Linux and Free Software

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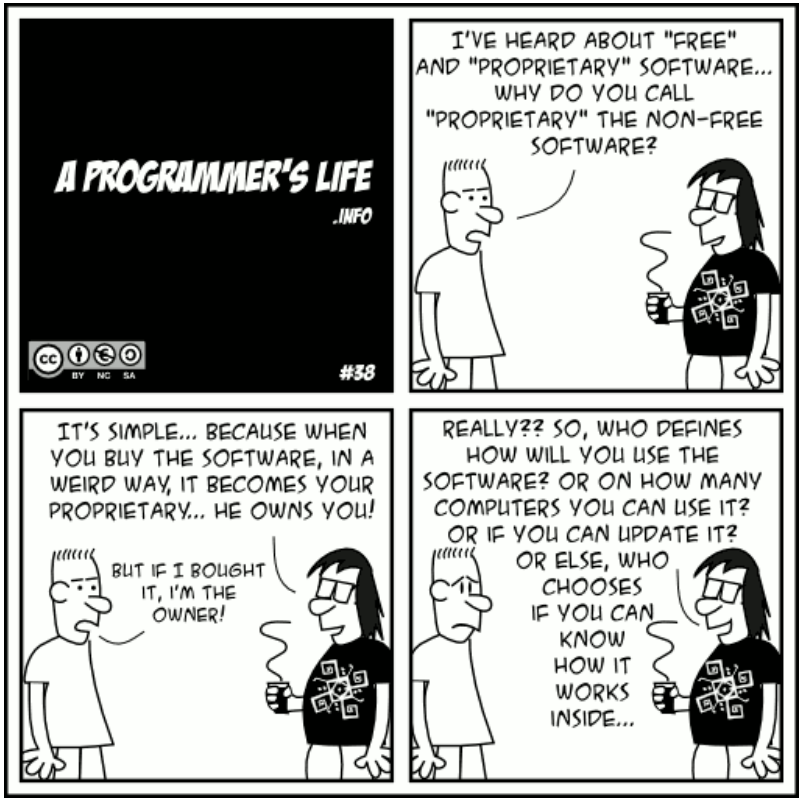
What is Free Software?

- Free software is a type of computer software which is distributed with its source code and allows its users the following ***freedoms***:
  - The **freedom to run** the program for any purpose.
  - The **freedom to study** how the program works, and change it to make it do what you wish.
  - The **freedom to redistribute** copies, so that you can help your neighbours.
  - The **freedom to improve** the program, and release your improvements to the public, so that the whole world benefits.
- Defined by **Richard Stallman** in **GNU General Public License**.

What is Free Software?



Richard Stallman

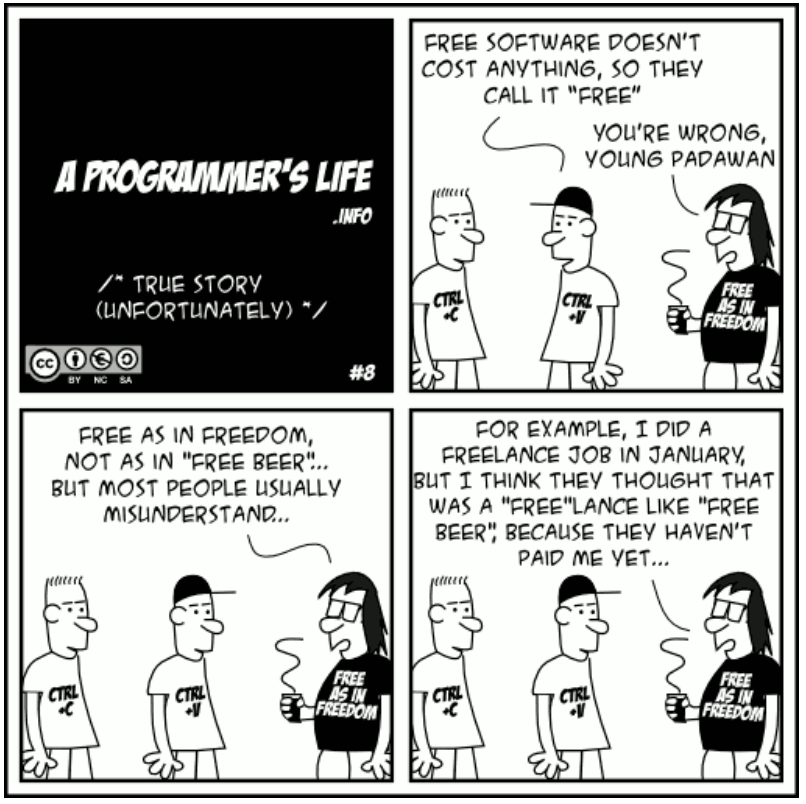
- American software developer, expert on computer systems.
- Started **The GNU Project** in 1983 to create an operating system composed entirely of free software.
- Written **GNU General Public License** and defined **Free Software** in 1989.

What is Free Software?

- The term “free software” should not be confused with an another term, “open source”.
  - Open source is a software development method.
- Free software is not unlicensed or freeware software.
  - Free software are licensed with General Public License.
- Free software should not be confused with free of charge software.
  - *“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”.*

Richard Stallman

What is Free Software?



The GNU Project

- The GNU Project, started in 1983, is a free software project which aims to provide computer users with an operating system composed full of free software that gives the users the freedom run, study, improve and distribute.
- By 1991, the operating system had all necessary utilities ready, except the kernel software that communicates directly with the computer hardware.
- That year, the **Linux Kernel** (developed by **Linus Torvalds**, outside the GNU Project) appeared.

EXCUSE ME!
Do you have a moment to talk about Linux?

Linus Torvalds

- Finnish software engineer.
- In 1991, when a student at the University of Helsinki, he started developing simple operating system components on his own.
- In time, these components has turned into a single, usable operating system kernel.
- Thus, the **Linux Kernel** was born.

Birth of the Linux Kernel

- Linus Torvalds has announced this project publicly by posting the following announcement on a newsgroup on Aug. 25, 1991:

```
From: torvalds@klaava.helsinki.fi (Linus Benedict Torvalds)
To: Newsgroup: comp.os.minix
Subject: What would you like to see most in minix?
Summary: small poll for my new operating system

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 (torv...@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 :-(.
```

Birth of the GNU/Linux Operating System

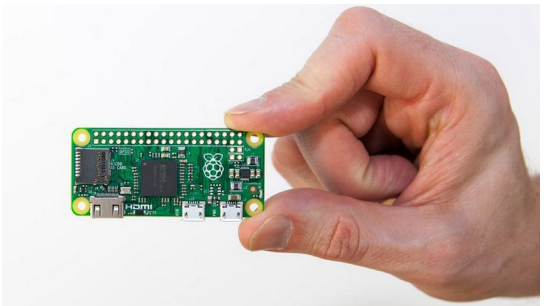
- In 1992, Linus Torvalds changed licensing of the Linux kernel to General Public License; made the Linux kernel a free software.
- Developers started to integrate the GNU Project with the Linux kernel.
- Thus the complete free operating system, **GNU/Linux** was born.

Advantages of Using Linux and Free Software

- Free software do not spy on their users.
- Free software are highly auditable.
- Free software encourage collaboration.
- Free software are secure and stable. A recently discovered security vulnerability can be patched and distributed around the world in just a few hours. A Linux server can run untouched without encountering any software crashes for many years.

Advantages of Using Linux and Free Software

- The Linux kernel can be modified to run on many different architectures and devices such as desktop computers, laptop computers, mobile phones, tablet computers, servers, smart TV’s, cars, IoT devices, modems etc.



Advantages of Using Linux and Free Software

- Linux (GNU/Linux) based operating systems support working with multiple users. They can manage thousands of users, their files and running programs simultaneously.
- Linux based operating systems come with open source and freely modifiable free software. They are highly customizable.
- With the availability of many different distributions, everyone can find the best Linux based distribution that fits themselves.

Linux Distributions

- Any set of software (office, internet, development, utilities, games, etc) that are bundled together with the Linux kernel is called a **Linux Distribution**.

Arch Linux

Debian

elementary OS

Fedora

Gentoo

Kubuntu

Linux Mint

Mandriva

openSUSE

Pardus

Red Hat Enterprise Linux

Ubuntu

and many more...

Statistics

- 1991 – Linux 0.02 has been announced.
- 1992 – 10 users worldwide.
- 1993 – Linux 1.0 has been announced, more than 200 users.
- 1994 – 100.000 users worldwide.
- 1995 – Almost 500.000 users worldwide.

Statistics

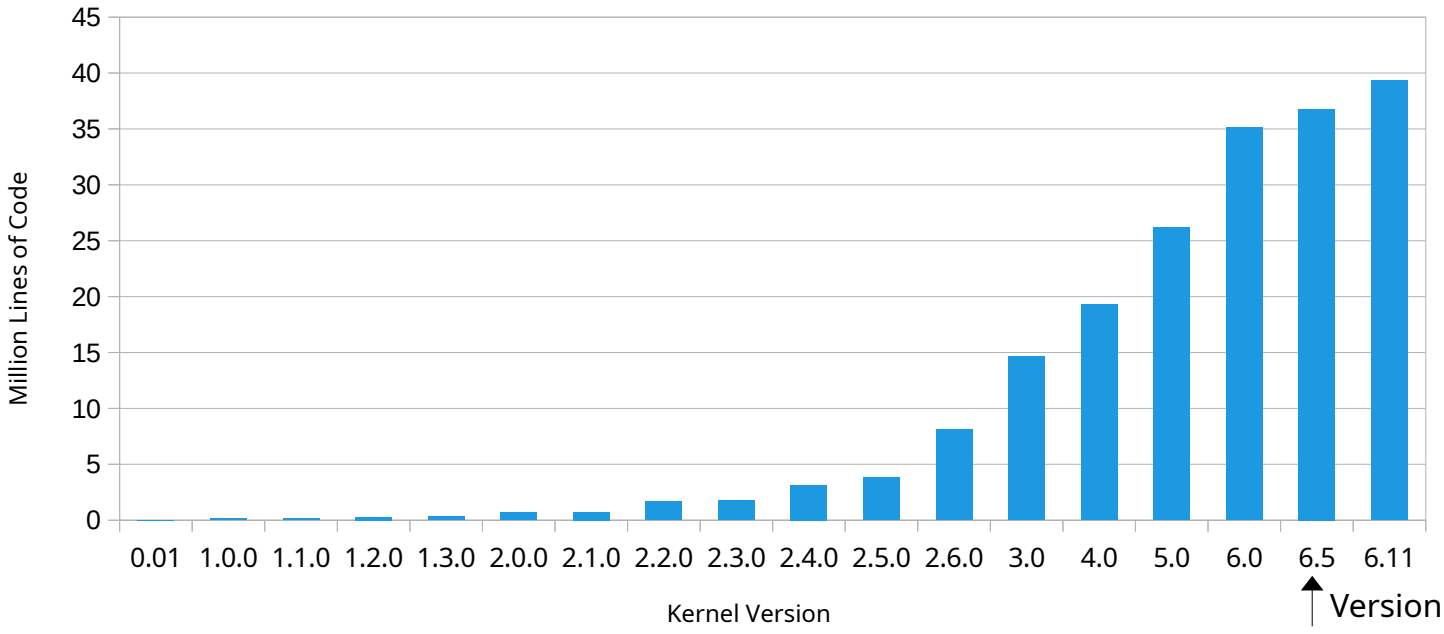
- 1996 – Linux 2.0 has been announced.
- 1997 – Almost 5.000.000 users.
- 1998 – Almost 10.000.000 users.
- 1999 – Linux 2.2 has been announced.2001 – Linux 2.4 has been announced.
- 2003 – Linux 2.6 has been announced.

Statistics

- 2011 – Linux 3.0 has been announced.
- 2015 – Linux 4.0 has been announced.
- 2019 – Linux 5.0 has been announced.
- 2022 – Linux 6.0 has been announced.
- The development of Linux kernel continues with Version 6.11.
- It is estimated to be used by millions of people all around the world.

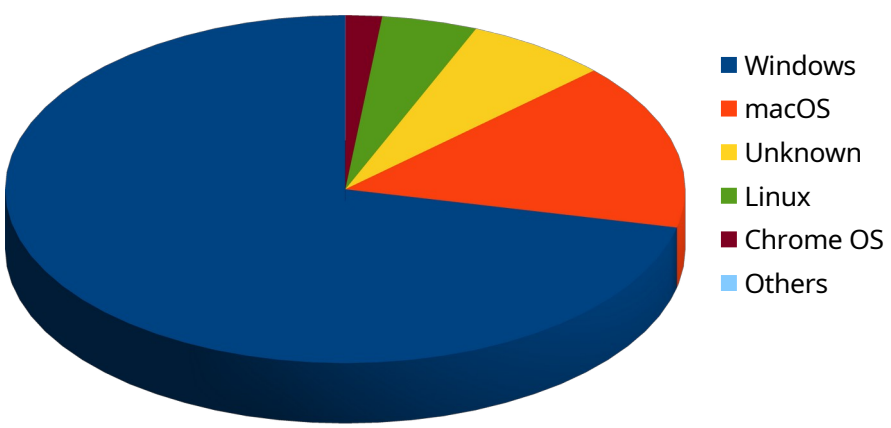
Statistics

- Number of kernel contributors is estimated to be over 15.000 from over 1.000 different companies.

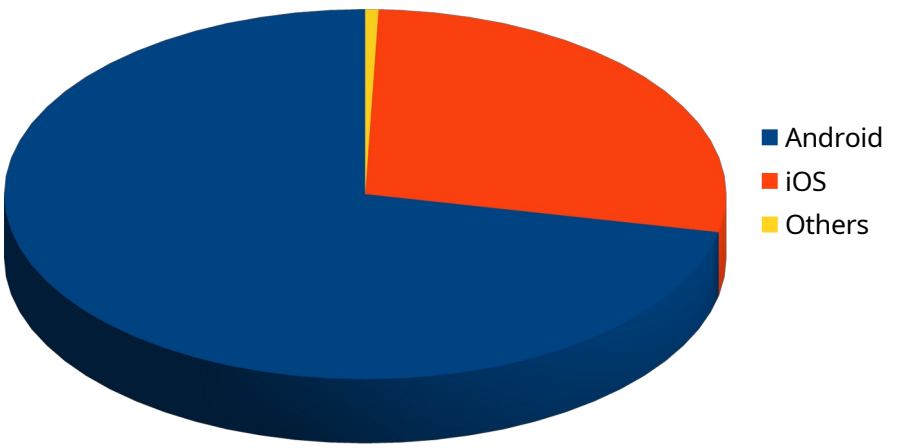


Statistics

Desktop Operating Systems (StatCounter)

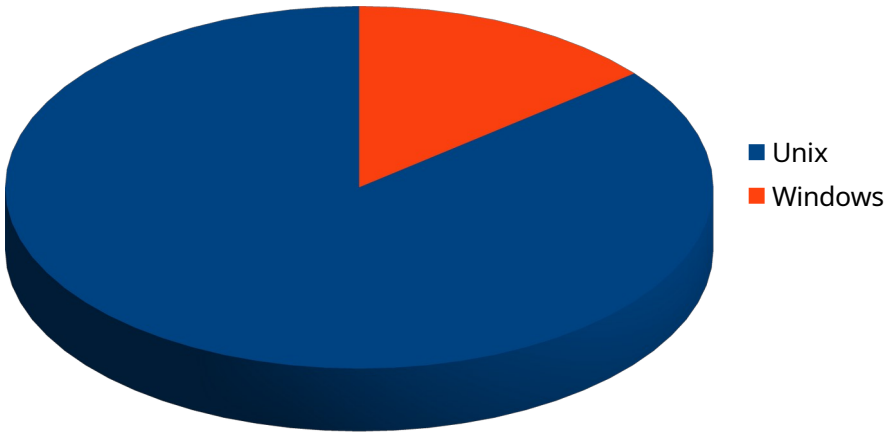


Mobile Operating Systems (StatCounter)

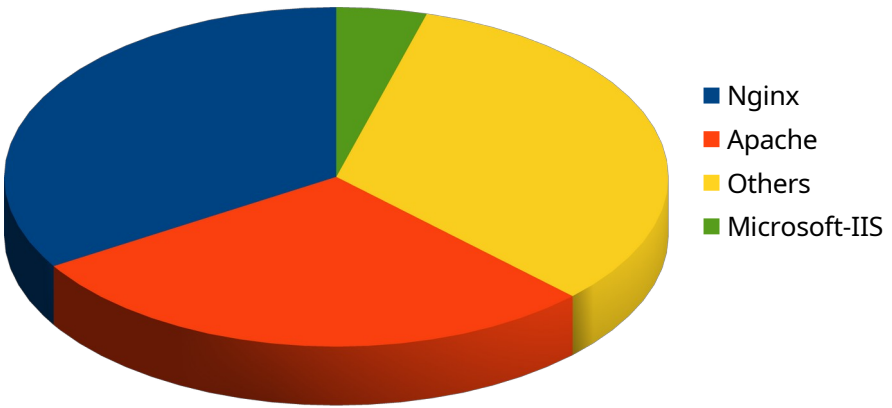


Statistics

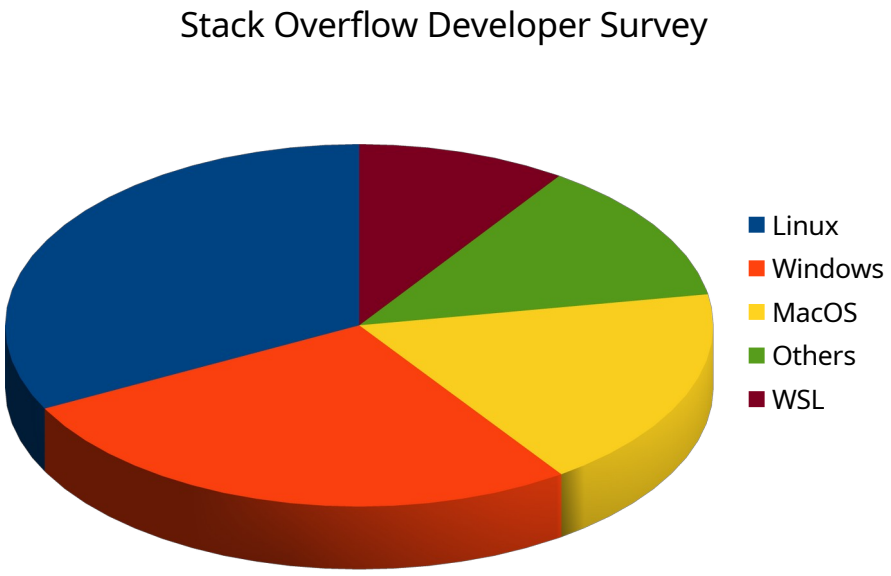
Public Servers (W3Techs)

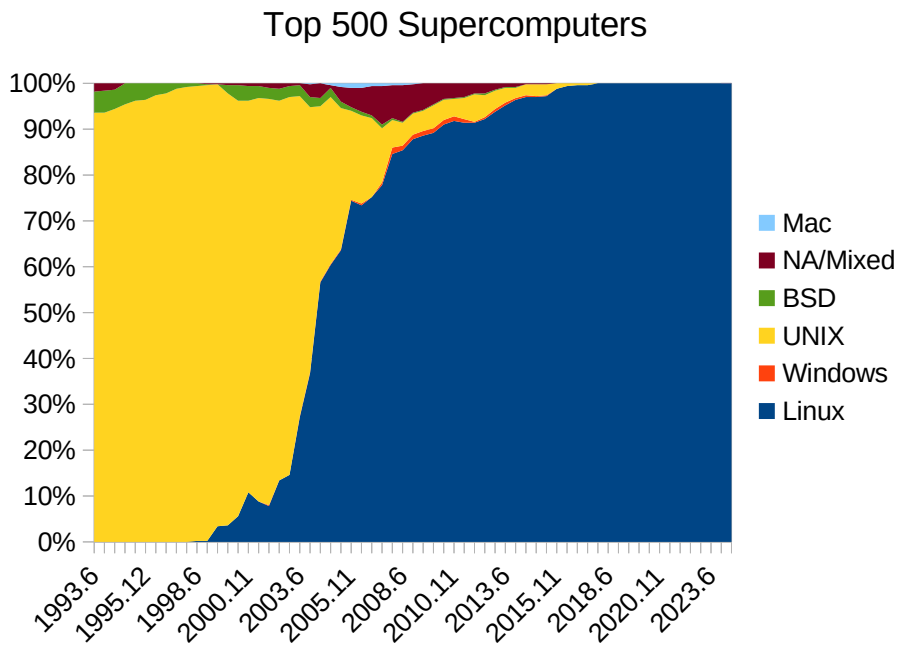


Web Server Software (W3Techs)

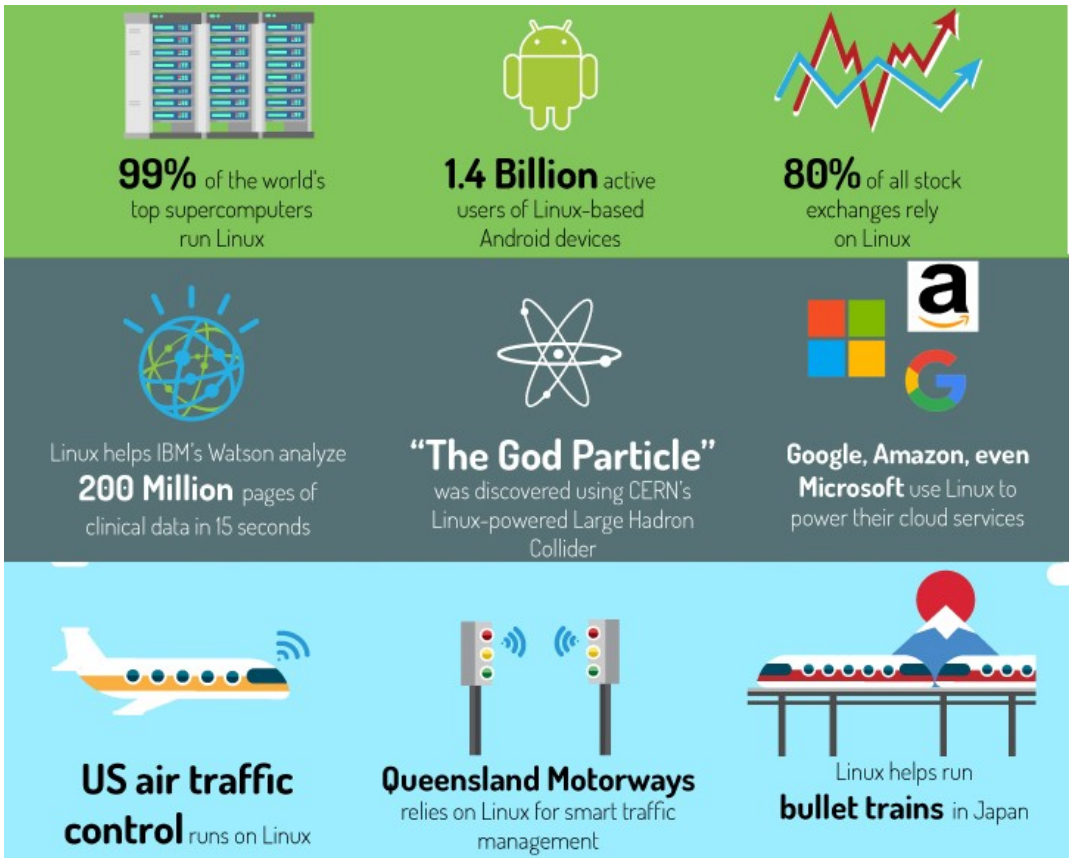


Statistics


Stack Overflow Developer Survey
Linux
Windows
MacOS
Others
WSL


Top 500 Supercomputers
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1993.6
1995.12
1998.6
2000.11
2003.6
2005.11
2008.6
2010.11
2013.6
2015.11
2018.6
2020.11
2023.6
Mac
NA/Mixed
BSD
UNIX
Windows
Linux

Statistics


99% of the world's top supercomputers run Linux
1.4 Billion active users of Linux-based Android devices
80% of all stock exchanges rely on Linux
Linux helps IBM's Watson analyze 200 Million pages of clinical data in 15 seconds
"The God Particle" was discovered using CERN's Linux-powered Large Hadron Collider
Google, Amazon, even Microsoft use Linux to power their cloud services
US air traffic control runs on Linux
Queensland Motorways relies on Linux for smart traffic management
Linux helps run bullet trains in Japan

Users, Supporters, Contributors

And many more...

Users, Supporters, Contributors

35,000-Core Ubuntu Farm Renders Avatar

I just attended Paul Gunn's talk at LCA2010, entitled:

- *Challenges in Data Centre Growth (or, "You need how many processors to finish the movie???")*

Paul is a Systems Administrator at Weta Digital, a Wellywood digital effects studio here in Wellington, New Zealand. Check out some of the feature films that Weta Digital has worked on, and I think you'll recognize a few. *District9, Day the Earth Stood Still, Jumper, King Kong, Lord of the Rings, Fantastic Four, Eragon, X-Men, i-Robot.* Wow!

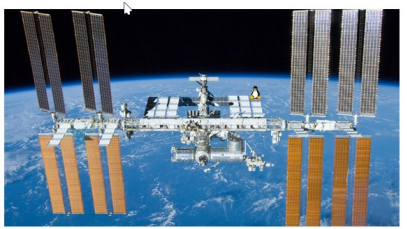
It was a great talk, about the type of data center needed to render special effects in today's blockbuster movies. They have a 2 Petabyte disk array, 10gbps networking, and 35,000 cores (4,000+ HP blades) in their data center, and still it takes 48 hours to render some of their graphic sequences.

According to Paul, Ubuntu is at the core of all of this, running on all of the rendering nodes, and 90% of the desktops at Weta Digital. He notes that his farm (he calls it a "render wall") is in fact an Ubuntu Server farm, and not RHEL as he has seen reported in the media.

International Space Station switches from Windows to Linux, for improved reliability

The United Space Alliance, which manages the computers aboard the International Space Station in association with NASA, has announced that the Windows XP computers aboard the ISS have been switched to Linux. "We migrated key functions from Windows to Linux because we needed an operating system that was stable and reliable."

By Sebastian Anthony May 9, 2013



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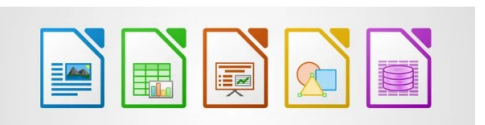
In specific, the "dozens of laptops" will make the change to Debian 6. These laptops will join many other systems aboard the ISS that already run various flavors of Linux, such as RedHat and Scientific Linux. As far as we know, after this transition, there won't be a single computer aboard the ISS that runs Windows. Beyond stability and reliability, Keith

German state ditches Microsoft for Linux and LibreOffice

Why? Schleswig-Holstein cites cost, security, and digital sovereignty - though not necessarily in that order.

Written by **Steven Vaughan-Nichols,** Senior Contributing Editor
April 4, 2024 at 2:06 p.m. PT



The Document Foundation

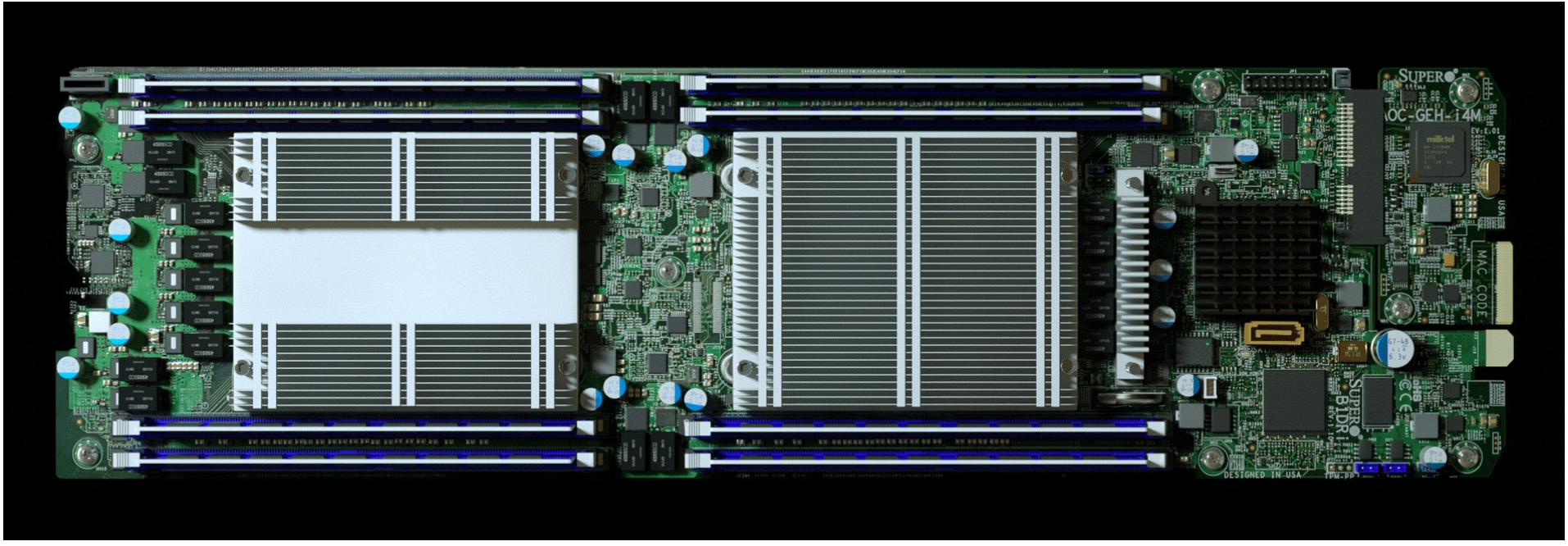
Thanks to hardware vendors working hand-in-glove with Microsoft, many people never realize there are alternatives to Windows and Office.

But that's not the case in the European Union (EU) and China, where computer users know all about Microsoft's dominance on the desktop -- and many don't like it. So, when Dirk Schrödter, digitalization minister for the German state of Schleswig-Holstein, announced the state government would switch from proprietary software "towards free, open-source systems and digitally sovereign IT workplaces for the state administration's approximately 30,000 employees," there was cause for rejoicing among Linux desktop fans.

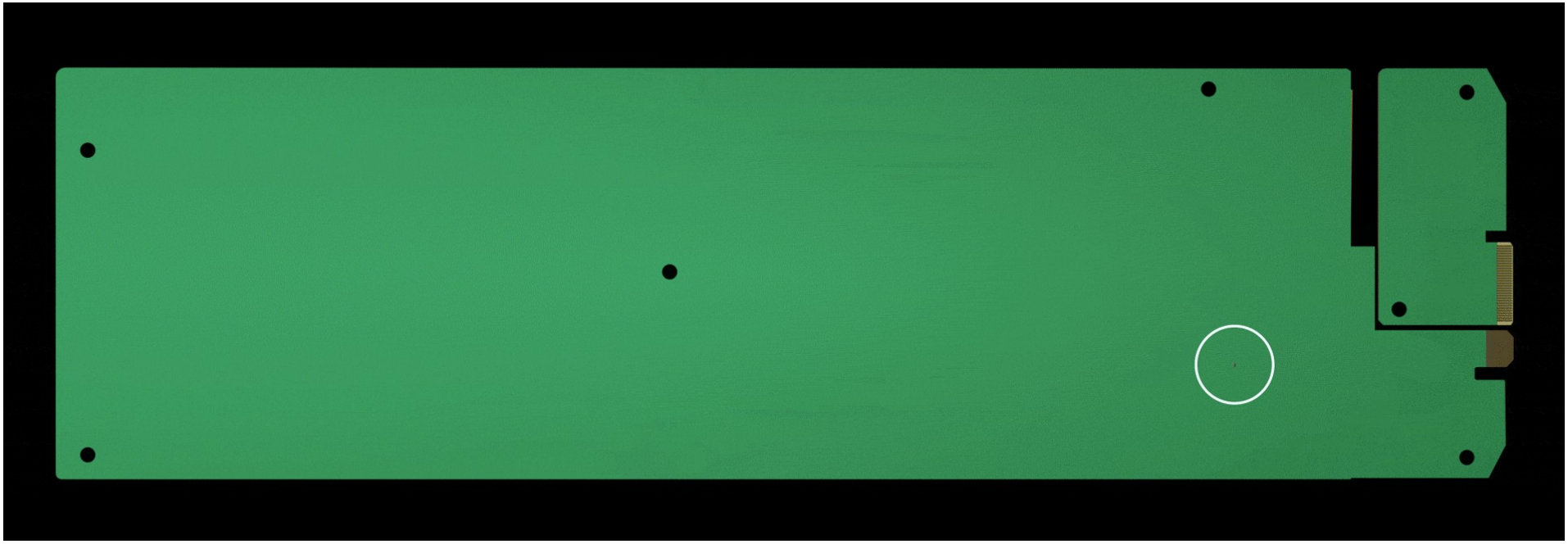
Popular Questions

- Can my computer run Linux and other free software?
- Can I really do whatever I want with Linux and free software?
- If Linux is so good, then why doesn’t everybody use it?
- What is the best Linux distribution?
- Will it cost money to use Linux and / or other free software in the future?
- I’ve started using Linux but I get lots of updates everyday, why?
- Are there any Linux and free software communities in our country?
- How can I contribute? I don’t know how to start.

Free Software: Is It Sufficient?



Free Software: Is It Sufficient?



Free Software: Is It Sufficient?

Your Questions?

Recommended Links

- Bilgisayar Mühendisleri Odası
  https://www.bmo.org.tr/
- Linux Kullanıcıları Derneği
  https://www.lkd.org.tr/
  https://linux.org.tr/
- OMG! Ubuntu!
  https://www.omgubuntu.co.uk/
- LinuxInsider
  https://www.linuxinsider.com/
- Slashdot
  https://linux.slashdot.org/
- How Many People Use Linux in 2024?
  https://earthweb.com/how-many-people-use-linux/
- How many people use Ubuntu?
  https://ubuntu.com/blog/ubuntu-is-everywhere
- Ubuntu Connects Everything
  https://ubuntu.com/blog/infographic-ubuntu-connects-everything

Recommended Links

- TED: The mind behind Linux | Linus Torvalds
  https://www.youtube.com/watch?v=o8NPllzkFhE

- Richard Stallman Interview on the History and Ethics of Free Software
  https://www.youtube.com/watch?v=gfwKnsHd9WM

Thanks for Listening!

This presentation has been created on
Free Operating System KDE neon
With
Free Office Suite LibreOffice.
"Free as in free speech, not free beer"