Unix / Linux Overview

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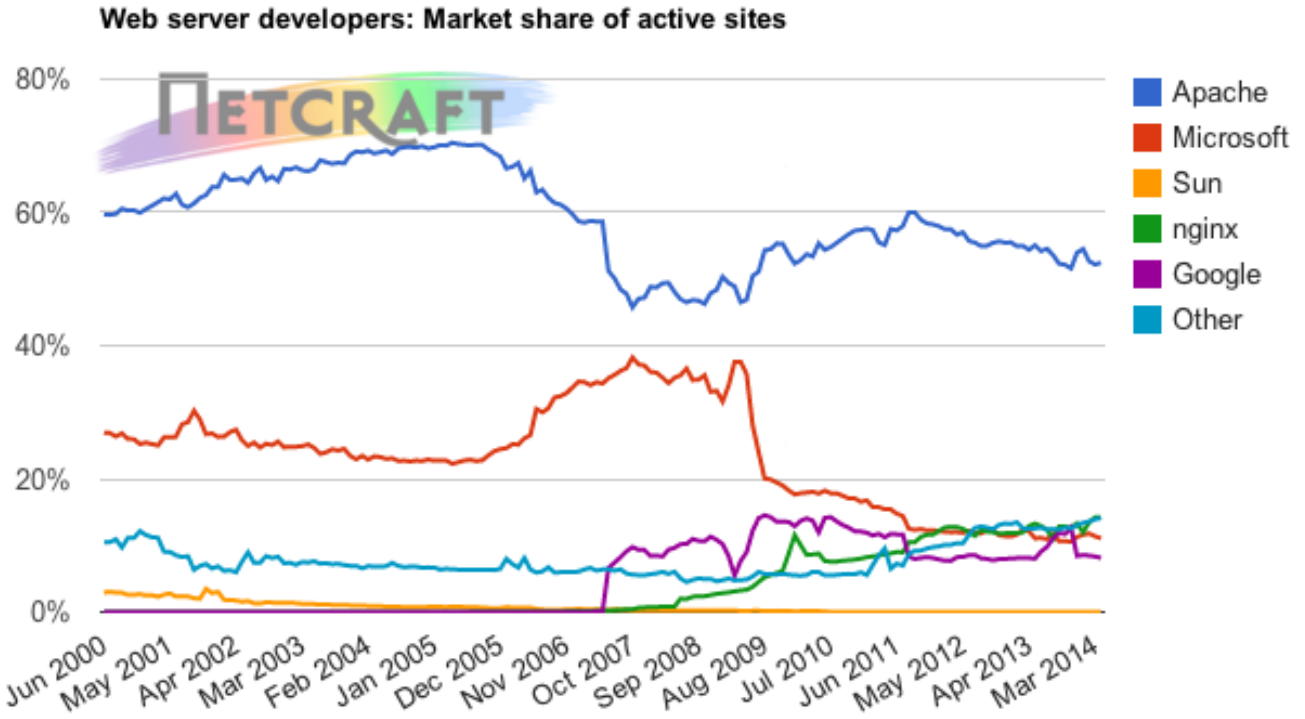
Why do we use Unix / Linux?

- Many Internet core services are Unix / Linux
- Enterprise Computing built around Unix / Linux
- Open Source network monitoring & management:
  - Widely used
  - Generally not available for Windows
- Router OSes are command-line and some, even, Linux

Unix / Linux and Windows

- **We Assume**
  - End users are on Windows (some places Macs, too)
  - Don’t expect end-users to use UNIX or Linux
  - We do expect that you are likely to use Linux or UNIX
- **Licensing**
  - Windows products and license schemes cost $$
  - Open Source software is “free” (as in beer)
  - Actual costs to implement vary widely

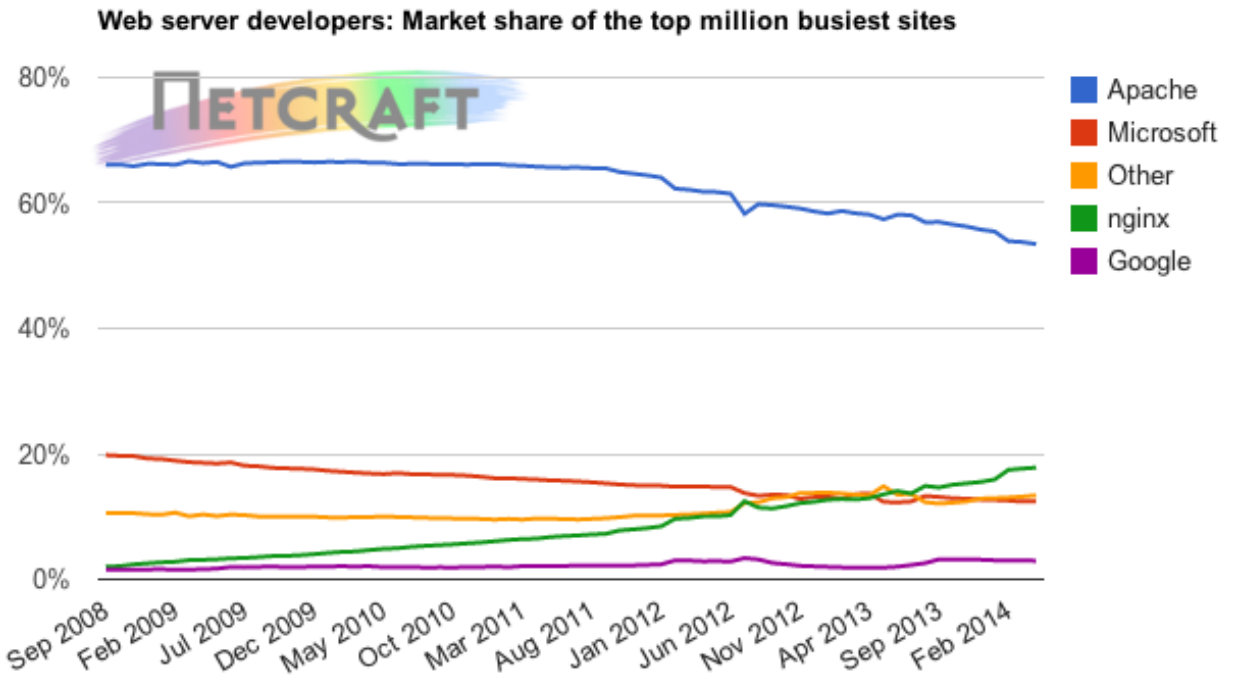
Netcraft Survey: Approx 1 Billion Hosts



Developer	March 2014	Percent	April 2014	Percent	Change
Apache	93,759,928	52.18%	95,512,314	52.44%	0.26
nginx	25,497,586	14.19%	25,900,525	14.22%	0.03
Microsoft	20,436,280	11.37%	20,175,151	11.08%	-0.30
Google	14,967,579	8.33%	14,829,924	8.14%	-0.19

http://news.netcraft.com/archives/2014/04/02/april-2014-web-server-survey.html

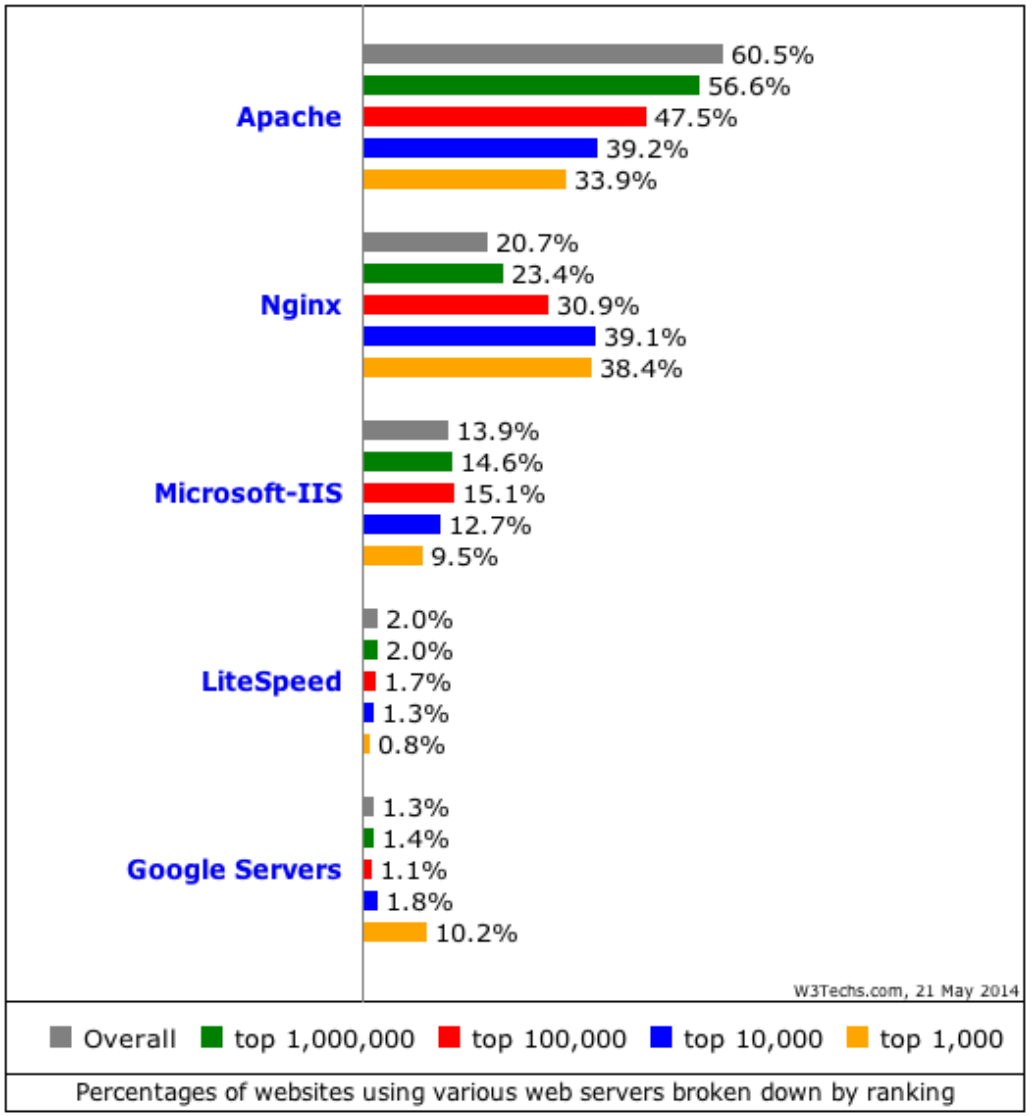
Netcraft Survey: Approx 1 Billion Hosts



Developer	March 2014	Percent	April 2014	Percent	Change
Apache	537,714	53.77%	534,392	53.44%	-0.33
nginx	176,507	17.65%	178,154	17.82%	0.16
Microsoft	123,981	12.40%	124,019	12.40%	0.00
Google	29,937	2.99%	29,593	2.96%	-0.03

Note the growth of nginx open source server. Majority of nginx sites are Linux / UNIX based

W3Techs Survey



Note the growth of nginx open source server. Majority of nginx sites are Linux / UNIX based. Majority of other server types run on Linux / UNIX.

http://w3techs.com/technologies/cross/web_server/ranking

Security Space Survey: May 2014

Across All Domains

Market Share Change (Total servers: **72,502,578**)

Server[1]	April Count	April %	March Count	March %
Apache	44,929,572	61.97%	45,166,394	62.49%
Microsoft	11,606,636	16.01%	11,254,649	15.57%
Zeus	90,836	0.13%	82,595	0.11%
Netscape	7,687	0.01%	7,955	0.01%
WebSTAR	2,409	0.00%	2,412	0.00%
WebSite	1,405	0.00%	1,423	0.00%
Other	15,864,033	21.88%	15,758,082	21.80%

[1]Servers are ordered according to their global market share.

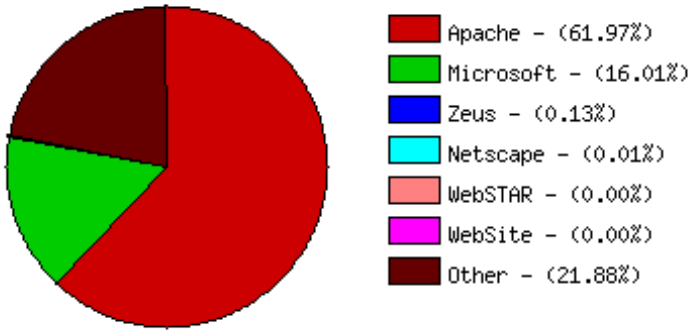
Domain .com (Commercial)

Market Share Change (Total servers: **32,473,400**)

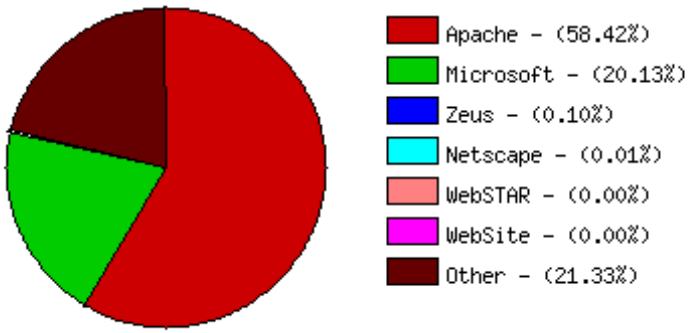
Server[1]	April Count	April %	March Count	March %	Change
Apache	18,969,842	58.42%	19,084,176	58.92%	-0.50%
Microsoft	6,537,406	20.13%	6,433,327	19.86%	+0.27%
Zeus	33,029	0.10%	28,439	0.09%	+0.01%
Netscape	4,684	0.01%	4,851	0.01%	+0.00%
WebSTAR	1,455	0.00%	1,441	0.00%	+0.00%
WebSite	657	0.00%	662	0.00%	+0.00%
Other	6,926,327	21.33%	6,837,455	21.11%	+0.22%

[1]Servers are ordered according to their global market share.

Market Share for April 2014 - Across All Domains



Market Share for April 2014 - Domain .com (Commercial)



http://www.securityspace.com/s_survey/data/201404/index.html

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

Flexibility

- Both emphasize small, interchangeable components

Manageability

- Remote logins rather than GUI
- Scripting is integral

Security

- Modular design leads to a reasonable security model
- Linux and its applications are not without blame

UNIX/Linux History

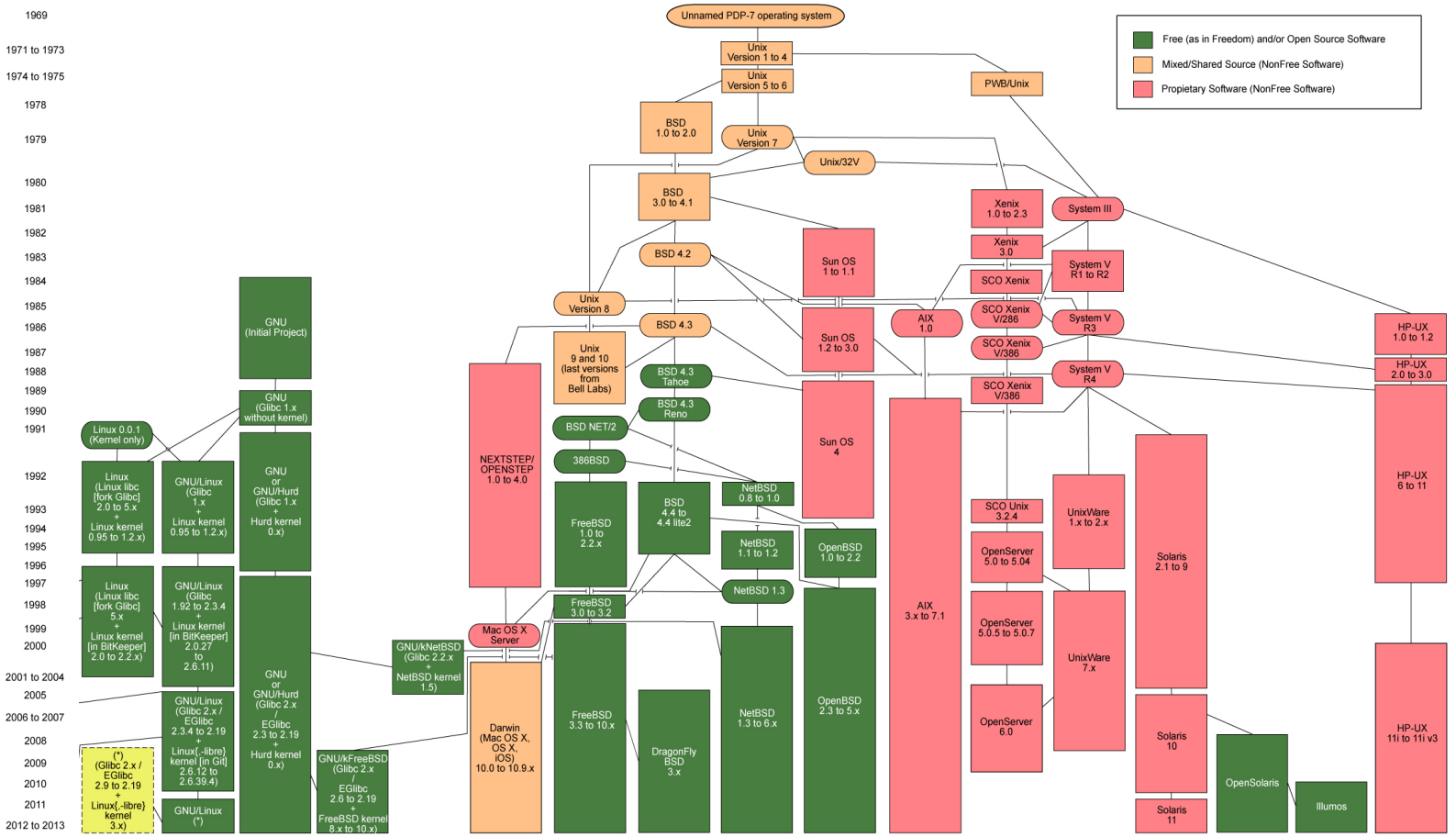


Image: http://commons.wikimedia.org/wiki/File:Unix_history-simple.en.svg

FreeBSD Timeline

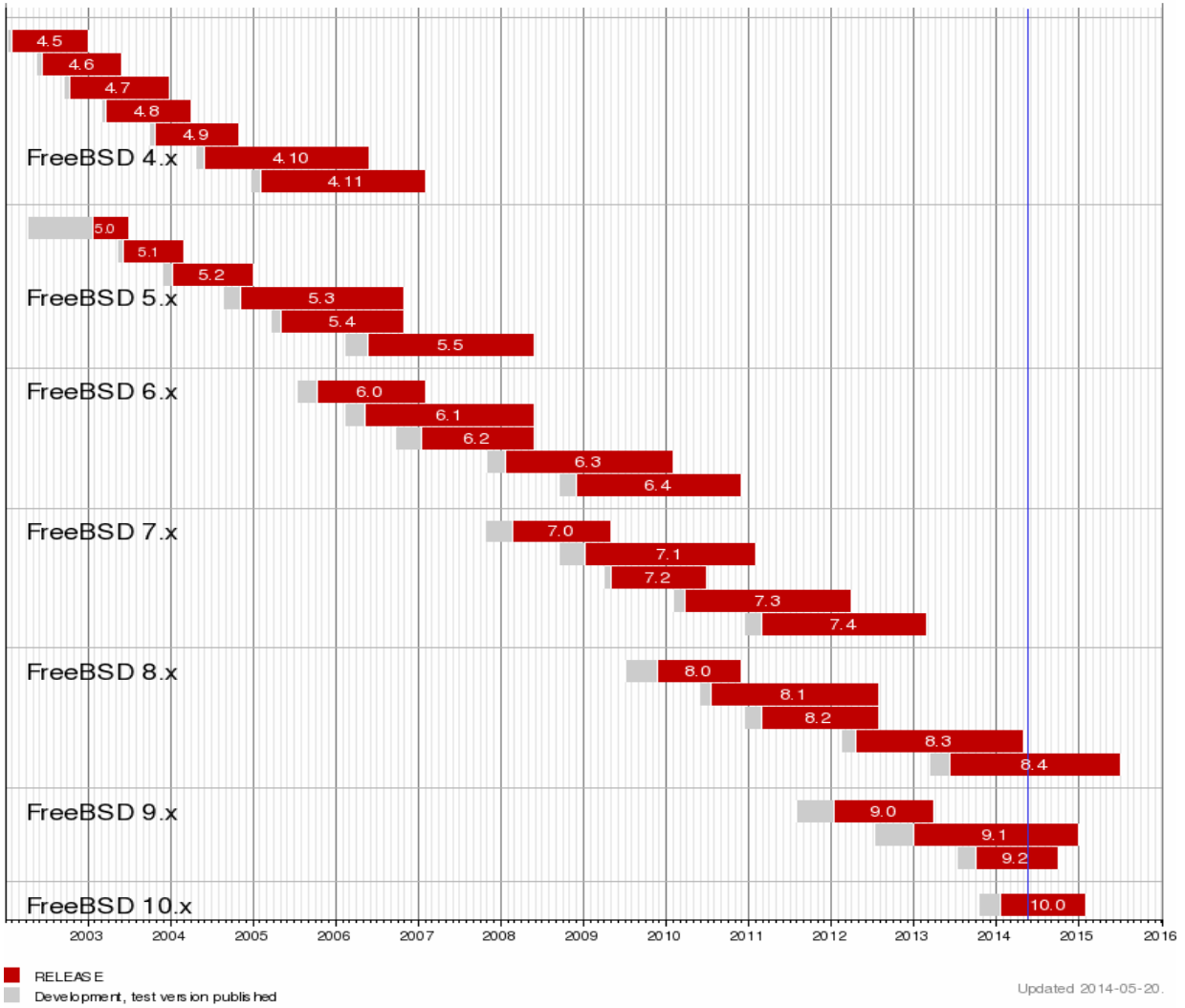


Image: http://commons.wikimedia.org/wiki/File:FreeBSD-TimeLine.png

Linux Timeline

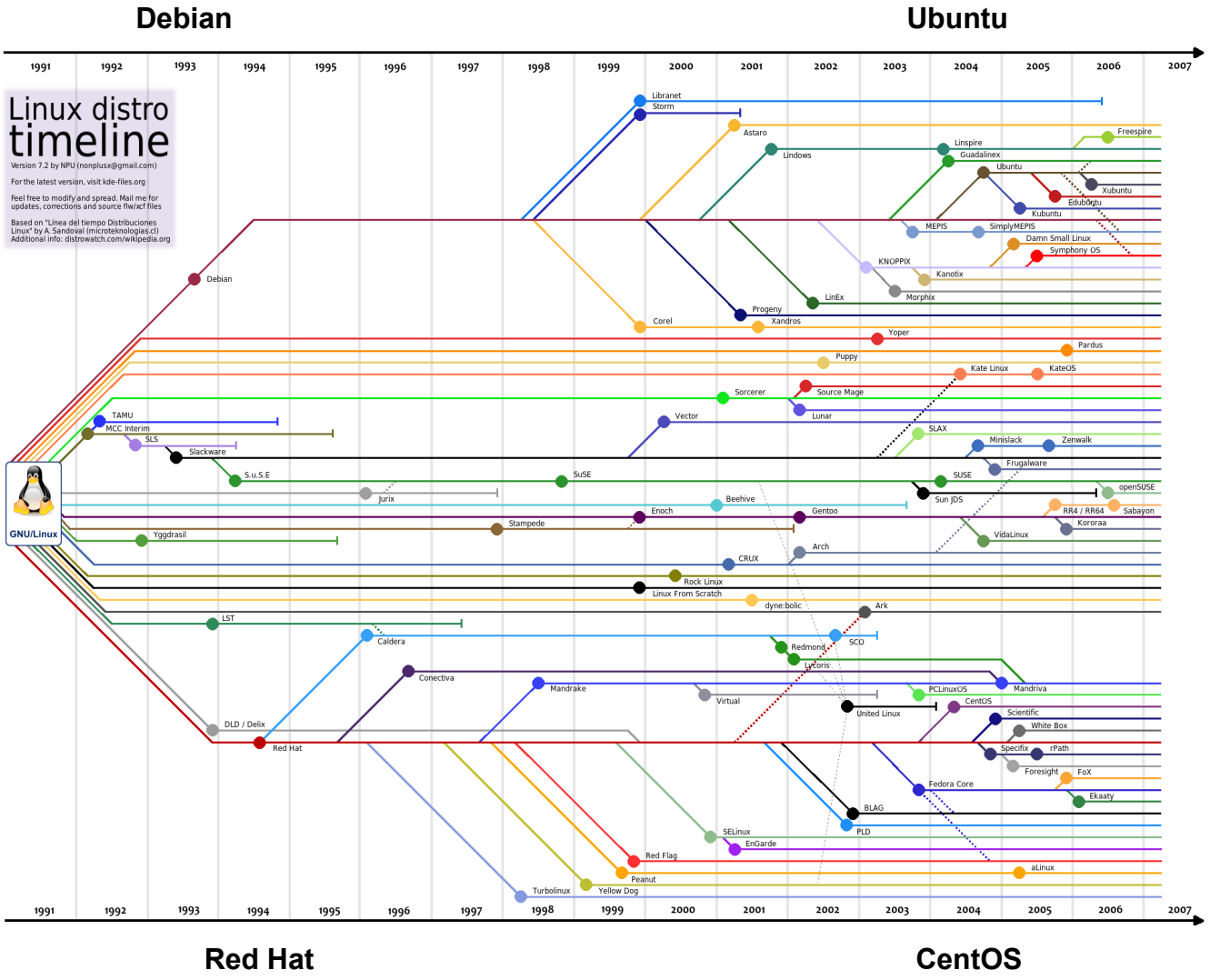


Image: http://kde-files.org/content/show.php/Linux+Distro+Timeline?content=44218

Ubuntu Timeline

Version	Code name	Release date	Supported until		Kernel version
			Desktops	Servers	
4.10	Warty Warthog	2004-10-20	2006-04-30		2.6.8
5.04	Hoary Hedgehog	2005-04-08	2006-10-31		2.6.10
5.10	Breezy Badger	2005-10-13	2007-04-13		2.6.12
6.06 LTS	Dapper Drake	2006-06-01	2009-07-14	2011-06-01	2.6.15
6.10	Edgy Eft	2006-10-26	2008-04-25		2.6.17
7.04	Feisty Fawn	2007-04-19	2008-10-19		2.6.20
7.10	Gutsy Gibbon	2007-10-18	2009-04-18		2.6.22
8.04 LTS	Hardy Heron	2008-04-24	2011-05-12	2013-05-09	2.6.24
8.10	Intrepid Ibex	2008-10-30	2010-04-30		2.6.27
9.04	Jaunty Jackalope	2009-04-23	2010-10-23		2.6.28
9.10	Karmic Koala	2009-10-29	2011-04-30		2.6.31
10.04 LTS	Lucid Lynx	2010-04-29	2013-05-09	2015-04	2.6.32
10.10	Maverick Meerkat	2010-10-10	2012-04-10		2.6.35
11.04	Natty Narwhal	2011-04-28	2012-10-28		2.6.38
11.10	Oneiric Ocelot	2011-10-13	2013-05-09		3.0
12.04 LTS	Precise Pangolin	2012-04-26[218]	2017-04-26[140]		3.2 or newer[219]
12.10	Quantal Quetzal	2012-10-18	2014-05-16[220]		3.5[221]
13.04	Raring Ringtail	2013-04-25	2014-01-27[8]		3.8[222]
13.10	Saucy Salamander	2013-10-17[223]	2014-07-17[224]		3.11
14.04 LTS	Trusty Tahr	2014-04-17[225]	2019-04		3.13[226]
14.10	Utopic Unicorn	2014-10-23[205]	**2015-07**		3.16[227]
15.04	Vivid Vervet	2015-04-23[213]	2016-01		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.

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 have short cryptic names (why?)
  - "`ls`" = list files
  - "`cp`" = copy file
  - "`rm`" = remove (delete) file
- Most base systems include software
  - Editors, compilers, system admin tools
- Even more software is available
  - Thousands and thousands of packages

Services, Processes Daemons

- Daemons
  - programs that run in the background
- Examples:
  - **Apache:** The Apache Web server
  - **crond**: Executes programs at certain times of day
  - **syslogd**: Takes log messages and writes them to files
  - **sshd**: Accepts incoming logins
  - **sendmail:** accepts incoming mail (smtp)
    - Along with other MTA daemons like Exim, Postifx

Any questions?

Software Installation FreeBSD

Software management in FreeBSD

- Install from source
- Install from binary
- Compile from source using a port
- **Use a wrapper tool, such as *portinstall*.**
- **Install pre-built FreeBSD packages using *pkg_**
- **Some people using *pkng* (next gen)**

You can keep the source tree local and up-to-date. This is known as the *ports collections*. A number of tools to do this, including *portsnap.*

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 FreeBSD

Startup scripts in FreeBSD

- `/etc/rc.d` – system startup scripts
- `/usr/local/etc/rc.d` – third-party startup scripts

Controlling services

- In `/etc/defaults/rc.conf` – initial defaults
- `/etc/rc.conf` – override settings here

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 do *a "buildworld"* to move between major and minor releases (FreeBSD).
- You can use *apt* and/or *yum* to move between many major and minor Linux releases.
- Ubuntu does `do-release-upgrade` to move to a new version.

There's More

The FreeBSD Handbook

http://www.freebsd.org/handbook/

FreeBSD Resources

http://www.freebsd.org

http://forums.freebsd.org

http://www.freshports.org/

http://wiki.freebsd.org

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

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 use ssh to log in on your virtual Linux machine as user *sysadm*

1. Windows users download putty.exe from:
   http://noc.ws.nsrc.org/downloads

2. Save putty.exe to your desktop and double-click the icon

3. Connect to pcN.ws.nsrc.org as user *sysadm*
   We'll do this now and instructors will help

Mac / Linux users open a terminal window and do

```
$ ssh sysadm@vmN.ws.nsrc.org
```

You specific VM and password will be given in class