The story of Linux

From a hacker's hobby
to the king of supercomputing

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Free and Open Source Software

- Two competing ideas:

    - The return of the 'Good Old Times' of software

    - A new phenomenon born with the Internet explosion in early 90s

- In a way, both are right – the truth lies most likely somewhere in between

MIT AI Lab

- July 1, 1963 – Project MAC (originally Mathematics and Computation) launched on a DARPA 2 MUSD grant

- J.C.R. Licklider, M. Minsky, J. McCarthy

- PDP-6 (later, 10), ITS, LISP

- A hacker paradise: culture of sharing and playful cleverness

- 1970 – Marvin Minsky with his disciples founded AI Lab

- 1971 – a student named R.M. Stallman was looking for internship – got also a job and a place to live (lab…)

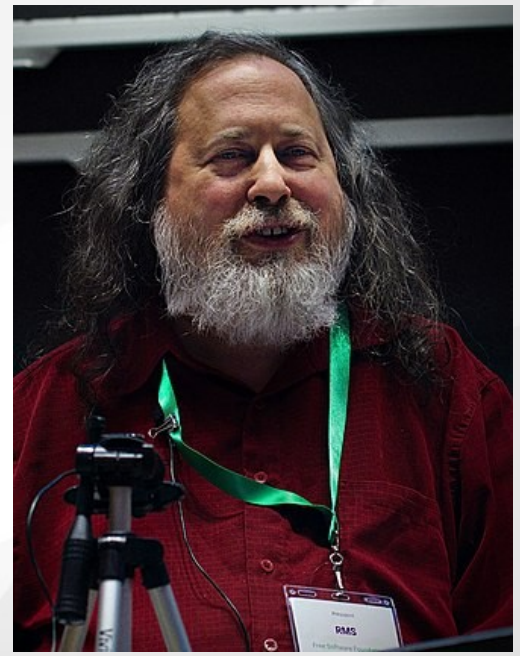- Emacs: a text editor as the 'killer app' of the time

Licklider

Minsky

McCarthy

Stallman

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Times change

- 1981 – strife in the lab, two groups forming two companies specializing on LISP and related computers (LMI led by Richard Greenblatt, and Symbolics by Russell Noftsker). In the end, most of the lab disbanded

- Stallman stayed for awhile (and helped LMI), but finally started to search for a new place. Ideas of a free system
  - 1982 – started to develop a new, fully free operating system (a rewrite of Unix, considered ITS too old already)

RMS, the crazy guy

- RMS (as he is still called today) decided to rewrite (a free) Unix from scratch – more or less alone - and on November 27, 1983 sent an announcement to Usenet and various lists (https://www.gnu.org/gnu/initial-announcement.en.html)

- GNU, stands for Gnu's Not Unix (recursively)

- First utility: Yacc => Bison

- Wrote to Andrew S. Tanenbaum to get permission to use his Amsterdam Compiler Kit – the refusal sparked another decision to write a C compiler (later known as GCC) too

From Emacs to FSF

- 1985 – GNU Emacs and GNU Manifesto

- Stallman quit MIT, but was permitted to stay at the lab – and made his living from selling Emacs on tapes (USD 159)

- Later that year, founded the Free Software Foundation. Emacs went to FSF to provide income, RMS completed GCC and started to sell that instead

Efforts on GNU

- In five years, completed main components of the GNU system:

    - Text editor (GNU Emacs)

    - Shell (bash)

    - C library (glibc)

    - GNU debugger (gdb)

    - ...

- 1990 – RMS received the MacArthur Foundation stipend (230 000 USD on five years) – invested it and lives on it even today

- Almost full system but the kernel

Back in 1991…

- Common people used MS-DOS 4.0 and Windows 3.0

- Hackers lacked a system to hack on – Unix went closed-source, others were from the start (Apple, Microsoft)

- Business ban lifted on Internet

- Birth of WWW

Minix

- In late 70s at the Dutch Free University, Andrew S. Tanenbaum taught operating systems using Unix v6 as a teaching aid

- 1979 - AT&T released Unix v7 and forbade even academic use of source code. Tanenbaum was forced to stick with theory only for a time

- In 1987, wrote Minix, a minimal Unix version for PC-s

- Open source, but due to publisher's demands was only available bundled with Tanenbaum's book (on diskettes)

- Stallman came to ask again... No

Linus

- Beginning: Grandpa's Commodore Vic-20

- Univ. of Helsinki, then Finnish army with junior officer's rank => later mentioned as a crash course in team management

- 5.I.91 – Linus took a student loan and bought his first PC (386, 4M RAM, 40M HDD)

- Ordered Tanenbaum's book and Minix, studied DOS and assembler, and most of the time, played the Prince of Persia

- March – first post to comp.os.minix

- August 25, 1991 – the e-mail announcement:

Linus' message from August 25, 1991

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 protable (uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that's all I have :-(.

The first steps of the new system

- September 1991 – v.0.01, Freax => Linux

- End of the year - v.0.12, license switched to GNU GPL

- December 1991 – Another war of words: Andrew Tanenbaum vs Linus Torvalds

- March 1992 – 0.12 jumped to 0.95 (damn optimists...). The newsgroup comp.os.linux created (at first alt.os.linux)

- Crazy folks (Rich Sladkey) used Linux in dual boot

- Experiments with X (v0.95), the Xfree86 project started

- September 1992 – Internet (TCP/IP) support added

Distros and docs

- Early 1993 – The Linux Documentation Project

- The first distro – MCC Linux in Manchester Computing Centre (Bruce Perens et al) in February 1992. Soon, SLS, SuSE, Debian, Slackware, TurboLinux etc followed

- Approximately 100 000 users

- Introduction of CD-ROM – a cheap and large (compared to 3.5" diskettes) medium. Yggdrasil, the first live-CD distro

The first landmark

- 1994 – Linux 1.0

- Red Hat founded

- First port of Linux: DEC Alpha (later, Motorola 68000 and Sun SparcStation)

- Linux Journal

- First Linux books published by O'Reilly
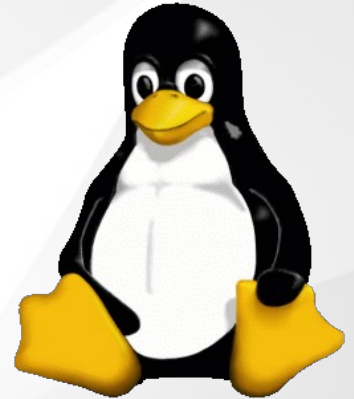
- Andrew Tridgell created Samba

LAMP

- 1995: NCSA httpd => Apache

- MySQL AB by David Axmark, Michael "Monty" Widenius and Allan Larsson

- Rasmus Lerdorf creates the first versions of PHP

- About 1.5 million users

What's in the name?

- 1996 – yet another fisticuff: Linus & Co vs RMS and FSF over the new system's name. FSF suggested 'Lignus' or 'Lignux'.

- Los Alamos: physicists connected 68 Linux boxes and achieved 19 bln op/s for 1/10 of the price of a comparable supercomputer

- Some people sought a mascot for Linux – Linus mentions 'I like penguins'. Done

- June 1996 - Linux 2.0, followed soon by 'Linus 2.0', Patricia Miranda Torvalds. Papa Linus set example for a new breed of hacker – being hairy, unkempt and asocial is not necessary. And later, Linus got two more daughters

Birth of a desktop

- October 1996 – Matthias Ettrich founded the KDE project, first betas came the next year

- Built on the Qt libraries from Troll Tech in Norway. Not free software. RMS started to growl

- As usual, started a competing project – birth of GNOME, led by Miguel de Icaza

- 2000 – Qt adopts GNU GPL, end of growling

- Both projects go on today, a number of new ones join later

Two schools

- Freeware Summit 1997 – RMS not invited

- Most of the company (Bruce Perens, Eric S. Raymond, Linus) decided to found a new approach called 'open source'. The aim was not to frighten business people – the focus being on technology rather than ideology

- In practical aspects the two cooperate (FLOSS as an umbrella term), in official politics make faces

- Linux Kongress 1997 – Eric S. Raymond presented his essay The Cathedral and the Bazaar, the groundwork for the Open Source school of thought

In 1998...

- Linux had about 12 million users

- Mandrake, the first 'Linux for ordinary people'

- The rise and fall of Loki Games

- The Halloween Documents leaked from Microsoft, suggesting that the company had started to feel the heat

Millennium

- 1999: Linux kernel 2.2 brought the system to mainframes

- The sensational IPO of VA Linux

- 2000: Red Hat started cooperation with IBM

- A German company StarDivision released StarOffice 5.1 and 5.2, the first actual alternatives to MS Windows (closed-source freeware, but available on both MS Windows and Linux)

- Sun bought StarDivision. StarOffice turned proprietary, a new free version called OpenOffice.org created

New century

- 2001: kernel 2.4

- GNOME 1.4, KDE 2

- Ximian Evolution, quite like MS Outlook

- 2002: GNOME 2, KDE 3

- Openoffice.org 1.0

- The crooked boss drove Loki Games to bankruptcy

- Red Hat Linux replaced by RHEL and Fedora

- Knoppix and other CD-Linuxes

2003-2007

- Advent of multimedia ja 3D (including drivers for NVidia)

- 2003: SCO court case against IBM and Linux kernel 2.4 (but 2.6. was released already the same year

- 2004: Mark Shuttleworth founded Canonical, releasing the first version of Ubuntu Linux (4.10 Warty Warthog)

- 2005: 3D UI on Linux (Compiz/Beryl); Linux Mint started (at first an offshoot of Kubuntu)

- 2007: standard wars surrounding the new file formats of MS Office. Google started to move on Android

2008-2012

- 2008: Estobuntu (ID card support from the box)

- The netbook boom => boost to Linux (1/3 initially preinstalled on Linux). Major stock exchanges (NYSE etc) adopted Linux

- 2010: Openoffice.org => Sun/Oracle => LibreOffice. CyanogenMod

- 2011: *The Year of Messy Linux Desktop* (GNOME 3 and Unity vs MATE and Cinnamon). Google Chromebook

- 2012: Linux Mint dethroned Ubuntu as the commoner's Linux. Cloud started to move on Linux (Red Hat had a major role)

- BIOS => UEFI: another obstacle

- Akademy 2012 (the KDE Summit) held at IT College

2013-2017

- 2013: Microsoft re-classified Estonia as a developed country, meaning up to 25 times higher prices for schools – Linux held as a serious contender for the first time

- Steam and Spotify for Linux. Android had 75% of mobile market

- 2014: a series of scandals and conflicts in the FLOSS world (systemd, a sexism scandal, desktop controversies continue)

- 2015: Kernel series 4.0

- 2017: Top500 (list of world's most powerful supercomputers) became Linux-only for the first time. LineageOS

Recent developments

- Kernel 5.0 2019, 6.0 2022

- Hell is about to freeze over: Microsoft is actively contributing to Linux (actually was 5th largest kernel developer already in 2011!), it also powers Azure and can be run inside Windows (WSL)

- 2019: IBM bought Red Hat (goes on as an independent division)

- Linux currently powers about 90% of the cloud

- Found in embedded systems, space tech, cars, robots, musical instruments and sound tech, weapon systems...

Case study: this guy here

- All desktops and laptops: Linux Mint

- Kakupesa (the home server): Ubuntu Server

- Router: MikroTik

- TV: Tizen

- Phone and tablet: LineageOS

- Synth: Kronos OS (based on Linux)

- Guitar amp: ?? , controlled by a LineageOS tablet

- Car: Android Auto, sound system ?

Near future

- The evolution continues (if not too many fights happen)

- Proliferation of blended and hybrid business models and liberal free licenses (BSD, MIT, X11), yet GPL retains a strong presence

- The bigger; the more penguin: supercomputing, cloud

- Android => 'real' Linuxes on mobile devices (Pinephone, Librem 5)?

- Mainstream software gets better, desktop is a question mark

- Rise of security and privacy issues

Read on

- MOODY, Glyn. Rebel Code: Inside Linux and the Open Source Revolution. Perseus Publishing, Cambridge MA 2001

- POYNDER, Richard. The Basement Interviews https://poynder.blogspot.com/2006/03/basement-interviews.html

- RAYMOND, Eric Steven. The Cathedral and the Bazaar. http://www.catb.org/~esr/writings/cathedral-bazaar/

- SALUS, Peter. The Daemon, the Gnu, and the Penguin. A History of Free and Open Source Software. http://www.groklaw.net/staticpages/index.php?page=20051013231901859

- STALLMAN, Richard Matthew. Free Software, Free Society. Ed. Joshua Gay. GNU Press 2002. https://www.gnu.org/doc/fsfs3-hardcover.pdf

- TORVALDS, Linus, DIAMOND, David. Just for Fun: The Story of an Accidental Revolutionary. Harper-Collins 2001

Thanks