

# HISTORY

## Linux at 25

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In June 1991, at the USENIX conference in Nashville, BSD NET-2 was announced. Two months later, on August 25, Linus Torvalds announced his new operating system on `comp.os.minix`. Today, Android, Google's version of Linux, is used on over two billion smartphones and other appliances. In this article, I provide some history about the early years of Linux.

Linus was born into the Swedish minority of Finland (about 5% of the five million Finns). He was a "math guy" throughout his schooling. Early on, he "inherited" a Commodore VIC-20 (released in June 1980) from his grandfather; in 1987 he spent his savings on a Sinclair QL (released in January 1984, the "Quantum Leap," with a Motorola 68008 running at 7.5 MHz and 128 kB of RAM, was intended for small businesses and the serious hobbyist). It ran Q-DOS, and it was what got Linus involved:

One of the things I hated about the QL was that it had a read-only operating system. You couldn't change things ...

I bought a new assembler ... and an editor.... Both ... worked fine, but they were on the microdrives and couldn't be put on the EEPROM. So I wrote my own editor and assembler and used them for all my programming. Both were written in assembly language, which is incredibly stupid by today's standards. [1]

But look for a moment at Linus' posting of August 25, 1991: `comp.os.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).

Linus had ported `bash` (1.08) and `gcc` (1.40). More would come. In the fall of 1990, the University of Helsinki had installed its first UNIX machine, a MicroVAX running Ultrix. But Linus was "eager to work with Unix by experimenting with what I was learning in Andrew Tanenbaum's book" ([1], p. 53) and read all 700-odd pages of *Operating Systems* [Prentice-Hall, 1987]. The book "lived on my bed." *Operating Systems* came with the code for Minix, Tanenbaum's UNIX clone.

One of the things that struck Linus about UNIX was its openness. Another was its simplicity. And then came a bolt from the blue: in early 1991, Lars Wirzenius dragged Linus to the Polytechnic University of Helsinki to hear Richard Stallman. "I don't remember much about the talk," Linus says. "But I guess something from his speech must have sunk in. After all, I later ended up using the GPL for Linux."

On January 5, 1991, Linus got his father to drive to a "mom and pop" computer store, where he had ordered a no-name 4-Meg, 33 MHz, 386 box. He was 21. The box came with DOS, but Linus wanted Minix and ordered it. It took a month for the parcel to find its way to Finland, but it arrived and Linus fed the 16 diskettes to the machine. And then he began "playing" with it. The first thing he wrote was a terminal emulator: "That's how Linux got started. With my test programs turning into a terminal emulator."

Because Linus was truly dependent upon the Internet and (specifically) the comp.os.minix newsgroup, we can date events far more accurately than in earlier decades.

We know that Linus' first posting to comp.os.minix, asking about the POSIX standard, was July 3, 1991. And we can see his posting about "doing a (free) operating system (just a hobby, won't be big and professional like gnu) ... This has been brewing since april ..." of August 25, 1991.

There was a reasonable expression of interest. We thus know that Linus put what we would now call Linux 0.01 up on the University of Helsinki ftp site on September 17, 1991. "No more than one or two people ever checked it out," he said.

The following January there was discernible growth in the Linux community, leading (I think) to the online debate about kernels begun by Andy Tanenbaum on January 29, 1992. Although I don't want to go into detail, the debate began with Andy stating that microkernels were better than monolithic kernels, and that Linux was therefore already obsolete.

It is more important, in my opinion, that in the spring of 1992, Orest Zborowski ported X-windows to Linux and that, thanks to the Internet and to Usenet, the work of a hobbyist in Finland could be picked up elsewhere in Europe, in Australia, and in the US.

Also in 1992, Rémy Card wrote the extended file system for Linux, the first to use the virtual file system, modeled after the one in BSD. Later, Card went on to write ext2, which moved further away from the limitations of the Minix file system and was more like the BSD fast file system.

The number of Linux users continued to grow, as did the versions of the software: Linux .01 was 63 KB compressed. Only a few weeks later, on October 5, Linus posted .02; on December 19, v.11 was posted; and on January 5, 1992, v.12—108 KB compressed—appeared. On March 7, there was v.95 and on May 25, 1992, v.96 showed up, with support for X and taking up 174 KB compressed.

Ted Ts'o was the first North American Linux user. "There was fairly strong social cohesion," he told me. "Linux was the first big project to succeed in a distributed fashion."

### The Birth of Distros

Following Linus' postings of 1991, there soon were what we have come to call "distributions." And, rather than utilizing ftp, they came on CD-ROM.

The first of these was Adam Richter's Yggdrasil. In the Old Norse Edda, Yggdrasil is the "world ash," from a branch of which Odin/Wotan made his spear. Yggdrasil alpha was released on December 8, 1992, and was called LGX: Linux/GNU/X—the three components of the system.

John Gilmore, Michael Tiemann, and David Henkel-Wallace formed Cygnus in 1989. Richter spoke to Michael Tiemann about setting up a business but was "definitely uninterested in joining forces with Cygnus."

Yggdrasil beta was released the next year. Richter's press release read:

The Yggdrasil beta release is the first UNIX(R) clone to include multimedia facilities as part of its base configuration. The beta release also includes X-windows, networking ... an easy installation mechanism, and the ability to run directly from the CD-ROM.

The beta was priced at \$50; the production release was \$99.

SuSE was also formed in 1992 as a consulting group. SuSE was originally S.u.S.E.—"Software-und-System-Entwicklung," or Software and System Development—but did not release a Linux distribution for several years. The next distribution—and the oldest still in existence—was Patrick Volkerding's Slackware, released July 16, 1993, soon after he graduated from Minnesota State University Moorhead. Slackware, in turn, was the basis for SuSE's release "Linux 1.0" of SLS/Slackware in 1994. SLS was "Softlanding Linux System," Peter MacDonald's 1992 distribution, on which parts of Slackware were based. SuSE later integrated Florian La Roche's Jurix distribution, resulting in a unique distribution: SuSE 4.2 (1996).

The next year, Mark Bolzern was trying to sell a UNIX database from Multisoft, a German company. He encountered difficulties because it was relatively expensive to set up the UNIX system. Then he came across Gnu/Linux and realized that he now had a real solution. He convinced Multisoft to port Flagship (the db) to Linux, and "that was the first commercial product released on Linux," Bolzern said.

"People were always having trouble installing Linux," he continued, "and then Flagship wouldn't run right because something had changed." Bolzern decided that what was needed was a release that wouldn't change for a year, so he "picked a specific distribution of Slackware" and "the name Linux Pro." Soon he was selling more Linux than Flagship: "we're talking hundreds per month."

And when Red Hat came out, Bolzern picked that up.

Marc Ewing had set up Red Hat in 1993. He said: "I started Red Hat to produce a development tool I thought the world needed. Linux was just becoming available and I used [it] as my development platform. However, I soon found that I was spending more time managing my Linux box than I was developing my software, and I concluded that what the world really needed was a good Linux distribution."

In 1993, Bob Young was working for Vernon Computer Rentals. He told me: “I knew the writing was on the wall for my future with that company [VCR].” He continued:

Red Hat the company was legally incorporated in March of 1993 in Connecticut under the name ACC Corp., Inc. It changed its name to Red Hat Software, Inc. in early 1996, and changed its name a last time to simply Red Hat, Inc. just before going public in June of 1999.

ACC Corp., Inc. bought the assets, including all copyrights and trademarks (none were registered at the time) relating to Marc Ewing’s sole proprietorship business venture, in January 1993. Marc’s Red Hat project was not incorporated but was run out of Marc’s personal checking account. Marc received shares in ACC Corp, Inc. in return for the Red Hat name and assets.

In 1995 Red Hat packaged Linux, some utilities, and initial support for \$50. Also in 1995, Bryan Sparks (with funding from Ray Noorda, former CEO of Novell) founded Caldera, and the Apache Software Foundation released Apache, which would become the most widespread Web server. But Red Hat soon became the most popular Linux release. This was unexpected: Linus had said that he expected Caldera to be the top supplier, because it was “kind of a step beyond” in that it was targeting the office market. “I think what’s interesting about Caldera is they based their stuff on Red Hat and then they added a commercial kind of approach.”

When Red Hat became a “success,” Bob Young and family moved from Connecticut to North Carolina (Ewing lived in Durham).

ACC, Young’s company, had sold Linux/UNIX software and books. Young had been introduced to the UNIX world in 1988, when he was with Vernon Leasing and Rentals, and began publishing New York UNIX as well as catalog sales. This led to his being the founding editor of *Linux Journal*, a post he held for two issues in 1994, before “splitting the losses” with Phil Hughes, the publisher of *LJ*.

On November 5, 1993, Linus spoke at the NLUUG (Netherlands UNIX Users’ Group).

On March 12, 1994, Linus released Linux 1.0, basically v0.99, patch level 157. It was the first stable kernel distribution.

I don’t want to go into extensive detail here, but I think that there are a number of important points to be made:

1. The birth, growth, and development of Linux were totally unorganized.
2. It was geographically well-distributed.
3. It was conducted via the Internet.

In the summer of 1995, I was approached by Lisa Bloch, then the Executive Director of the Free Software Foundation (FSF), as to the feasibility of a conference on “Freely Redistributable Software.” I was enthusiastic but had my qualms about profitability. Richard Stallman, at our meeting, was quite understanding: FSF would bankroll the affair, but he hoped we could turn a small profit.

Lisa and I put together a committee (Bob Chassell, Chris Demetriou, John Gilmore, Kirk McKusick, Rich Morin, Eric Raymond, and Vernor Vinge) and we posted a Call for Papers on several newsgroups.

Thanks to “Maddog” (Jon Hall), Linus agreed to be a keynote speaker, and Stallman was the other. We had a day of tutorials and two days of papers (February 3–5, 1996, at the Cambridge Center Marriott). Half a dozen distributions were represented, and everything ran smoothly. By the end, I was a nervous wreck, and the FSF ended up making a tiny profit.

Debian Linux was created by Ian Murdock (Debian = Debbie + Ian), who officially founded the “Project” on August 16, 1993. From November 1994 to November 1995, the Debian Project was sponsored by the FSF.

In November 1995, Infomagic released an experimental version of Debian which was only partially in ELF format as “Debian 1.0.” On December 11, Debian and Infomagic jointly announced that this release “was screwed.” Bruce Perens, who had succeeded Murdock as “leader,” said that the data placed on the 5-CD set would most likely not even boot.

The real result was that the “real” release, Buzz, was 1.1 (June 17, 1996), with 474 packages. Bruce was employed by Pixar and so all Debian releases are named after characters in *Toy Story* (1995):

- ◆ 1.2 Rex, December 12, 1996 (848 packages)
- ◆ 1.3 Bo, June 5, 1997 (974 packages)
- ◆ 2.0 Hamm, July 24, 1998 (“over 1500 packages”)
- ◆ 2.1 Slink, March 9, 1999 (“about 2250 packages”)
- ◆ 2.2 Potato, August 15, 2000 (“more than 3900 binary packages”)
- ◆ 3.0 Woody, July 19, 2002 (8500 binary packages)
- ◆ 3.1 Sarge, June 6, 2005 (15,400 packages)
- ◆ 4.0 Etch (obsolete)
- ◆ 5.0 Lenny (obsolete)
- ◆ 6.0 Squeeze (obsolete)
- ◆ 7 Wheezy (obsolete)
- ◆ 8 Jessie (current stable release)
- ◆ 9 Stretch

Buzz fit on one CD, Slink went to two, and Sarge is on 14 CDs in the official set. It was released fully translated into over 30 languages and contains a new debian-installer. Slink had also introduced ports to the Alpha and Sparc. In 1999, Debian also began a Hurd port.

Although Debian carried the burden of being tough to install for several years, Sarge changed that. The new installer with automatic hardware detection was quite remarkable. That's why I've reduced the detail over the next decade.

At this point, I'd like to introduce Mandrake, a Linux distribution based on Red Hat 5.1 and KDE. KDE was a joke on CDE (Common Desktop Environment), begun by Matthias Estrich in Tuebingen in 1996. Mandrake was created by Gael Duval, a graduate of Caen University, in July 1998. From 1998 to early 2004, Mandrake was reasonably successful, notable for its high degree of internationalization as well as for the variety of chips it would run on. However, in February 2004 Mandrakesoft lost a suit filed by the Hearst Syndicate, which claimed invasion of their trademarked "Mandrake the Magician." Starting with 10.0, there was a minor name change. Then, in April 2005, Mandrakesoft announced that there was a merger with Conectiva and that the new name would be Mandriva.

Joseph Cheek founded Redmond Linux in 2000. In 2001 it merged with DeepLinux. In January 2002, the company was renamed Lycoris, and its Desktop/LX was based on Caldera's Workstation 3.1. In June 2005, Lycoris was acquired by Mandriva.

It might be a full-time job to track all the distributions and their origins. For instance, Kanotix is a Debian derivative. It is also a Knoppix derivative, as it is a live CD, and it is solid as a rock.

Knoppix was created by Klaus Knopper, a freelance IT/Linux consultant. It has achieved popularity because it is easily run from the CD, without installation, and because it can be readily employed to fix corrupted file systems, etc. It was the first Linux on a live CD.

The last time I attempted a tally of Linux distributions, about ten years ago, there were well over 100; over a dozen might be considered popular. But then the world changed. Android lurched onto the scene. Initially developed by Android, Inc., which Google bought in 2005, Android was unveiled in 2007.

Just look how far that (free) operating system has come:

- ◆ 2013: Android claims 75% of the smartphone market share, in terms of the number of phones shipped (a total of 1.859 billion in 2015).
- ◆ 2014: Ubuntu claims 22 million users.
- ◆ 2015: Version 4.0 of the Linux kernel is released.

Statista projects 2.8 billion smartphone users worldwide in 2016. Over 2 billion of them employ Android.

Happy 25th birthday, Linux, and thank you, Linus!

Further details of the birth and development of Linux may be found in my book *The Daemon, the Gnu, and the Penguin* (Reed Media Services, 2008).

### Reference

- [1] L. Torvalds, *Just for Fun* (HarperCollins, 2001), pp. 45, 53.

## ;/login: 2016 Publishing Schedule

;/login: has changed from a bimonthly to a quarterly schedule, with four issues per year. Below is the publishing schedule for the rest of 2016.

Issue	Article Drafts Due	Final Articles Due	Columns Due	Proofs to Authors	Issue Mailing Date
Fall	June 6	June 13	June 27	August 1	September 1
Winter	September 6	September 13	September 20	October 24	November 26

