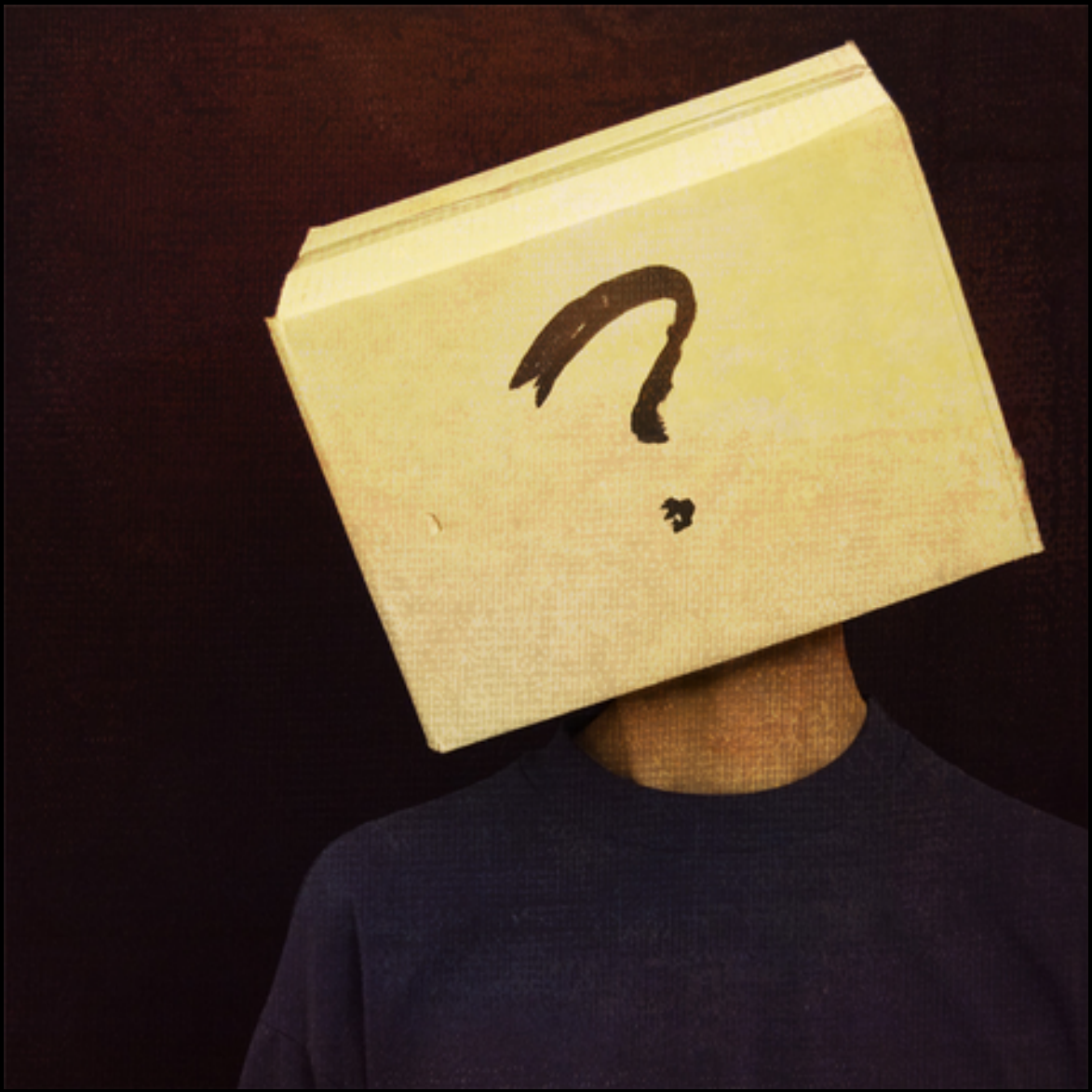
Thorsten Leemhuis

What's Up in the Land of the Linux Kernel

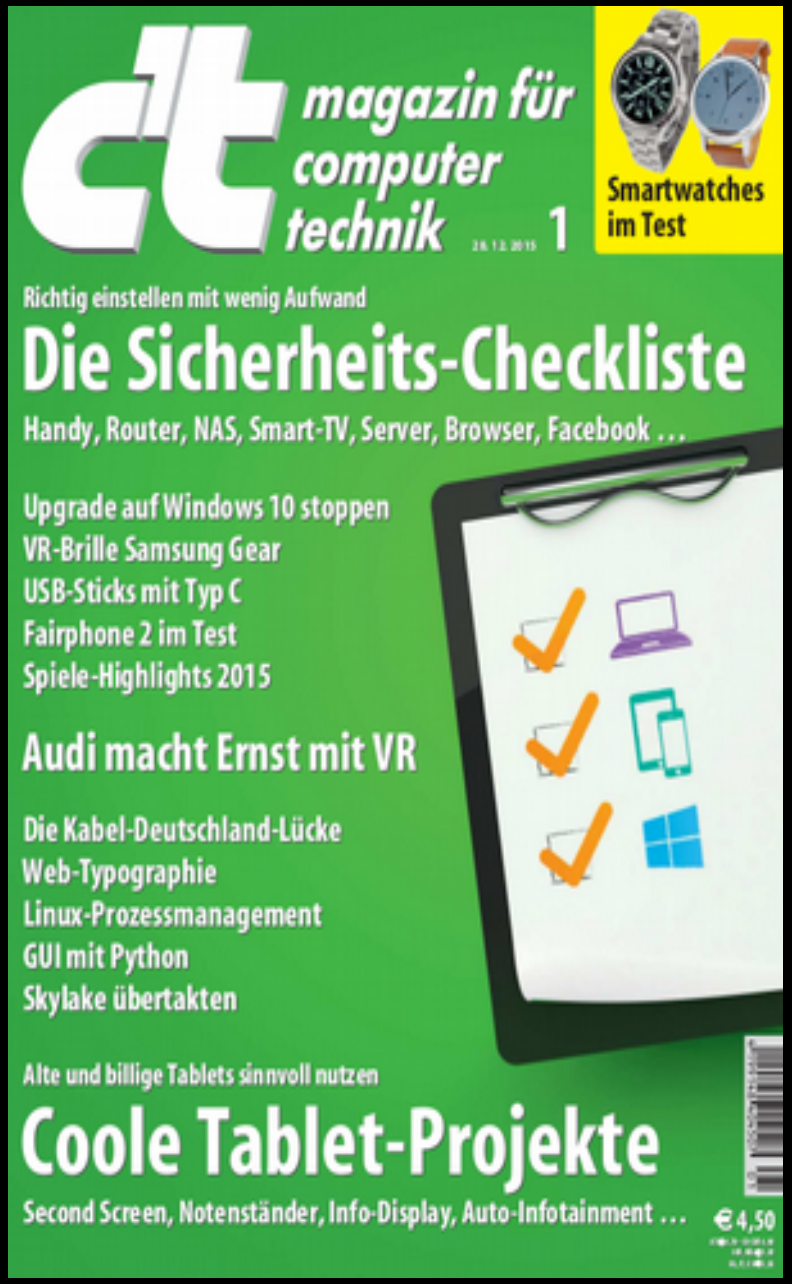
%pre

%pre | whoami



%pre | whoami @work

%pre | whoami @work



Kernel-Log | Linux 4.4

Thorsten Leemhuis

Linux-Kernel 4.4

3D-Grafiktreiber für virtuelle Maschinen und mehr Sicherheit bei RAID 5

Der Linux-Kernel 4.4 wird einen Grafiktreiber für den Raspi mitbringen. Performance-Verbesserungen im Netzwerksubsystem sollen DDoS-Attacken erschweren. Zwei neue Ansätze versprechen High-End-SSDs mehr Leistung zu entlocken.

Das in der ersten Januarhälfte erwartete Linux 4.4 erweitert die Fähigkeiten des Treibers Virtio-GPU. Dadurch sollen Linux-Distributionen, die in einer mit KVM betriebenen virtuellen Maschine (VM) laufen, in Zukunft die 3D-Beschleunigung des Wirtsystems nutzen können. Bei diesem über mehrere Jahre als „Virgl 3D" entwickelten Ansatz nimmt ein Gast-3D-Treiber die OpenGL-Befehle zur Ausführung an den Host weiter. Das Verfahren erfordert neben Linux 4.4 die Grafikbibliothek Mesa 11.1 und den Systememulator Qemu 2.3; beide sollen noch im Dezember erscheinen.

Virtualisierungs-Software von VMware oder VirtualBox ermöglicht schon länger eine Nutzung der 3D-Beschleunigung in Linux-VMs. Die VMware-Produkte sind allerdings proprietär und VirtualBox erfordert oft die mühsame Einrichtung passender 3D-Gasttreiber. Anders als Virgl 3D funktioniert der 3D-Support dieser Virtualisierungslösungen allerdings auch in VMs mit Windows. Selbiges gilt auch für das noch unfertige „KVMGT" von Intel, bei dem die Gast-Treiber direkt auf Funktionen von Intel-GPUs zugreifen.

Raspi-Treiber

Linux bringt mit Version 4.4 erstmals einen Kernel-Grafiktreiber für die Broadcom-Prozessoren mit, die auf den verschiedenen Ausführungen des Raspberry Pi stecken. Dieser Treiber funktioniert weitgehend autark und ist nicht auf den Grafiktreiber in der proprietären Firmware angewiesen, wie es bei den derzeit zumeist eingesetzten Treibern der Fall ist. Der in 4.4 enthaltene und von Broadcom selbst vorangetriebene Treiber beherrscht aber bislang keine 3D-Beschleunigung, die sollen Verbesserungen ermöglichen, die in Linux 4.5 einfließen sollen.

Der MD-RAID-Code wird bei Software-RAIDs der Level 4, 5 und 6 ein Log führen können, das auf einem weiteren Datenträger liegt und Datenverlöschungen bei Systemabstürzen verhindert. Das zugrundeliegende Verfahren ähnelt dem von Journaling-Dateisystemen wie Ext4: Der Kernel schreibt jede Änderung zuerst in das Log und erst danach auf die am RAID beteiligten Datenträger. Falls die Stromversorgung beim Schreiben auf die RAID-Datenträger ausfällt, kann der Kernel die im Log hinterlegten Daten beim nächsten Start nutzen, um die Integrität innerhalb kurzer Zeit wiederherzustellen.

Das Log kann auch die Geschwindigkeiten kleinwenig steigern, da es Änderungen kurz puffert. Die Log-Funktion für MD-RAID stammt von Facebook-Mitarbeitern, die bereits an Erweiterungen arbeiten, die das Log zu einem vollwertigen Writeback-Cache machen. Dabei puffert das Log länger und mehr, was der Geschwindigkeit zugute kommt.

Offene SSDs

Neu ist auch Unterstützung für ein LightNVM genanntes Framework, das für „Open-Channel SSDs" gedacht ist. Mit diesem Begriff bezeichnen die LightNVM-Entwickler einige vornehmlich für Server gedachte SSDs, bei denen das Betriebssystem einige Arbeiten übernehmen kann, die normalerweise der Flash Translation Layer (FTL) oder das Bad Block Management der SSD-Firmware erledigen. Das Delegieren ans Betriebssystem soll die Geschwindigkeit steigern, denn das vermeidet nicht nur Overhead, sondern auch störende Wechselwirkungen zwischen SSD-Firmware und Betriebssystem. Derzeit gibt es aber nur eine Handvoll SSDs, mit denen das Ganze gelingt.

Geschwindigkeitssteigerungen bei High-End SSDs. Für Server verspricht auch eine neue, noch experimentelle Infrastruktur. Bei ihr nutzt der Kernel Polling, wenn es große Datenmengen mit besonders schnellen Datenträgern austauscht. Diesen Trick nutzen viele Netzwerk-Treiber im Kernel schon länger, denn bei der Verarbeitung riesiger Datenmengen macht das regelmäßige Abrufen neuer Daten beim Controller weniger Arbeit als die Abarbeitung der vielen Interrupts, die sonst auflaufen.

Linux 4.4 wird TCP-Handshakes schneller verarbeiten. Das reduziert Latenzen und erschwert zugleich DDoS-Attacken, denn der Kernel kann nun mehr Anfragen bedienen, bevor er unter hoher Last in Straucheln gerät.

Die bessere Performance ist unter anderem einigen Optimierungen der Locking-Mechanismen im TCP-Code zu verdanken. Bei Tests durch den zuständigen Entwickler steigerten diese Änderungen die Zahl der per SYN/ACK hergestellten TCP-Verbindungen um das Zwei- bis Dreifache. Der Entwickler hat zudem noch einige Umbauten an Codepfaden für das SO_REUSEPORT-Flag vorgenommen, über das mehrere Anwendungen auf einem Port lauschen können; das konnte die Zahl der TCP-Handshakes noch mal nahezu verdoppeln.

Der neue Packet-Loss-Algorithmus RACK (Recently ACK) soll die Geschwindigkeit von TCP-Verbindungen steigern, bei denen häufiger Netzwerkpakete verloren gehen. Dazu versucht RACK etwaige Paketverluste anhand der Übertragungszeiten anderer Pakete zu erkennen, und nicht anhand der Reihenfolge, in der sie eintreffen, wie es bisherige Algorithmen meist tun. RACK ist vorerst experimentell und stammt von Google. Das Unternehmen setzt den Algorithmus offenbar schon eine Weile ein und hat ihn bei der IETF zur Standardisierung eingereicht.

Unprivilegierte Anwendungen können erstmals mit dem eBPF (extended Berkeley Packet Filter) ausgeführte Programme in den Kernel laden, um damit Datenströme zu verarbeiten, die durch den Kernel fließen. Dadurchkann beispielsweise ein nicht von Root ausgeführtes Tcpdump in Zukunft eBPF-Filter beim Kernel hinterlegen, damit der nur die Netzwerkpakete an den Sniffer weitergibt, die der Nutzer untersuchen will. Von unprivilegierten Anwendern stammende eBPF-Programme unterliegen allerdings einigen Einschränkungen, damit Angreifer den eBPF-Interpreter nicht missbrauchen.

Unabhängig davon haben die Entwickler das Performance-Analyse-Werkzeug perf erweitert, damit es eBPF-Programme automatisch bauen, prüfen und in den Kernel laden kann. Der Kernel kann mit solchen Programmen irrelevante Events frühzeitig ausfiltern, um Overhead und den Störeinfluss der Analyse zu reduzieren.

Langzeit-Kernel

Facebook-Entwickler haben die Prozessorlast beim Einsatz der Btrfs-Mount-Option ratime reduziert. Zuvor hatten sie festgestellt, dass die darüber aktivierte Datenverteilungsmethode die Performance bei ihren Hardware-RAIDs der Level 5 und 6 erheblich verbessert.

Zu den neu zum Kernel stoßenden Treiber gehört einer für USB-WLAN-Chips von Realtek, für die es bislang nur einen Staging-Treiber gab, der größere Qualitätsmängel aufweist. Der Kernel 4.4 wird zudem einige per Firewire angesprochene Sound-Chips besser unterstützen und spricht per I²S angebundene Audio-Chips von Skylake-Notebooks an. Der Wacom-Treiber steuert jetzt vier weitere Grafiktabletts der Intuos-Serie an. Linux 4.4 wurde zudem vorab aus einem Longterm-Kernel erklärt. Daher soll es nicht nur knapp drei Monate, sondern bis mindestens Januar 2018 mit Fehlerkorrekturen und kleineren Verbesserungen versorgt werden. (thl@ct.de)

%pre | whoami @work

INFOS ZUM ARTIKEL

Kapitel

Die Neuerungen von Linux 4.7 UPDATE

TRENDS & NEWS | KERNEL-LOG

Thorsten Leemhuis 30.05.2016 Kernel-Log, Linux, Linux 4.7, Linux-Kernel

Die neue Kernel-Version unterstützt AMDs neue Grafikchips. Ferner soll Linux 4.7 das Stromsparpotenzial moderner Prozessoren stärker ausschöpfen und Wartezeiten vermeiden, die bislang bei hoher Netzwerklast auftraten.

Linus Torvalds hat Linux 4.7 freigegeben. Eine der wichtigsten Verbesserungen der neuen Kernel-Version: Der Amdgpu-Treiber unterstützt jetzt die Polaris-Grafikprozessoren von AMD (u. a. 1, 2

www.heise.de/thema/Kernel_Log

%pre | whoami @work

THE H OPEN

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07 June 2013, 17:41

1 2 next »

Kernel Log: Coming in 3.10 (Part 1)

Networking

by Thorsten Leemhuis

Networking enhancements
Minor gems

Linux 3.10 sees improvements in the way lost packets at the end of TCP transactions are handled, speeding up HTTP data transfer. It also sees the addition of support for VLAN stacking and Realtek's RTL8188EE wireless chip.

Last weekend, Linus Torvalds released the fourth pre-release version of Linux 3.10. Technical problems meant that it was initially only available via the git source code management system, though Torvalds notes in the email announcing the release that he considers git to be the easiest way of getting hold of it anyway. Linux 3.10-rc4 is now also available as a source code archive via kernel.org.

As usual, Torvalds and his fellow developers merged all of the major changes for the 3.10 kernel in the two weeks following the release of version 3.9. Linux 3.10 thus now finds itself in the stabilisation phase, where large-scale changes are undertaken only in exceptional cases. Therefore, we are now able to offer a fuller overview of the most important changes to be anticipated in the 3.10 kernel, which is due for release in late June/early July. We will be presenting a series of articles looking at various areas of the kernel.

THE H OPEN HEADLINES

- The H is closing down
- Hardware Hacks: Fire, alarms, touchable boards and NFC rings
- GitHub gets smart over open source licences
- NSS 3.15.1 brings TLS 1.2 support to Firefox
- Second Android signature attack disclosed
- One month left for the EclipseCon Europe 2013 call for papers

THE H OPEN

Kernel Log: Coming in 3.10 (Part 4) - Drivers

Linux 3.10 will be able to use the video acceleration features offered by Radeon graphics cores. Systems with Intel graphics will wake from standby faster. Linux now has an input device driver for Apple's infrared receiver more »

closed down July 2013 :-(

%pre | whoami @Fedora

fedora

Thl talk preferences watchlist contributions log out

user page | discussion | edit | history | move | unwatch

WIKI

- Fedora Project Wiki
- News
- Events
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- Recent changes
- Random page
- Help

NAVIGATION

- Home
- Get Fedora
- Join Fedora

SUB-PROJECTS

- Ambassadors
- Community Operations
- Design

User:Thl

Thorsten Leemhuis

[edit]

Email: <fedora@leemhuis.info>

GPG Key: 4C583D2D (run **gpg --recv-key 4C583D2D** to get it)

Jabber: thl_at_home@jabber.ccc.de

Google+: https://plus.google.com/+ThorstenLeemhuis/

Facebook: https://www.facebook.com/thleemhuis

Supported languages : de, en Living in: Hannover, Germany;

I was the first FESCo's chairman not working for Red Hat; that was about in 2006 till Fedora Core and Extras merged in early 2007, when I had to step down from the position due to conflicting interests with my day job. I then helped getting the EPEL effort running and served as the EPEL Steering Committee chairmen till February 2008. In parallel to my Fedora contributions within the Fedora project I did a lot of work for a well know 3rd-party add-on package repository and helped getting the predecessor running, which quickly become the unofficial official Add-On repository for Fedora in late 2008/early 2009.

These days mostly inactive in Fedora due to time constrains; I'm maintaining just a few Fedora packages that I need for work and maintain repositories with Fedora packages that contain

%pre | whoami @Fedora

- Design
- Documentation
- EPEL
- Infrastructure
- Internationalization
- Localization
- Marketing
- Magazine
- Package Maintainers
- Quality Assurance
- Websites
- All projects

SEARCH

Go Search

TOOLS

- What links here
- Related changes
- Upload file
- Special pages
- Printable version
- Permanent link

Package repository with Linux vanilla kernels for Fedora [edit]

This page contains information about a set of repositories which contain RPM packages with Linux vanilla kernels built for Fedora. 'Vanilla' in this scope means 'unmodified'. In other words: the sources used to compile those kernels come straight from kernel.org and do not contain any of the enhancements which the official Fedora kernels contain.

How to use these repos [edit]

How to use, the quick (aka TLDR) verison [edit]

Download the definitions for the Kernel vanilla repositories:

```
curl -s https://repos.fedorapeople.org/repos/thl/kernel-vanilla.repo | suc
```

Run this to get the latest development kernel:

```
sudo dnf --enablerepo=kernel-vanilla-mainline update
```

You don't want to run a development kernel and want the latest stable kernel instead? Then run this:

```
sudo dnf --enablerepo=kernel-vanilla-stable update
```

Reboot. That's it – at least most of the time, as sometimes it's not that easy:

- Is UEFI Secure Boot active on your system? Then you have to disable it in your BIOS Setup to run kernels from these repos, as they are not signed with a key that a default Secure Boot setup

%pre | whoami @linux

not a Linux kernel developer

%pre | whoami @linux

good overview

%pre | whoami @linux

thanks to my constant reporting

%pre | whoami @linux

thanks to working as regression tracker for Linux 4.7 and 4.8

%pre | whoami @linux

and thx to lwn.net

%pre | this talk

1. short status overview
2. recent developments
3. important changes
4. things in the works
5. meta view on development

%pre | this talk

- 1. short status overview -

Where we are and was is happening right now

%pre | this talk

- 2. recent developments -

features in the
newest kernel version

%pre | this talk

- 3. important changes -

important changes in the past 12 to 18 months

%pre | this talk

- 4. work in progress -

trying to look ahead a bit

%pre | this talk

- 5. meta view -

development pace, growth, number of developers, current problems, ...

%pre | this talk

BTW: slides will continue to change this frequently

(this is already slide #21)

%pre | this talk

therefore better write questions down!

part 1:
short status overview

brief overview

everything works
smoothly as usual

this is a good thing!

brief overview

current kernel version:
Linux 4.8

brief overview

released yesterday

brief overview

Ubuntu 16.10 will use it

and many others, too

brief overview

like each new version, it brings support for ~500 more devices or device classes

brief overview

100 to 200 of them are for ACPI-, USB-, or PCI/PCIe devices

brief overview

that's important because hardware vendors release new devices frequently

brief overview

a bunch of new & improved security and hardening techniques

quite a lot happens in this area!

brief overview

ETA for Linux 4.9:
December, 5th
or one week later

brief overview

new versions typically get released every
9 or 10 weeks

one week less than a few years ago

brief overview

you can bet on it!

you'll lose sometimes,
but win most of the time

brief overview

every new version consists of ~12.500 Commits

brief overview

from about
~1.500 developers

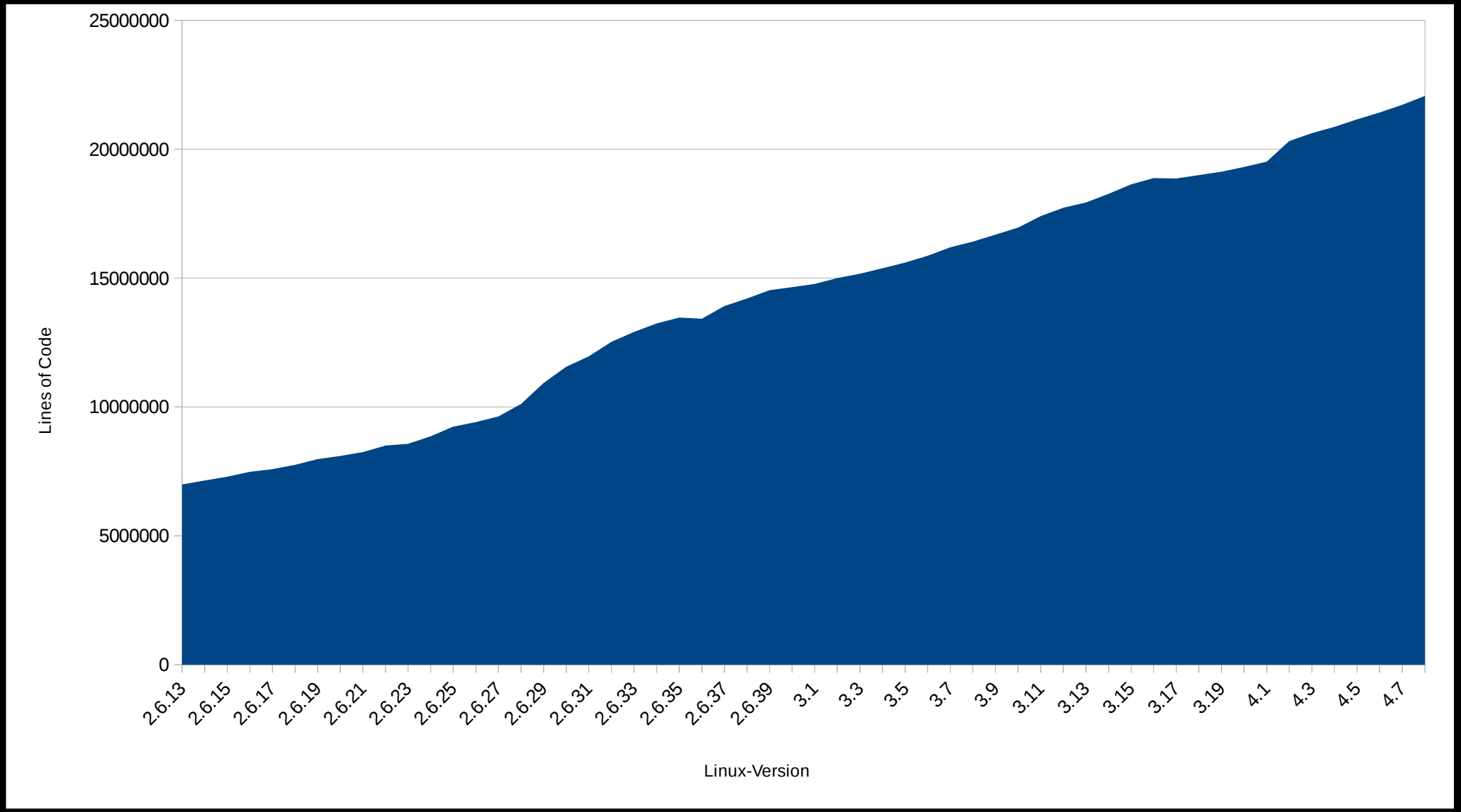
brief overview

containing about
700.000 lines of
new or modified code

brief overview

sources grow by
~290.000 lines
every release

brief overview



brief overview

22 million lines of code

(including documentation, comments, blank lines, ...)

brief overview

between 4.7 and 4.8-rc1

14 days with
12.423 commits containing
647.518 insertions &
307.408 deletions

brief overview

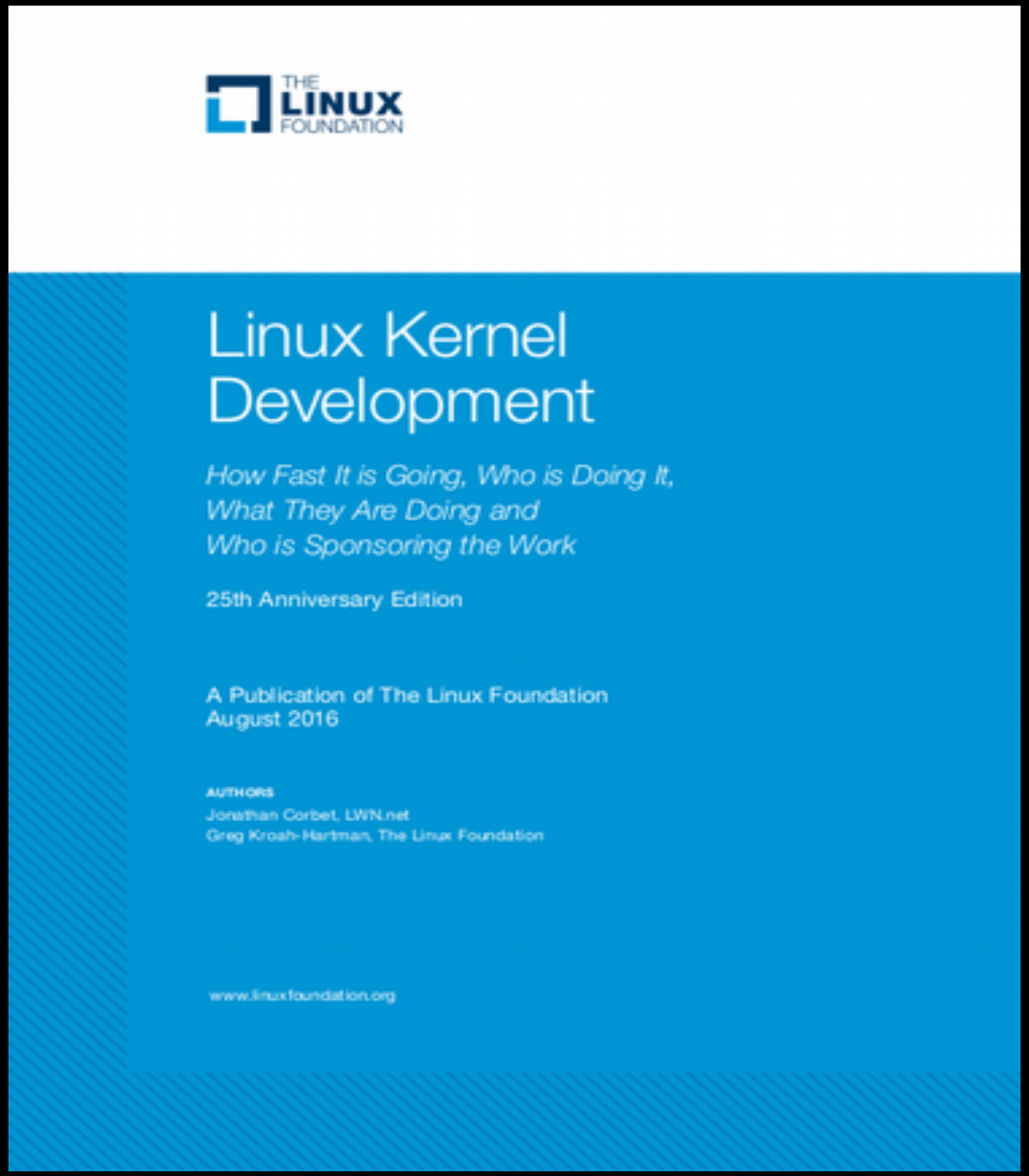
one change every
97 seconds

brief overview

despite that speed,
everything works very well

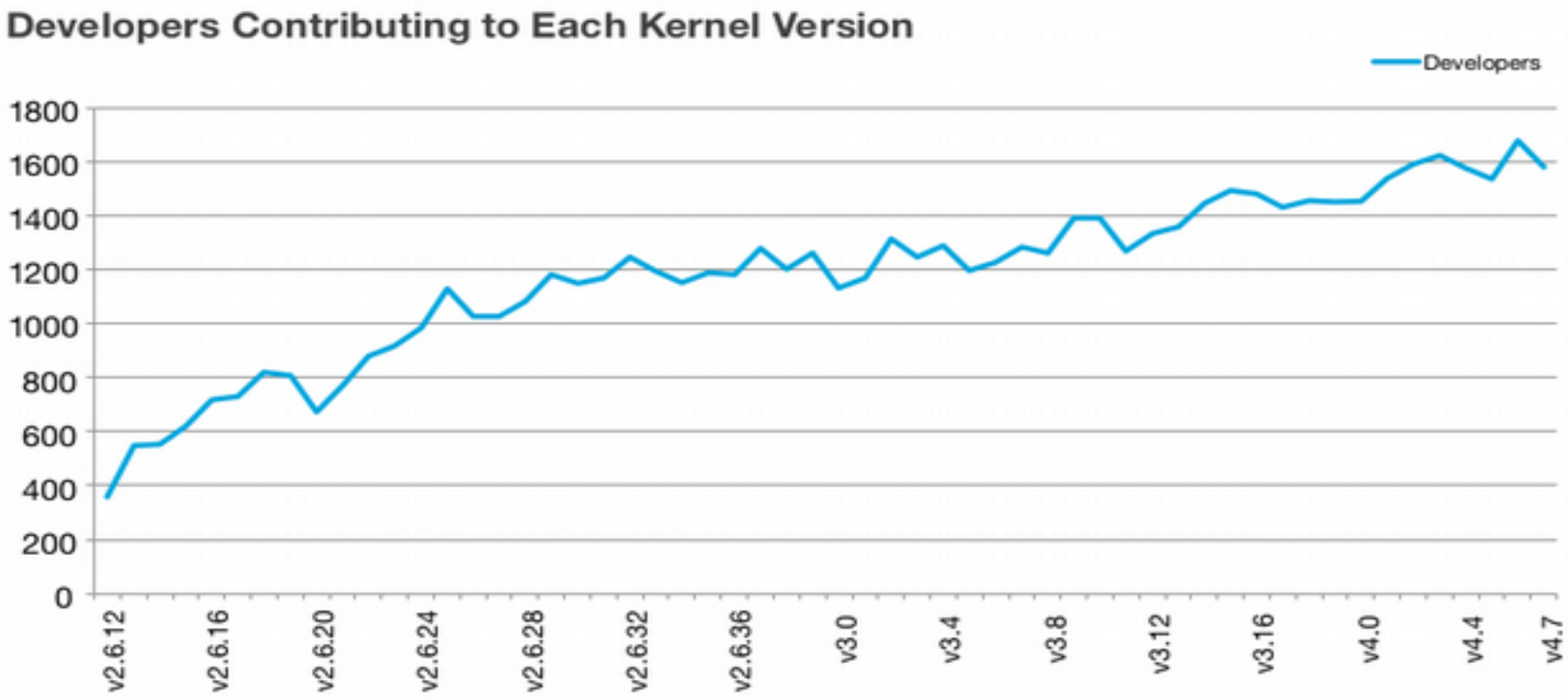
nothing to worry about

brief overview



www.linux.com/publications/linux-kernel-development-how-fast-it-going-who-doing-it-what-they-are-doing-and-who-5

brief overview



Since the beginning of the Git era (the 2.6.11 release in 2005), a total of 13,594 developers have contributed to the Linux kernel; those developers worked for a minimum of 1,340 companies. The number of companies supporting work on the kernel appears to be stable and not growing like the number of developers — but the 251 companies observed to have supported work on 4.2 was an all-time record.

www.linux.com/publications/linux-kernel-development-how-fast-it-going-who-doing-it-what-they-are-doing-and-who-5

brief overview

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Search
Kernel
Security
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Edition
Return to the Kernel page

A look at the 4.8 development cycle

[LWN subscriber-only content]

By **Jonathan Corbet**
September 28, 2016

As of this writing, the 4.8 development cycle is nearing its end. Linus has let it be known that a relatively unusual -rc8 release candidate will be required before the final release, but that still means that the cycle will only require 70 days, fitting into the usual pattern. A look at the development statistics for this release also fits the pattern about now.

With regard to the release cycle, it has become boringly regular in recent years. The 3.8 kernel, released on February 18, 2013, came out on a Sunday, as has every subsequent release with the exception of 3.11, which was released on Monday, September 2, 2013. In these last few years, the only cycle that has taken longer than 70 days was 3.13, which required 77 days. The extra week that time around was forced by Linus's travels, rather than anything inherent in that cycle itself. Since then, every cycle has taken 63 or 70 days, with the sole exception of 3.16, which showed up in 56 (and one could quibble that it was really a 63-day cycle as well — that was the time Linus experimented with opening the merge window before the previous final release had been made).

In this 70-day cycle, we have seen the addition of 13,253 non-merge changesets from 1,578 developers — so far; the numbers will increase slightly before the end. It is thus a busy cycle, though the record for the busiest (3.15, with 13,722 commits) remains unchallenged. Those developers grew the kernel by 350,000 lines this time around. The most active developers in this cycle were:

lwn.net/Articles/701650/

brief overview

LWN.net

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Edition
Return to the Kernel page

Work on the 4.8 kernel was supported by 217 employers that we were able to identify. The most active employers this time around were:

Most active 4.8 employers

By changesets			By lines changed		
Intel	1960	14.8%	Samsung	120693	14.4%
Red Hat	1143	8.6%	Intel	104291	12.4%
(Unknown)	806	6.1%	(None)	102848	12.3%
(None)	746	5.6%	Red Hat	48563	5.8%
Linaro	662	5.0%	IBM	42298	5.0%
IBM	654	4.9%	Mellanox	29226	3.5%
Samsung	637	4.8%	(Unknown)	27671	3.3%
SUSE	338	2.6%	Linaro	22960	2.7%
Google	294	2.2%	Broadcom	18040	2.2%
AMD	281	2.1%	Cisco	17868	2.1%
Oracle	259	2.0%	MediaTek	16292	1.9%
Texas Instruments	258	1.9%	QLogic	15986	1.9%
Mellanox	243	1.8%	ARM	14397	1.7%
Renesas Electronics	223	1.7%	Renesas	14283	1.7%

lwn.net/Articles/701650/

that was part 1

next up

part 2:
recent developments

recently | Linux 4.7

Linux 4.8

recently | Linux 4.8

XFS RMAP

Intel vGPU

driver for GeForce 1000

eXpress Data Path (XDP)

recently | Linux 4.8

the first three
are still WIP :-/

(and that's why they get mentioned later in this talk)

recently | Linux 4.8

and even XDP is still in its early phase

recently | Linux 4.8

XDP is a programmable and high performance networking data path

recently | Linux 4.8

IOW: a bypass within the kernel to handle some of the network traffic

recently | Linux 4.8

picks up packages right after the NIC got them

recently | Linux 4.8

and process them with BPF programs you write

recently | Linux 4.8

less features

recently | Linux 4.8

but handles some tasks
quicker and with
less overhead

recently | Linux 4.8

supported right now:
early drop,
forward & rewrite

recently | Linux 4.8

DDoS mitigation/defense

more efficient forwarding

recently | Linux 4.8

not a kernel bypass,
like DPDK

recently | Linux 4.8

Advantages of XDP over DPDK

- Allows option of busy polling or interrupt driven networking
- No need to allocate huge pages
- Dedicated CPUs are not required, user has many options on how to structure the work between CPUs
- No need to inject packets into the kernel from a third party userspace application
- No special hardware requirements
- No need to define a new security model for accessing networking HW
- No third party code/licensing required

github.com/iovisor/bpf-docs/raw/master/Express_Data_Path.pdf

recently | Linux 4.8

4.8: what else?

recently | 4.8: even more

optimized WLAN transfers

improved Raspi 3 support

architecture emulation containers

drivers for new graphic cores from ARM, Intel, Nvidia

recently | 4.8: even more

Software driver for RDMA over Converged Ethernet (RoCE)

bunch of security improvements

new tools and formats for writing kernel documentation

recently | 4.8: even more

more details about 4.8:

heise.de/-3283402

lwn.net/Kernel/Index/#Releases-4.8

kernelnewbies.org/Linux_4.8 (WIP)

recently | 4.8: even more

4.8 will soon be used in Arch Linux, Ubuntu 16.10, OpenSuse Tumbleweed

within a few weeks also in Fedora 23/24/25...

that was part 2

next up

part 3:
important changes

important changes

Kernel Self Protection /
kernel hardening

changes | kernel hardening

security bugs just happen

changes | kernel hardening

it often takes 5 years
until they are found

changes | kernel hardening

need to protect the kernel against common flaws

changes | kernel hardening

just like today's cars
are prepared for a
potential crash

changes | kernel hardening

the Kernel Self Protection Projekt (aka KSPP) drives these efforts

changes | kernel hardening

they improved or merged a big bunch of security and hardening techniques

changes | kernel hardening

KASLR improvements,
SLUB freelist randomization,
GCC Plugins,
Hardened usercopy,
ro_after_init for modules,
improved RNG

changes | kernel hardening

that's just what's
new in 4.8!

note: (1) most, but not all were driven by the KSPP; (2) some were ported from grsecurity/PAX

changes | kernel hardening

many similar things
in earlier versions

changes | kernel hardening

more to come

Kernel stack hardening in 4.9?

changes | kernel hardening

BTW: yes, this hardening sometimes has a negative impact on performance

changes | kernel hardening

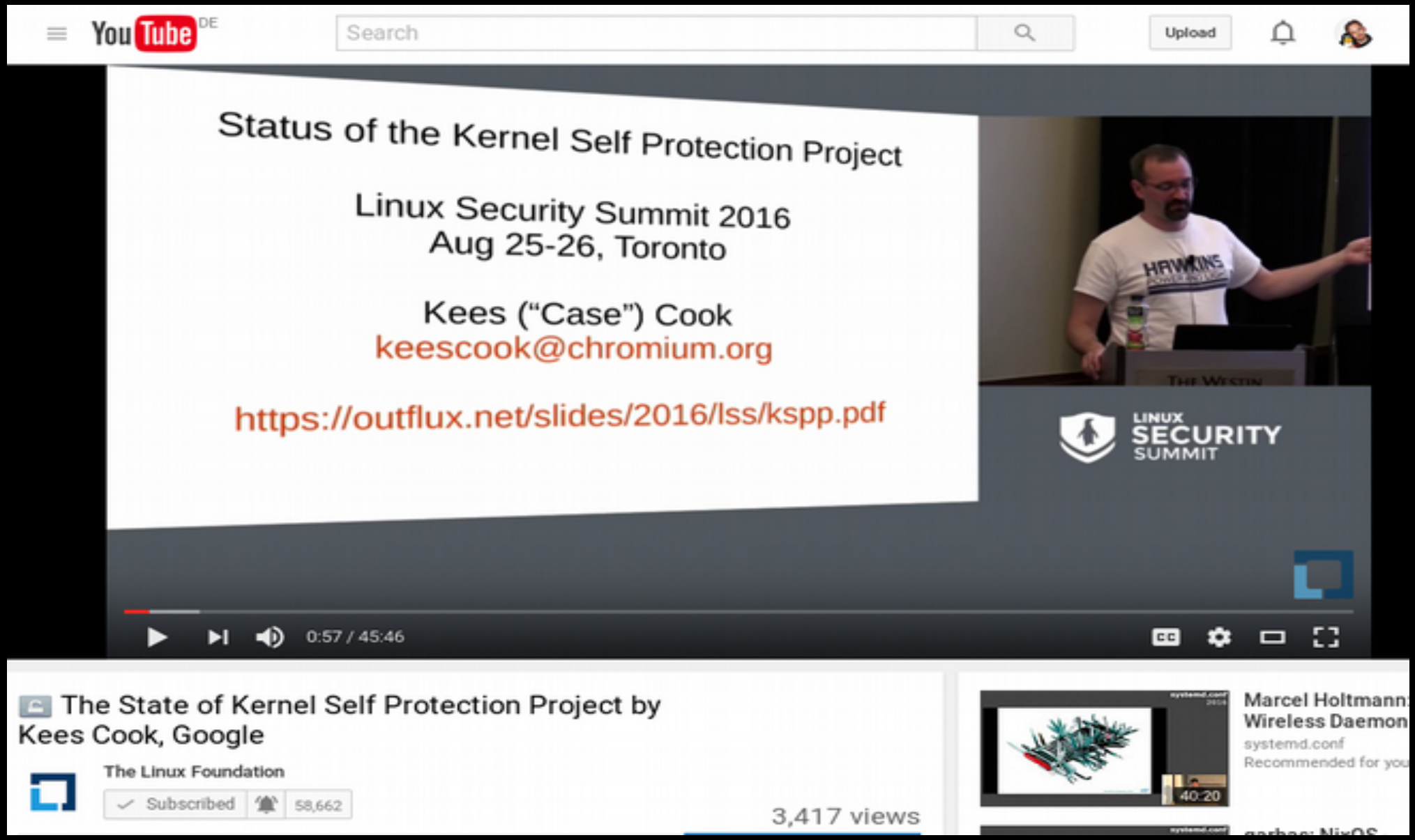
just like protections techniques make cars heavier and thus slower

get used to it

changes | kernel hardening

more details in videos and slides from the recently held security summit

changes | kernel hardening



www.youtube.com/watch?v=aMkCKeZ8xZw

important changes

what else?

important changes

BPF got improved and became more important

(and there is more to come)

WIP | BPF

Berkeley Packet Filter/BPF: What tcpdump uses to just get the relevant packages

WIP | BPF

was improved (Extended BPF/eBPF) and became flexible & programmable in-kernel VM

WIP | BPF

VM == "abstract computing machine"

(think of a Java VM and not KVM/XEN/VMware/...)

WIP | BPF

making the BPF more capable and useful

(the e in eBPF got dropped lately)

WIP | BPF

BPF is used in more and more areas

to improve things or realize new features

WIP | BPF

network traffic control, performance monitoring, tracing, syscall filtering, ...

WIP | BPF

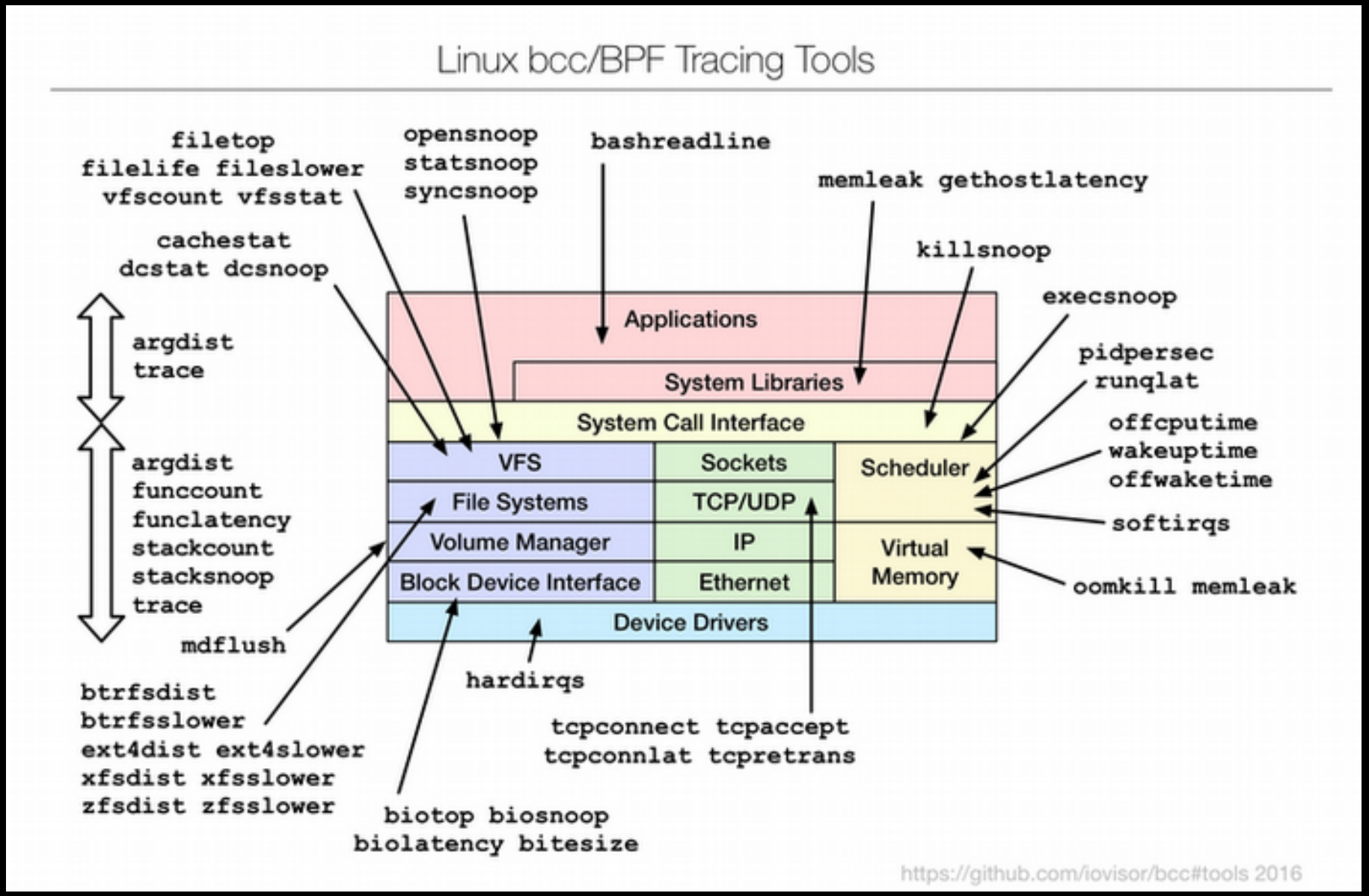
for example used in the eXpress Data Path/XDP

WIP | BPF

dynamically analyzing performance improved a lot thx to eBPF

became/becomes more D-Trace like

WIP | BPF



github.com/iovisor/bcc

WIP | BPF

Linux BPF Superpowers

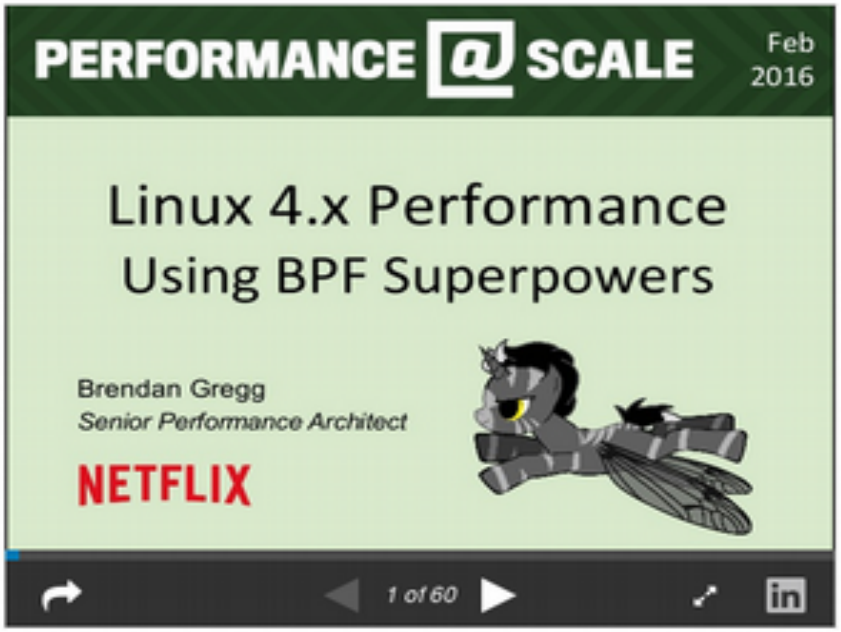
05 Mar 2016

Last month I spoke at Facebook's Performance @Scale event about Linux BPF Superpowers. These are coming to Linux in the 4.x series, and I've been using them in new open source performance tools.

Video is on Facebook (30 mins):

> Linux 4.x Performance: Using BPF Superpowers (Brendan Gregg)
>
> Posted by At Scale on Friday, February 26, 2016

Slides are on slideshare:



www.brendangregg.com/blog/2016-03-05/linux-bpf-superpowers.html

important changes

what else?

important changes

the graphics drivers
improved quite a lot

changes | GPU

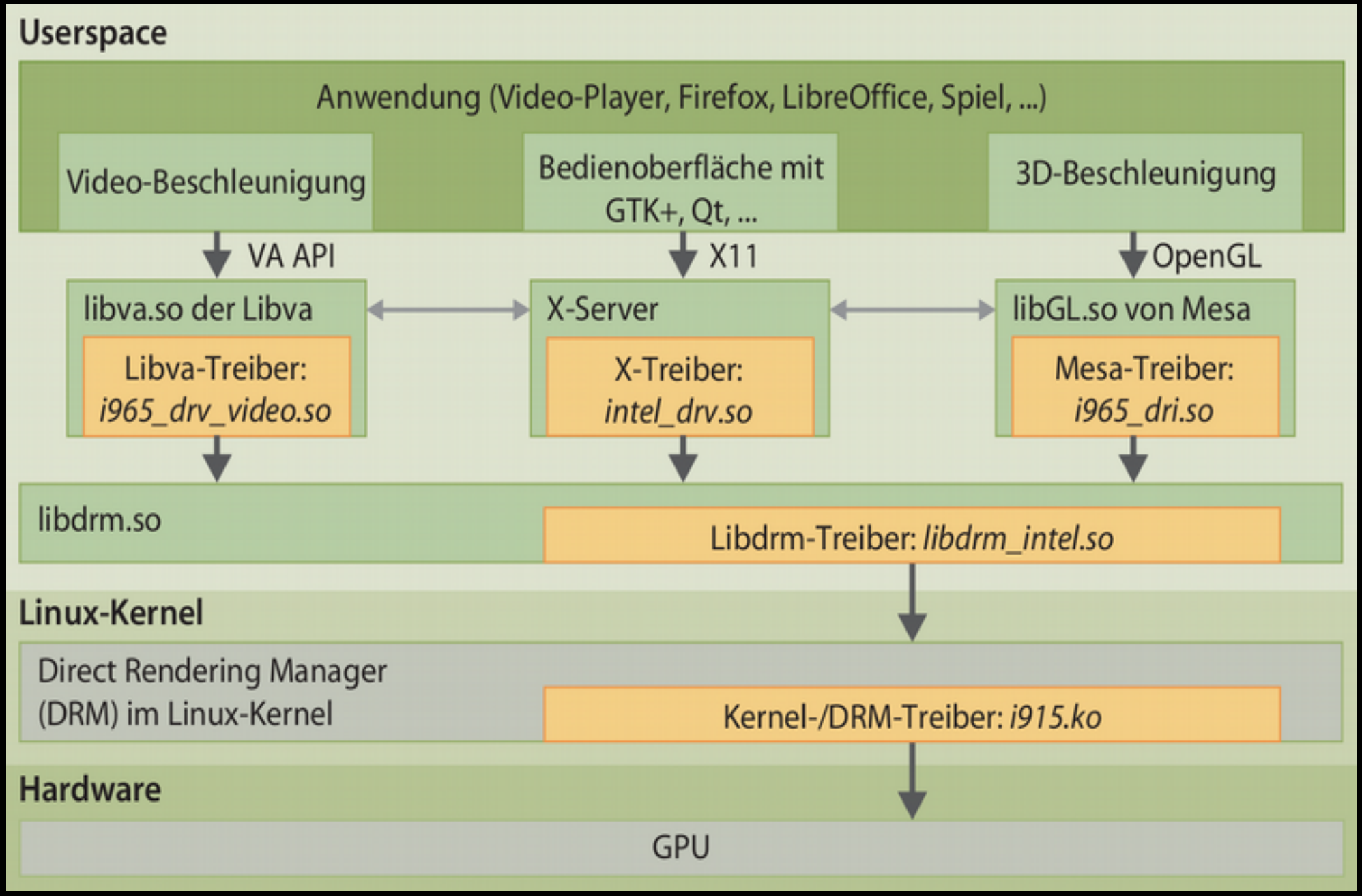
not only those in the kernel, but and the userland drivers which are build on top of it

changes | GPU

worth its own talk :-/

(what follows is a brief overview)

changes | GPU



Quelle: c't 23/2014, S. 160ff: http://www.heise.de/ct/ausgabe/2014-23-Die-Grafiktreiber-Architektur-von-Linux-2415770.html

changes | GPU

that's why some of the improvements I'll mention are in userland drivers

changes | GPU

Intel GPUs

changes | GPU Intel

finally supports OpenGL 4.3 with Mesa 12.0

(run more games, #yeah!)

changes | GPU Intel

Mesa 12.1 (13.0) will soon bring support for 4.4 or 4.5

changes | GPU Intel

Intel's drivers are not as good as their reputation

(Skylake support for example came late and had stability problems in the beginning)

changes | GPU

next up

changes | GPU

AMD Radeon

changes | GPU AMD

FLOSS drivers got
a whole lot better in the
past two years!

(thx AMD!)

changes | GPU AMD

most things just work

Video acceleration, power management, DP MST, HiDPI, HDMI&DP Audio, ...

changes | GPU AMD

and 3D performance improved quite a lot

changes | GPU AMD

sometimes it's close to or even better than AMDs old proprietary drivers

(for the older GPUs)

changes | GPU AMD

Mesa 12.0 brought OpenGL 4.3 support, too

changes | GPU AMD

4.7 brought support for the latest GPUs

Rx 400 series

changes | GPU AMD

IOW: AMDs FLOSS drivers are more than good enough for most things

and better than their reputation

changes | GPU AMD

some problems as well

DAL, performance on newer GPUs, ...

changes | GPU

next up

changes | GPU

Nvidia GeForce

changes | GPU Nvidia

FLOSS drivers still slow and lack a lot of features

nevertheless they are good enough for some use cases

changes | GPU Nvidia

it didn't help much that Nvidia participates a little in Nouveau development

(since ~2 years now thx to Tegra)

changes | GPU Nvidia

acceleration on recent GPUs requires a signed firmware

900 and 1000er series

changes | GPU Nvidia

took more than a year for the 900 series

changes | GPU Nvidia

support merged
in Linux 4.6

changes | GPU Nvidia

4.8 brought a driver for GeForce 1070 & 1080

changes | GPU Nvidia

still waiting for Nvidia to release the Firmware :-/

important changes

what else?

changes | Btrfs

BTRFS:
no big changes recently

changes | Btrfs

but a few small improvements and fixes

changes | Btrfs

is this "Next generation file system for Linux" finally stable?

changes | Btrfs

that questions is a bit like "can I swim here?"

changes | Btrfs

the answer depends on the local conditions

changes | Btrfs

but also on your swimming abilities

changes | Btrfs

for Ext4 it's a bit like this

changes | Btrfs

changes | Btrfs

for Btrfs it's more like this

changes | Btrfs

changes | Btrfs

that's for the common usage of Btrfs; there are a few areas more like this

changes | Btrfs

changes | Btrfs

as some parts of Btrfs are still WIP and unstable

changes | Btrfs

for example the
RAID 5/6 support

changes | Btrfs

Feature	Status	Notes
Subvolumes, snapshots	OK	
Trim (aka. discard)	OK	*fstrim* and mounted with *-o discard* (has performance implications)
Autodefrag	OK	
Defrag	mostly OK	extents get unshared *(see below)*
Auto-repair	OK	automatically repair from a correct spare copy if possible (dup, raid1, raid10)
Compression	mostly OK	*(needs verification and source)* auto-repair and compression may crash
Scrub	OK	
Scrub + RAID56	Unstable	will verify but not repair
Filesystem resize	OK	shrink, grow
Send	OK	corner cases may still exist
Receive	OK	
Single (block group profile)	OK	
DUP (block group profile)	OK	
RAID0	OK	
RAID1	OK	
RAID10	OK	
RAID56	Unstable	write hole still exists, parity not checksummed
Seeding	OK	should be better documented

btrfs.wiki.kernel.org/index.php/Status

changes | Btrfs

one of the reasons why Btrfs still requires a learning phase

changes | Btrfs

which is only worth it
if you benefit from Btrfs
features

important changes

what else?

important changes

quite a lot of improve-
ments in the network area

(way to many to mention the all)

changes | network

some made Linux ready for 100 Gigabit Ethernet

(just one example)

changes | network

a lot of improvements
for tunneling

#cloud

changes | network

nft/nftables
matures slowly

(iptables successor)

important changes

what else?

changes

virtio-gpu/Virgl 3D

changes | virtio-gpu

3D in Linux VMs running on a Linux host

changes | virtio-gpu

3D driver in the guest passed commands to the host which executes them with its 3D driver

changes | virtio-gpu

everything required in the latest distros

(e.g. Linux >= 4.4 && Mesa >= 11.1 && Qemu >= 2.5 && ...)

changes

what else?

changes

Raspberry-Pi-Support

changes | raspi

out of the box support for the various raspi variants improved a lot

changes | raspi

and we now have floss drivers in kernel and Mesa

called "vc4"

changes

what else?

changes

a lot of other things

changes | much more

copy offloading for NFS

OOM killer got optimized

ARM64 support matures

parallel NFS (pnfs)

Cgroup v2

changes | much more

NVDIMMs and other types of Persistent Memory (pmem)

CRIU (Checkpoint & Restart)

Cgroup Namespaces

userfaultfd: Post-copy live migration for Qemu/KVM

that was part 3

next up

part 4:
things in the works
(aka "WIP")

WIP

what the next few month might bring

WIP

not kdbus

it's dead, Jim

WIP

developers started "Bus1" instead

WIP | Bus1

still pre-alpha and not officially announced

WIP | Bus1

design inspired by Androids "binder" and other IPC techniques

WIP | Bus1

universal IPC

can transport D-Bus messages, but can also be used for other protocols

WIP

what else?

WIP

Intels Graphics Virtualization Technology (GVT-g)

WIP

use parts of your iGPU in VMs

WIP

3D acceleration in VMs

(Linux and Windows)

WIP

initial bits in 4.8

WIP

what else?

WIP

XFS Reverse-mapping

WIP | XFS RMAP

also in 4.8, but not used for anything yet

WIP | XFS RMAP

foundation for many improvements currently developed

WIP | XFS RMAP

of free extents. i.e. it is coherent with the free space btrees we already maintain and never overlaps with them.

This reverse mapping infrastructure is the building block of several upcoming features - reflink, copy-on-write data, dedupe, online metadata and data scrubbing, highly accurate bad sector/data loss reporting to users, and significantly improved reconstruction of damaged and corrupted filesystems. There's a lot of new stuff coming along in the next couple of cycles,a nd it all builds in the rmap infrastructure.

As such, it's a huge chunk of new code with new on-disk format features and internal infrastructure. It warns at mount time as an

WIP | XFS RMAP

IOW: many features that people like in Btrfs & ZFS

(but integrated volume management is not among them)

WIP | XFS RMAP

so will XFS in the end be our "next gen file system for Linux"?

WIP | XFS RMAP

we'll see, but it certainly will be interesting to watch

WIP

what else?

WIP

MD-RAID:
Clustering, Log-Device

WIP | Mdadm

clustering support for MDDRAID1 slowly getting production ready

WIP | Mdadm

Log-Device:
Journaling for RAID 5/6

WIP | Mdadm

avoids the "write hole"

and improves the performance a little bit; more to come

WIP

what else?

WIP

a lot more

WIP | much more

live patching improvements

year 2038

realtime & realtime KVM

WIP | much more

richacls

support for SMR hard discs

Tinification

schedutil

that was part 4

next up

Teil 5: meta view

meta

a look at kernel development itself

meta

a new longterm kernel
every January

(longterm == 2 years support)

meta | Longterm

makes it more predictable

(for users and distros)

meta | Longterm

Linux Kernel Monkey Log

Random bits from Greg Kroah-Hartman

Blog | Archives | Search | RSS

SEP 6TH, 2016

4.9 == Next LTS Kernel

As I briefly mentioned a few weeks ago on my G+ page, the plan is for the 4.9 Linux kernel release to be the next "Long Term Supported" (LTS) kernel.

Last year, at the Linux Kernel Summit, we discussed just how to pick the LTS kernel. Many years ago, we tried to let everyone know ahead of time what the kernel version would be, but that caused a lot of problems as people threw crud in there that really wasn't ready to be merged, just to make it easier for their "day job". That was many years ago, and people insist they aren't going to do this again, so let's see what happens.

I reserve the right to not pick 4.9 and support it for two years, if it's a major pain because people abused this notice. If so, I'll possibly drop back to 4.8, or just wait for 4.10 to be released. I'll let everyone know by updating the kernel.org releases page when it's time (many months from now.)

Recent Posts

- 4.9 == Next LTS Kernel
- Kdbus Details
- Binary Blobs to C Structures
- Booting a Self-signed Linux Kernel
- Longterm Kernel 3.10

About Greg

Greg is a Fellow at the Linux Foundation and is responsible for the Linux kernel stable releases. He is also the maintainer of a variety of different kernel subsystems (USB, char/misc, staging, etc.) and has written a few books about Linux kernel development.

kroah.com/log/blog/2016/09/06/4-dot-9-equals-equals-next-lts-kernel/

meta view

what else?

meta view

there are about
two or three security
issues every week

and each year there are a few that are really critical

better be prepared!

meta | security

the big distros know that

meta | security

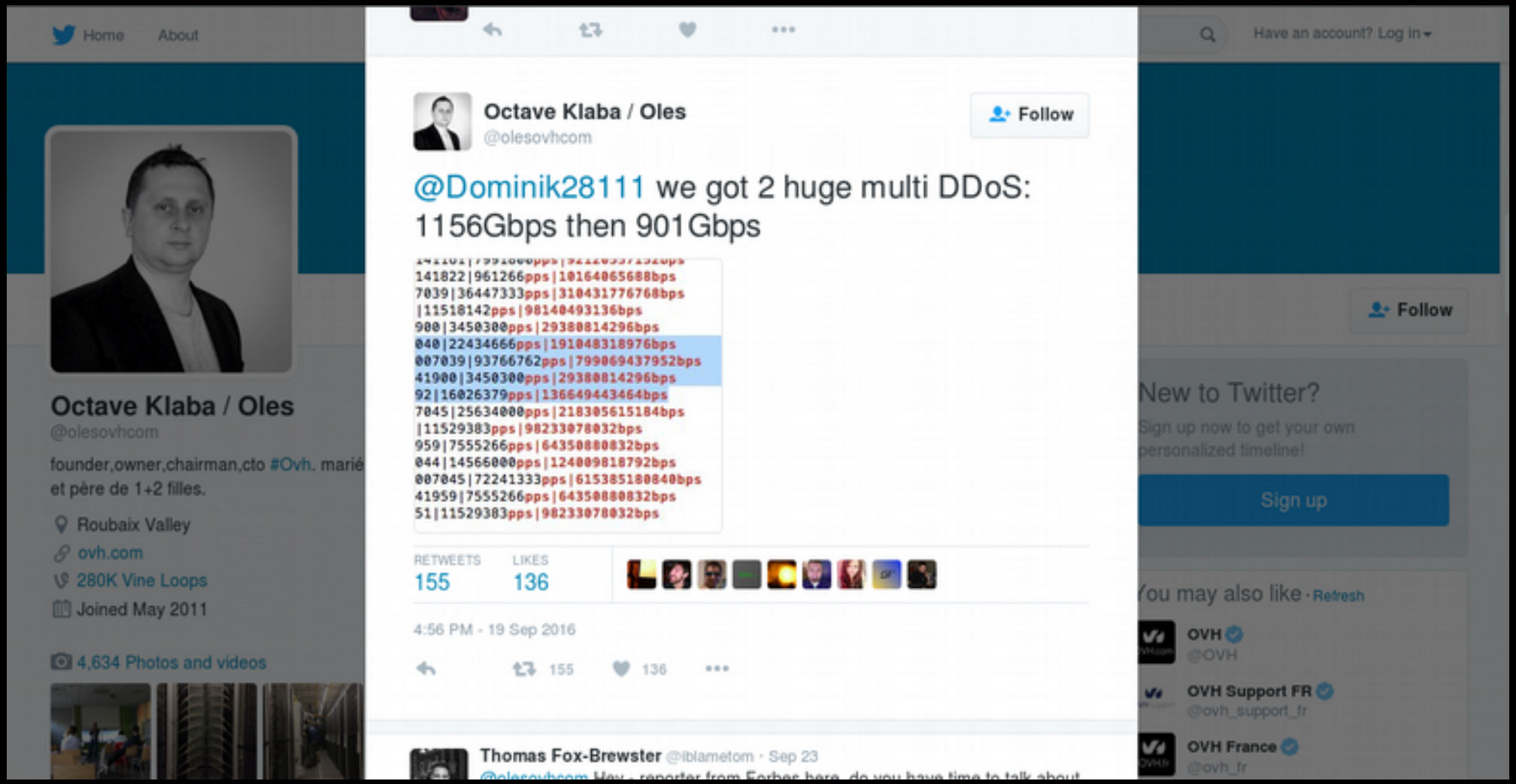
many vendors do not understand this yet:-/

(esp. in the embedded world)

meta | security

that will become a big problem with the Internet-of-Things (IoT)

meta | security



it seems it already is :-/

meta view

what else?

meta view

GPL enforcement

meta view | GPL enforcement

a long debate recently

indirectly triggered by
"hch vs VMware"

meta view | GPL enforcement

some of the most important kernel developers are against it

meta view | GPL enforcement

will be a topic on this years kernel summit

meta view

what else?

meta view

stable & longterm kernels
not working as hoped

meta view | stable issues

(1) to many regressions?

meta view | stable issues

(2) ignored by manufactures of embedded hardware?

meta view | stable issues

many recent android phones running quite old kernels

meta view | stable issues

this is a mess and been like that for a long time

meta view | stable issues

kernel developer once again look how matters can be improved

meta view

what else?

meta view

testing and regression tracking are a problem

my pet peeve ;-)

meta view | testing

bug reporting is hard

bugzilla.kernel.org doesn't work to well

to hard to run mainline

scares testers away

meta view | testing

lot's of room for improvements and community participation

meta view

what else?

meta view

more and more tools are developed and used to find bugs early

meta | bug hunt tools

fuzzing tools:
Trinity, Kcov/Syzkaller

meta | bug hunt tools

CI: kernelci.org,
kbuild test robot aka "0-day"

meta | bug hunt tools

Kselftest, GCC plugins

meta view

what else?

meta view

new Linux competitors emerging for use in IoT

e.g. Zephyr & Magenta

meta view

Linux to heavy for IoT?
Remains to be seen...

meta | Linux & IoT

maybe IoT hardware becomes powerful enough for Linux soon

meta | Linux & IoT

and maybe tinification
makes Linux more suitable

meta view

what else?

meta view

issues with
kernel development?

meta | development

developers getting old?

not enough fresh blood

not enough reviewers

LKML tone too unfriendly, hostile and anti-woman?

meta changes | development

really complicated &
complex topics

meta changes | development

a lot is not as bad as the journalists make it sound

meta changes | development

a lot of things are
way better then
5 or 10 years ago

meta | development

but yes, some things could be better

like so often in life

that was part 5

%post

%post

more details?

%post | more details

use a search engine, Luke!

slides and recording from talks and articles available

%post | more details

ask me if you can't find anything

%post

three more things

%post

(1) help testing the kernel

%post | testing

especially if you own not that widespread Hardware

%post | testing

or use your distro in a unusual way

%post | testing

if you do not test it,
nobody might

%post | testing

bugs/regressions only get noticed when they're old

%post | testing

making them
way harder
to track down and fix

%post | testing

which will annoy *you*
in the end

%post | testing

in your interest to test

%post

(2) tell me what you think about this talk or my articles

%post | feedback

there is always something to improve

I might do it again just like this if you do not provide feedback

%post

(3) want to be kept up2date?

%post

heise online > Themen > Kernel-Log

Kernel-Log

Thema Kernel-Log

teilen 0 | tweet | teilen 0

Alle Beiträge zu: Kernel-Log

Linux 4.8 bringt neue Treiber und verbessert die Sicherheit

Das am 3. Oktober erwartete Linux 4.8 bringt zahlreiche neue und überarbeitete Treiber, durch die der Kernel 500 weitere Geräte oder Geräteklassen unterstützt. Ferner gab es allerlei Verbesserungen, die das Ausnutzen von Sicherheitslücken erschweren.

19. September, 08:01 Uhr 59

Linux 4.8: Vorboten neuer XFS-Funktionen und Schnellstraße im Netzwerk-Stack

Das XFS-Dateisystem soll einige Features lernen, die Anwender an Btrfs und ZFS schätzen. Der Netzwerk-Code bekommt einen Express-Pfad, um bestimmte Aufgaben erheblich effizienter erledigen zu können

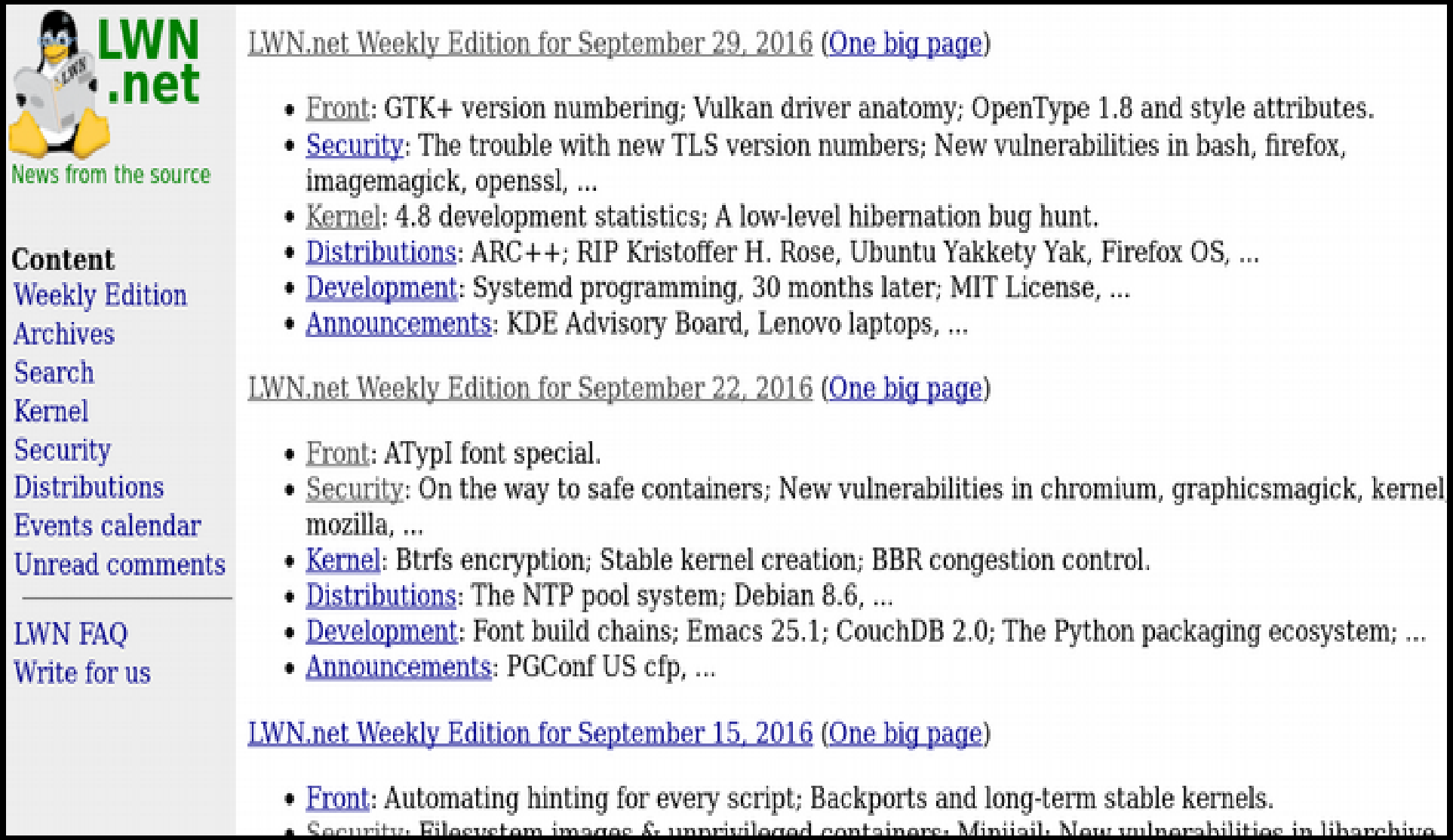
Artikel zum Thema

Die Neuerungen von Linux 4.8

Das Anfang Oktober erwartete Linux 4.8 bringt zahlreiche neue und überarbeitete Treiber, durch die der Kernel fünfhundert weitere Geräte

www.heise.de/thema/Kernel_Log

%post



LWN.net
News from the source

Content
Weekly Edition
Archives
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Kernel
Security
Distributions
Events calendar
Unread comments

LWN FAQ
Write for us

LWN.net Weekly Edition for September 29, 2016 (One big page)

- Front: GTK+ version numbering; Vulkan driver anatomy; OpenType 1.8 and style attributes.
- Security: The trouble with new TLS version numbers; New vulnerabilities in bash, firefox, imagemagick, openssl, ...
- Kernel: 4.8 development statistics; A low-level hibernation bug hunt.
- Distributions: ARC++; RIP Kristoffer H. Rose, Ubuntu Yakkety Yak, Firefox OS, ...
- Development: Systemd programming, 30 months later; MIT License, ...
- Announcements: KDE Advisory Board, Lenovo laptops, ...

LWN.net Weekly Edition for September 22, 2016 (One big page)

- Front: ATypI font special.
- Security: On the way to safe containers; New vulnerabilities in chromium, graphicsmagick, kernel, mozilla, ...
- Kernel: Btrfs encryption; Stable kernel creation; BBR congestion control.
- Distributions: The NTP pool system; Debian 8.6, ...
- Development: Font build chains; Emacs 25.1; CouchDB 2.0; The Python packaging ecosystem; ...
- Announcements: PGConf US cfp, ...

LWN.net Weekly Edition for September 15, 2016 (One big page)

- Front: Automating hinting for every script; Backports and long-term stable kernels.
- Security: Filesystem images & unprivileged containers; Minijail; New vulnerabilities in libarchive

lwn.net

%post

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The Linux Kernel Archives

index : kernel/git/torvalds/linux.git

Thorsten Leemhuis

The Linux kernel

#linux #kernel

2,357 followers - 169 posts - Public

FOLLOW

Thorsten Leemhuis 2d

The second pre-release of the #Linux #kernel 4.8 is out: https://lkml.org/lkml/2016/8/14/874 Side note: The first regression report for Linux 4.8 is out as well: https://lkml.org/lkml/2016/8/14/484 And I sent out another one for Linux 4.7, too: https://lkml.org/lkml/2016/8/14/483

LKML.ORG

Messages in this thread

From Linus Torvalds <>
Date Sun, 14 Aug 2016 20:25:10 -0700
Subject Linux 4.8-rc2

We've had a week since the merge window closed, and rc2 is out. Go test it.

The diffstat for rc2 looks unusual, in that only about 1/6th is drivers (normally drivers account for about half the bulk of the updates). Instead, it's dominated by arch updates, and fs/ and mm/. But that's most likely just because the fixes to the bigger driver areas haven't started trickling in yet - rc2 tends to be a quiet period after the craziness that is the merge window.

And the reason mm/ stands out is mainly just because of a pull request from the merge window that I had delayed until after rc1 in order to look more at it.

So I expect that things will be back to normal this upcoming week.

Nothing really strange seems to be going on, so please just go out and test it and report any problems you encounter. It's obviously fairly early in the rc series, but I don't think there was anything particularly worrisome this merge window, so don't be shy..

Linus

+1 6 3

Thorsten Leemhuis: +Marius Orcsik I haven't heard much about DAL recently, so I assumed things are still stucked, as

Thorsten Leemhuis 4d

Originally shared by Greg Kroah-Hartman - 27 comments

4.9 == next LTS kernel.

I need to get my blog back and running (stupid ruby dependencies), so until then, might as well say it here...

+1 3

Thorsten Leemhuis 6d

Hellwig Announces He Will Appeal VMware Ruling After Evidentiary Set Back in Lower Court http://sfconservancy.org/news/2016/aug/09/vmware-appeal/ "[...] In a statement on his website, Christoph Hellwig announced today that he will appeal the ruling of the Hamburg District Court, which recently dismissed his case against VMware. As Christoph underscores in his statement, the ruling concerned German evidence law and the Court did not rule on the merits of the case. The ruling centered around German evidentiary rules related to documenting Christoph's contributi...

software freedom conservancy

plus.google.com/+ThorstenLeemhuis

%post

that's it – questions?

(TWIMC: this is slide #264)

Thorsten Leemhuis

mail: linux@leemhuis.info, thl@ct.de
GPG Key: 0x72B6E6EF4C583D2D
IRC@freenode.net: knurd
plus.google.com/ThorstenLeemhuis

#EOF