Kernel maintainership: an oral tradition

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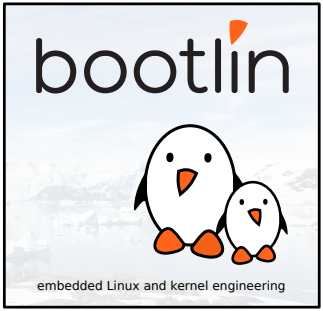
- Embedded Linux engineer and trainer at **Bootlin**
  - Embedded Linux **expertise**
  - **Development**, consulting and training
  - Strong open-source focus
- Open-source contributor
  - Contributing to **kernel support for the Armada 370, 375, 38x, 39x and Armada XP** ARM SoCs from Marvell.
  - Co-maintainer of mvebu sub-architecture (SoCs from Marvell Engineering Business Unit)
  - Living near **Lyon**, France



Motivation and Overview

- Motivation
  - Implicit or unwritten rules.
  - Make such rules more explicit.
  - Help new maintainers and contributors.
  - Guidelines I would have liked to find.
- Overview
  - The role of a maintainer
  - Accepting a patch
  - Interaction with other maintainers

The role of a maintainer

- Gathering patches for the subsystem
  - Through emails.
  - Sometimes through a git tree.
- Reviewing the submitted patches
  - Best case: accepted as is.
  - Most often: ask for a new version pointing the parts to improve.
  - Worst case: rejected.
- Pushing the gathered patches to the upper subsystem
  - Pull request to another maintainer.
  - Or directly to Linus Torvalds.

Becoming a maintainer

- Creating a new subsystem:
  - Most obvious.
  - Under `arch/` usually a new family of a **CPU** or an **SoC**.
  - Under `drivers/` usually a new **framework** or a **specialization** of an existing class driver.
- Joining the current maintainer:
  - After being active in the subsystem especially by doing reviews.
  - Generally asked by the current maintainer(s) but sometimes after offering help.
- Replacing a maintainer:
  - Either co-opted by the current maintainer before leaving.
  - Or asked by upper maintainer because of your involvement in this subsystem.
  - Or on a volunteering base because you are interested by the subject (and because you need to push your own patches).

Expectation of the submitter

- Reviewing the patch in a couple of days (or hours)
  - Writing and testing the code took a long time, reviewing it should be fast.
  - Eager to have feedback to make things move on.
- Knowing the hardware by heart
  - As maintainer of the subsystem you appear as the expert of the hardware it supports.
  - Supposed to have all the variants of the hardware.
- Updating the status of the submitted patches
  - Letting know if the patches have been received, reviewed, applied or rejected.
  - Expected to be done in real time.

Expectation of the upper maintainer

- Don't introduce any breakage.
- No merge conflict.
- No regression.

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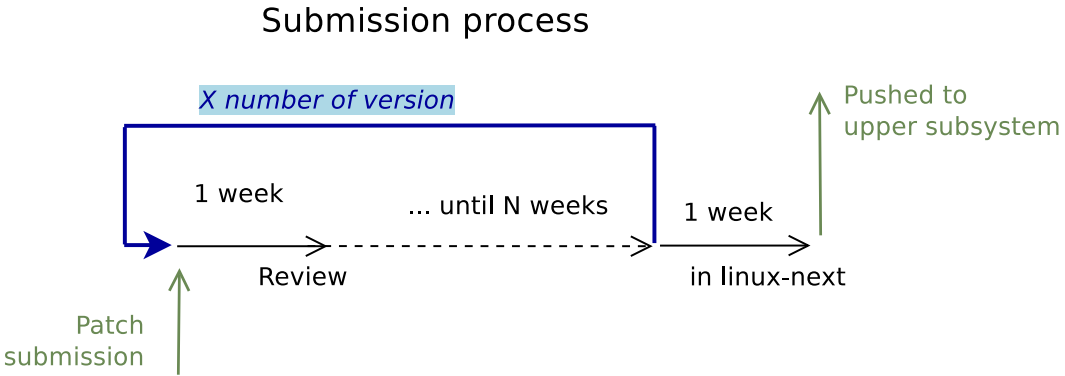
Timeline for the submission of a patch 1/3

- At least one week between submission and being applied
  - Leave time to interested people to review the series
  - Could be shorter for a new version of a series already reviewed
- Stay in linux-next one week before being submitted to the upper subsystem
  - Allows to fix merge conflicts before creating an immutable branch.
  - Could be shorter if already been in linux-next before or if the changes are well contained.

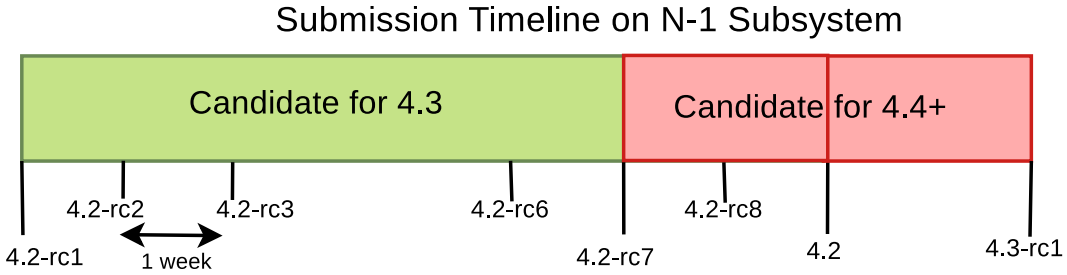
Timeline for the submission of a patch 2/3

- The deeper the subsystem is, the longer will be the time between submission and being merged in mainline



Timeline for the submission of a patch 3/3

- As the Linux release candidates are weekly, then for a subsystem at N-1, series submitted after -rc6 (or rc7) won't be in the next release.



Accepting a patch

- Obvious criteria
  - Must respect the coding rules (use `checkpatch.pl` for this).
  - Must compile without warning.
- No regression.
- Testing the hardware is nice to have but not mandatory.
  - For a new device feature or device you can assume it was tested by the submitter.
  - Ask for a `Tested-by` from other users if you have any doubt.
  - Rely on testing farms if you can.
- Be careful of dependencies with other subsystems.

Organization of the subsystem git tree

- At least 2 branches:
  - `current` for gathering the fixes of the current release candidate.
  - `for-next` for gathering the patches for the next release candidate.
- Could be useful to have a third branch for the release candidate after.
- Could have topic branches:
  - For big subsystems such as `arm-soc`.
  - To let other subsystems merge your subsystem related part of series (see later).
- Based on the -rc1 to make the merge easier.

The stable kernels

- Most users use a kernel from a distribution.
- Most distributions use stable kernels.
- When receiving a fix, always ask if it could be useful for older kernels.
- Tag the commit with `Cc: <stable@vger.kernel.org>`.
- Indicate from which from which version it applies by adding it in comment.
- Even better use the tag `Fixes: SHA-1_ID ("title of the patch")`.

The linux-next kernel 1/2

- The place where are merged all the commits expected to be in the kernel after the next merge window closes.
- How to use it as a maintainer
  - The branches merged in linux-next have to be declared to Stephen Rothwell.
  - Send him an email with the name of the repository and the branch to merge.
  - Do not have to be an immutable branch: all the branches are merged again for each linux-next release (on a daily basis).

The linux-next kernel 2/2

- Benefit of being in `linux-next`
  - Being merged every day with all the other branches allows to detect the merge conflicts early.
  - As a bonus, Stephen often resolves the conflict.
  - Used by the autobuilder such as `0-Day` done by `01.org` from `Intel` or the `kernel CI` supported by `Linaro`.

Automatic tester projects

- Projects which automatically test your branch
- `0-Day`:
  - Fetches the branches from the main kernel repository (at least `git.kernel.org`).
  - Compiles test various defconfig and architecture.
  - Boots and does some performance tests on hardware.
  - Now seems also to apply patches directly from the mailing lists.
- `kernel CI`:
  - Compiles several branches mainly ARM related.
  - Boots and test on many boards.
  - Fancy website to retrieve the results.

Dealing with your own patches

- You are a maintainer but you remain a developer.
- You have the possibility to directly apply your own patches.
- Not really in the spirit of an open development.
- Still good to have reviews and suggestions.
- However most of the time you won't get a review as you are supposed to be the one who reviews!
- But still apply the submission process: waiting at least one week after submitting to the mailing list before applying the patch in your `-next` branch.

Coordinating with the co-maintainers 1/2

- Subsystems maintained more and more often by several people.
- Benefits:
  - Allows to be more responsive especially if located in distant timezones.
  - Avoids having a stalled subsystem during holidays.
  - Eases the turn over: easier to leave and easier to join a team.
- Drawbacks
  - Need to find an agreement in case of opposite opinions.
  - Need to coordinate.

Coordinating with the co-maintainers 2/2

- Each co-maintainer has her/his own interests and fields of expertise.
  - Spreads the review.
  - Allows to stay focused.
- An `Acked-by` given by a co-maintainer is enough.
- Only one co-maintainer gathering the patches and taking care of the pull requests for a given kernel release cycle.
  - Easier to keep track of the submitted patches.
  - The git repository remains shared at least for emergency.
  - Better to decide in advance who will be the next in charge.
- Coordinating by email is fine most of the time.

Coordinating with the maintainers of other subsystems 1/2

- Some series modify several subsystems at the same time.
- Dependencies between the patches.
- We want the kernel to be *bisectable*.
- The order in which the patches are applied matters.
- Can't predict in which order the subsystem will be merged.
- Need to synchronize with the maintainers of other subsystems to solve this.

Coordinating with the maintainers of other subsystems 2/2

- One maintainer takes the entire series:
  - Will have commits modifying another subsystem in her/his git tree.
  - May cause merge conflicts.
- One maintainer creates an immutable branch
  - A topic branch with only the patch from the series.
  - Will be in both trees: it will avoid the merge conflict.
  - If a fix is needed, it can't be squashed, it will have to be a separate commit.
- Merging the series in two kernel releases:
  - No merge conflict.
  - No immutable branch.
  - But the feature is delayed of at least 3 months.
  - Still possible to have the feature by delaying the clean-up in the second release.

Submitting the gathered patches 1/2

▶Identify the patches to apply when reading the emails.	`M-x gnus-registry-set-article-mark` under `emacs` or by using `patchwork`.
▶Apply them on your branch.	`M-x dvc-gnus-article-apply-patch` under `emacs`.
▶Add your `Signed-off-by` (as you are going to submit them you have to do it).	`git commit --amend -s --no-edit`

Submitting the gathered patches 2/2

- Sign your branch

```
git tag -s tag_name branch_name
```

- Push your branch on your public repository

```
git push public_repo tags/tag_name
```

- Generate the pull request cover letter:

```
git request-pull previous_tag public_repo \
tags/tag_name | cat
```

`previous_tag` is either the tag previously pulled during the last request or the `rc1` of the current kernel.

Final words

- Find the good balance between maintainer duty and submitter expectations.
- Be nice and helpful with the submitters especially the new ones.
- Remain vigilant about the code quality and stability of the kernel.

Questions?

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http://bootlin.com/pub/conferences/2015/elce/clement-kernel-maintainership-oral-tradition