CSE 291
IHigh Performance Interconnect and Packaging
Winter 2008

University of California, San Diego

Course Information

Instructor

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Schedule

- Lectures: 2:00-3:20PM, TTH, SSB 106

Textbooks

- (H) High Speed Signal Propagation: Advanced Black Magic Howard Johnson and Martin Graham
- (D) Digital Systems Engineering William J. Dally, John W. Poulton

Content

- 1. Structure of Interconnect and Packaging, D2
- 2. Electrical and Physical Scaling, D1,H1
- 3. Transmission Line Model, D3,H2
- 4. Interconnect Signaling, D7,D8,H3,H5,H6
- 5. Transmitters and Receivers, D4,D11
- 6. Timing Interface, D10
- 7. Timing Components, D12
- 8. Noises, D6
- 9. Power Distribution, D5
- 10. Clock Distribution, D9,H12
- 11. Physical Interface
- 12. Heat Dissipation
- 13. Modeling and Simulation

Interconnect and Packaging

- Cost
  - Materials
  - #pins, #layers, wire densities
  - Heat sinks
- Performance
  - Bandwidth
  - Latency
- Power
  - Distribution: RLC, and Voltage Regulator
  - Consumption
  - Thermal Dissipation

System Examples

Blue Gene/L (2005)

- 25KW/Rack
- 64Racksx
  2Midplanesx
  16Node cardsx
  8Compute cardsx
  2PUs
- 64x32x32 Torus
- 1.4Gb/s differential link, 700MHz clock

z900 (2002)

- 1.3KW/MCM
- 20 PUs, 918MHz
- 2 10x3cross bar,16K nets, 459MHz
- Source synchronous and elastic receiver