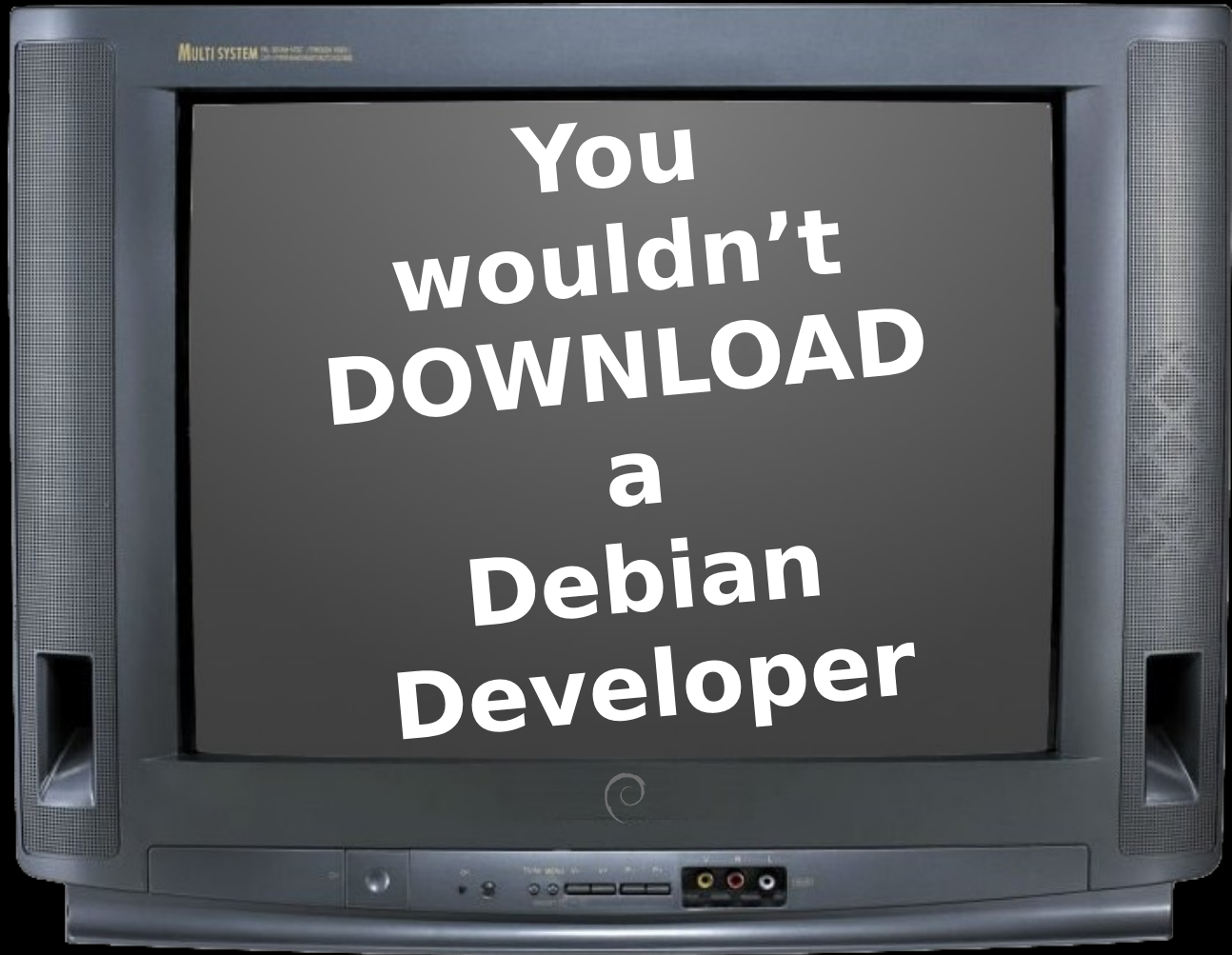


Debian Reunion



Hamburg • 2022

Jonathan Carter
Debian Reunion
Hamburg, Germany
2022-05-29



A talk and conversation about
hindsight, insight and foresight

1993

1998

2003

2008

Some lessons learned from highvoltage's youthful days

- Some people who sound very clever and are very confident, don't always know what they're talking about
- Things can change *very* fast
- It is really difficult to predict what's going to happen in the future, even by experts
- When people spend enough time with a technology, they become emotionally invested in it
- **People use the term “*never*” way too liberally**

2022

January 2022

flrmWare

What is firmware?

Paraphrased from Wikipedia:

“Firmware may contain basic functions of a device, and may provide hardware abstraction services to higher-level software such as operating systems. For less complex devices, firmware may act as the device's complete operating system, performing all control, monitoring and data manipulation functions. Typical examples of devices containing firmware are embedded systems (running embedded software), home and personal-use appliances, computers, and computer peripherals.

Firmware is held in non-volatile memory devices such as ROM, EPROM, EEPROM, and Flash memory. Updating firmware requires ROM integrated circuits to be physically replaced, or EPROM or flash memory to be reprogrammed through a special procedure.”







Firmware lessons learned from highvoltage's 90's hardware

- Firmware has changed a lot during the 90s
- Initially, burned to ROM and then never changed again
- ROM Updates become possible later on, and was mostly beneficial
- Firmware increasingly became something that is served from the software drivers, this came with both benefits and downsides

... things have become a little more complicated since then...

11 May 2022



Over 500 GTC sessions now available free on NVIDIA On-De

TECHNICAL BLOG

[SUBSCRIBE](#)

NEWS

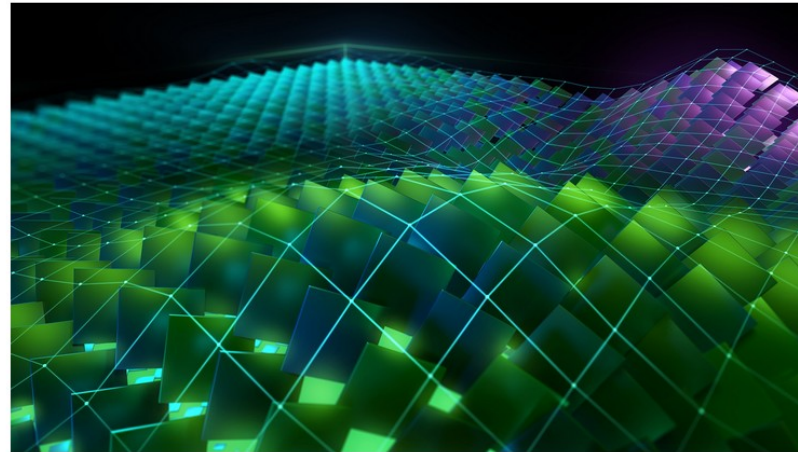
May 11, 2022

NVIDIA Releases Open-Source GPU Kernel Modules

By Ram Cherukuri, Shirish Baskaran, Andy Ritger, Fred Oh and Dwayne Swoboda

[Discuss \(5\)](#) [Share](#) [+5 Like](#)

Tags: CUDA, developer, Linux, News, open-source software



NVIDIA is now publishing Linux GPU kernel modules as open source with dual GPL/MIT license, starting with the R515 driver release. You can find the source code for these kernel modules in the NVIDIA Open GPU Kernel Modules repo on [GitHub](#).

<https://developer.nvidia.com/blog/nvidia-releases-open-source-gpu-kernel-modules/>

12 May 2022



Hector Martin

@marcan42



So NVIDIA "released" their kernel driver as open source.

By which they mean, they moved most of it to firmware and made the open source driver call into it. There are almost 900 functions implemented in the 34MB firmware, give or take, from what I can see.

Broadcom vibes...

6:58 AM · May 12, 2022 · Twitter Web App

808 Retweets **136** Quote Tweets **3,749** Likes



Hector Martin @marcan42 · May 12



Replying to @marcan42

For reference, Apple's GPU firmware is ~400kB. Apple's display controller, which is a similarly insane RPC mess, is ~7MB, but most of it is data tables (~1.5MB is code).

Don't get me wrong, less blobs in the kernel is great... but open source their "driver" they did not.



5



75



1,017



Hector Martin @marcan42 · May 12



At least their kernel side code is "only" 58MB of source code. AMD still takes the lead, with almost 300MB of autogenerated includes they somehow managed to upstream into the Linux kernel tree...



10



26



638



Hector Martin @marcan42 · May 12



But yeah, somehow ~every other GPU vendor manages to have open source kernel drivers that *don't* require megabytes of firmware/kernel code to run behind the scenes. Userspace code, sure, but kernel? I still have no idea why on earth Nvidia always needed that much junk.



6



36



567



Hector Martin @marcan42 · May 12



Question to ponder: is this a licensing hack? Nvidia wasn't allowed to use GPL-only kernel exports due to linking with the blob. Now the blob runs on another CPU... but it's still remote procedure calls. Is that "linking"? Does it make a philosophical difference?



7



32



531



Intel Management engine



Firmware lessons learned from highvoltage's 2022 hardware

- Your computer is now a network of multiple independent computers running non-free code, but... at least a free Debian can still co-exist on the main CPU!





What are others doing?

fwupd 1.8.0 and 50 million updates

I've just tagged the 1.8.0 release of fwupd, with [these release notes](#) — there's lots of good stuff there as always. More remarkable is that **LVFS has now supplied over 50 million updates to Linux machines** all around the globe. The true number is going to be unknown, as we allow vendors to distribute updates without any kind of logging, and also allow companies or agencies to mirror the entire LVFS so the archive can be used offline. The true number of updates deployed will be a lot higher than 50 million, which honestly blows my tiny mind. Just 7 years ago Christian asked me to “*make firmware updates work on Linux*” and now we have a thriving client project that respects both your freedom and your privacy, and a thriving ecosystem of hardware vendors who consider Linux users first class citizens. Of course, there are vendors who are not shipping updates for popular hardware, but they're now in the minority — and every month we have two or three new vendor account requests. **The logistical, security and most importantly commercial implications of not being “on the LVFS” are now too critical even for tier-1 IHVs, ODMs and OEMs to ignore.**

<https://blogs.gnome.org/hughsie/2022/04/28/fwupd-1-8-0-and-50-million-updates/>

MULTI SYSTEM



FREE SOFTWARE
FOUNDATION



®
open source
initiative

So what can we do?

DFSG / SC

Split firmware out to
non-free/firmware



Download Debian

[Debian Install / Live amd64](#)

Install Debian or run it from live media. Consult our hardware compatibility list or run the hardware compatibility report tool from the live media.

[Debian Install / Live + firmware amd64](#)

Contains non-free firmware required for many network adaptors and graphic cards.

[Read more...](#)

But what after that?

But what after that? We have funds to help make things happen

- Fund firmware reverse engineering where it seems plausible?
- Kickstarter campaigns to produce new GPUs, or new machines entirely?
- Invest heavily in the RISC-V eco-system, like ensuring that every DD has their own RISC-V hardware?
- Create press kits explaining benefits of free firmware both for and for hardware manufacturers, actively engage them and motivate them to either release firmware or specifications so that others can create it?

What if we could get the RISC-V community to do this with the

2023

2024

2025

2026

2027

2028

2029

2030

2031

2032

2033

2034

2035

2036

2037

2038

Back to 2022...

**~70 000
debian packages**

~18 500

Cran (r-lang) packages

~85 000
Rust crates

~108 000

Packages in cpan (perl)

**~350 000 packages
in PyPI (Python)**

**We should prepare for
1M packages by the 2030's**

What does that mean?

Dpkg, APT, archives, upload processes, package maintenance, human cost, etc all need to scale.

Or, at some point we'll have to decide on different levels of support for different software

Or just not ship some software at all.

Can appimages supplant Debian packages? Can we build them and distribute them on Debian infrastructure along .debs?

Is it possible to have it all?

**All the freedom we want, all the
packages we want, all the quality we
want?**

It 's worth at least a shot.

Tuesday, 7th of June
17:00 – 19:00 UTC

Jitsi call:

**[https://jitsi.debian.social/
FutureDebian2022](https://jitsi.debian.social/FutureDebian2022)**



Debian Reunion



Hamburg • 2022

Debian Reunion Hamburg 2022
2022-05-26