



A Scalable and Flexible GPU Architecture for OpenGL | ES 2.0

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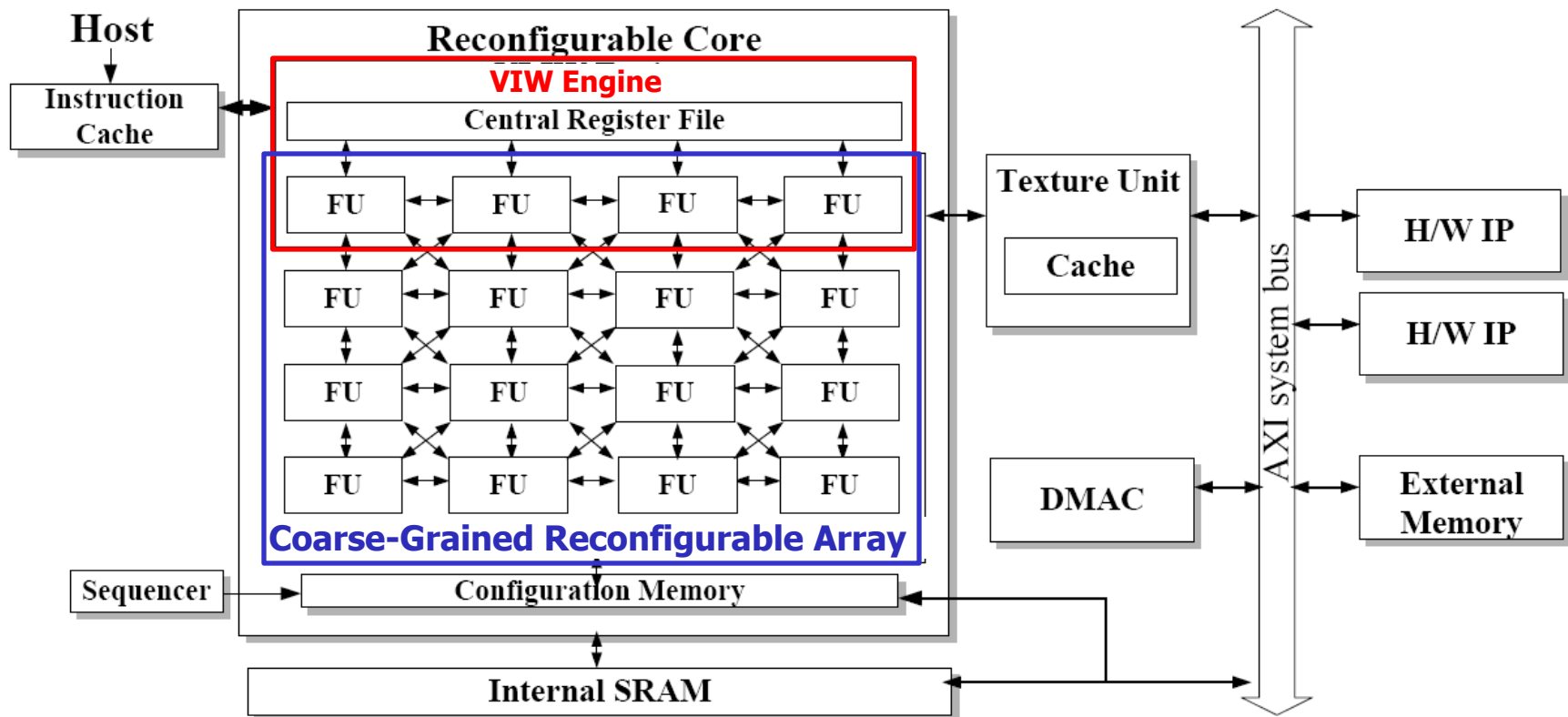
Motivation

- **Mobile devices are widely used all over the world.**
- **Application Processor (AP) is a core component for multimedia processing.**
- **The cost of ASIC is gradually increasing.**
 - Requirements for high performance, low power, area and shorter time-to-market.
 - Industry standard changes very fast!
- **We need a more flexible solution.**



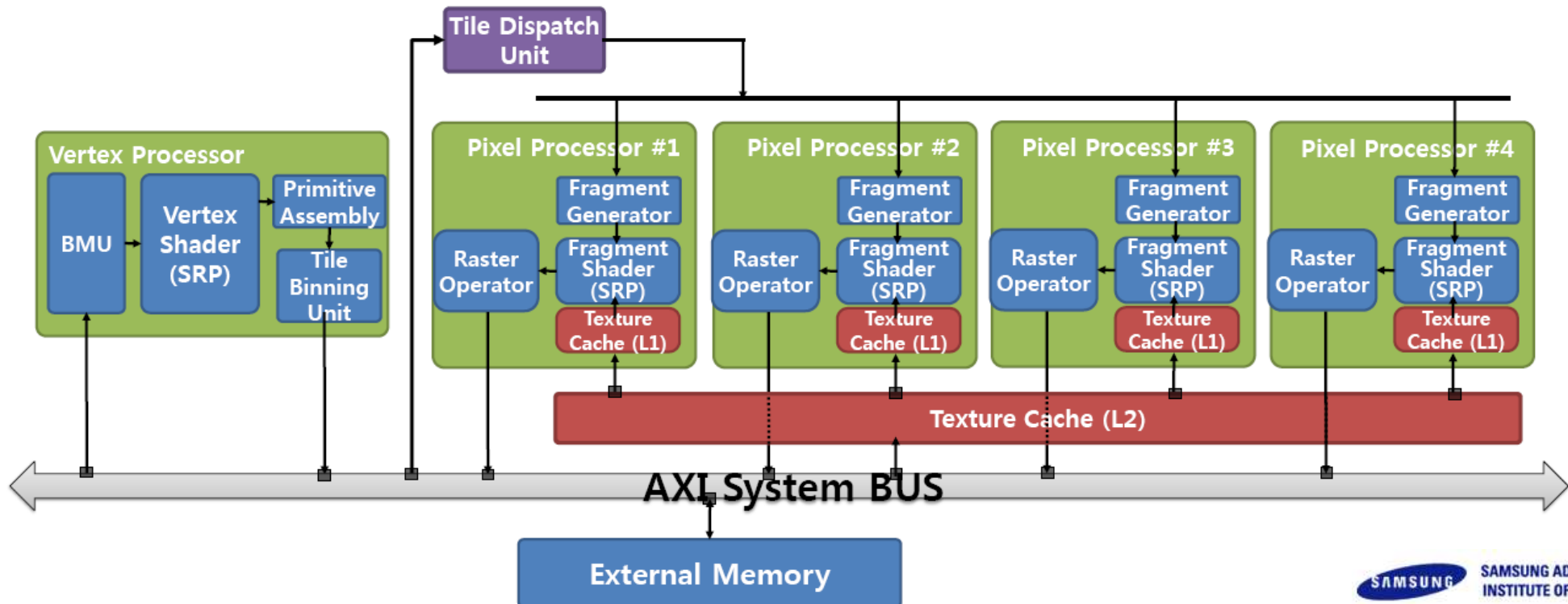
SAMSUNG Reconfigurable Processor

- A flexible architecture template.
- Application kernels can configure the internal structures in the run-time.



Multi-Core SRP based GPU

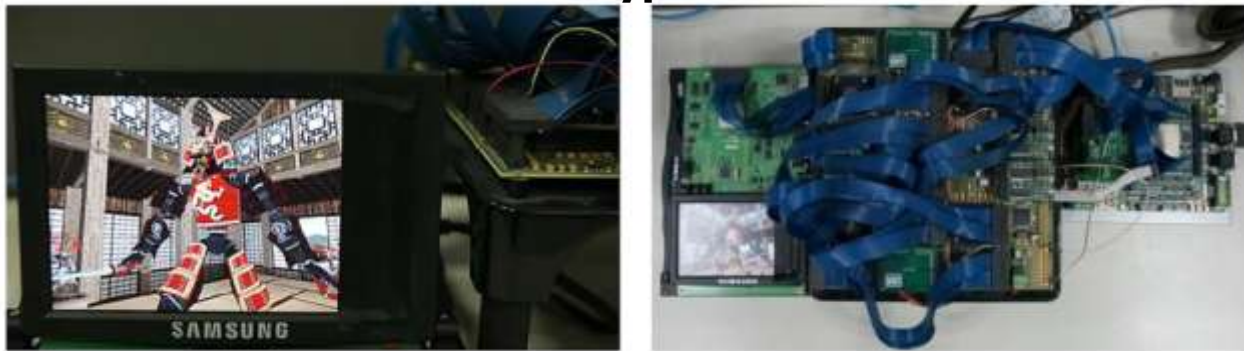
- 5 SRP based GPU (1 vertex, 4 pixel shader, dedicated H/W acceler.)
- Effective parallel rendering
 - SRP & HWA are processed in fully pipelined manner.
 - Load balancing can be done by TDU.



Prototyping & Evaluation

- Xilinx Virtex5 FPGA board running at 25 MHz for functional verification
- Verilog RTL simulation for performance evaluation
- Test apps: 3D Mark Mobile 1.0/2.0 and GLBenchmark

Prototype



Demonstration



Cyber samurai

Taiji



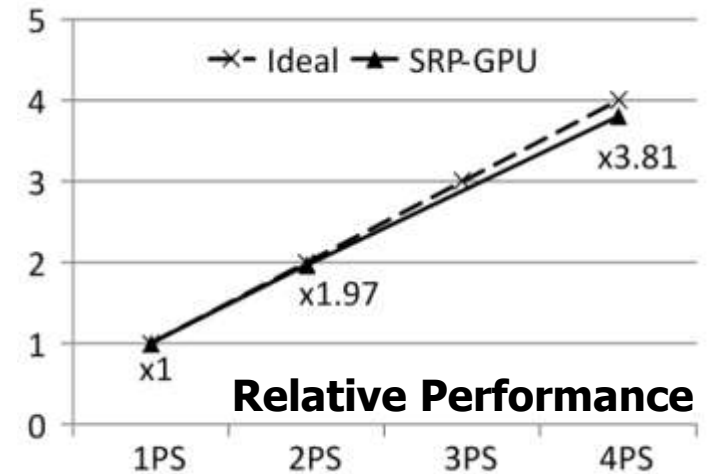
Hover jet



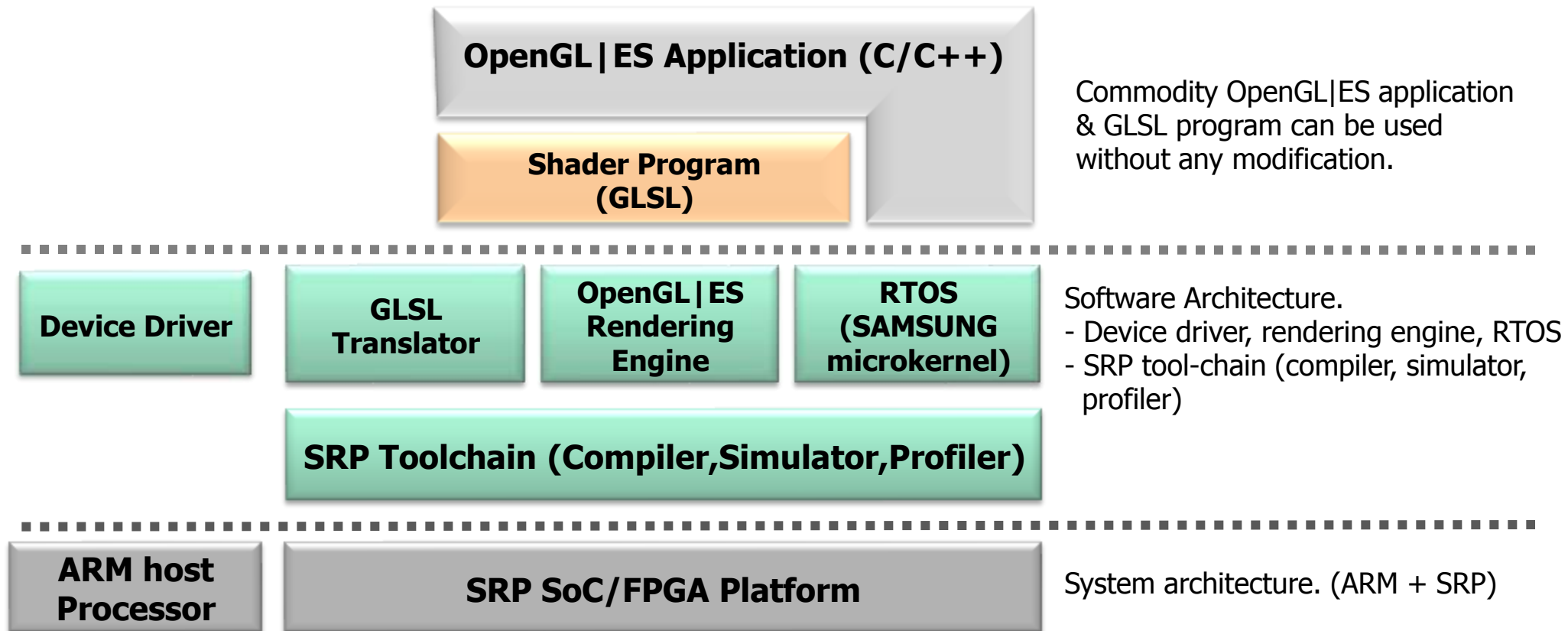
Egypt



Pro



SRP and OpenGL | ES Ecosystem



Future Work & Vision

- **Short- & long-term goal**

- Redesigning the architecture. (e.g. unified shader, multithreading)
- Being a complete IP for future SAMSUNG's AP.
- Presenting a full SRP environment to mobile app developer.

- **SRP based multimedia platform**

- SRP-based audio is already shipped into SAMSUNG Exynos. (Galaxy S2)
- Video/image apps are successfully mapped in the lab.

