UNIX™/Linux Overview

Introduction to UNIX/Linux
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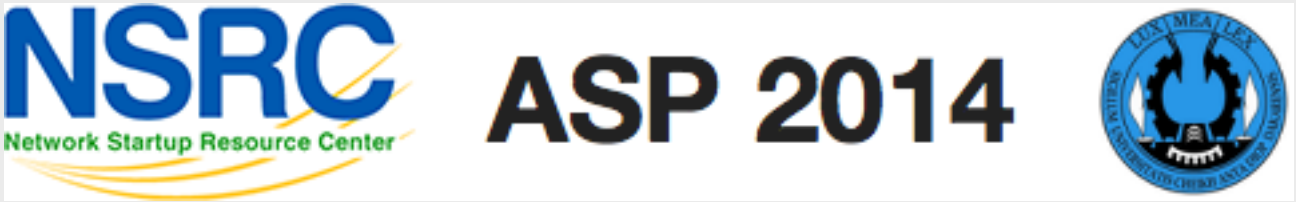


UNIX / Linux and Windows

Why are we using UNIX / Linux?

- Majority of core services on the Internet provided by UNIX / Linux
- Much of Enterprise class computing built around UNIX / Linux
- Pretty much all scientific computing is done on UNIX / Linux

We assume

- End users are on Windows (some places Macs, too)
- Don't expect end-users to use UNIX or Linux
  - Except Physicists ☺
- We do expect that you are likely to use Linux or UNIX

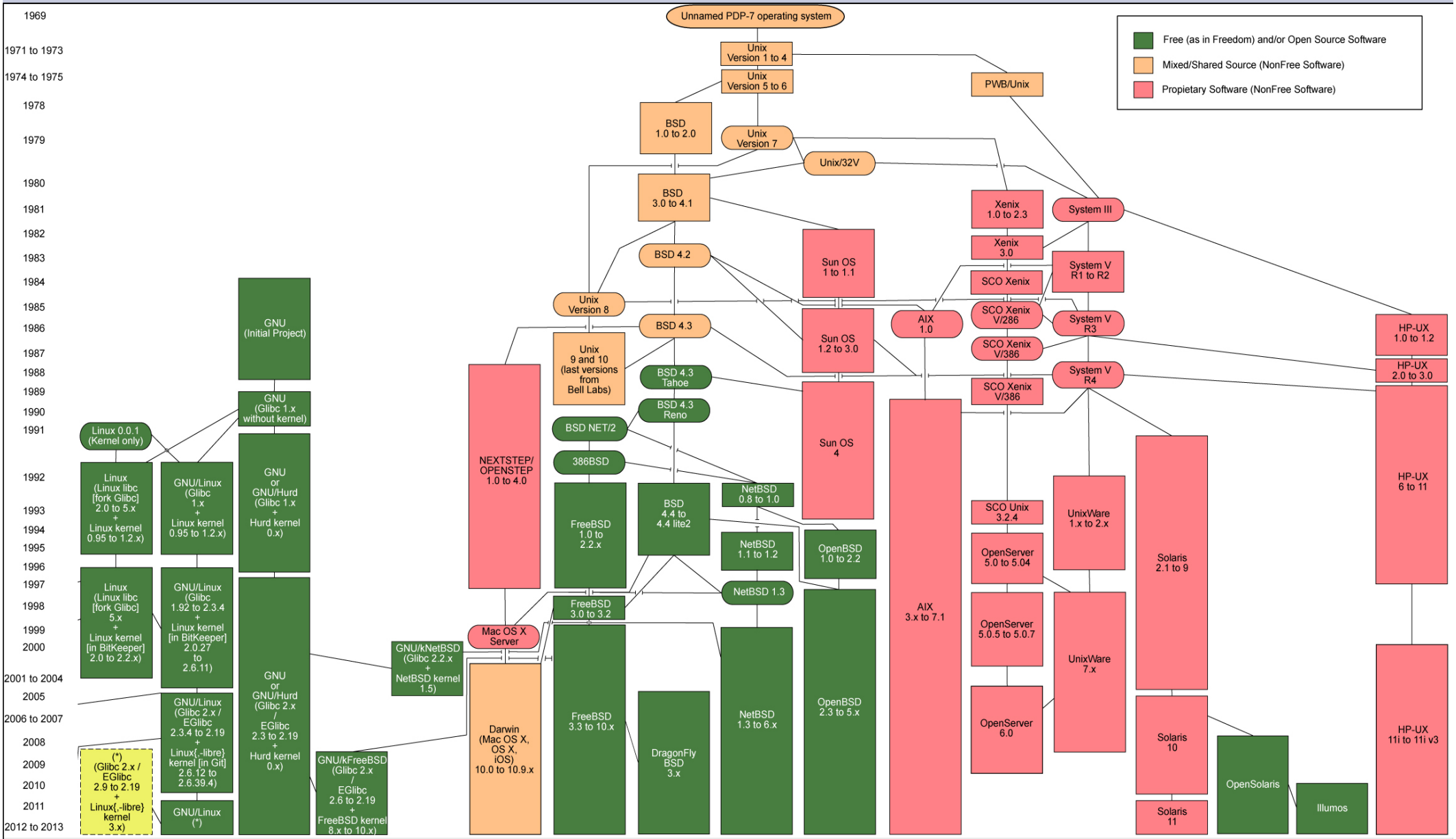
Licensing

- Open Source software is "free" (as in beer)
- Many tools available for free (or with few restrictions)
- Imagine cluster computing with thousands of nodes running
  - Windows (and each requiring a license)

Unix and Linux

- Are they the same?
  - Yes, at least in terms of operating system interfaces
  - Linux was developed independently from Unix
  - Unix is much older (1969 vs. 1991)
- Scalability and reliability
  - Both scale very well and work well under heavy load
  - (this is an understatement )
- Flexibility
  - Both emphasize small, interchangeable components
- Manageability
  - Remote logins rather than GUI
  - Scripting is integral
- Security
  - Due to modular design has a reasonable security model
  - Linux and its applications are not without blame

UNIX/Linux History



Adopted from http://en.wikipedia.org/wiki/File:Unix_history-simple.svg

Ubuntu Timeline

Version	Code name	Release date	Supported until		Kernel version
			Desktops	Servers	
4.10	Warty Warthog	20 October 2004	30 April 2006		2.6.8
5.04	Hoary Hedgehog	8 April 2005	31 October 2006		2.6.10
5.10	Breezy Badger	13 October 2005	13 April 2007		2.6.12
6.06 LTS	Dapper Drake	1 June 2006	14 July 2009	1 June 2011	2.6.15
6.10	Edgy Eft	26 October 2006	25 April 2008		2.6.17
7.04	Feisty Fawn	19 April 2007	19 October 2008		2.6.20
7.10	Gutsy Gibbon	18 October 2007	18 April 2009		2.6.22
8.04 LTS	Hardy Heron	24 April 2008	12 May 2011	9 May 2013	2.6.24
8.10	Intrepid Ibex	30 October 2008	30 April 2010		2.6.27
9.04	Jaunty Jackalope	23 April 2009	23 October 2010		Old version, no longer su
9.10	Karmic Koala	29 October 2009	30 April 2011		2.6.31
10.04 LTS	Lucid Lynx	29 April 2010	9 May 2013	April 2015	2.6.32
10.10	Maverick Meerkat	10 October 2010	10 April 2012		2.6.35
11.04	Natty Narwhal	28 April 2011	28 October 2012		2.6.38
11.10	Oneiric Ocelot	13 October 2011	9 May 2013		3.0
12.04 LTS	Precise Pangolin	26 April 2012[204]	26 April 2017[138]		3.2 or newer[205]
12.10	Quantal Quetzal	18 October 2012	16 May 2014[206]		3.5[207]
13.04	Raring Ringtail	25 April 2013	27 January 2014[8]		3.8[208]
13.10	Saucy Salamander	17 October 2013[209]	July 2014[8]		3.11
14.04 LTS	Trusty Tahr	17 April 2014[210]	**April 2019**		3.13[211]
14.10	Utopic Unicorn	16 October 2014[212]	July 2015		TBA

Legend: Old version | Older version, still supported | **Latest version** | Future release

Note the length of support for the LTS (Long Term Support) versions of Ubuntu.

http://en.wikipedia.org/wiki/List_of_Ubuntu_releases

Shells

Command line interface for executing programs

- Windows equivalent: command.com or command.exe

Also programming languages for scripting

- DOS/Windows equivalent: batch files, WSH, VBScript, JScript
- Linux/Unix: Perl, shell, php, python, C, etc.

Choice of similar but slightly different shells

- **bash:** the "Bourne-Again Shell". Combines POSIX standard with command history.
- **sh:** the "Bourne Shell". Standardised in POSIX
- Others: **ksh**, **tcsh**, **zsh, csh**

User processes

The programs that you choose to run

Frequently-used programs tend to have short cryptic names (why?)

"**`ls`**" = list files
"**`cp`**" = copy file
"**`rm`**" = remove (delete) file

Lots of stuff included in most base systems

Editors, compilers, system admin tools

Lots more stuff available to install as well

Thousands and thousands of packages

Services, Processes Daemons

Programs that run in the background; called daemons. Think “services” in Windows.

Examples:

apache:	The Apache Web server
cron:	Executes programs at certain times of day
syslogd:	Takes log messages and writes them to files
sshd:	Accepts incoming logins
sendmail	(other MTA daemons like Exim, Postifx): accept and deliver mail (SMTP)

Any questions?

?

Software Installation Linux

Two major packaging systems:

- Redhat Package Manager ➔ RPM
- Debian Packages ➔ DPKG

Both have wrapper tools to make them easier to use:

- rpm wrapped with **“yum”**
- dpkg wrapped with **“apt” and “aptitude”**

Both use repositories.

Linux has the other usual suspects as well:

- Install from source
- Install from binary

System Startup Linux

Startup scripts

In /etc/init.d/ (System V)
In /etc/init/ (Ubuntu 12.04 LTS and Upstart)

NOTE! Upon install services run!

Controlling services

Stop/Start/Restart/Reload/Status Services

```
# service <Service> <Action>
```

or, “old school”

```
# /etc/init.d/<service> <action>
```

Administration

- The use of the *root* account is discouraged. The *`sudo`* program is used instead.
- You can use *apt* and/or *yum* to move between many major and minor Linux releases (RedHat/Fedora, CentOS, Debian, Ubuntu)
- Ubuntu does `do-release-upgrade` to move to a new version.

There's More

Ubuntu Resources

http://www.ubuntu.com
http://ubuntuforums.org
http://www.debian.org
http://ubuntuguide.org
http://en.wikipedia.org/wiki/Debian
http://en.wikipedia.org/wiki/Ubuntu_(Linux_distribution)

Connect to your Virtual Linux Machine

Now you will use ssh to log in on your own virtual Linux machine as userid *sysadm*

1. Windows users download putty.exe from:

   http://10.0.0.250/downloads/putty.exe

2. Save putty.exe to your desktop and double-click the icon
3. Connect to 10.0.0.X as user "*sysadm*"
   We'll do this now and instructors will help

Mac / Linux users open a terminal window and do

```
$ ssh sysadm@10.0.0.X (X = 1 - 59)
```

You specific VM and password will be given in class