



Cycle Ingénieur 3^{ème} Année – Option GSE

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Ch1 - 1 -



Plan



- **Ch1 – Overview of System Design Using SystemC**
- Ch2 – Overview of SystemC
- Ch3 – Data Types
- Ch4 – Modules
- Ch5 – Notion of Time
- Ch6 – Concurrency
- Ch7 – Predefined Channels
- Ch8 – Structure
- Ch9 – Communication
- Ch10 – Custom Channels and Data
- Ch11 – Transaction Level Modeling

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Overview of System Design Using SystemC



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Ch1 - 3 -

Electronic Systems Now



- Blend of Hardware and Software
 - CoDesign (Concurrent Design)
 - Embedded Systems
- Software / Firmware
 - Bottleneck (communication)
- Easier to create heterogeneous concurrency than to use it !

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Overview of System Design Using SystemC

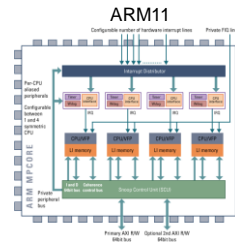


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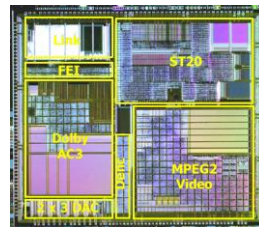


Soft versus Hard

- CPU (ARM11)
- FPGA (VirtexII Pro, V4, V5)
- ASSP (Application-Specific Standard Product)
- ASIC (Application-Specific Integrated Circuit)
- SoC, MPSoC
- Hybrid



Xilinx



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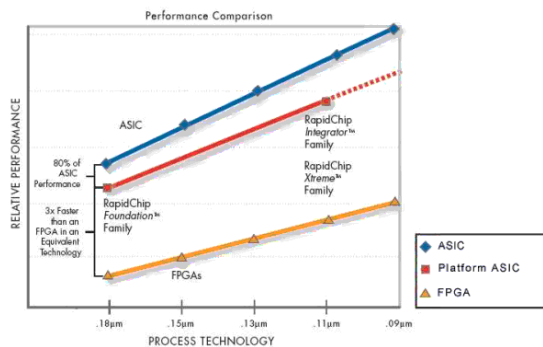
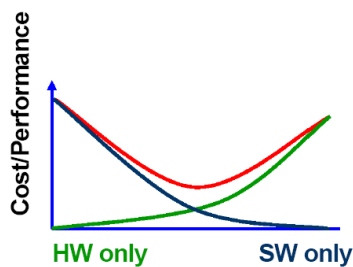


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Performance

- FPGA versus DSP/CPU



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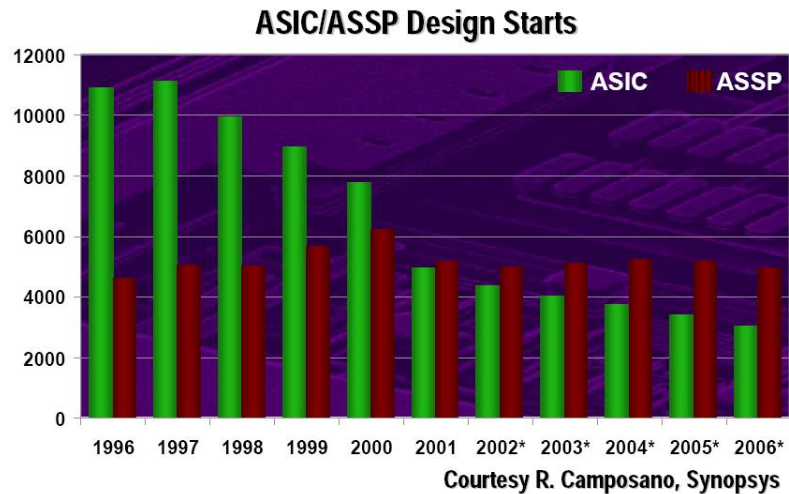
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ASICs on the road to extinction ?



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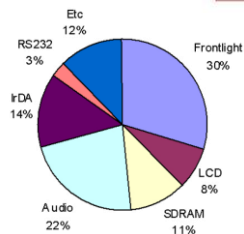


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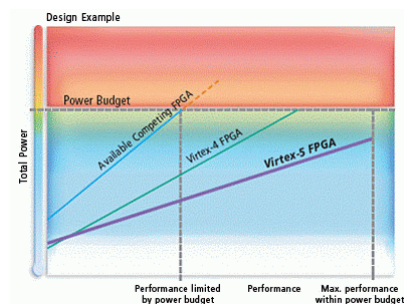
Power Consumption

- 206MHz StrongArm SA-1110 processor
- 320x240 resolution color TFT LCD
- Touch screen
- 32MB SDRAM / 16MB Flash memory
- USB/RS-232/IrDA connection
- Speaker/Microphone
- Lithium Polymer battery
- PCMCIA card expansion pack & CF card



* Note

SDRAM power consumption is guessed by setting its self-refresh mode
CPU is idle state of most of its time
Audio, IrDA, RS232 power is measured when each part is idling
Etc includes CPU, flash memory, touch screen and all other devices
Frontlight brightness was 16



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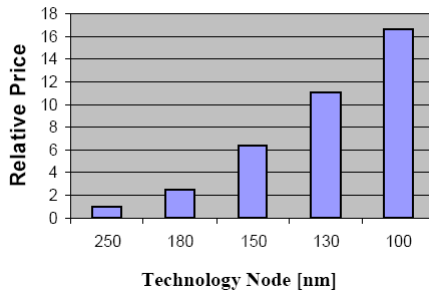
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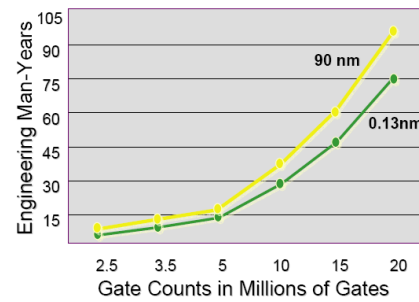
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Cost

Mask Cost



Complexity



DesignCon 2004 : Jan M. Rabae

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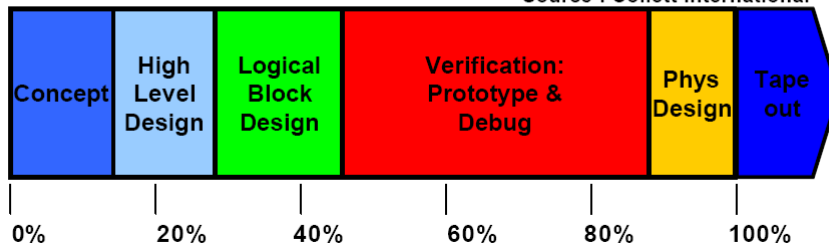


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Time to Market

Time spent on different phases in a typical SoC design project

Source : Collett International



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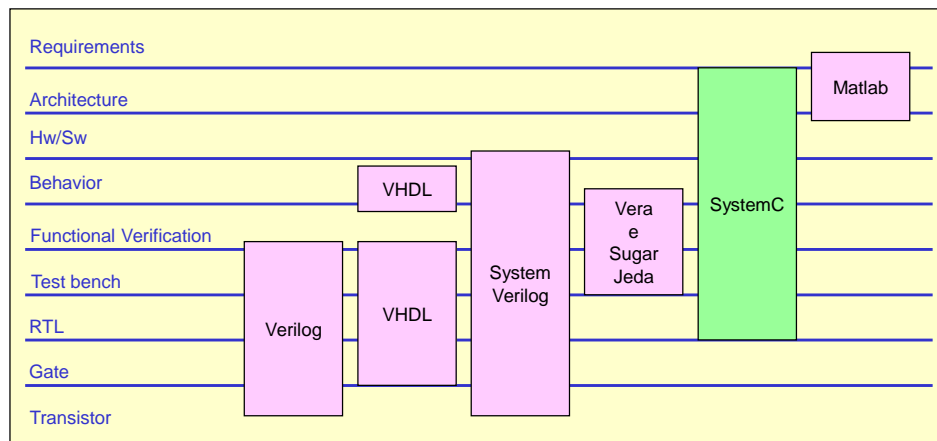
System Level Design



- Drastic power reduction
- Abandon the pure synchronous path
- Self-Correcting architectures
- **Demands System-Level approach**
 - High Level of abstraction
 - Early on validation
 - Delay decision into Hardware and/or Software part
 - Language ??

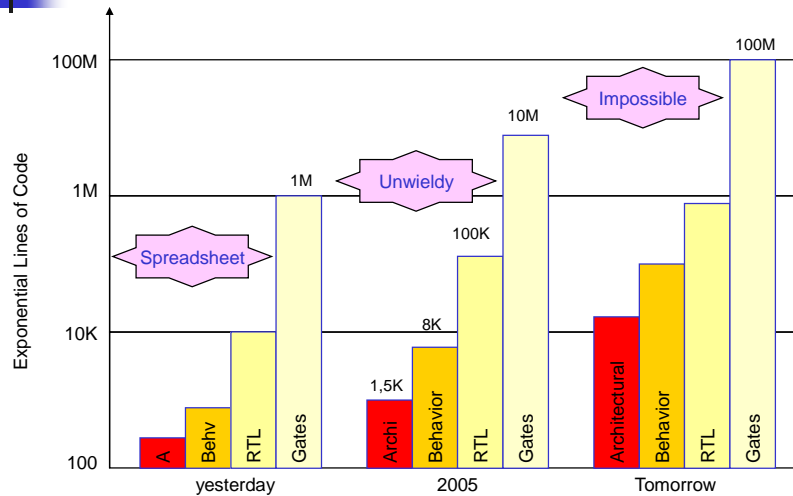


Language Comparison





Increasing Design Complexity



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Overview of System Design Using SystemC



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Facing Design Complexity



- SystemC supports several techniques for addressing the complexity
 - Abstraction
 - Design reuse
 - Team discipline
 - Project reuse
 - Automation

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Overview of System Design Using SystemC



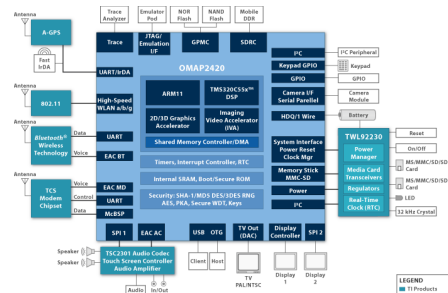
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Facing Design Complexity Design Reuse



- Reuse has emerged as the dominant productivity technique for RTL and software design
- Reuse will continue to be a major component of any new methodology to address increased complexity
- Platform based design is an evolution of design reuse to higher levels of abstraction



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