The ExCALIBUR Hardware and Enabling Software (H&ES) Programme

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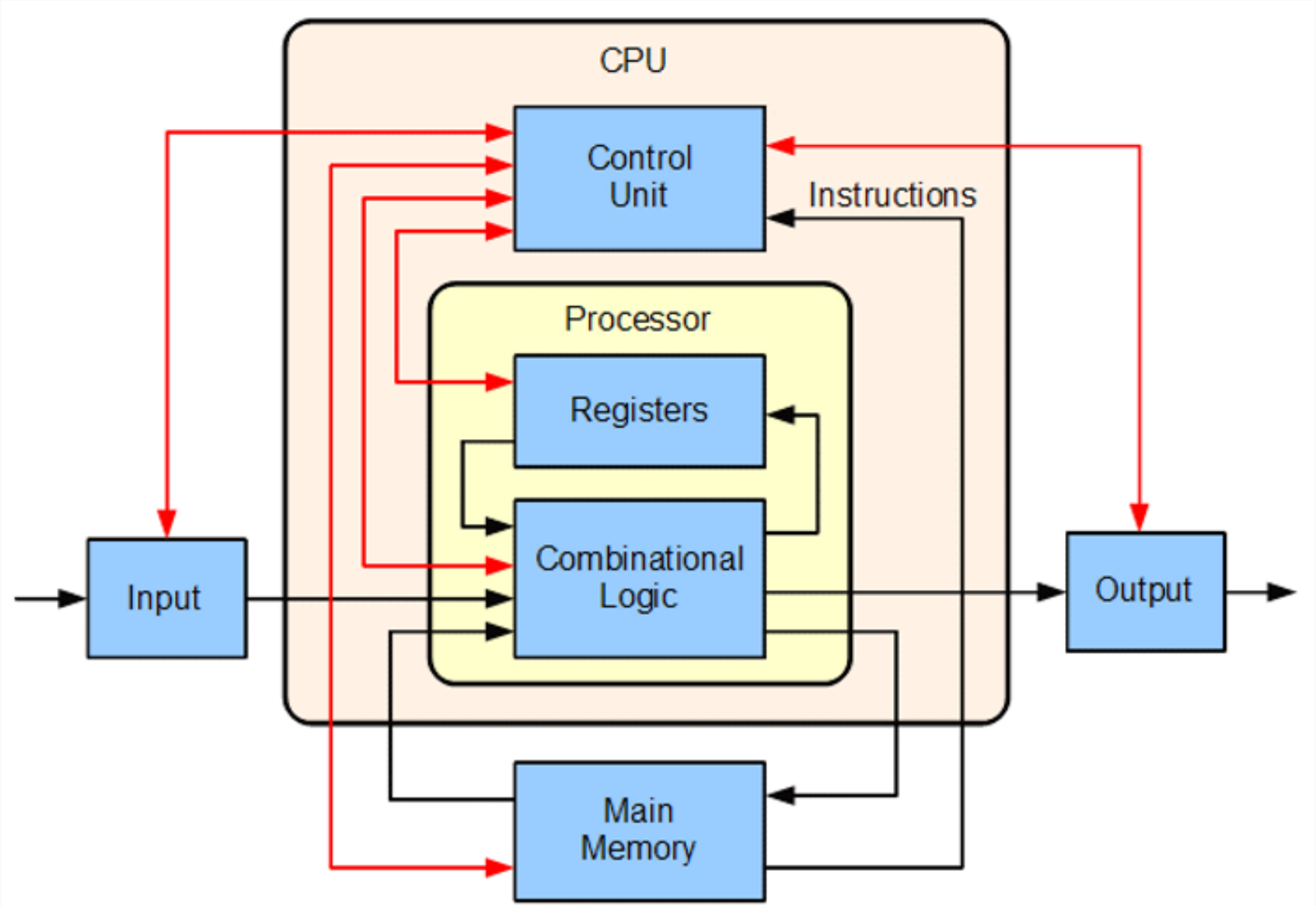
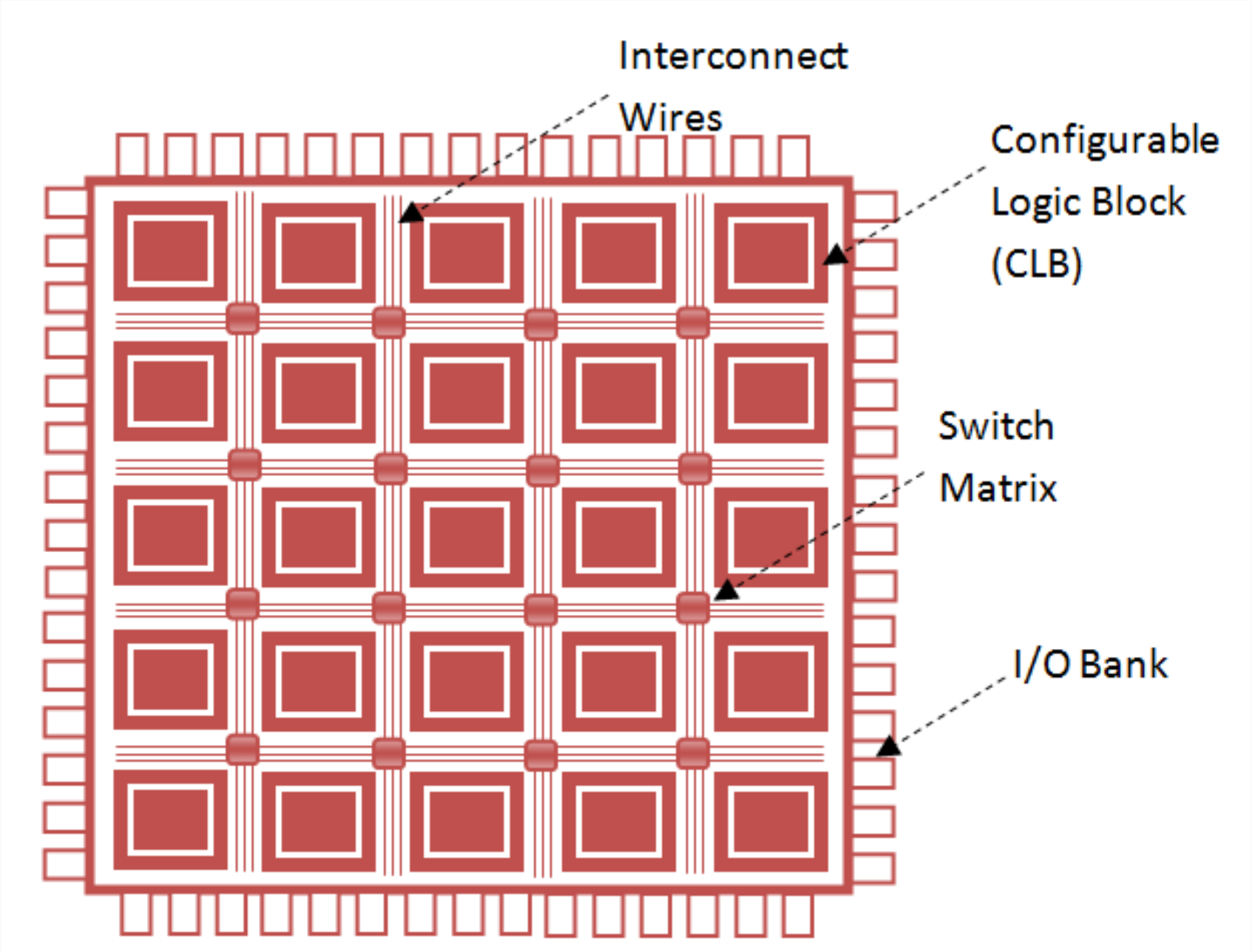
What are FPGAs and why are they useful?

CPU/GPU Architecture



FPGA Architecture



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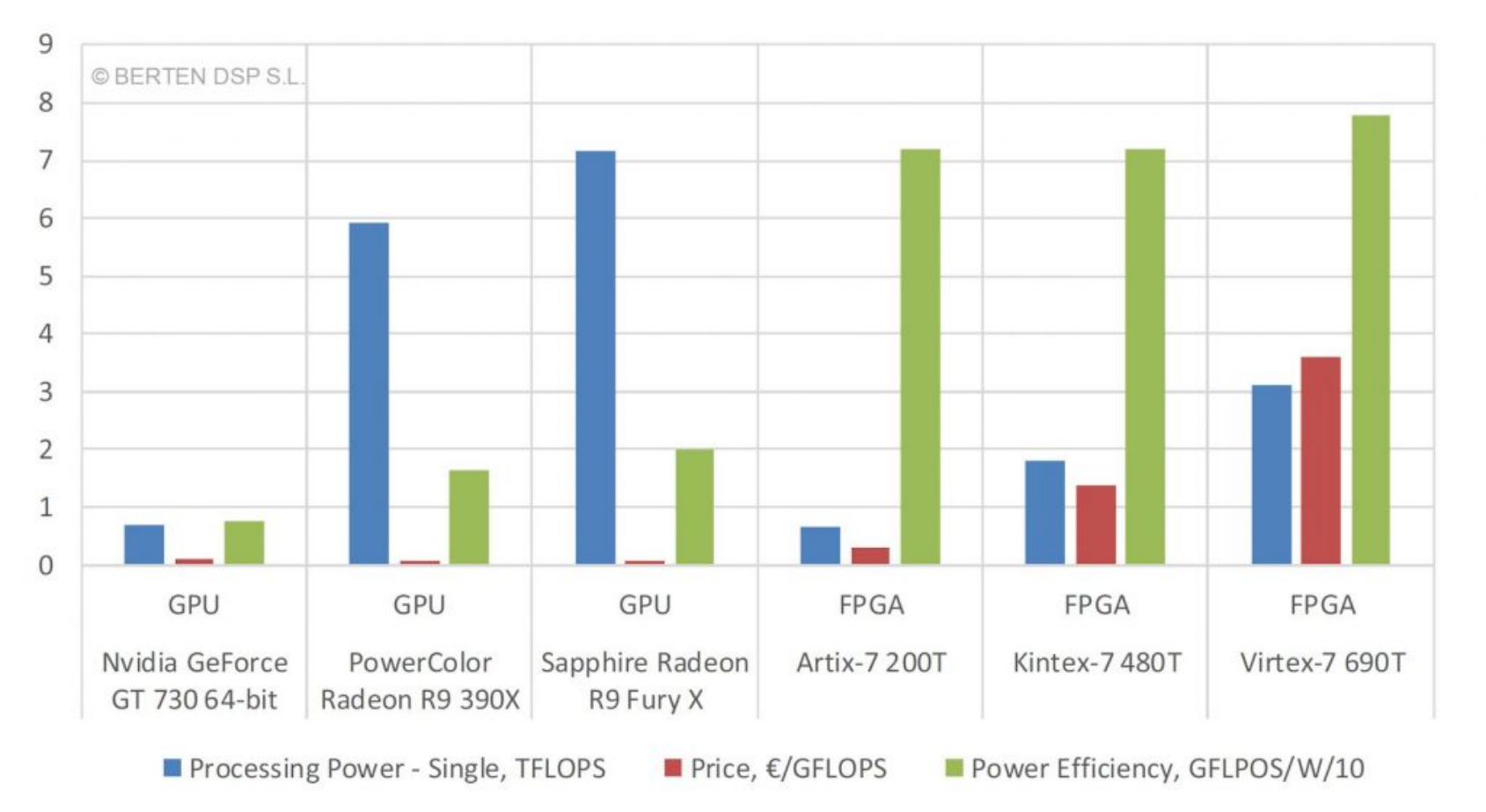
- FPGAs offer parallelism through **pipelining** (e.g. single production line)



[1]

[1] GPU vs FPGA Performance Comparison - BERTEN. (2020, December 06). Retrieved from https://www.bertendsp.com/gpu-vs-fpga-performance-comparison

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- FPGA optimisation can be unintuitive; requires good optimisation tools

Current state of developer tools

Tool	Vendor Support	Ease of use
Vitis HLS	Xilinx	low-level; includes libraries; good but tricky tools
OpenCL	Xilinx/Intel	low-level; potentially portable to CPU/GPU
SYCL	Intel	better syntax; likely future direction for Intel
DaCe Python	Xilinx/Intel	Higher level; portable; immature; harder to debug + optimise

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- Potential collaboration with SysGenX

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- Used development to better understand Vitis HLS tooling

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  - Focus on usability
  - Integrate with existing codes/projects (WP4 of SysGenX?)