

KernelCI

testing a broad variety of hardware

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LPC 2019: LISBOA



LINUX RUNS

EVERYWHERE

Linux testing runs...

WHERE?

Kernel testing landscape

- kselftest, syzbot, ...
- KUnit: unit testing and mocking^[1]
 - arch agnostic, can use UML: fast!
- KTF: Kernel Test Framework^[2]
 - RFC Aug 12, 2019
 - Learn more today !!

COMING SOON...
TO A ROOM NEAR YOU

^[1] https://google.github.io/kunit-docs/third_party/kernel/docs/

^[2] https://lore.kernel.org/linux-kselftest/CAFd5g44-RMaH0kwb+=mW41HO_CgBZ3wK0vnr=Yvb_rE68JazWg@mail.gmail.com/

Kernel testing landscape

- Intel O-Day and Linux Kernel Performance (LKP)^[1]
 - Builds and static analysis for many arches
 - Only run tests on Intel x86
- LKFT: Linaro Kernel Functional Tests^[2]
 - Only run tests on Linaro member platforms
- CKI: Continuous Kernel Integration^[3]
 - Stable kernel focus: x86_64, arm64, ppc64le
 - Hackfest this week (after LPC)

• ^[1] <https://01.org/lkp>

^[2] <https://lkft.linaro.org/>

^[3] <https://cki-project.org/>

Kernel testing landscape

- Developers: contributors to upstream, maintainers
 - Only run tests on their workstations / dev boards
- Users: distros, OEMs, SoC/CPU vendors
 - Only run tests on their own hardware
 - Don't necessarily send fixes upstream

A wide, flat expanse of sand, likely a beach or a large open area, covered with numerous footprints and tracks. The tracks are most prominent in the center, forming a dense, winding path that leads towards the horizon. The sand is a light, warm tone, and the overall scene is captured in a slightly desaturated, vintage-style photograph. The text is overlaid on the upper half of the image.

Total test coverage

=

On the beaten tracks

KernelCI: off-road testing

Goal: all CPU architectures

Today:

→ x86_64, arm, arm64, mips, arc, riscv

Goal: a wide range of
hardware platforms

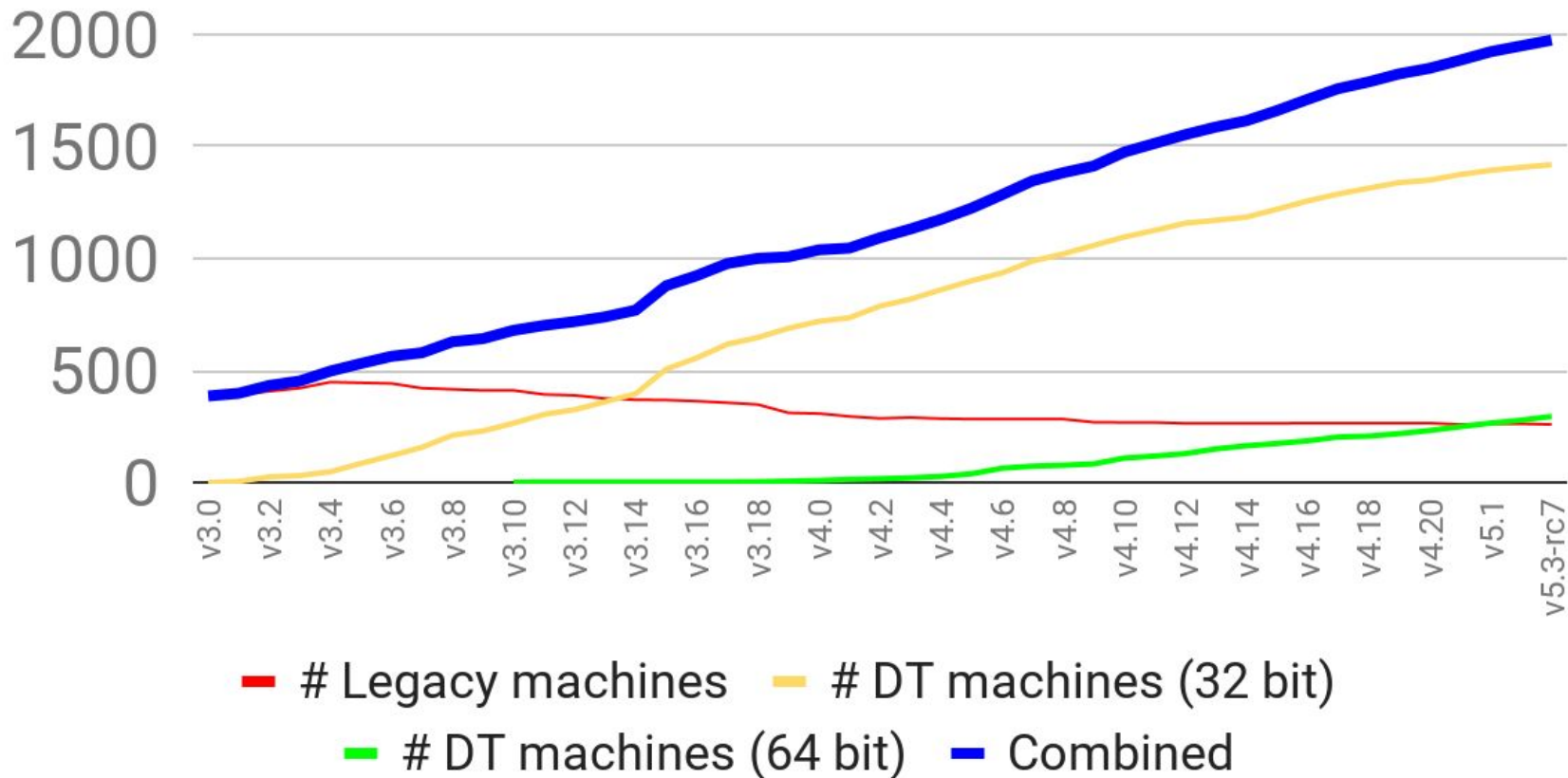
Today

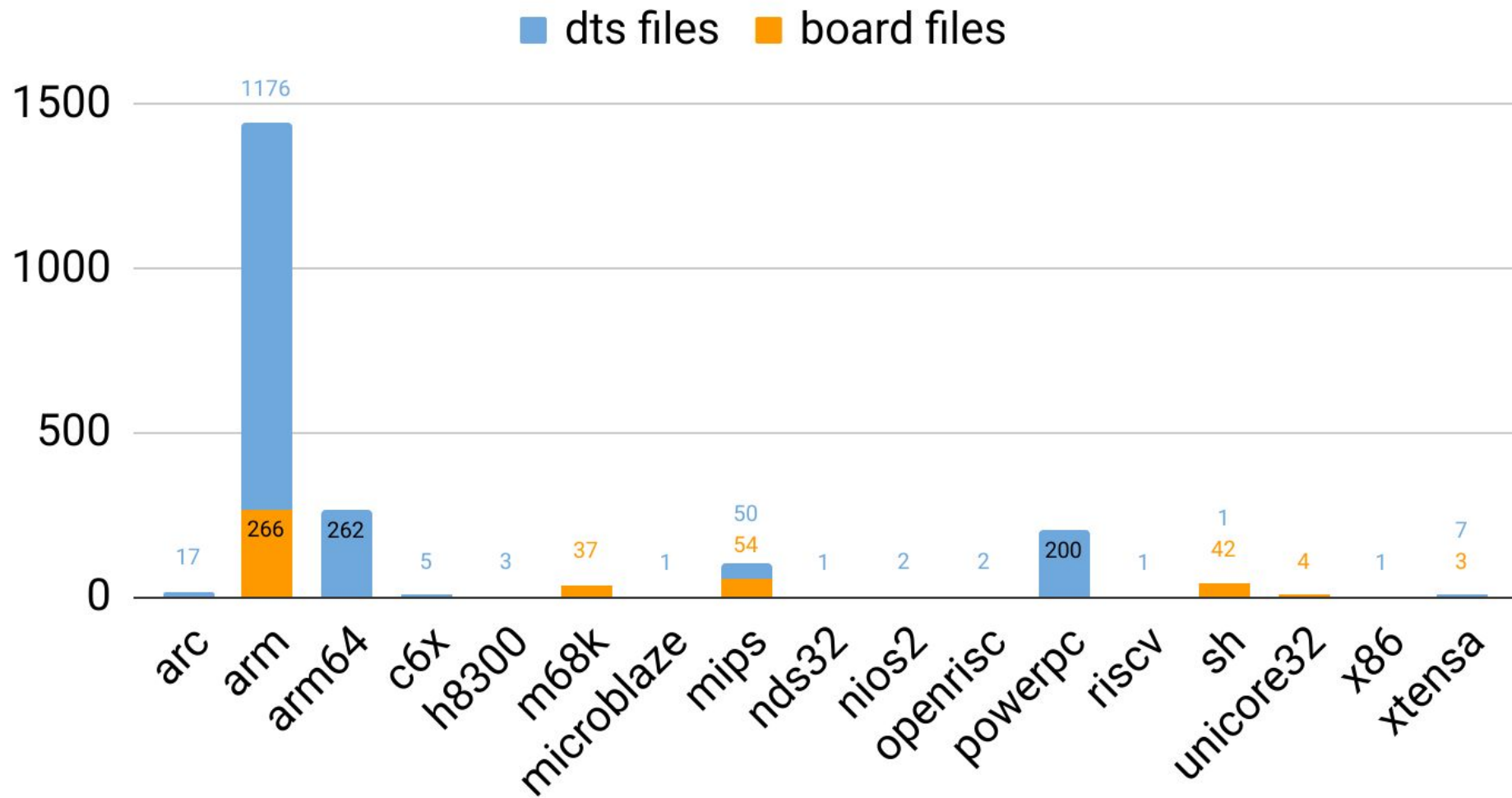
→ 35+ SoC vendors

→ 250+ unique boards



unique platforms upstream (arm, arm64)





KernelCI: multiple build dimensions

Multiple kernel trees

- mainline, next, stable, stable-rc
- subsystems: media, sound, clk, soc
- maintainers, developers
- android-common, chrome-platform

Multiple compilers

- gcc, clang
- multiple versions

Multiple config options

- all upstream defconfigs (220+)
- `CONFIG_CPU_BIG_ENDIAN=y`
- `CONFIG_SMP=n`
- `CONFIG_RANDOMIZE_BASE=y`
- and more...



Functional tests

Graphics: IGT (DRM/KMS)

- → Subset run on a handful of devices, gradually expanding

Media: v4l2-compliance

- → Full test suite run on hardware and QEMU (vivid driver)

Power: suspend / resume

- → Run on many boards, finding issues regularly

USB: smoke test

- → Check that the USB subsystem is initialised

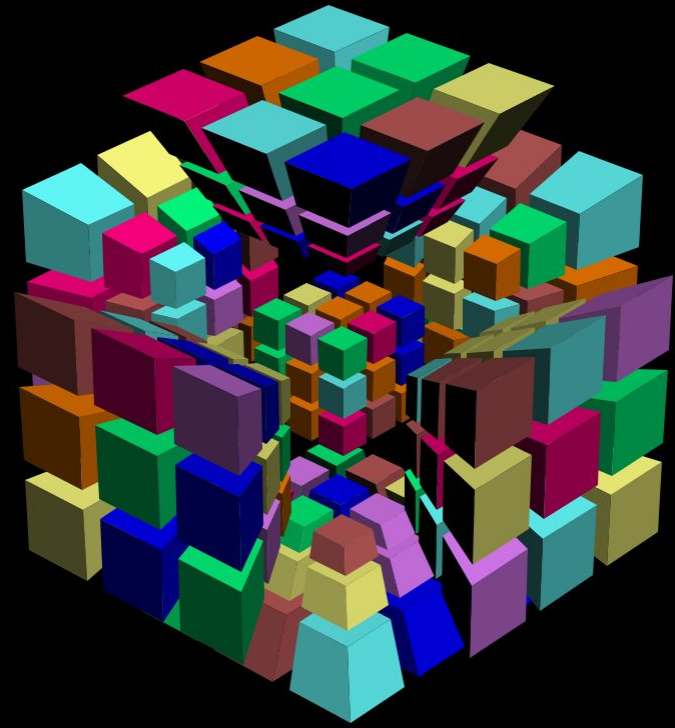
Challenge: data is growing

Matrix is expanding

Collecting lots of data, results, logs, artifacts

Storage, Analytics, Visualization, Reporting

Big Data?



What's next?

Collaboration: LKFT, CKI, ...

Improve reporting, analytics,
visualization, reporting, etc.

More hardware

More compute horsepower
(GCE, Azure, ...)

More tests: fuzzing, KUnit?

Distro kernels?



Joining the Linux Foundation

- Membership scheme
- Sustainable funding
- KernelCI as a service
- Premier members:
 - Collabora, BayLibre, Google, Microsoft, RedHat, CIP
 - ... *official project launch @ OSS / ELC Europe*





Photo credits

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