Maintaining a large kernel subsystem

Embedded Linux Conference 2015

Arnd Bergmann <arnd@linaro.org>
In an isolated system, entropy can only increase.
In an isolated system, entropy can only increase. Muse, the 2nd law.
Overview

1. Setup of the arm-soc tree
2. Keeping your workload down
3. Keeping your upstream happy
4. Future outlook
Setup of the arm-soc tree
Changesets per kernel version and subsystem maintainer
Code size and supported machines

- # Legacy machines
- # DT machines
- kloc mach-`
- kloc dts

Kernel version

v3.0 v3.1 v3.2 v3.3 v3.4 v3.5 v3.6 v3.7 v3.8 v3.9 v3.10 v3.11 v3.12 v3.13 v3.14 v3.15 v3.16 v3.17 v3.18 v4.0
arm-soc maintainers

Primary maintainers:
- Olof Johansson (Google)
- Arnd Bergmann (Linaro)

Backup maintainer:
- Kevin Hilman (Linaro)
Setup of the arm-soc tree

- Shared git tree
  
git://git.kernel.org/pub/scm/linux/kernel/git/arm/arm-soc.git
- Access locking over IRC
- Documenting merges in file arch/arm/arm-soc-
  for-next-contents.txt
- One local branch per incoming pull request
- 5-15 topic branches for Linus
- One for-next branch for linux-next
next/fixes-non-critical
 reset/fixes
 git://git.pengutronix.de/git/pza/linux reset/fixes

omap/fixes-not-urgent
 git://git.kernel.org/pub/scm/linux/kernel/git/tmlind/linux-omap

patch
 ARM: msm: Silence readb/writeb warnings due to missing IOMEM()

renesas/fixes
 git://git.kernel.org/pub/scm/linux/kernel/git/horms/renesas
 tags/renesas-fixes-for-v3.16

next/cleanup
 versatile/leds
 git://git.kernel.org/pub/scm/linux/kernel/git/linusw/linux-integrator
 contains renesas/fixes

patch
 leds: Fix build for LEDS_CLASS=m on versatile
<table>
<thead>
<tr>
<th>Changesets</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>1478</td>
<td>Olof Johansson</td>
</tr>
<tr>
<td>1425</td>
<td>Arnd Bergmann</td>
</tr>
<tr>
<td>658</td>
<td>Laurent Pinchart</td>
</tr>
<tr>
<td>588</td>
<td>Tony Lindgren</td>
</tr>
<tr>
<td>540</td>
<td>Shawn Guo</td>
</tr>
<tr>
<td>453</td>
<td>Thomas Petazzoni</td>
</tr>
<tr>
<td>452</td>
<td>Magnus Damm</td>
</tr>
<tr>
<td>417</td>
<td>Lee Jones</td>
</tr>
<tr>
<td>416</td>
<td>Kuninori Morimoto</td>
</tr>
<tr>
<td>411</td>
<td>Stephen Warren</td>
</tr>
<tr>
<td>406</td>
<td>Linus Walleij</td>
</tr>
<tr>
<td>388</td>
<td>Fabio Estevam</td>
</tr>
<tr>
<td>336</td>
<td>Linus Torvalds</td>
</tr>
<tr>
<td>312</td>
<td>Maxime Ripard</td>
</tr>
<tr>
<td>255</td>
<td>Paul Walmsley</td>
</tr>
<tr>
<td>251</td>
<td>Simon Horman</td>
</tr>
<tr>
<td>244</td>
<td>Kevin Hilman</td>
</tr>
<tr>
<td>241</td>
<td>Tomasz Figa</td>
</tr>
<tr>
<td>235</td>
<td>Kukjin Kim</td>
</tr>
<tr>
<td>233</td>
<td>Alexander Shiyan</td>
</tr>
</tbody>
</table>
Typical arm-soc topic branches

fixes
fixes-non-critical
cleanup
soc
defconfig

dt
board
drivers
multiplatform
arm64
Typical arm-soc topic branches

fixes
fixes-non-critical
cleanup
soc
defconfig
dt
board
drivers
multiplatform
arm64
<table>
<thead>
<tr>
<th>Typical arm-soc topic branches</th>
</tr>
</thead>
<tbody>
<tr>
<td>fixes</td>
</tr>
<tr>
<td>fixes-non-critical</td>
</tr>
<tr>
<td>cleanup</td>
</tr>
<tr>
<td>soc</td>
</tr>
<tr>
<td>defconfig</td>
</tr>
<tr>
<td>dt</td>
</tr>
<tr>
<td>board</td>
</tr>
<tr>
<td>drivers</td>
</tr>
<tr>
<td>multiplatform</td>
</tr>
<tr>
<td>arm64</td>
</tr>
</tbody>
</table>
Example pull request

ARM: SoC platform changes

New and updated SoC support. Also included are some cleanups here the platform maintainers hadn't separated cleanups from new development in separate branches.

Some of the larger things worth pointing out:

- A large set of changes from Alexandre Belloni and Nicolas Ferre preparing at91 platforms for multiplatform and cleaning up quite a bit in the process.
- Removal of CSR's "Marco" SoC platform that never made it out to the market. We love seeing these since it means the vendor published support before product was out, which is exactly what we want!

New platforms this release are:

- Conexant Digicolor (CX92755 SoC)
- Hisilicon HiP01 SoC
- CSR/sirf Atlas7 SoC
- ST STiH418 SoC
- Common code changes for Nvidia Tegra132 (64-bit SoC)

We're seeing more and more platforms having a harder time labelling changes as cleanups vs new development -- which is a good sign that we've come quite far on the cleanup effort. So over time we might start combining the cleanup and new-development branches more.
Keeping the workload down
Introducing new subsystems

clk      iommu      pinctrl
cpufreq  irqchip   pwm
cpuidle  led       regulator
dmaengine mailbox  syscon
gpio     pci-host  timers
Moving boards out to devicetree

- Avoid the largest source of code explosion
- Decouple drivers from boards
Code size and supported machines

Kernel version
Delegating to submaintainers

- Build a trusted work relationship
- Provide guidance when needed
- Special care for hobbyists
Rejecting submissions

- Most important part of the job
- Most stressful part of the job
- Only way to effect changes
- Careful balance
- Always explain what should be done instead
Creating arbitrary rules

Undocumented arm-soc rules:
- Send pull requests to arm@kernel.org
- Split changes into our topic branches
- No patch tracker / patchwork
- One maintainer per platform
- Ping us after a week if we didn’t apply it
Keeping your upstream happy
How to make your upstream grumpy

- Send all your changes late
How to make your upstream grumpy

- Introduce a regression and when asked about it, say it was intentional
Side note:
Solving cross-tree dependencies

a. Stage out changes across multiple releases
b. Send the same branch to multiple maintainers
c. Make a shared branch with common changes
d. Get an Ack from one maintainer to merge changes through another tree
How to make your upstream grumpy

- Sneak changes in that you know are unwelcome
Future outlook
What’s coming for 4.x
What’s coming for 4.x

- Code size keeps going down
- Continue DT conversion
- Multiplatform for all ARMv6/v7
- Multiplatform for ARM9
- More arm64 platforms
- More Cortex-M platforms
What’s coming for 4.x

Job complete before 5.0?
Questions?