

The Lima Driver

An update on
the command stream / driver side of
the open source driver for
the ARM Mali GPUs.

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Some ARM GPU history

- Before: nothing but talk.
- 2011: Idea and initial mali RE-ing.
- 2012: Early days.
 - FOSDEM: first renders.
 - Linuxtag: correctly spinning companion cube.
 - Other ARM GPU projects started.
- 2013: Full proof of concept.
 - FOSDEM: Q3A timedemo.
- 2014: Actual driver for the masses?

Last year.

- Memory management
- Initial mesa driver
- ...

That's it really...

Hardware: Cubietruck

- Allwinner A20
 - Dual core Cortex A7 @ 1GHz
 - Mali M400MP2 @ 312MHz
- Board with all the fixin's
- Schematics available, but not OSHW
- Linux-sunxi code
 - Sunxi u-boot
 - Sunxi-3.4 kernel
 - xf86-video-fbturbo
 - ...

<http://linux-sunxi.org/>

- Big community with lots going on.
- Easy to replace android with proper linux
- Joined june 2012: no more android!
- Vendor code is a mess.
- Sunxi-kms talk later.
- Danger of throwing the baby out with the bathwater.

Standard, “old”, mesa driver...

- Lima is 2 separate projects
 - 2 insane tasks already.
 - Aids debugging and benchmarking.
- Gallium doesn't allow for that.
 - Symbol layout first, then forced on compiler.
 - No real way to hook in another compiler.
 - “Don't you dare do an intel!”
- Needs just 2 small patches for an external shader compiler.

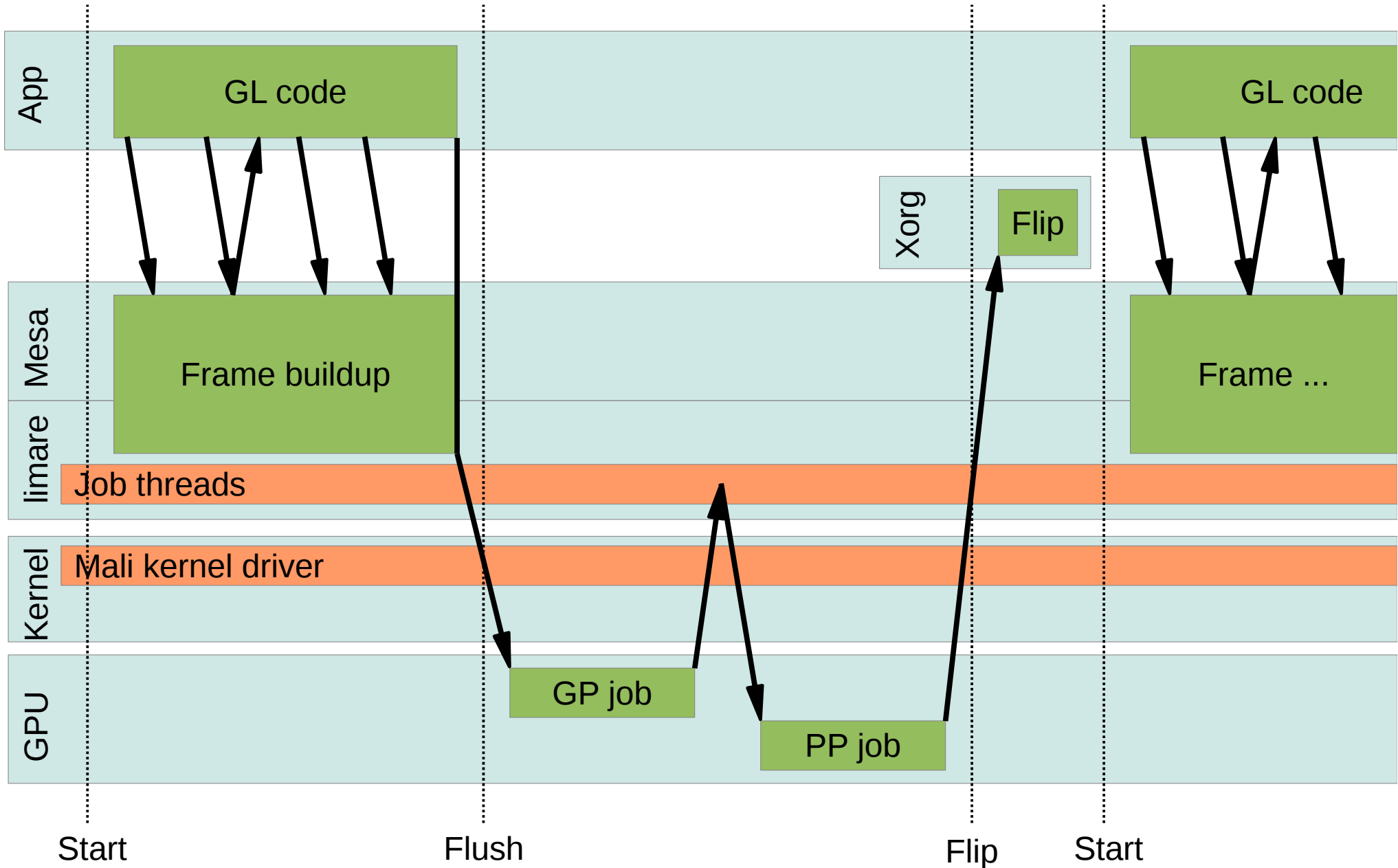
Standalone Mesa driver.

- Our hardware is:
 - Mix-n-match IP block.
 - Limited resources.
 - Limited free support.
 - Limited audience for a free driver... unless...
- Not hard:
 - Only needs build system changes.
 - Currently supports Mesa-8.0.x through Mesa-9.2.x.
 - Mesa packages available at linux-sunxi.org.
- But... Politics...

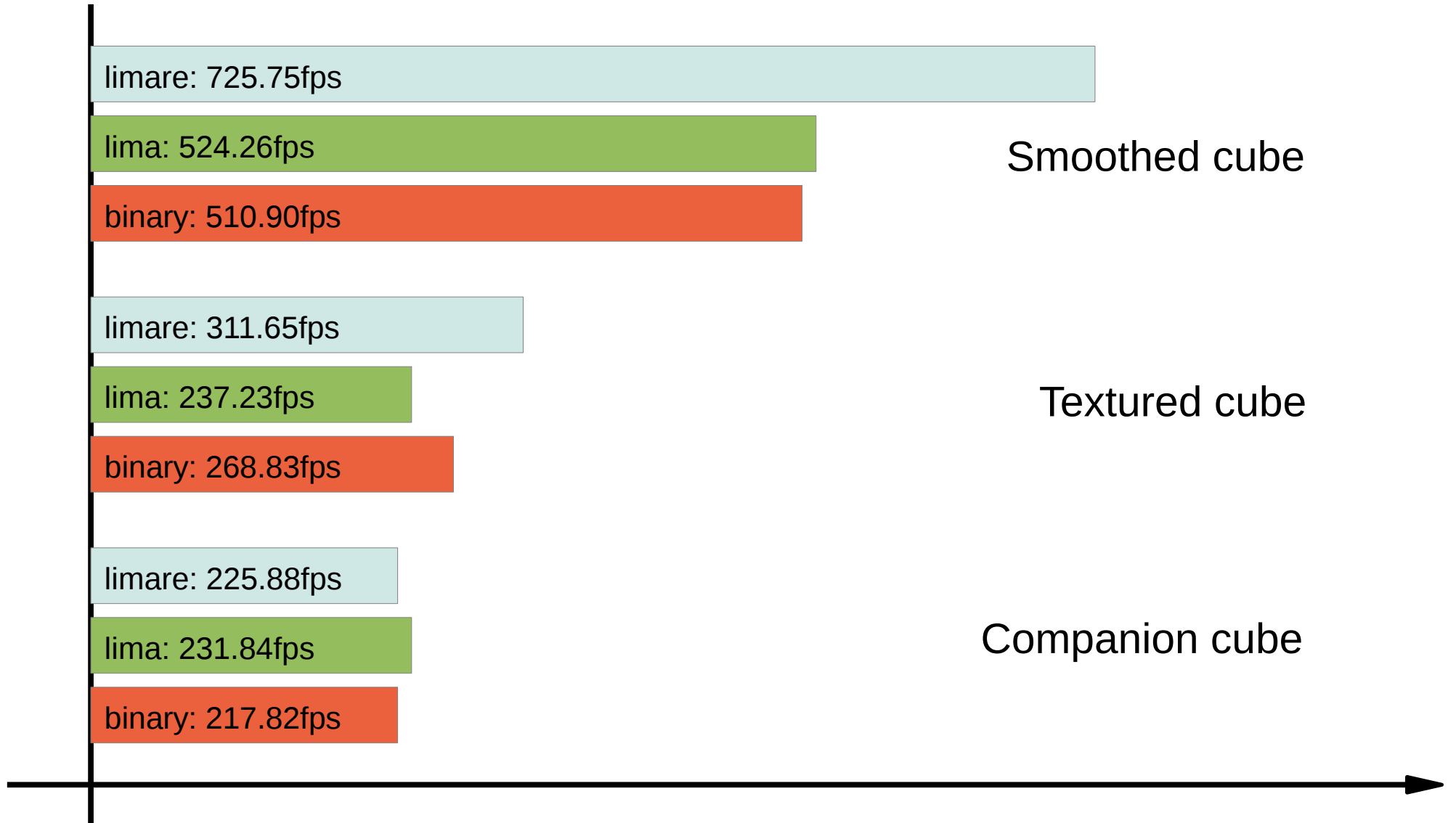
Synchronization.

- Limited resources, so all silicon needs to be used.
- Mali is a proper mix-n-match SoC IP block.
- Vendor kernels are a mess...
- No unified command processor to synchronize everything for you.
- dma-buf is a good first approach, but for some reason lacks synchronization → dma-fence

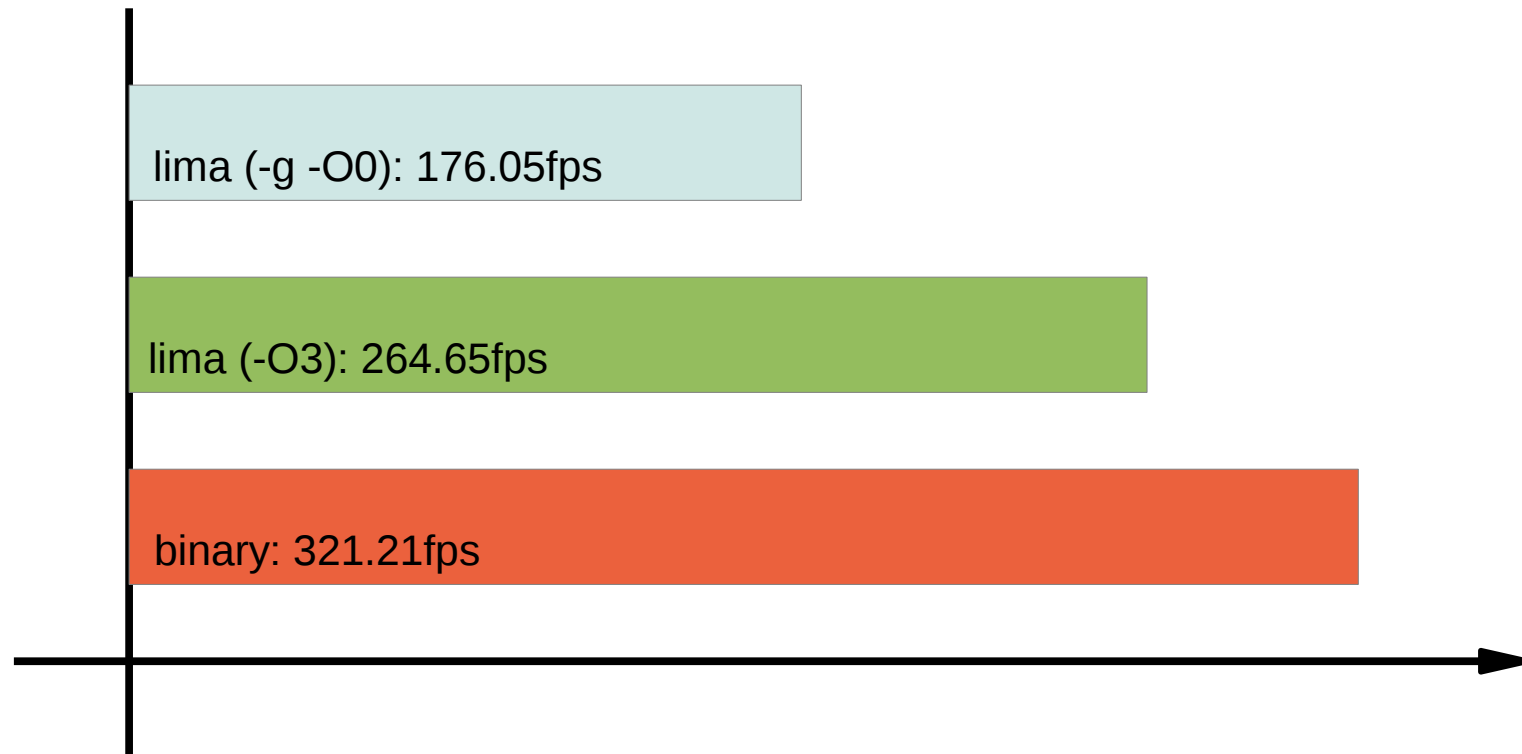
Frame lifetime



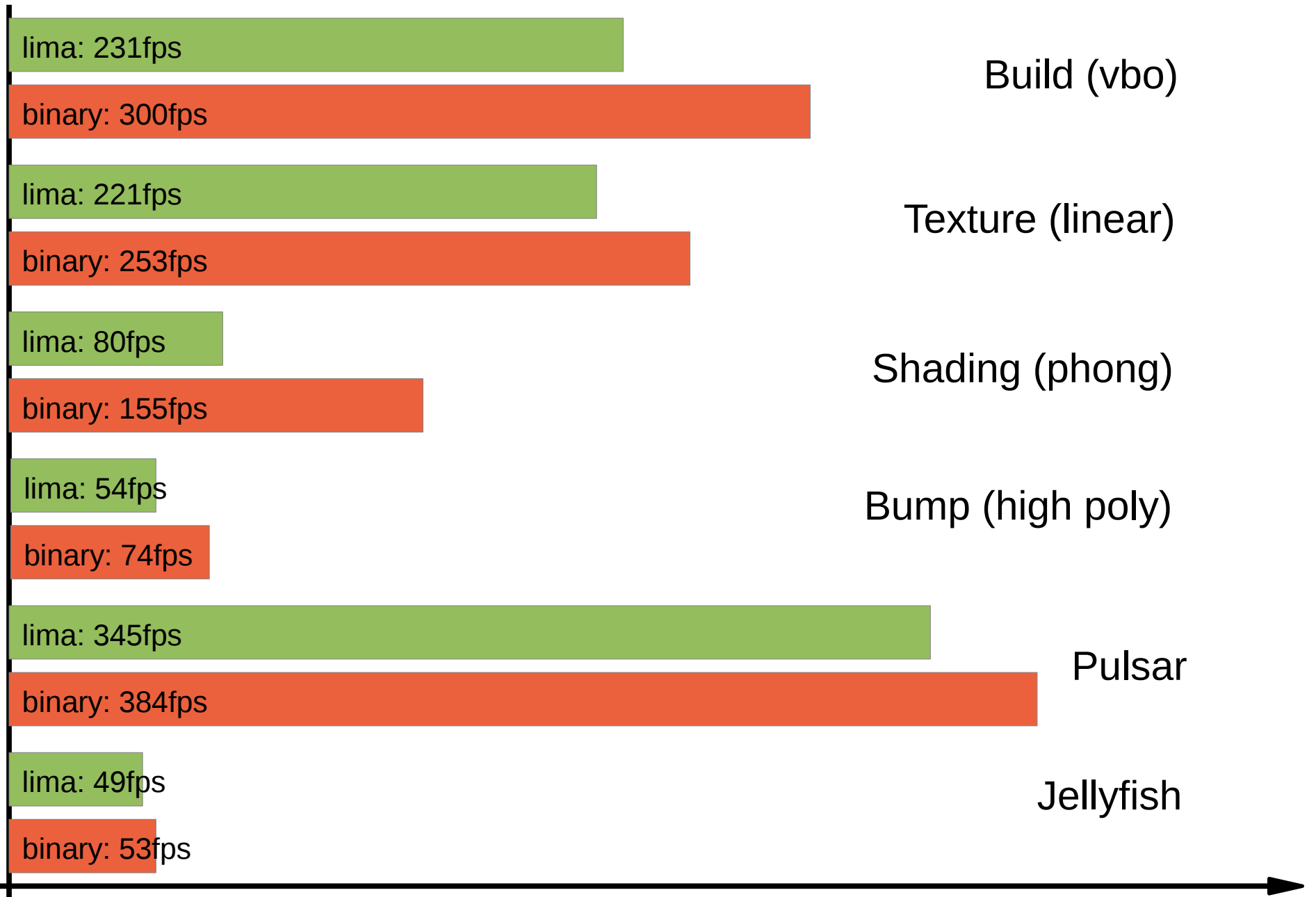
Performance: limare tests



Performance: es2gears



Performance: glmark2-es2



Future.

- Full glmark2-es2 coverage & release.
- Incorporate Connor's glsl work.
- Implement dma-buf/fence.
- Proper tie in with at least sunxi display code.
- Job submission rewrite/kernel driver rewrite???

Tamil driver.

- Mali T6xx/T7xx
- Fresh start.
- Missing community for the chromebook,
At least it's not android...
- Early days:
 - Capture/replay.
 - Shader Compiler.

A word from our... Beneficiaries?

- “[...] we currently see very little advantage to ARM in the creation of such a driver and several disadvantages.”
- “[...], this project is producing and publicising your versions of documentation about the internals of our hardware, which we do not want, [...]”
- “Finally, if we wanted an Open Source driver, we could Open Source our own driver...”

Jem Davies,

ARM Fellow, VP of Technology, Media Processing Division,

10th of May 2013

Questions?