Linux Kernel Development Cycle

Meeting 2

LKCAMP - Round 3 - April 2, 2019

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Brief summary

- The kernel uses a rolling development model
  - A new release every 2-3 months (since kernel 2.6)
  - Thousands of changes every new release
  - Non-semantic version numbers
- Mainline kernel changes must be accepted by Linus Torvalds

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Version Numbering

- Until kernel 2.6, a new kernel was release every 2 years
- From kernel 2.6 onward, releases happened every 2-3 months (named 2.6.1, 2.6.2 etc)
- At arbitrary points, the version was deemed too large
  - 2011-07-21, from 2.6.39 to 3.x
  - 2015-04-12, from 3.19 to 4.x
  - 2019-03-03, from 4.20 to 5.x

Note that there's no special meaning to the minor version. It's simply increased per-release.

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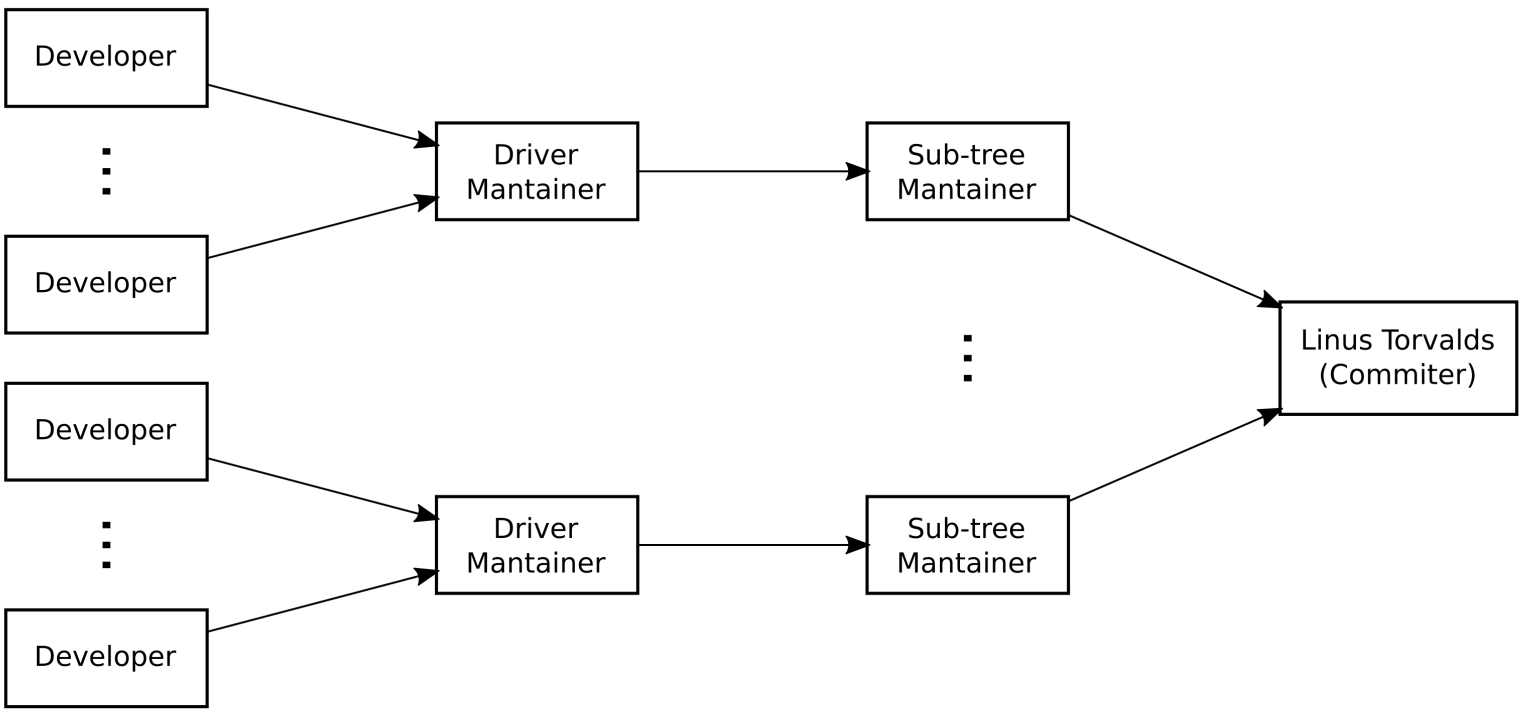
Development cycle

How can a single person review and accept that many changes?



Development cycle

- "Merge window" open for around 2 weeks after a stable release
  - Time for accepting new features into the kernel
- Kernel stabilizes over the following 6-10 weeks
  - Versions released as "-rcN"
  - E.g., Linux 5.1-rc1

Development cycle

Development cycle for 4.16 (all dates in 2018):

Release date	Kernel version
January 28	4.15 stable release
February 11	4.16-rc1, merge window closes
February 18	4.16-rc2
February 25	4.16-rc3
March 4	4.16-rc4
March 11	4.16-rc5
March 18	4.16-rc6
March 25	4.16-rc7
April 1	4.16 stable release

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Kernel maintenance

- Kernel development continues while the merge window is closed!
- Changes that are to be sent in the next merge window are collected into "-next" trees
- Some of those may be accepted into stable releases, given some constraints:
  - They must fix a significant bug
  - They must already be merged into the mainline
- These releases get an extra number at the end (e.g., 4.16.1, 4.16.2 etc), usually named something like "4.16.y"

Kernel maintenance

- At first, the latest kernel would usually be maintained only until the next stable release
- Eventually, the needs of the community brought about Long Term Support (LTS) kernels
  - Stable releases maintained for at least 2 years
  - Somewhat arbitrarily decided on
  - 4.9.y and 4.14.y were picked based on being the last release of their respective years

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Sending patches

What do maintainers expect from your patch?

- Patches don’t break the build
- Their description is well-written
- All of them have the proper commit tags
- They are easy to understand
- They will work on every supported system
- They were sent to the correct recipients
- Just use plain text in your email

Sending patches

When you contribute to Linux Kernel you must agree with:

- Developer’s Certificate of Origin terms (for sending patches)
  - Indicated by a "Signed-off-by" tag
- Reviewer’s statement of oversight terms (for reviewers)
  - Indicated by a "Reviewed-by" tag

Sending patches

- Signed-off-by: author and maintainers who contributed to the patch
- Co-Developed-by: attribute someone as an author as well
- Reviewed-by: reviewed according to the Reviewer's Statement
- Acked-by: maintainer accepted the patch without contributing to it
- Tested-by: successfully tested in some environment
- Cc: inform that potentially interested person has received this patch
- Reported-by: give credit to the bug reporter
- Suggested-by: give credit to the person who had the idea
- Fixes: commit id which generated the fixed bug

Sending patches

The canonical patch format:

```
From: Baolin Wang <>
Subject: [PATCH v3] power: reset: Add Spreadtrum SC27xx PMIC power off support
Date: Fri, 23 Feb 2018 11:32:38 +0800

On Spreadtrum platform, we need power off system through external SC27xx
series PMICs including the SC2720, SC2721, SC2723, SC2730 and SC2731 chips.
Thus this patch adds SC27xx series PMICs power—off support.

Signed—off—by: Baolin Wang <baolin.wang@linaro.org>
———
Changes since v2:
 — Change to build—in this driver.

Changes since v1:
 — Add remove interface.
 — Add regmap checking when probing the driver.
 — Add MODULE_ALIAS()
———
 drivers/power/reset/Kconfig            |    9 +++++
...
———
1.7.9.5
```

Sending patches

Header:

```
From: Baolin Wang <>
Subject: [PATCH v3] power: reset: Add Spreadtrum SC27xx PMIC power off support
Date: Fri, 23 Feb 2018 11:32:38 +0800
```

Sending patches

Summary + Tags:

On Spreadtrum platform, we need power off system through external SC27xx series PMICs including the SC2720, SC2721, SC2723, SC2730 and SC2731 chips. Thus this patch adds SC27xx series PMICs power—off support.

Signed—off—by: Baolin Wang <baolin.wang@linaro.org>

Sending patches

Patch Changelog since v1:

```
Changes since v2:
 — Change to build—in this driver.

Changes since v1:
 — Add remove interface.
 — Add regmap checking when probing the driver.
 — Add MODULE_ALIAS()
```

Sending patches

Diff + Extras:

```
 drivers/power/reset/Kconfig                |    9 +++++
...
---
1.7.9.5
```

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References

- http://kroah.com/log/blog/2018/02/05/linux-kernel-release-model/
- https://www.kernel.org/doc/html/v4.19/process/2.Process.html#the-lifecycle-of-a-patch
- https://www.kernel.org/category/releases.html
- https://www.kernel.org/doc/html/latest/process/stable-kernel-rules.html
- https://developercertificate.org/
- https://www.kernel.org/doc/html/v4.17/process/submitting-patches.html