty.
  - First result for "Putty" from Google.
  - Can be found in the References of the class site, although it may not be the latest build.
- If you are logging in from any other system, you should already have the wonderfully simple *ssh* tool.
- The labs are physically located in Upson 328 & and 361, and Rhodes 455. I can't imagine why you would want to go there, but you could. I don't know if all these labs house UNIX machines.

Changing Your Password

Most systems will make you change your initial password the first time you log in. If this one doesn't, do it anyway!

Your First Command

passwd

- Brings up a prompt to change your current password