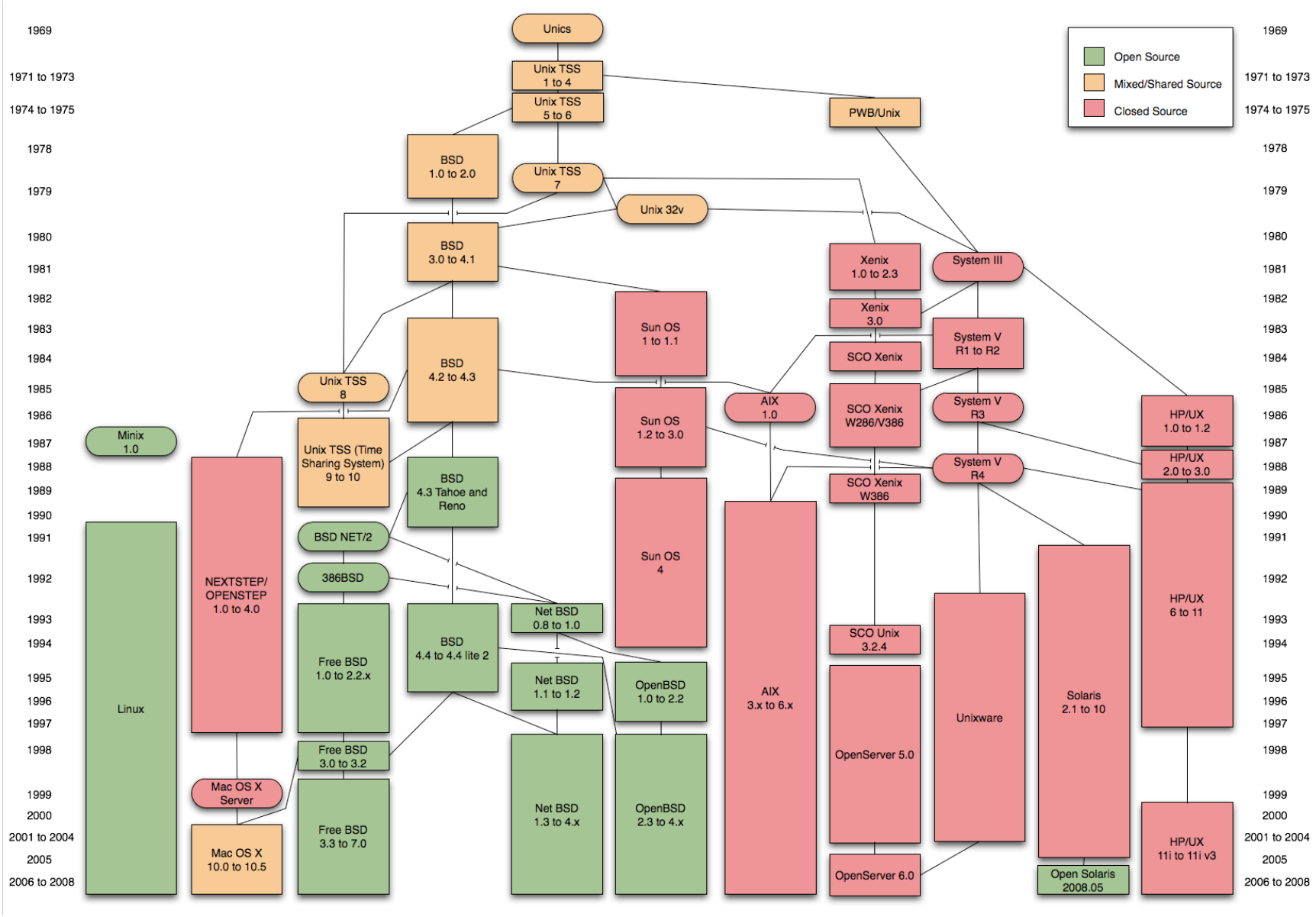
Hervey Allen

Network Startup Resource Center

PacNOG 6: Nadi, Fiji

UNIX™/Linux Overview

History


Open Source
Mixed/Shared Source
Closed Source
1969
1971 to 1973
1974 to 1975
1978
1979
1980
1981
1982
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1985
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1987
1988
1989
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1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001 to 2004
2005
2006 to 2008
Unics
Unix TSS 1 to 4
Unix TSS 5 to 6
PWB/Unix
BSD 1.0 to 2.0
Unix TSS 7
Unix 32v
BSD 3.0 to 4.1
Xenix 1.0 to 2.3
System III
Xenix 3.0
Sun OS 1 to 1.1
System V R1 to R2
SCO Xenix
BSD 4.2 to 4.3
Unix TSS 8
AIX 1.0
SCO Xenix W286/V386
System V R3
HP/UX 1.0 to 1.2
Minix 1.0
Unix TSS (Time Sharing System) 9 to 10
Sun OS 1.2 to 3.0
HP/UX 2.0 to 3.0
BSD 4.3 Tahoe and Reno
System V R4
SCO Xenix W386
BSD NET/2
NEXTSTEP/ OPENSTEP 1.0 to 4.0
Sun OS 4
386BSD
HP/UX 6 to 11
Net BSD 0.8 to 1.0
Free BSD 1.0 to 2.2.x
BSD 4.4 to 4.4 lite 2
AIX 3.x to 6.x
SCO Unix 3.2.4
Linux
Net BSD 1.1 to 1.2
OpenBSD 1.0 to 2.2
Unixware
Solaris 2.1 to 10
OpenServer 5.0
Free BSD 3.0 to 3.2
Mac OS X Server
Net BSD 1.3 to 4.x
OpenBSD 2.3 to 4.x
HP/UX 11i to 11i v3
Free BSD 3.3 to 7.0
Mac OS X 10.0 to 10.5
OpenServer 6.0
Open Solaris 2008.05

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

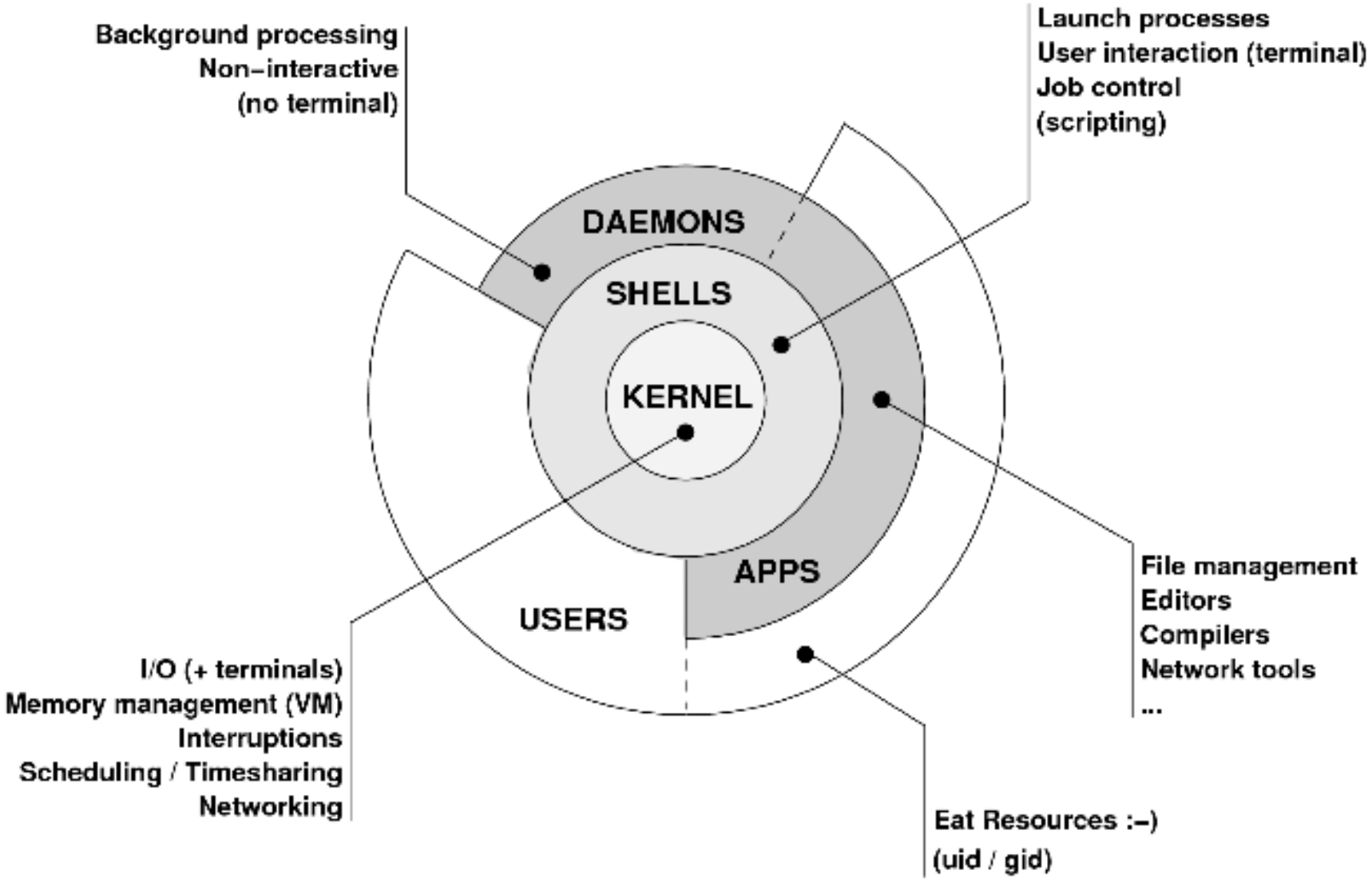
Manageability

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



The Kernel

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.

Default Partitioning Scheme

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

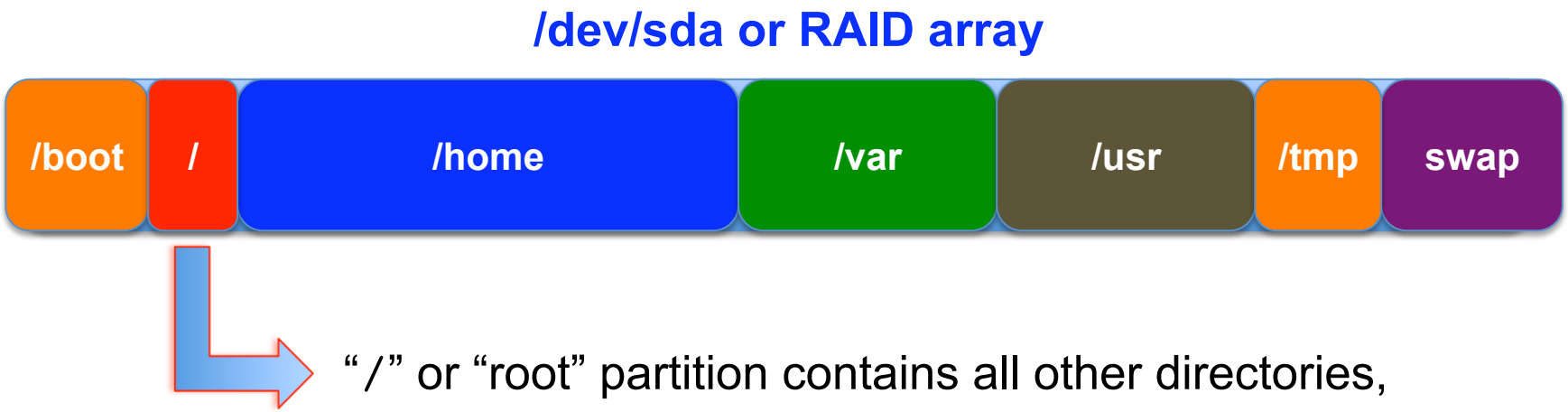
/usr	Contains OS utilities, third-party software
/tmp	Temporary files
/var	Variable files such as logs, print queues
/home	Contains user data
/boot	System kernel files
/	Everything else (/bin, /etc, /lib, /opt, /sbin)

- What size for each partition?
- Partitions can go on separate disks.
- Particular to Linux. (/usr/home, /usr/tmp, etc.)

Visual layout next slide ➔➔

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



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

Uniquely Ubuntu cont.

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
```

Uniquely Ubuntu cont.

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.

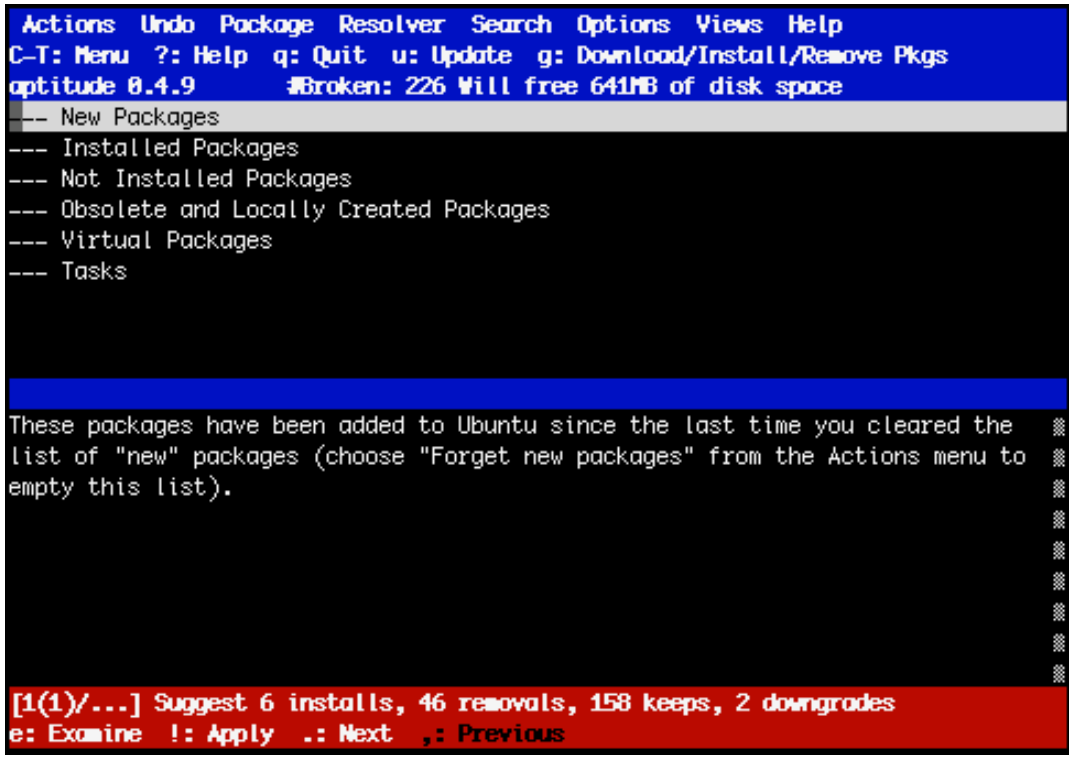
Package sources in /etc/apt/sources.list (how you install from cd/dvd or the network).

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

Version	Code name	Release date
4.10	Warty Warthog	2004-10-20
5.04	Hoary Hedgehog	2005-04-08
5.10	Breezy Badger	2005-10-13
6.06 LTS	Dapper Drake	2006-06-01
6.10	Edgy Eft	2006-10-26
7.04	Feisty Fawn	2007-04-19
7.10	Gutsy Gibbon	2007-10-18
8.04 LTS	Hardy Heron	2008-04-24
8.10	Intrepid Ibex	2008-10-30
9.04	Jaunty Jackalope	2009-04-23[42]
9.10	Karmic Koala[43]	2009-10-29[44]
10.04 LTS	Lucid Lynx[45]	2010-04-29[46]

There's More!

But, hopefully enough to get us started...

Some Resources

www.ubuntu.com

ubuntuforums.org

www.debian.org

ubuntuguide.org

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

http://en.wikipedia.org/wiki/Ubuntu_(Linux_distribution)

GIYF (Google Is Your Friend)