Hervey Allen
Network Startup Resource Center

PacNOG 6: Nadi, Fiji
UNIX™/Linux Overview
Unix vs. Linux

Are they the same?
In terms of operating system interfaces, yes
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
Due to modular design has a reasonable security model
Linux and its applications are not without blame
The UNIX™ System

- **Background processing**
  - Non-interactive
  - (no terminal)

- **Launch processes**
  - User interaction (terminal)
  - Job control
    - (scripting)

- **DAEMONS**

- **SHELLS**

- **KERNEL**

- **APPS**

- **USERS**
  - I/O (+ terminals)
  - Memory management (VM)
  - Interruptions
  - Scheduling / Timesharing
  - Networking

- **File management**
  - Editors
  - Compilers
  - Network tools
  - ...

- **Eat Resources :-)**
  - (uid / gid)
The "heart" of an operating system

- Device drivers
  - Communicate with your hardware such as block devices, character devices, network devices, pseudo devices, etc.
- Filesystems
  - Organise block devices into files and directories
- Memory management
- Timeslicing (multitasking)
- Networking stacks - especially TCP/IP
- Enforces security model
Shells

Command line interface for executing programs
- DOS/Windows equivalent: command.com or command.exe to use the Windows Command Shell.

Programming languages for scripting
- DOS/Windows equivalent: Windows Script Files (.WSF) or old school BATch files (.BAT).

Choice of similar but slightly different shells
- **sh**: the "Bourne Shell". Standardised in POSIX
- **csh**: the "C Shell". Not standard, but includes command history
- **bash**: the "Bourne-Again Shell". Combines POSIX standard with command history.
- Others: **ksh**, **tcsh** (Mac OS X default), **zsh**
User Processes

The programs that you choose to run.
Frequently-used programs tend to have short cryptic names.

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

Lots of stuff included in most base systems:
Editors, compilers, servers, system admin tools

Lots more stuff available to install as well
Using the Debian/Ubuntu repositories*

*Commercial software available with Ubuntu Server 9.10 LTS
System Processes

Programs that run in the background; also known as "daemons" =>

Examples:

- **cron**: Executes programs at certain times of day
- **inetd**: Accepts incoming TCP/IP connections and starts programs for each one
- **sendmail** (other MTA daemons like Exim, Postfix, qmail): Accepts incoming mail
- **sshd**: Accepts incoming logins
- **syslogd**: Takes log messages and writes them to files
Security Model

Numeric IDs

- user id (uid 0 = "root", the superuser)
- group id
- supplementary groups

Mapped to names

/etc/passwd, /etc/group (plain text files)

Suitable security rules enforced

- e.g. you cannot kill a process running as a different user, unless you are "root"
Questions
Core Directory Refresher

/ (/boot, /bin, /sbin, /etc, maybe /tmp)
/var (Log files, spool, maybe user mail)
/usr (Installed software packages)
/tmp (May reside under “/”)

Don't confuse the the “root account” (/root) with the “root” (“/”) partition.
During an Ubuntu installation you can choose this option. It creates the following:

- **Root partition:**
  Contains everything not in other partitions like /bin, /sbin, /usr, /tmp etc. User home directories are under /home.

- **A swap partition** for virtual memory

- **/boot** for kernel boot files
Partitioning Issues and Schemes

- /usr: Contains OS utilities, third-party software
- /tmp: Temporary files
- /var: Variable files such as logs, print queues
- /home: Contains user data
- /boot: System kernel files
- /: Everything else (/bin, /etc, /lib, /opt, /sbin)
  - What size for each partition?
  - Partitions can go on separate disks.
  - Particular to Linux. (/usr/home, /usr/tmp, etc.)
A “Fairly Typical” Partition Scheme

• Hardest part is choosing the size for each partition.
• New file systems, logical volume management, partitions on a disk can help with all of these issues

/dev/sda or RAID array

```
/boot / /home /var /usr /tmp swap
```

“/” or “root” partition contains all other directories, such as: /bin, /etc, /lib, /opt, /sbin, etc.
Notes… Partitioning

• Partitioning is just a logical division
• If your hard drive dies, most likely *everything* will be lost.
• If you want “Data Security”, then you must backup your data – offsite.
• You can mirror drives, but… remember, “*rm -rf*” on a mirror works very well.
• For larger drives (500GB to 1TB) RAID 6 is necessary.
Questions
What’s Uniquely Ubuntu (Debian)

Software management:
- dpkg
- apt
- apt-cache
- aptitude
- synaptic
- meta-packages
- repositories
Uniquely Ubuntu cont.

Startup scripts:
- In /etc/init.d/ (System V)
- Upon install services run!

Controlling services:
- update-rc.d
- sysvconfig
- rcconf
- rc-config
Make and GCC

• Not installed by default. Why?
• 30,000'ish packages (depending on what repositories you decide to use):
  – http://packages.ubuntu.com/
• To install:
  apt-get install build-essential
The use of the *root* account is discouraged and the *sudo* program should be used to access root privileges from your own account instead.

You can do `apt-get dist-upgrade` to move between major and minor releases.

Package sources in `/etc/apt/sources.list` (how you install from cd/dvd or the network).
Good Reading

man apt-get
man sources.list

Some people like **aptitude**, partly for the full-screen interface:
Meta Packages

• Annoying to new users
• Provide all packages for subsystems
• Initial documentation
  https://help.ubuntu.com/community/MetaPackages

Examples include:
- build-essential (libc, g++, gcc, make)
- ubuntu-desktop (xorg, gnome)
- linux-generic (kernel source)
- linux-headers-generic (kernel headers)
- Etc…
The World of Ubuntu

- Ubuntu supported by Canonical Ltd, founded by Mark Shuttleworth
- “Ubuntu” = “humanity towards others”
- **Versions:**
  - New release every 6 months
    - Supported for 18 months
  - LTS = Long Term Service
    - New LTS every 2 years
    - Desktop support for 2 years
    - Server support for 5 years
  - Ubuntu community uses code names to refer to versions.
  - 32 and 64-bit versions

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<th>Version</th>
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<th>Release date</th>
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<td>4.10</td>
<td>Warty Warthog</td>
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<tr>
<td>10.04 LTS</td>
<td>Lucid Lynx[^45]</td>
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There’s More!

But, hopefully enough to get us started...

**Some Resources**

www.ubuntu.com  
ubuntuforums.org  
www.debian.org  
ubuntuguide.org  

*GIYF (Google Is Your Friend)*