# UNIX™/Linux Overview

## Unix/IP Preparation Course

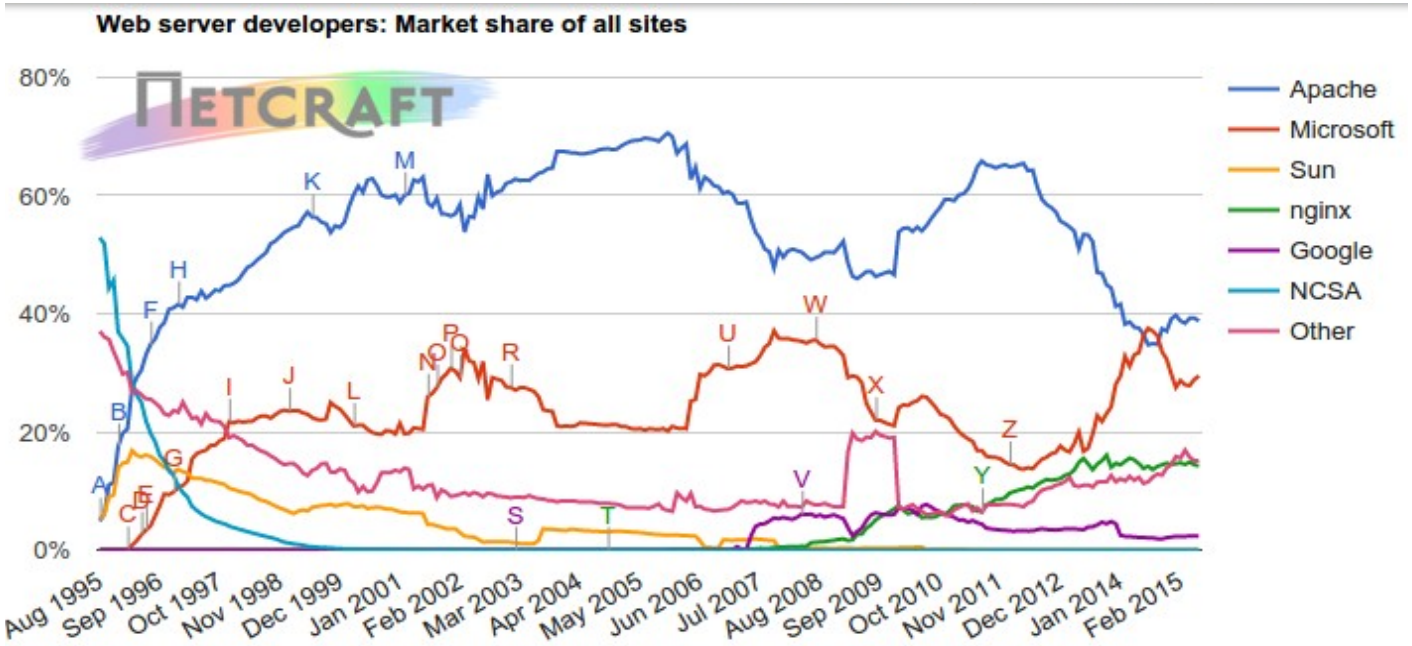
# Why do we use Unix / Linux?

- 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

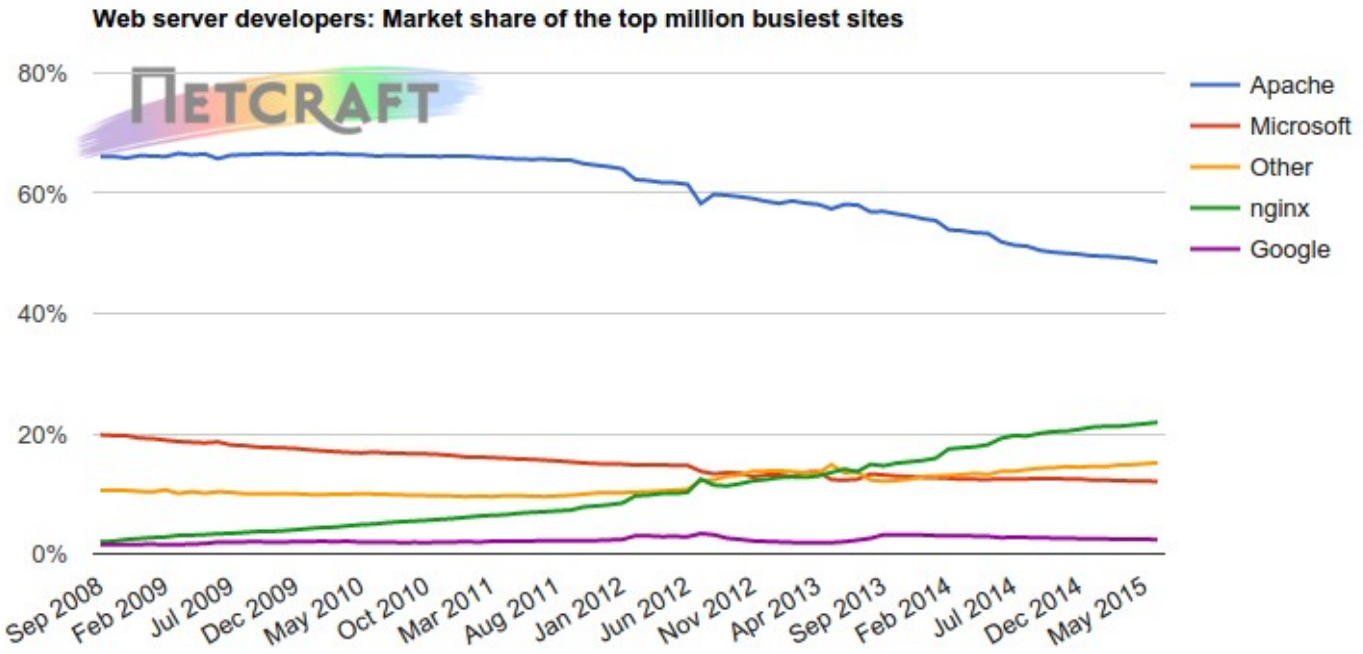
# Netcraft Survey: Approx 1 Billion Hosts




| Developer | May 2015 | Percent | June 2015 | Percent | Change |
|---|---|---|---|---|---|
| Apache | 336,813,959 | 39.26% | 334,731,035 | 38.78% | -0.48 |
| Microsoft | 247,784,668 | 28.88% | 254,408,179 | 29.48% | 0.59 |
| nginx | 123,697,645 | 14.42% | 122,965,522 | 14.25% | -0.17 |
| Google | 20,103,068 | 2.34% | 20,130,732 | 2.33% | -0.01 |

http://news.netcraft.com/archives/2015/06/25/june-2015-web-server-survey.html

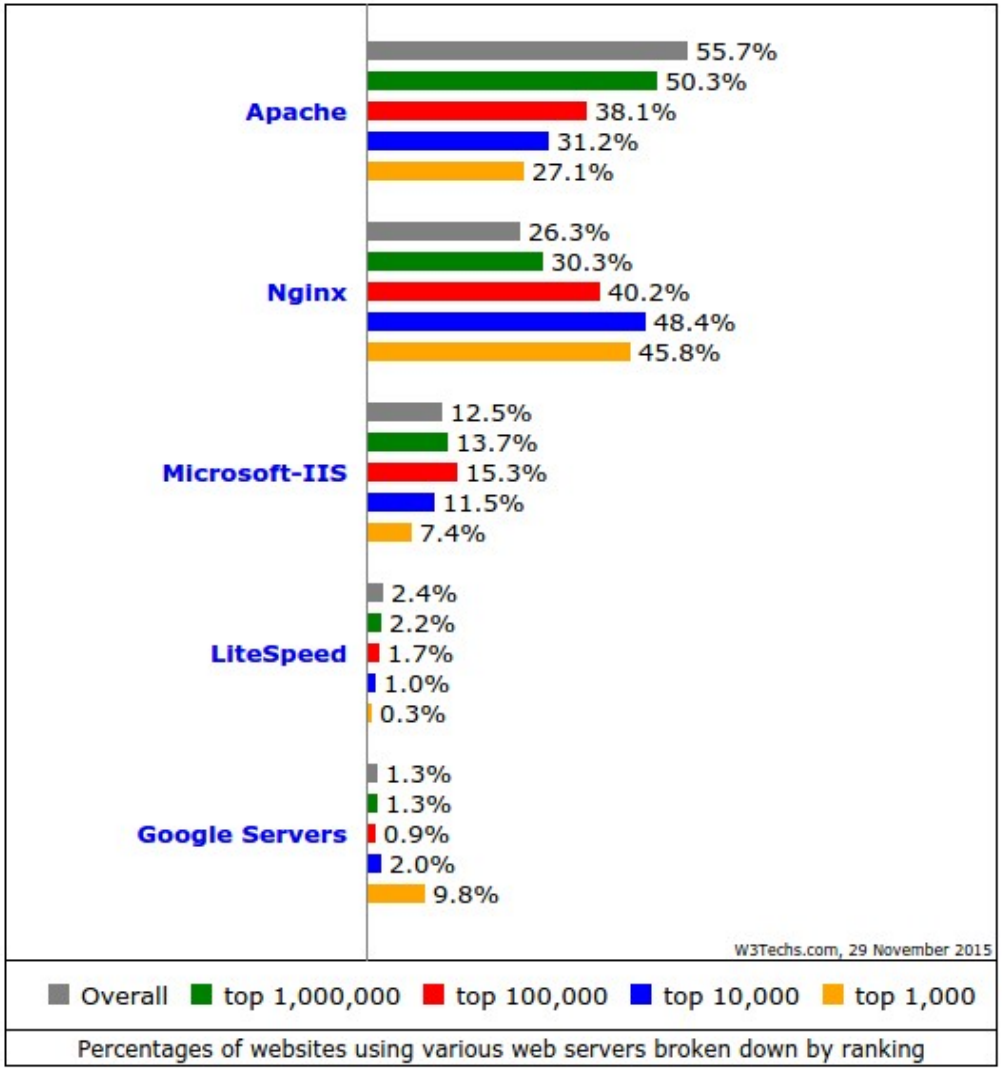
# Netcraft Survey: Approx 1 Billion Hosts




| Developer | May 2015 | Percent | June 2015 | Percent | Change |
|---|---|---|---|---|---|
| Apache | 488,313 | 48.83% | 485,315 | 48.53% | -0.30 |
| nginx | 216,433 | 21.64% | 218,913 | 21.89% | 0.25 |
| Microsoft | 121,274 | 12.13% | 120,239 | 12.02% | -0.10 |
| Google | 24,170 | 2.42% | 23,751 | 2.38% | -0.04 |

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: November 2015

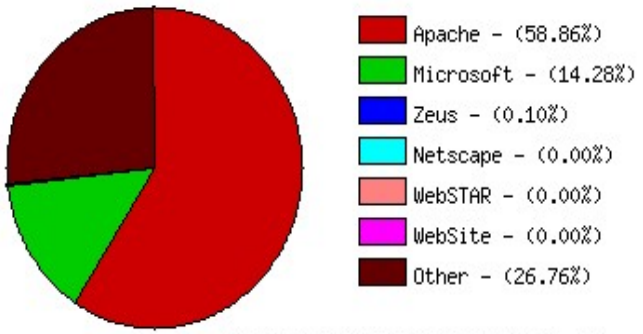
## Across All Domains

**Market Share Change** (Total servers: **75,104,606**)

| Server[1] | October Count | October % | September Count | September % | Change |
|---|---|---|---|---|---|
| Apache | 44,206,850 | 58.86% | 44,301,105 | 58.45% | +0.41% |
| Microsoft | 10,721,422 | 14.28% | 11,210,747 | 14.79% | -0.51% |
| Zeus | 78,300 | 0.10% | 76,906 | 0.10% | +0.00% |
| Netscape | 1,597 | 0.00% | 1,600 | 0.00% | +0.00% |
| WebSTAR | 1,150 | 0.00% | 1,689 | 0.00% | +0.00% |
| WebSite | 865 | 0.00% | 858 | 0.00% | +0.00% |
| Other | 20,094,422 | 26.76% | 20,195,349 | 26.65% | +0.11% |

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

**Market Share for October 2015 - Across All Domains**





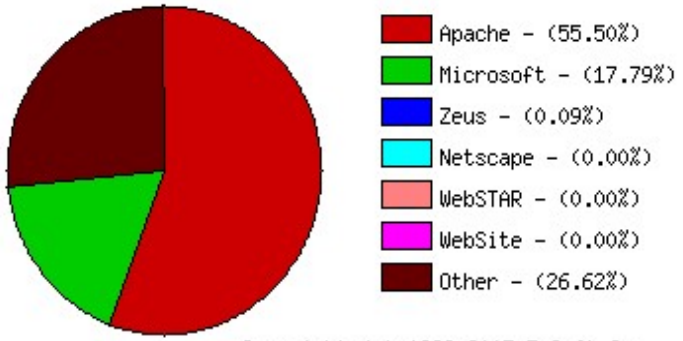

## Domain .com (Commercial)

**Market Share Change** (Total servers: **32,858,319**)

| Server[1] | October Count | October % | September Count | September % | Change |
|---|---|---|---|---|---|
| Apache | 18,236,930 | 55.50% | 18,364,562 | 55.08% | +0.42% |
| Microsoft | 5,844,717 | 17.79% | 6,163,382 | 18.48% | -0.69% |
| Zeus | 29,102 | 0.09% | 27,339 | 0.08% | +0.01% |
| Netscape | 675 | 0.00% | 669 | 0.00% | +0.00% |
| WebSTAR | 564 | 0.00% | 1,049 | 0.00% | +0.00% |
| WebSite | 406 | 0.00% | 405 | 0.00% | +0.00% |
| Other | 8,745,925 | 26.62% | 8,785,508 | 26.35% | +0.27% |

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

**Market Share for October 2015 - Domain .com (Commercial)**






http://www.securityspace.com/s_survey/data/201510/com/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

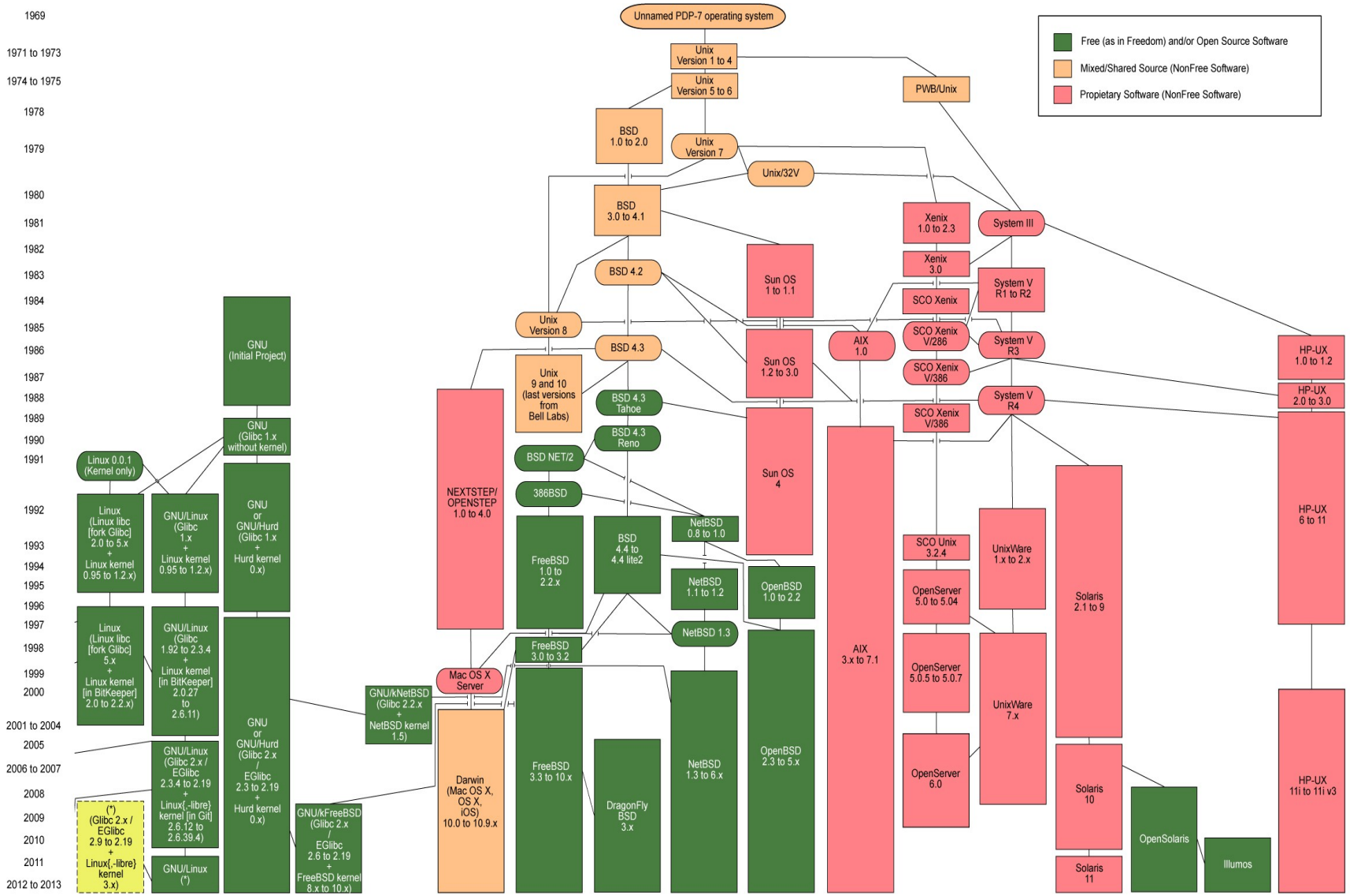



Image: http://commons.wikimedia.org/wiki/File:Unix_history-simple.en.svg

# FreeBSD Timeline

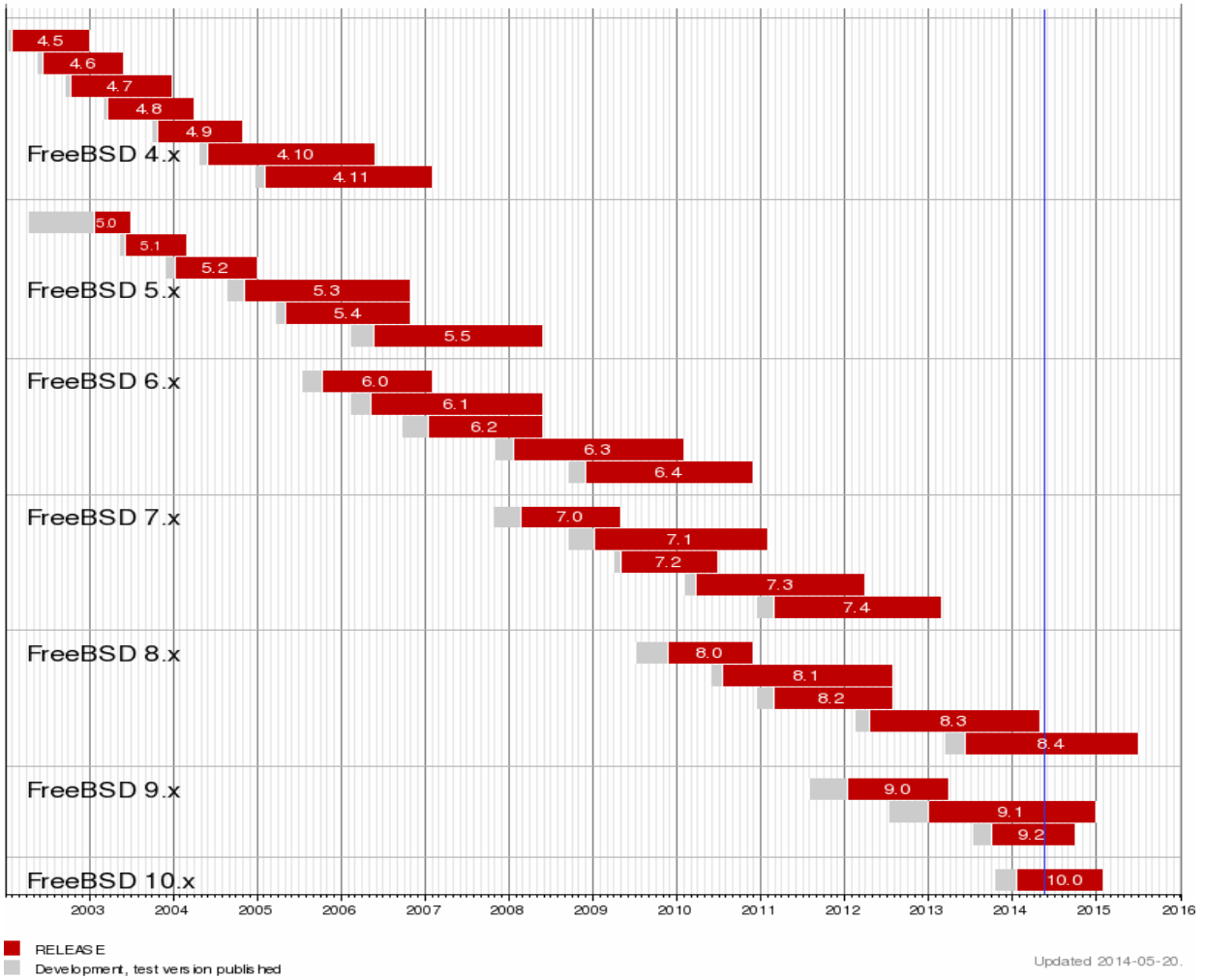



Image: http://commons.wikimedia.org/wiki/File:FreeBSD-TimeLine.png

# Linux Timeline

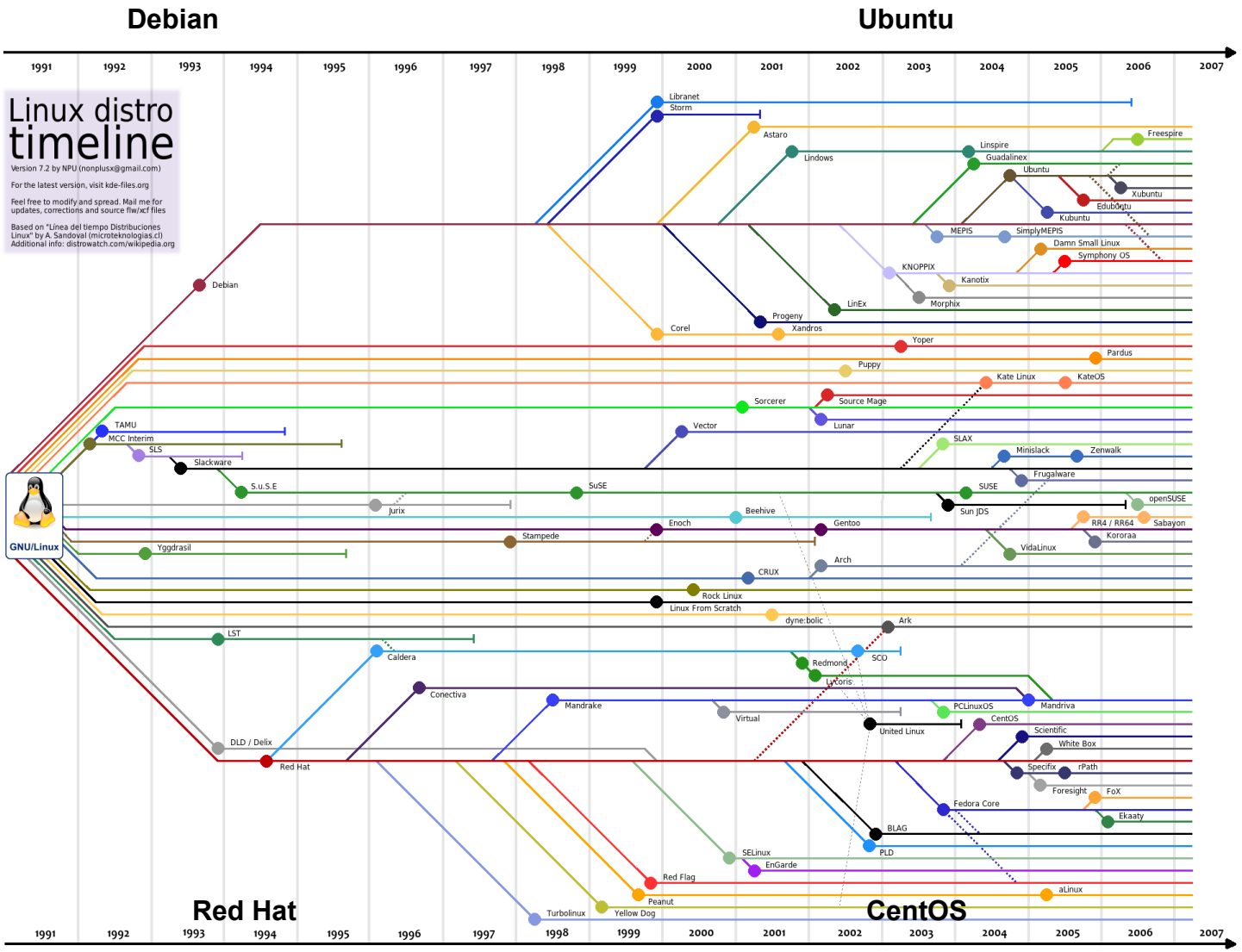



Image: http://kde-files.org/content/show.php/Linux+Distro+Timeline?content=44218

# 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 | 2015-04-30 | 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[245] | 2017-04-26[142] | | 3.2+[246] |
| 12.10 | Quantal Quetzal | 2012-10-18 | 2014-05-16[247] | | 3.5[248] |
| 13.04 | Raring Ringtail | 2013-04-25 | 2014-01-27[8] | | 3.8[249] |
| 13.10 | Saucy Salamander | 2013-10-17[250] | 2014-07-17[190] | | 3.11 |
| 14.04 LTS | Trusty Tahr | 2014-04-17[194] | 2019-04 | | 3.13[251]/3.19[202] |
| 14.10 | Utopic Unicorn | 2014-10-23[209] | 2015-07-23[252] | | 3.16[253] |
| 15.04 | Vivid Vervet | 2015-04-23[217] | 2016-01 | | 3.19.3[254] |
| 15.10 | Wily Werewolf | 2015-10-22[228] | **2016-07** | | 4.2[255] |
| 16.04 LTS | Xenial Xerus | 2016-04-21[239] | 2021-04 | | 4.3[256] |

**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. (POSIX = Portable Operating System Interface)
- **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 and are not in direct control of the user

- 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:** 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 userid *sysadm*

Windows users download putty.exe from:

1. Link to be given in class
2. Save putty.exe to your desktop and double-click the icon
3. Connect to `server-address-to-be-given-in-class` as user "*sysadm*"

We'll do this now and instructors will help

Mac / Linux users open a terminal window and do

```
$ ssh server-address-to-be-given-in-class
```

**You specific VM and password will be given in class**