KernelCI

testing a broad variety of hardware

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LPC 2019: LISBOA
LINUX RUNS EVERYWHERE
Linux testing runs…
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 !!

\[1\] https://google.github.io/kunit-docs/third_party/kernel/docs/
\[2\] https://lore.kernel.org/linux-kselftest/CAFd5q44-RMaH0kwb+=mW41HO_CgBZ3wK0vnr=Yvb_rE68JazWg@mail.gmail.com/
Kernel testing landscape

- Intel 0-Day and Linux Kernel Performance (LKP)[1]
  → Builds and static analysis for many arches
  → Only run tests on Intel x86

  → 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
[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
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 config options
- all upstream defconfigs (220+)
- CONFIG_CPU_BIG_ENDIAN=y
- CONFIG_SMP=n
- CONFIG_RANDOMIZE_BASE=y
- and more...

Multiple compilers
- gcc, clang
- multiple versions
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
Showing failures prompts developers to fix them.
Photo credits

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