



Designing Reliable Embedded System atop of Unreliable Hardware Platform

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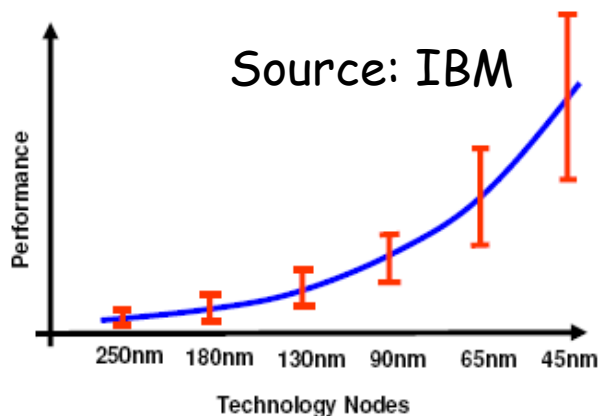
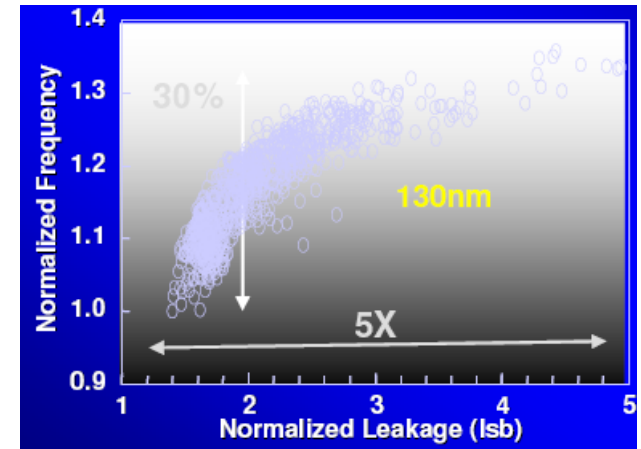
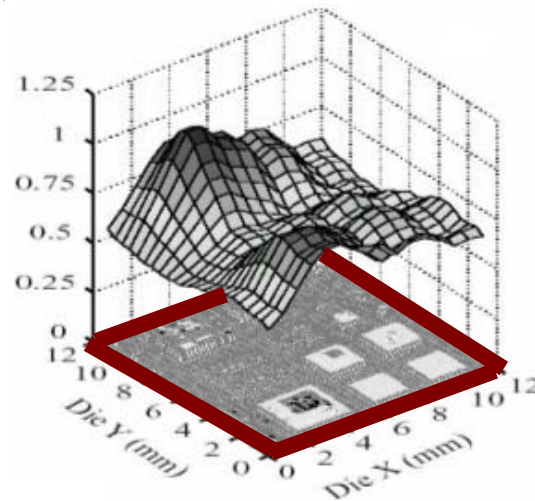
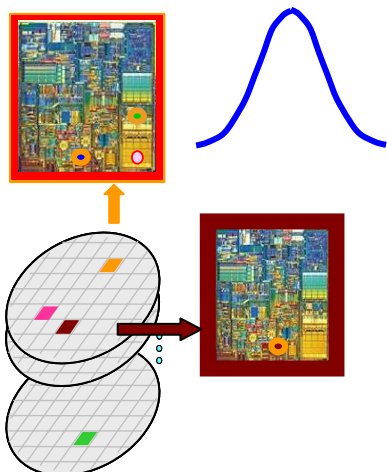
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What is the problem?

- As technology scales, embedded hardware are implemented in **more advanced technologies**:
 - e.g. ARM Cortex-A8, Xilinx Virtex-5 @ 65 nm
- These hardware platform **becomes more unreliable** as they are fabricated at deep-sub-micro technology with much smaller feature size!
 - Manufacture variation
 - Transient errors
 - Accelerate aging effects

Unreliable Hardware Platform

- Large **manufacture variations** cause large performance/power variation for identical designs

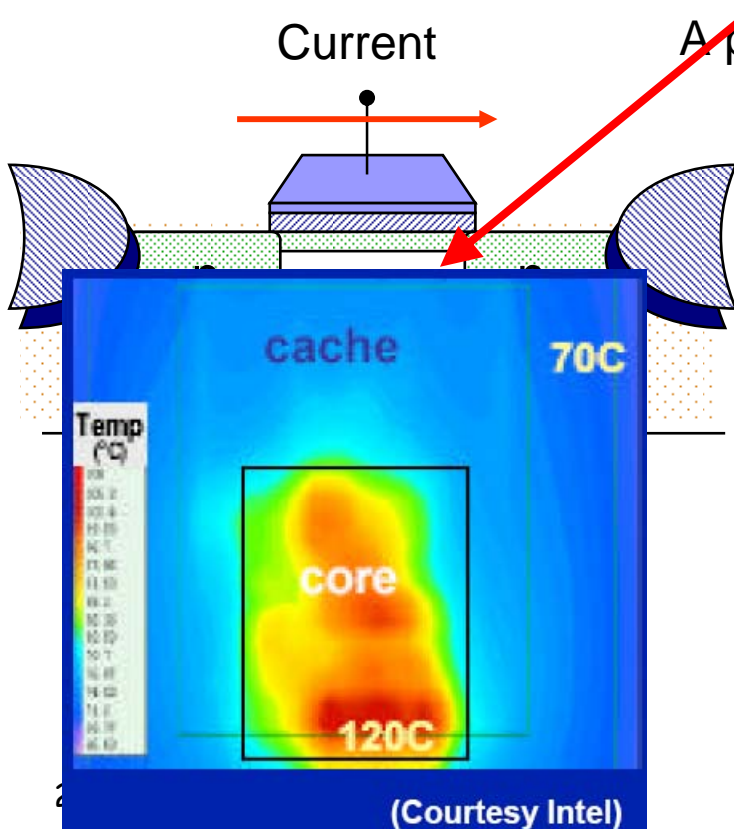


Worst case analysis for embedded software performance could be too pessimistic

Need **probabilistic design/analysis** for **variation-aware** embedded systems

Unreliable Hardware Platform

- **Transient errors** are much easier to happen (due to cosmic ray, thermal variation etc.)
- **Hardware ages** much faster (becomes slower and finally violates the real time constraints)



Hardware redundancy may not be feasible for cost-sensitive embedded system

transient fault tolerant, thermal-aware, aging-aware embedded system design

Control-feedback, self-healing, self-adaptive embedded system design.

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