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Linux 101: CI-trainSeminar

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Linux 101

CI-Train Seminar

Linux 101

- Edward Aractingi
- Assistant Director for IT Infrastructure
- Manages MU Data Center
- Responsible for Server Hardware, Storage, Performance, Security and Infrastructure Systems.

What is Linux?

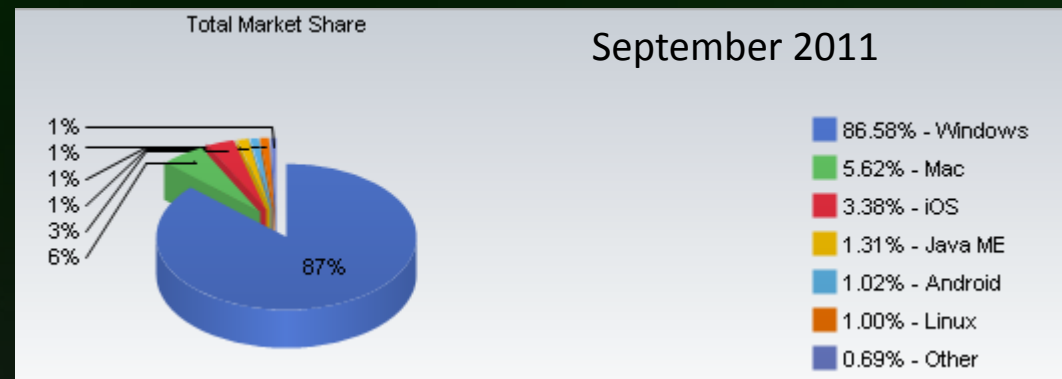
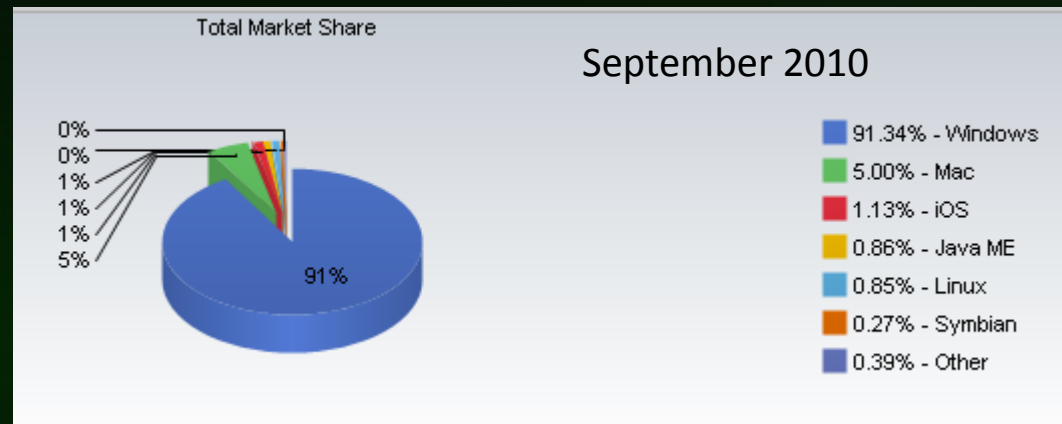
- Founded in 1991 by Linus Torvalds at university of Helsinki.
- Based on MINIX OS which is a UNIX derivative
- Light weight operating system
- Open Source
- Free



Source: Wikipedia

Linux vs Windows & Mac

- Gartner: Server Linux market share is 28% ¹
- Desktops: Web clients are 1% linux, 87% windows and 6% Mac ²



Major Distributions

- Top ten distros by Distrowatch.com:
 - Ubuntu (6 months, ease of use, LTS)
 - Fedora (6 months, security, cutting-edge)
 - OpenSUSE (Novel, Enterprise, Windows)
 - Debian (Geeks)
 - Mandriva
 - Slackware
 - Getoo
 - CentOS



In the Enterprise

- RedHat Enterprise Linux
- Novell SUSE Linux Enterprise
- Oracle Linux
- Ubuntu Server
 - Support
 - Management tools
 - Interoperability

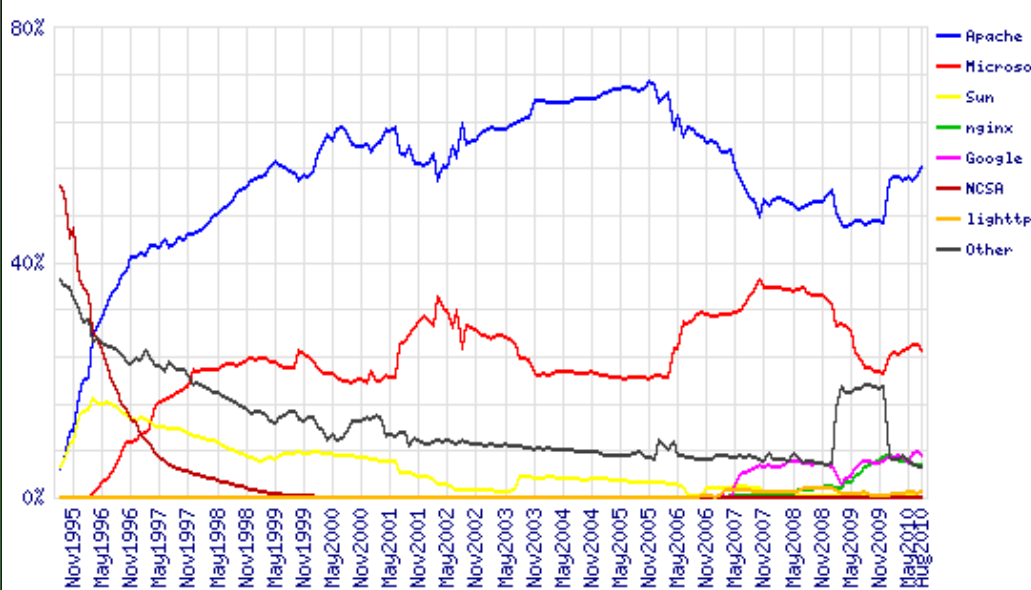


Popular Applications

- Apache Httpd web server (60% according to netcraft)
- MySQL database server
- Perl, Php, Python & other development tools
- Firewalls (ipfilters/iptables)
- Embedded devices (TIVO, Android..etc)
- & Desktops

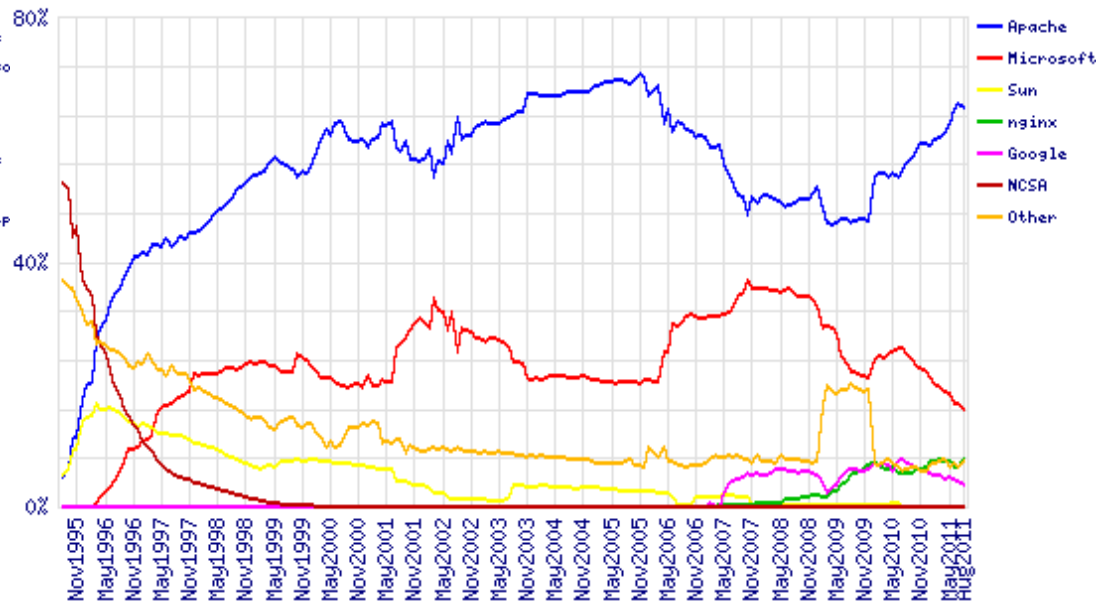
Apache Httpd Webserver

Market Share for Top Servers Across All Domains
August 1995 - August 2010



Developer	July 2010	Percent	August 2010	Percent	Change
Apache	112,945,968	54.90%	119,664,128	56.06%	1.16
Microsoft	53,217,620	25.87%	53,434,586	25.03%	-0.84
Google	15,849,853	7.70%	15,526,781	7.27%	-0.43
ngxin	11,474,696	5.58%	11,713,607	5.49%	-0.09
lighttd	1,258,800	0.61%	1,821,824	0.85%	0.24

Market Share for Top Servers Across All Domains
August 1995 - August 2011



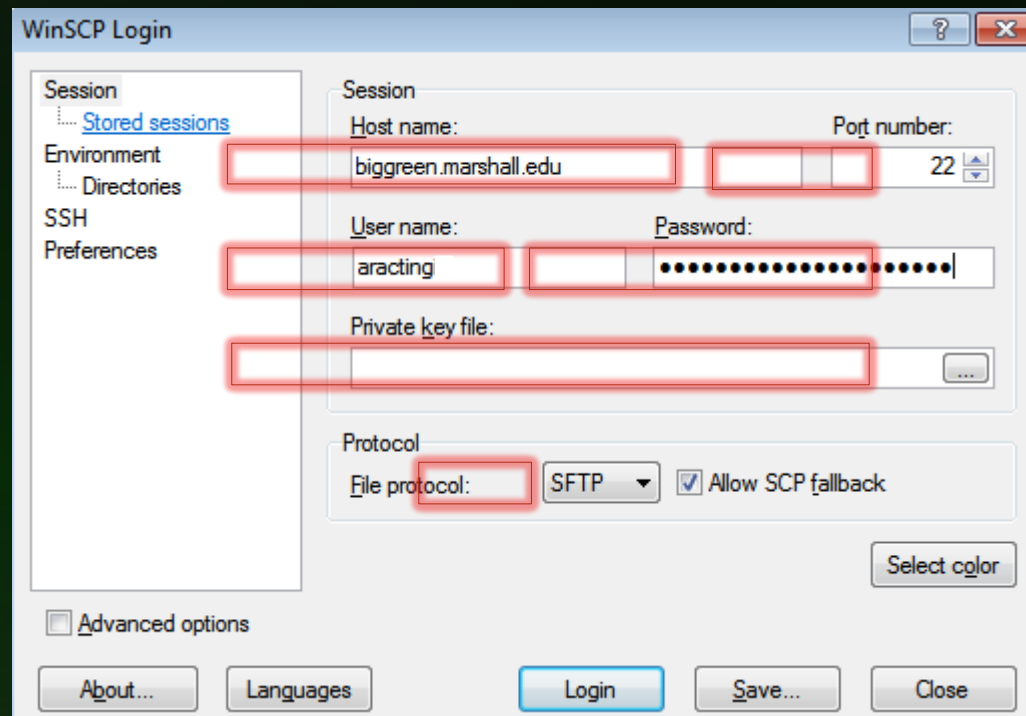
Developer	July 2011	Percent	August 2011	Percent	Change
Apache	235,326,985	65.86%	301,771,518	65.18%	-0.69
Microsoft	60,086,346	16.82%	73,415,916	15.86%	-0.96
ngxin	23,357,497	6.54%	35,533,439	7.67%	1.14
Google	15,641,574	4.38%	17,061,003	3.68%	-0.69

Connect to Linux

- Most popular way: Secure Shell (SSH)
- OpenSSH installed on the server
- SSH client installed on the desktop/client
- Provide security, encryption, performance.
- Multi platform clients
- Popular clients: OpenSSH (linux & MacOS) & Putty for windows

Copy Files from Windows

- Use WinCSP



The image shows the WinSCP Login dialog box. It has a sidebar on the left with a tree view containing 'Session', 'Stored sessions', 'Environment', 'Directories', 'SSH', and 'Preferences'. The main area is titled 'Session' and contains the following fields:

- Host name:** biggreen.marshall.edu
- Port number:** 22
- User name:** aracting
- Password:** [masked with dots]
- Private key file:** [empty field with a browse button]
- Protocol:** File protocol: SFTP (dropdown menu)
- Allow SCP fallback
-

At the bottom, there is a checkbox for 'Advanced options' and four buttons: 'About...', 'Languages', 'Login', and 'Close'.

WinSCP

Warning

The server's host key was not found in the cache. You have no guarantee that the server is the computer you think it is.

The server's rsa2 key fingerprint is:
ssh-rsa 2048 93:05:37:

If you trust this host, press Yes. To connect without adding host key to the cache, press No. To abandon the connection press Cancel.

Continue connecting and add host key to the cache?

Yes No Cancel Copy Key Help

WinSCP

Address: /home/aractingi1

aractingi1@biggreen.marshall.edu

Name	Ext	Size	Type	Changed	Rights	Owner	Group
.redhat			File folder	2011-01-11 1:4...	rw-rw-r-x	aractin...	aracti...
.ssh			File folder	2010-10-29 2:4...	rw-r-----	aractin...	aracti...
.t_coffee			File folder	2010-10-29 2:4...	rw-r-xr-x	aractin...	aracti...
.Trash			File folder	2011-01-11 1:4...	rw-r-----	aractin...	aracti...
bio			File folder	2010-10-29 2:4...	rw-r-xr-x	aractin...	aracti...
Desktop			File folder	2011-01-11 1:4...	rw-r-xr-x	aractin...	aracti...
mudnangs			File folder	2011-02-03 1:2...	rw-rw-r-x	aractin...	aracti...
ngs			File folder	2011-02-03 1:0...	rw-rw-r-x	aractin...	aracti...
.bash_history		6,477	BASH_HISTORY File	2011-08-25 10:...	rw-r-----	aractin...	aracti...
.bash_logout		33	BASH_LOGOUT File	2010-10-29 2:4...	rw-r--r--	aractin...	aracti...
.bash_profile		176	BASH_PROFILE File	2010-10-29 2:4...	rw-r--r--	aractin...	aracti...
.bashrc		124	BASHRC File	2010-10-29 2:4...	rw-r--r--	aractin...	aracti...
.dmrc		26	DMRC File	2011-01-11 1:4...	rw-r-----	aractin...	aracti...
.emacs		515	EMACS File	2010-10-29 2:4...	rw-r--r--	aractin...	aracti...
.esd_auth		16	ESD_AUTH File	2011-03-01 11:...	rw-r-----	aractin...	aracti...
.gtkrc-1.2-gnome2		92	2-GNOME2 File	2011-01-11 1:4...	rw-r--r--	aractin...	aracti...
.ICEauthority		392	ICEAUTHORITY File	2011-03-01 11:...	rw-r-----	aractin...	aracti...
.ncbirc		116	NCBIRC File	2010-10-29 2:4...	rw-r--r--	aractin...	aracti...
.viminfo		761	VIMINFO File	2011-01-28 2:4...	rw-r-----	aractin...	aracti...
.Xauthority		132	XAUTHORITY File	2011-03-01 11:...	rw-r-----	aractin...	aracti...
hpc_config_bkup.txt		14,786	Text Document	2011-01-28 3:1...	rw-r--r--	root	root
univ_tev		73,708	TEV File	2011-02-17 2:3	rw-r--r--	root	root

Operation	Source	Destination	Transferred	Time/Speed	Progress
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Linux File System

- Most common: ext3 (extended)
- Journaling
- Htree indexing
- Max file size **2 TB**
- Max file systems size to **32 TB**
- No transparent compression
- No file recovery
- Defragmentation

File system commands

- ls : directory listing
- cd : change directory
- rm : remove (-r recursively through dirs)
- cp : copy
- cat, more, less: show file contents
- pwd: list your present working directory
- locate: file any file (need updatedb first)
- Ln: create a link (shortcut) to a file of folder
- tar: create or extract files

File & Directory Permissions

- POSIX-compliant (as Unix and Mac OS x)
- Symbolic notation (
 - r read bit is set
 - w write bit is set
 - x execute bit is set
- Three user types **u**ser**g**roup**o**ther
 - `$ ls -l file`
 - `-rwxr-x--- 1 ed admins 10 2010-03-19 11:01 file`

Permissions Octal Notation

- 0 --- no permission
- 1 --x execute
- 2 -w- write
- 3 -wx write and execute
- 4 r-- read
- 5 r-x read and execute
- 6 rw- read and write
- 7 rwx read, write and execute

- "-rwxr-xr-x" = 755
- "-rw-rw-r--" = 664
- "-r-x-----" = 500

Change Permissions

- `chown` : change ownership
\$chown edward file
- `chmod` : change permissions
\$chmod g+w file or chmod 774 file
- `chgrp` : change group
\$chgrp admins file

Install packages

- Redhat – Fedora -centos
 - *\$yum install packagename*
- Debian – Ubuntu
 - *\$apt-get install packagename*

Start services

- Redhat – Fedora -centos
 - `$service servicename start [stop/restart]`
- Debian – Ubuntu
 - `$/etc/init.d/servicename start [stop/restart]`

vi Editor

- Text editor since 1976 for BSD unix
- Most widely used text editor (Linux Journal)
- Operates in two modes (insert or normal)
- "i" command gets you in "*insert*"
- Esc key exits you to "*normal*" mode

VI - Cursor Movement

- h move left (backspace)
- j move down
- k move up
- l move right (spacebar)
- w move to beginning of the next word
- b move to beginning of the previous word

VI - Inserting

- r replace character under cursor with next character typed
- R keep replacing character until [esc] is hit
- i insert before cursor
- a append after cursor
- A append at end of line
- O open line above cursor and enter append mode

VI - Deleting & Copying

- x delete character under cursor
- dd delete line under cursor
- dw delete word under cursor
- db delete word before cursor

- yy (yank)'copies' line which may then be put by the p(put) command.

Gcc compiler

- The GNU Compiler Collection includes front ends for C, C++, Objective-C, Fortran, Java, and Ada
- More from: *gcc.gnu.org*

Sample code

```
$vi hello
#include <iostream>

int
main ()
{
    std::cout << "Hello, Ed!\n";
    return 0;
}
```

Compile the code

```
$ g++ -Wall hello.cc -o hello
```

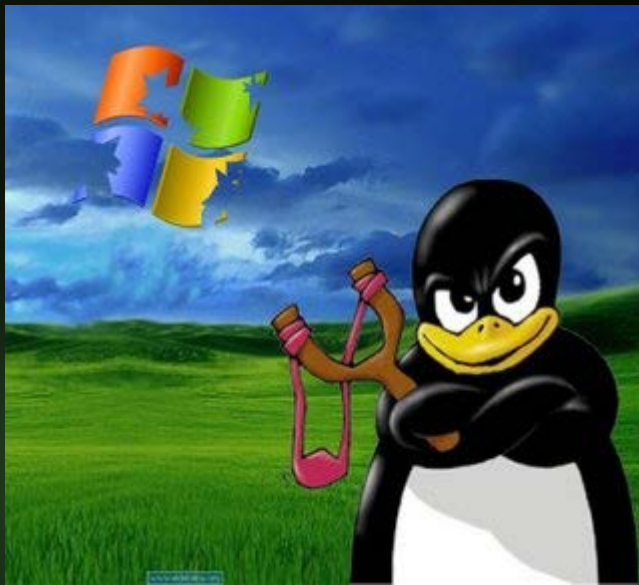
```
$ ./hello
```

```
Hello, Ed!
```

Further Reading

- www.linux.com (kernel www.linux.org)
- <http://www.linux-tutorial.info/>
- <http://www.freeos.com>
- www.linuxjournal.com
- www.linuxcentral.com
- www.distrowatch.com

Questions?



Windows

andLinux