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

Verification

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