Freeing one more SoC: Etnaviv status update
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Vivante IP cores:
Freeing much more SoCs
Who's the guy in front?

• Lucas Stach

• Kernel- and graphics developer at Pengutronix

• Providing customers with stable Linux based on mainline for their projects

• Engineering made-to-measure solutions

• Helping customers to reduce long time maintenance cost by bringing things mainline
Vivante hardware implementations

- Marvell
- Freescale
- Rockchip
- HiSilicon
- Ingenic
- ICT
Etnaviv

• FOSS driver for the Vivante IP cores

• Started as a RE project by Wladimir J. van der Laan
  • A lot of the commands and ISA are known

• Contributions from others like Christian Gmeiner
Vivante hardware

- Different IP core for 2D, 3D and VG available
- 3D core (straight-) forward renderer
- Modelled after DX9 pipeline + unified shaders
- Newer models have thread walker for compute
- Different hardware implementations
Vivante hardware configurations

- FE
- 2D
- 3D
-Resolve
- VG
Vivante hardware configurations

- FE to 2D
- FE to 3D
- FE to VG
- Resolve
Vivante hardware configurations

- Multiple pixel pipes
  - Thanks to Christian for figuring out how they work
  - Growing number of tile formats
- SLI like setups
FOSS driver – why does it matter

- FOSS drivers are awesome ;)
- Integrating vendor drivers a pain point
- No security audit possible
- Driver fixes not dependable
FOSS driver – why does it matter

- Freescale i.MX6 used in a lot of automotive and industrial applications
- Industrial chip lifetime
- i.MX6 has a guaranteed availability for 15 years
- Last newly build devices with this chip may ship in 2027
Etnaviv status - kernel

- Christian Gmeiner started kernel work in 2014
- Clone of Freedreno kernel adapted to Vivante HW
- Currently in state of RFCv2
Etnaviv status – kernel RFCv2

- Significantly reworked UAPI
- Proper cache handling for non-coherent archs
- Lots of stability improvements
- GPU suspend/resume possible
Etnaviv status - kernel

- Replaced fat and obfuscated Vivante kernel driver
- Readable code
- 60+ KLOC → 6.5 KLOC
Etnaviv status – kernel missing features

• Use of core internal DVFS
• Working and secure command stream validation
• Support for per-client MMU contexts
• Support for MMUv2
• Performance counters
Etnaviv status – X.Org

- Xf86-video-armada is able to drive 2D GPU
- Mostly developed by Russell King
  - Vivante galcore lib
  - libetnaviv on top of Vivante kernel driver
  - etna-drm
- Using 2D GPU
- Provides solid acceleration of common operations
- X-Video accel
Etnaviv status – libdrm

- Again started by Christian as Freedreno clone
- Rewritten to deal with the new kernel UAPI
- Some cleanups missing otherwise ready for review
Etnaviv status – MESA

• Started by Wladimir on top of the Vivante kernel driver and libetna

• Reworked to work on top of etna-drm

• Able to run simple Applications (yes, Quake 3 might be one of them)
Etnaviv status – MESA TODOs

- Get rid of FBDEV
  - Implement fused EGL device?
  - Put EGL device on top of KMS (EGL streams? *shudder*)
- Clean up state validation and emission
- Shooting Pigmits
Questions?