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The Libre-SOC Project

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The Libre-SOC Project aims to bring a DRM-free 3D GPU/CPU/VPU processor to fruition, providing the backbone of guaranteed "right to repair" and beyond. Anyone technically familiar with Apple's new processor knows the true implications: if Apple controls the entire stack right from boot, then with their market share, vendor lock-in on an unprecedented scale becomes the new reality. With Intel losing the plot (Spectre, Meltdown, QA failures) other vendors will likely follow their example.

If we do not wish to see that happen it is our duty and responsibility to provide alternative processor designs that are targetted at mass-volume products: tablets, smartphones, chromebooks and more.

This then defines the technical requirements:

- The processor must be power-efficient
- It must be capable of good 3D graphics
- It must have audio and video acceleration
- There must be good driver support (BSP)
- The entire stack must be Libre
- The processor must be "unbrickable"

With help from NLNet, under their Privacy and Enhanced Trust Programme, we have received seven separate EUR 50,000 Grants targetted at specific areas to make this a reality, covering:

- The core processor design which is to be an augmented POWER9 compliant design, guided by the OpenPOWER Foundation
- Paying for a 180nm test ASIC to be laid out using entirely libre ASIC tools by Sorbonne University (coriolis2)
- Two separately funded 3D Vulkan Drivers: Kazan and MESA
- Audio/Video assembly-level acceleration for inclusion in ffmpeg and gstreamer low-level libraries
- Support for Development of 3D and Vector Processing Standards and submission to the OpenPOWER Foundation for inclusion in PowerISA
- Documentation and openness to suit educational and business needs alike.
- Formal Correctness Proofs for both the low and high level design (including the IEEE754 units)

This latter is critically important for transparency: the processor has to be independently verifiable, and Mathematical Correctness proofs are a good way to achieve that.

This is a massively ambitious and unprecedented project. It is also based on a technically underappreciated historic design: the CDC 6600. With help from Mitch Alsup, the designer of the Motorola 68000, it has been possible to upgrade the 6600 core to multi-issue and precise exceptions with no architectural compromises.

With so much ground to cover, this talk therefore provides an overview and introduction to the project.

GSoC, EVoC or Outreachy

No

Code of Conduct

Yes

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