



Async at Sun

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Sun Labs

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Sun
microsystems
We make the net work.

About Sun

- **Sun is (was?) BIG**
 - **35K people, \$12.5 billion sales**
 - **Products: servers, workstations, software,..**
- **Processor and Network Products Group**
 - **UltraSparc products**
 - **Full-custom, semi-custom chips, and ASICs**
- **Sun Labs**
 - **200 people, \$24 million budget**
 - **Async Design Group, 14 people**

Async at Sun: Why and Where?

- **Speed, speed, speed**
- **Clocks will run out of time (“Sink or Async”)**
- **And yes,**
 - **Reduced energy consumption**
 - **Reduced radio interference**
 - **Architectural freedom**
- **Async design mostly in Sun Labs**
- **Async FIFOs in UltraSPARCIII, and more ..**
- **Active technology transfer**

Async at Sun Labs

- **Async Design Group, 14 people**
- **From spec to circuit to test chip via MOSIS**
- **Circuit family: GasP**
- **Cost function: Logical Effort Theory**
 - **Speed**
 - **Energy**
- **CAD Tools**
 - **Electric (www.staticfreesoft.com)**
 - **Transistor sizing**

CAD Tools, What We Like

- **Electric (www.staticfreesoft.com)**
- **Hierarchical design**
- **Automatic transistor sizing**
 - **Considering both wires and gates**
 - **Find speed limits of circuits**
 - **Compare “cost” (speed, power) of circuits**
 - **Trade off speed for power**
- **Automatic layout generation for modules**
- **Automatic translation from spec to circuit.....**

Impediments to Progress

- **CAD Tools**
 - **From spec to circuit (Intellectual tool?)**
 - **Cost function (speed, energy, area)**
 - **Transistor sizing**
 - **Layout generation**
- **Testing**
- **Education**
- **Commercial success**
- **Chaos of concurrency**