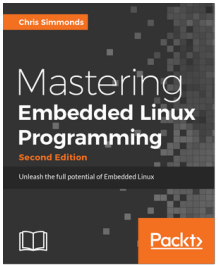
Running Android on the Raspberry Pi

Chris Simmonds

foss-north 2020

About Chris Simmonds



- Consultant and trainer
- Author of *Mastering Embedded Linux Programming*
- Working with embedded Linux since 1999
- Android since 2009
- Speaker at many conferences and workshops

"Looking after the Inner Penguin" blog at `http://2net.co.uk/`

@2net_software

`https://uk.linkedin.com/in/chrisdsimmonds/`

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- It's fun! No, really it is!

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- And a GPU with OpenGL ES 2.0 libraries (more about this later)

Android on dev boards

WandBoard, DragonBoard 410c, Hikey 620

Digi ConnectCore, BeagleBone Black, Raspberry Pi 3B

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The Raspberry Pi 3B+

- BCM2837 Soc: 4 x Cortex-A53 ARMv8 64-bit @ 1.4GHz
- 1 GiB SDRAM
- Micro SD card slot
- 4 full size USB 2.0 A host
- 100 Mbit Ethernet
- WiFi 802.11 a/b/g/n/ac
- Bluetooth 4.2/BLE
- HDMI video output
- 40-pin header for HATs

Hasn’t it been done already?

Sure! Here are two projects, there are others

- **Android RPi**: https://github.com/android-rpi
- **LineageOS**: (unofficial build from KonstaKang)
  https://konstakang.com/devices/rpi3/LineageOS16.0

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- Time and patience

Putting Android on Raspberry Pi

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  - Graphics
  - Lack of USB OTG port

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- We can chainload U-Boot to get some Android integration
  - e.g. the "boot reason" mechanism so we can boot into recovery mode

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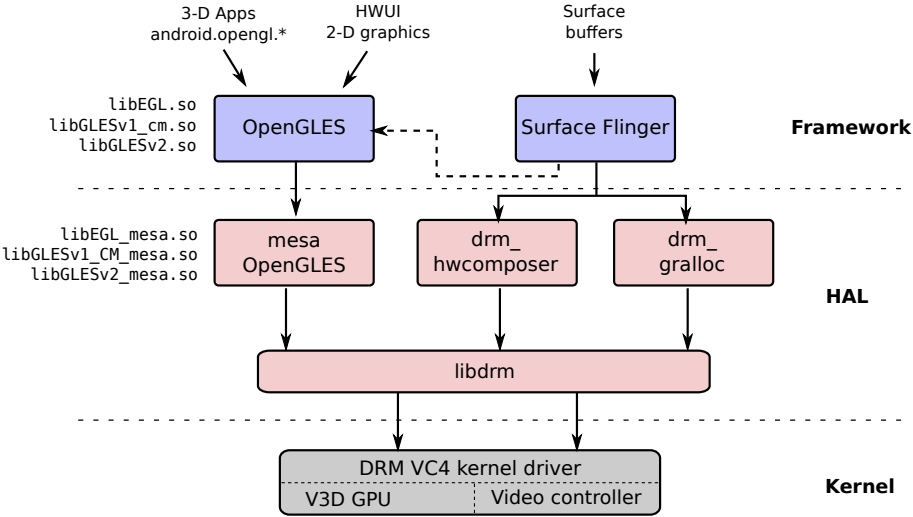
  - Use Soft GPU, **Swiftshader**

Graphics: Mesa



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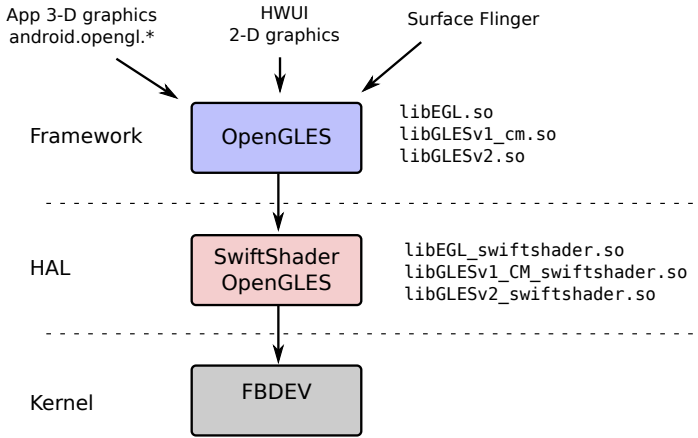
- Drivers for mobile GPUs include:

Driver	SoC
freedreno	Qualcomm MSM
nouveau	NVidea Tegra
VC4	Broadcom BCM2708 (Raspberry Pi)
etnaviv	NXP i.MX6
lima/panfrost	ARM Mali 4xx, Txxx and Gxx
softpipe	soft GPU

Graphics: Swiftshader



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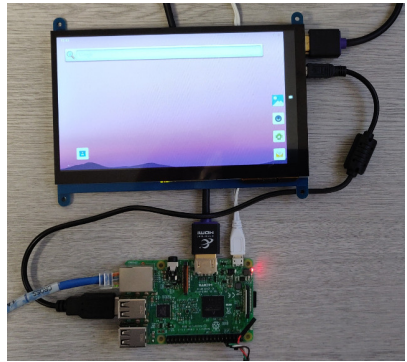
```
$ adb shell
rpi3:/ #
```

Current status of A4RPi

- Based on Android RPi project
- With some differences...
  - Vanilla AOSP tablet UI (instead of Android TV)
  - Android Treble compliant (almost)
  - U-Boot for Android/bootloader integration (WIP)
- Android 10
- Mesa 3D OpenGLES
- Early stages: still WIP



Code on github `https://github.com/csimmonds/a4rpi-local-manifest`

Delving deeper

- If you would like to discover more about building Android platforms, visit `http://www.2net.co.uk/training.html` and enquire about training classes for your company
  - 2net training is available world-wide

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`https://uk.linkedin.com/in/chrisdsimmonds/`