Welcome to GNU/Linux

Roger Griffiths
rgriffiths@mercyhurst.edu

Mercyhurst College
Department of Mathematics and Computer Systems

http://math.mercyhurst.edu/~griff/
What is Linux?

- A Fully-Functional Multi-User Multi-Process Unixlike Open Source Operating System comprised of Linus Torvalds’ kernel, many GNU tools, and software from many many more contributors worldwide.

- Originally the term Linux referred strictly to the kernel (the core of the operating system), but today the phrase refers to a collection of software (packages) that runs on top of the Linux kernel. These ’collections of software’ are known as distributions.

- “One of the misconceptions about Linux is that it was started out of a desire to create a competitor to Microsoft operating systems. This could not be further from the truth. Like many open source projects, Linux grew out of dissatisfaction. I couldn’t afford some of the commercial OS s and I didn’t want to run DOS or Windows - I don’t even know, did Windows really exist then?” - Linus
- HISTORY -
GNU Linux History (0)

- 1965 Bell Labs develops Multics.

- 1969 Bell Labs begins work on UNICS (Ken Thompson & Dennis Richie - who also created the C language).
  - Its portability led to widespread success.
  - Its free availability led to worldwide development.

- 1975: When UNIX became widely available, Bell Labs offered it to Universities.

- 1983: GNU Project founded by Richard Stallman. This foundation provides the fundamentals behind Linux development, as nearly all Linux distributions consist of GNU tools - GNU, stands for Gnu’s Not Unix. (see: http://www.gnu.org/gnu/).

- 1984 AT&T began selling their version of UNIX (System V).
The ideology of the Gnu Project still dives Linux development.
From the The GNU Manifesto by Richard Stallman:

I consider that the golden rule requires that if I like a program I must share it with other people who like it. Software sellers want to divide the users and conquer them, making each user agree not to share with others. I refuse to break solidarity with other users in this way. I cannot in good conscience sign a nondisclosure agreement or a software license agreement. For years I worked within the Artificial Intelligence Lab to resist such tendencies and other inhospitalities, but eventually they had gone too far: I could not remain in an institution where such things are done for me against my will.

So that I can continue to use computers without dishonor, I have decided to put together a sufficient body of free software so that I will be able to get along without any software that is not free. I have resigned from the AI lab to deny MIT any legal excuse to prevent me from giving GNU away.

The civics of our community

"Free software" and "open source" describe the same category of software, more or less, but say different things about the software, and about values. The GNU Project continues to use the term "free software", to express the idea that freedom, not just technology, is important.

The Free Software Definition: “Free software” is a matter of liberty, not price. To understand the concept, you should think of “free” as in “free speech,” not as in “free beer.”


There are numerous web sites and magazines dedicated to Free Software (and this philosophy)

- The Free Software Foundation: http://www.fsf.org/
- Free Software Magazine: http://www.freesoftwaremagazine.com/
- GNU Project: http://www.gnu.org/
By 1990 the GNU project had either found or written all the major components except one—the kernel.

Minix an operating system written by Andrew Tanenbaum, for teaching a class called Operating Systems: Design and Implementation.

1991: Linus Torvalds releases version 0.01 of his OS (a Minix-like kernel with GNU tools), and names it Linux. Originally planned to name the operating system: "Freax - free + freak + x".

Linux is released under the GNU General Public License (GPL), which they refer to as *copylefting* its software. “Proprietary software developers use copyright to take away the users’ freedom; we use copyright to guarantee their freedom. That’s why we reverse the name, changing “copyright” into “copyleft.”
From: torvalds@klaava.Helsinki.FI (Linus Benedict Torvalds)
Newsgroups: comp.os.minix
Subject: What would you like to see most in minix?
Date: 25 Aug 91 20:57:08 GMT

Hello everybody out there using minix -

I’m doing a (free) operating system (just a hobby, won’t be big and professional like gnu) for 386(486) AT clones. This has been brewing since april, and is starting to get ready. I’d like any feedback on things people like/dislike in minix, as my OS resembles it somewhat (same physical layout of the file-system (due to practical reasons) among other things).

I’ve currently ported bash(1.08) and gcc(1.40), and things seem to work. This implies that I’ll get something practical within a few months, and I’d like to know what features most people would want. Any suggestions are welcome, but I won’t promise I’ll implement them :-)

Linus (torvalds@kruuna.helsinki.fi)

PS. Yes - it’s free of any minix code, and it has a multi-threaded fs. It is NOT portable(uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that’s all I have :-(
Initially, there was animosity between Andrew Tanenbaum (a famous Dutch professor) and Linus Torvalds (a young graduate student): "I still maintain the point that designing a monolithic kernel in 1991 is a fundamental error. Be thankful you are not my student. You would not get a high grade for such a design :-)

(Andrew Tanenbaum to Linus Torvalds)

Soon many joined the Linux camp, including programmers from the GNU project. It was licensed under GNU General Public License, thus ensuring that the source codes will be free for all to copy, study and to change.

What is commonly called “Linux” is just the kernel of the OS. Linux is normally used in a combination with the GNU operating system: the whole system is basically GNU, with Linux functioning as its kernel.
- LINUX TODAY -
Today Linux is the fastest growing operating system in the world.

- 1998: estimate of the total user base, approximately 7 million users worldwide.
- The Linux Counter project estimates 29 million users worldwide (SWAG).

Linux is being actively developed under the open source model by developers worldwide.

Linus still calls the shots where the kernel is concerned, but Linux is more than just the kernel.

An increasing number of Academic, Financial, Graphics, Internet, and Research institutions are implementing Linux based servers, and clusters for High Performance Computing.

- Many of the fastest supercomputers run some Unix variant (Linux, Solaris, AIX,...)
- Various Internet based companies are based entirely on Linux. For example http://www.google.com has a cluster of SEVERAL THOUSAND machines, the largest ever Linux cluster (All of them run Redhat’s Linux distribution). Another example is the site: http://www.amazon.com, which replaced its SUN Solaris servers with an all Linux based solution several years ago.
Linux Today (2)

• Linux distributions (Distrowatch currently lists 352 different distros):
  • Red Hat
  • Fedora
  • Ubuntu
  • Debian
  • MEPIS
  • Gentoo Linux
  • Slackware
  • FreeBSD
  • Mandriva
  • openSUSE
  • Xandros
  • Arch Linux
  • Solaris
  • Turbolinux
  • Yellow Dog
  • Puppy
  • College Linux
  • Zenwalk ....................
How do you choose a distribution?

- Easiest for a beginner:
  - MEPIS
  - Ubuntu
  - Xandros

- Middle ground:
  - Mandriva
  - Fedora
  - SUSE

- More advanced distributions (read, harder to master):
  - Slackware
  - Debian
  - FreeBSD

- Can run from a CD (live CD):
  - Knoppix
  - Ubuntu
  - MEPIS
  - Damn Small Linux
- WHY LINUX? -
Why Linux? (1)

That depends on who is asking (server vs. client).

- You could believe in the philosophy embraced by the FSF/GNU.
- The Linux kernel has grown to be a most stable system.
  - Very efficient Memory Management
  - Modular kernel design, along with its Open Source development allows end users to develop and compile their own kernel for their specific requirements.
  - No copyright restrictions or restrictive licensing agreements.
  - Ported to many hardware configurations.
  - Linux is UNIX-like, shares the strengths of the Unix platform which has stood the test of time.
- Linux is Multi-user
- Fast releases of security bugs (free and easy updates)

- The depth of built-in utilities, which are indispensable once you take the trouble to learn them.
- You like getting your 'hands under the hood' of your computer
- You are an 'academic' at heart and thus embrace open source.
Why Linux? (2)

- Problems with existing systems:
  - Slow release pattern
  - High cost (M$ always uses the term: ’Total Cost of Ownership’)
  - Security
  - Monopolistic attitude
  - Lack of source code availability
  - Planned obsolescence of hardware (lack of backward support)
- Linux is portable (runs on many different machines)
- Standards, like POSIX (Portable Operating System Interface for computer Environments), lately spurred by the US government.
- You have access to the source code for almost any software that runs on Linux
- It is free - you have the ability to use/learn/modify the most sophisticated server OS FREE
Why Linux? (3)

- Look at all you get:
  - Comes with a complete development environment, including C, C++, Fortran, Java compilers, toolkits such as Qt and scripting languages such as Perl, Ruby, Python, Awk and sed.
  - Most distributions will also provide applications such as Open Office (very similar to Microsoft Office), Gimp (similar to Adobe Photoshop).
  - There are open source (and free) software packages such as Maxima or GNU Octave (similar to Maple or Mathematica), Scilab (similar to Matlab) and so on...
  - Unlike Windows, users have several choices for the graphical user interface (usually either Gnome, KDE, or Xfce)

- Two key words for Linux are “Have Fun!”
The Downside

- Problems with Linux:
  - System administration difficult for non-UNIX users (not a problem any more)
  - Some argue, the Desktop is lacking
  - Those same folks argue, the desktop is not as “integrated” as Windows (then they wonder why it is so easy for viruses to spread).
  - Lack of commercial applications (not at the research/enterprise level)
  - Lack of hardware vendor support (primarily for state of the art hardware)
  - Can be difficult to work in completely M$ shops, such as here at Microhurst.
  - You are a gamer with a state-of-the-art graphics card.
  - Most installations presume full-time network and ethernet
  - (This list is harder for me - sorry)
Why should you learn to Use Linux?

- As a 'technical' person, you should be able to address the question:
  
  "What is Linux?"

- If you end up doing web development, approximately 51% of web servers run Apache, predominately on the Unix or Linux platform.

- If you end up doing software development, you should be aware of the many advantages of the Linux development platform. By the way, all of Microsoft OS/software including DOS 2.x, all their languages and applications, Mac Word and Mac Excel, Windows Excel and Windows Word up through Windows 3.1, were written in vi and compiled on Xenix boxes (a Unix system Bill originally tried pushing).

- There is currently an industry shortage of programmers/developers with Linux experience (skills shortage leads to increased employee power).
Why should you learn to Use Linux?

To mess up a Linux box, you need to work at it; to mess up your Windows box, you just need to work on it, writes SecurityFocus columnist Scott Granneman.