

Experiences and lessons we learned using kselftest

Anders Roxell

A date in the future



Who is Anders ?



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Linaro engineer
10+ years in Embedded
Involved with the kernel for 6+ years (Kselftest for
1+ years)
Prefer sausages, cheese and beer.

Agenda

So why are we here?

- The story of Kselftest (to this date)?
- Why and how Linaro runs Kselftest
- Linaro contributions to Kselftest
- Future plans

What is kselftest?

The Linux Kernel contains a set of developers unit and regression tests.
(tools/testing/selftests)

Why is this needed?

- Identify regressions in the Linux Kernel

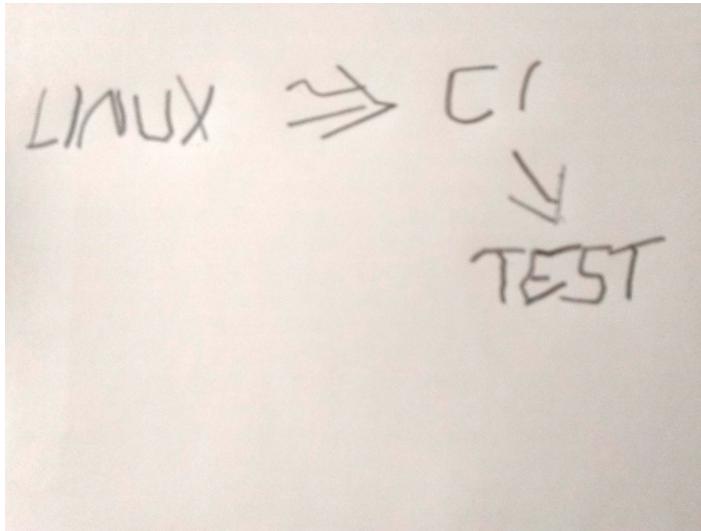
Who is it targeted at?

- Primarily to Kernel developers, but testers and users can also use it

<https://kselftest.wiki.kernel.org/>



When do we run Kselftest



When a new Kernel gets pushed (commits or tags), LKFT builds an OE image with the Kernel + Kselftest and run it in LAVA on real hardware

Why and what version Linaro runs of Kselftest?

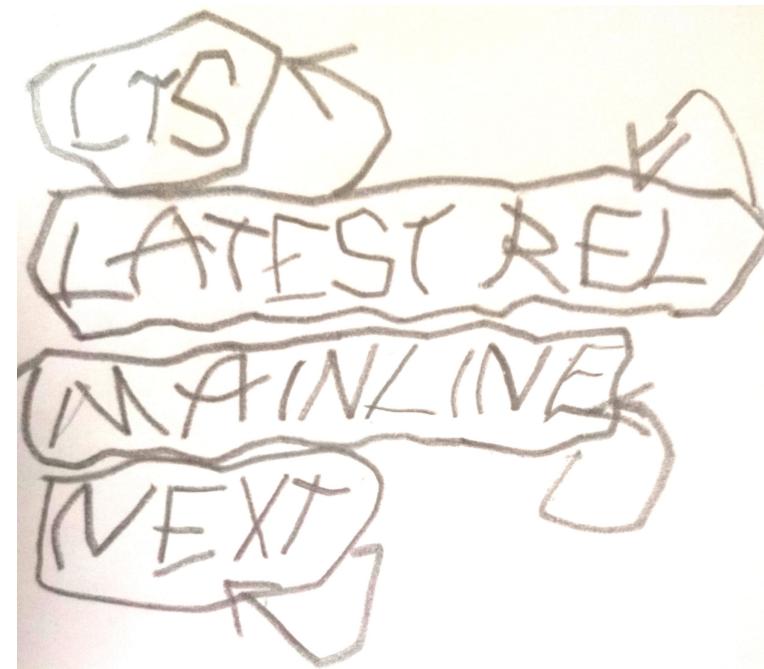
Kernel versions being tested:

- LTS kernels
 - Today: 4.4, 4.9, 4.14, 4.19
- ‘Latest’ released kernel
 - Today: 5.0
- Mainline
- Next

Kselftest versions being used for those tests:

- Latest released Kselftest (i.e., ‘Latest’ released kernel)
- in-tree Kselftest

<https://www.kernel.org/category/releases.html>



Linaro contributions to Kselftest

Dashboard

Email reporting

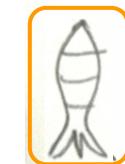
Config fragment files



Headers built if a subsystem needs it

Bug fixes

Presentation icons



= BEFORE



= NOW



= AFTER

1: Email reports on LTS and next kernels

Screencap of email report

```
L<[master@origin]>-(0) $ ./bin/generate_next_kselftest_report.py
SUBJECT: next-20190306 kselftest results

Summary
-----
kernel: 5.0.0
git repo: https://git.kernel.org/pub/scm/linux/kernel/git/next/linux-next.git
git branch: master
git commit: cf08baa29613dd899954089e7cc7dbald478b365
git describe: next-20190306
Test details: https://qa-reports.linaro.org/lkft/linux-next-oe/build/next-20190306

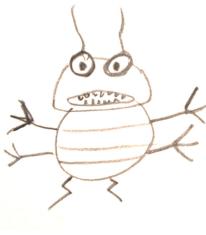
Regressions (compared to build next-20190305)
-----
```

Ref:

<https://github.com/Linaro/squad.git>

<https://github.com/Linaro/lkft-tools.git>

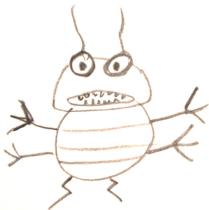
2: Dashboard



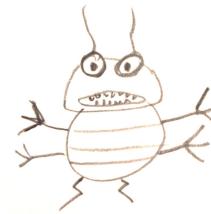
Test results

Filter results ...

Suite	x15 - arm	qemu_arm	qemu_i386	qemu_arm64	x86_64	qemu_x86_64	i386	hi6220-hikey - arm64	dragonboard-410c - arm64	juno-r2 - arm64
kselftest	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
kselftest-vsyscall-mode-native						✗				
kselftest-vsyscall-mode-none					✗					
spectre-meltdown-checker-test	✗	✓	✓	✓	✗	✓	✗	✓	✓	✗
boot	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓
ltp-syscalls-tests	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
build		✓	✓	✓		✓				
install-android-platform-tools-r2600	✓					✓		✓		



From QA-reports to report the issue or submit a patch to test the proposed fix



qa-reports.linaro.org/lkft/mainline/v5.0...



3: Framework changes - config changes



Hard to figure out what kernel fragment was needed to run Kselftest from a specific subsystem.



Have a config file in every subsystem directory that needs specific features enabled.

4: Framework changes - build changes

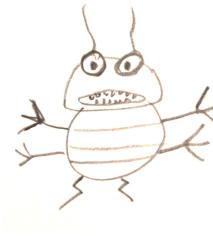
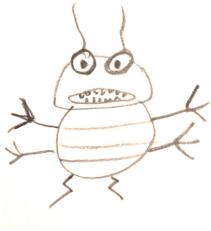


Generate headers -> build kselftest.



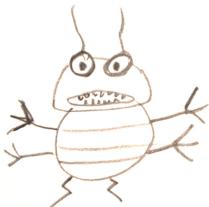
If a subsystem needs headers they will be generated.

5: Bug fixes



What kind of bugs:

- Kernel bugs or
- Kselftest bugs



From QA-reports to report the issue or submit a patch to test the proposed fix

Future plans

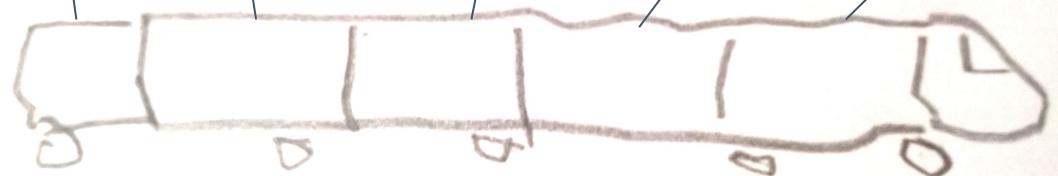
Out-of-tree build
with a relative path

Use an
'allmodconfig' built
kernel

Runtime check if a
feature is enabled or
not

Use headers from the tools directory
only and don't mix them with the
headers from headers install

Add Kselftest to
kernelCI





1: Out of tree build with a relative path



Uses its “own” build system in tools/



Should try to use Kbuild



2: Runtime check if a feature is enabled or not



Running an old kselftest



Will make kselftest able to run on any kernel





3: Use a 'allmodconfig' built kernel



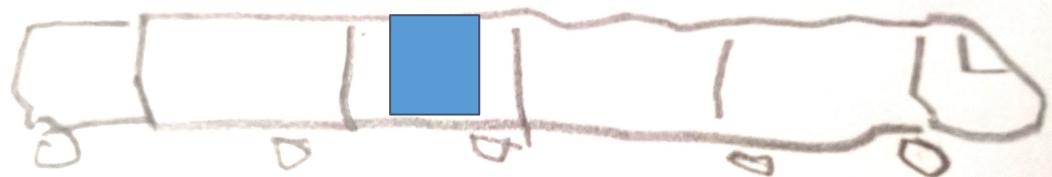
'allmodconfig' is not booting



Hopefully we have an 'allmodconfig' kernel that boots

We should be able to run more test suites against one built kernel and its modules.

Why is it good to have a bootable 'allmodconfig' kernel ?



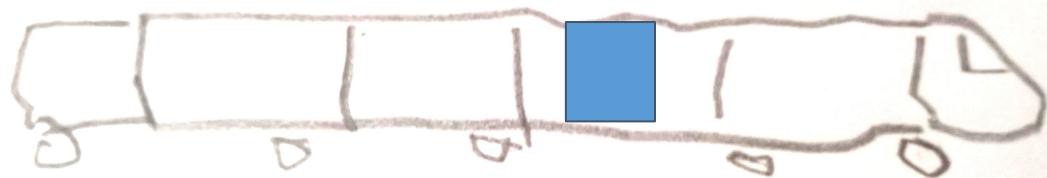
4: Use headers from tools/ directory only and not mix them with headers_install



If a subsystem needs headers they will be generated.



Use the copy of the headers that is located in tools/include and tools/arch/*/include





5: Adding Kselftest to kernelCI

Available Test Group Reports

The results shown here cover the last **14 days** of available data starting from **Mon, 18 Mar 2019** (time is **UTC** based).

25 ▾ Tests per page

Filter the results

Board	Total Test Groups	Total Unique Labs
am335x-boneblack	13,928	1
apq8016-sbc	4,499	2



Outdated Kselftest run in kernelCI today



Introduce a way to build Kselftest in kernelCI
--> Enable it on more HW

<https://kernelci.org/test/>



Thank you

Join Linaro to accelerate deployment of your
Arm-based solutions through collaboration

contact@linaro.org

