

High-Performance Embedded Systems-on-a-Chip

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Outline

- Introduction
 - Context & Challenges
 - Problem Formulation & Constraints

Systems on a Chip

- Computers \Rightarrow Information Appliances
- Ubiquitous & Invisible
- Non-programmable (by end user) but “parameterizable”
- Programmable (by designer): product evolution

Why Special Purpose VLSI for SoC

- Speed (raw)
- Power and/or Energy Consumption
- Cost (per unit, in large volume)
- Weight, size, . . .

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the price for the performance

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- Time to market constraints
- Evolving specifications
- Exponentially increasing design complexity
- Moving target technology

Moving Technology: Trends

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- **Reconfigurability:** FPGA's CPLD's, ...
- **Diversity:** ASIC's, processor cores & FPGA's on the same die.

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- ASICs
- FPGA based reconfigurable coprocessors
- Programmable instruction-set processors (ISP's)
 - ◆ ASIPs, DSPs, processor cores
 - ◆ parallel ISP's (SIMD or SPMD)

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- **Codesign:** software & hardware—two sides of the same coin
- Focus on **compute-intensive** parts (loops)
- **Massive parallelism** and **Formal methods:**
 - ◆ Performance
 - ◆ Low power (energy speed tradeoff)
 - ◆ Design complexity