High-Performance Microprocessor Design

Outline

- Introduction
- Technology scaling
- Power
- Clock
- Verification

Introduction

- Alpha has historically been at the forefront of processor performance
  - Clean architectural design
  - Clever micro-architectural design
  - Aggressive circuit design
- As a result, Alpha designers had to be at the forefront in dealing with the challenges of DSM scaling.

Power

- Power dissipation limits performance
  - Lower voltage
  - Conditional clocks
- Power distribution is a major concern
  - Supply affects circuit performance, reliability
  - IR drops, L dI/dt drops
  - Requires careful design of power supply grid
  - On/off chip decoupling capacitors

Clock

- High clock rates require extremely careful clock design. Must control
  - Slew rate
  - Skew
  - Jitter
- And try not to burn up the chip doing it

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Verification

- Verification has become the largest component of design effort.
- Static timing
- Electrical checks
- Logic verification

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