

A Brief Tour of the Linux OS

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Characteristics

- Pre-emptive multi-tasking OS
 - multiple users running multiple tasks simultaneously
 - System controls applications instead of vice-versa.
 - Also called “time-sharing”

Characteristics(cont'd)

- Command-line shell is also a programming language.
 - Shell “scripting”
- Multiple commands can be joined together to produce a final output.
- “Standard I/O” streamed I/O

Linux and Files

- Under Linux/UNIX, everything is a file.
- Files have types and permissions.
 - Types:regular, character, block, special
 - Regular:text or program
 - Character:serial
 - Block: disk
 - Special: device/driver interface.

What makes this all possible?

- Global effort and goodwill on behalf of an entire world of programmers and developers
- Open Source and GPL licensing

Linux File Permissions

```
perms    owner  grp  size  mod.date  name
-rwxr-xr-x  larmadilo  staff  517  12 Nov 00:28  JhaiPingTest.sh
```

- Read, write, execute for owner, group and world.
- Use `chmod` to change permissions
- Use `chown` to change ownership

Permissions(cont'd)

- chmod ops: binary math on 3 bits or flag-based (+/- r, w, x)
- chmod 777 <file> and chmod +rwx <file> are the same thing.

Linux File System

- Files are organized into directories
- Directories can also be “mount points” for disks or disk partitions.
- Partitions can be on a physical hard disk, on a network or on removable media(Flash memory, CDROM, etc.)

What is a file system?

- Logical structure for organizing data on storage media, usually into “blocks”.
- Examples:
 - ext2 (classic Linux FS)
 - vfat (Windows 95,98,2000, etc)
 - ext3
 - reiserfs, etc.

Linux File System

- Important system directories:
 - / “slash” or “root” (approx. 30-250 MB)
 - /usr “user”(approx 100-1500GB or >)
 - /var “varr” (approx 50-500MB)
 - /tmp “temp” (same)

System Partitions

- / - kernel, boot scripts, drivers, vital commands and utilities, config files.
- /usr -most of the OS executable commands, libraries, etc.
- /var -system logs, scratch files, queues,etc.
- /tmp -temporary files

Why partition a disk?

- Control usage of disk space by users/ programs
- Reduce fsck(1) time and control logical damage.
- Provide logical organization to a system's storage resources.

Journaling File Systems

- Synchronizes more often than ext2
- Transaction-oriented, similar to some databases.
- Useful where power conditions are unreliable
- Examples: ext3, reiserfs, xfs
- May need modules built into kernel

Linux Kernel

- Running binary image of the Linux OS
- Manages device access(RAM, storage, network, video, keyboard/mouse, etc.).
- Schedules/Controls execution of other programs.
- Linux kernel is “modular” or “micro-kernel”, parts can be loaded/removed on request.
- Other modules can be added in later by recompiling a new kernel

Other useful kernel info

- /proc -contains useful info about system hardware
 - /proc/cpuinfo
 - /proc/interrupts
 - /proc/devices
 - /proc/sys/net/ipv4/ip_forward

Open Source Software

- Classic Scientific Approach
- Source Code available for inspection, modification and contribution back to the community
- “With a thousand eyeballs, all bugs are shallow”
- Right to know what’s in your software
- Right to modify/innovate
- Right to share

Types of OSS Licenses

- GPL
- BSD
- Many others: Mozilla, MIT, IBM, Sun Community License, etc.
- You can set any kind of license you want for your software

GPL License

- GNU General Public License
 - Free Speech vs. Free Beer
 - Allows free, unrestricted copying and distribution
 - Modifications to GPL-licensed software are also covered by the GPL.
 - Binary distribution of GPL-licensed software must include a notice that the source is available and is GPL-licensed
 - Not compulsory

BSD License

- “Berkeley Standard Distribution”
- Most significant difference from GPL is that it allows privatization/”capturing” of source code for commercialization

Licensing/Open Source links

- Free Software Foundation: www.fsf.org
- Electronic Frontiers Foundation: www.eff.org
- Software in the Public Interest:
www.debian.org

Open Source Links(cont'd)

- BSD
 - OpenBSD www.openbsd.org
 - FreeBSD www.freebsd.org
 - NetBSD www.netbsd.org

Open Source Links(cont'd)

- Open Source Project Hosting:
 - www.openprojects.org
 - www.freshmeat.net
 - www.sourceforge.net
 - Why not host your own?