Orientation

Dr. Paul D. Franzon

Purposes

• Put this class (and other classes) within the context of your career
• Understand how silicon systems are designed in a global economy
The Global Enterprise (Example)
Design Flow

High Value Teams

System Concept

System Specification
  - Simulatable

System Partitioning
  - Modeling

Chip Specifications
  - Simulatable
  - Partitions Modeled
  - Issues: HW, SW, physical, logic, circuit, power, performance

Low Cost Teams
Design Flow (2)

High Value Teams

Design Execution
- Against system models
- Constant monitoring of all teams

High IP / High complexity content Designs
- Design components with high novelty element
- Generation of new or modified IP by IP companies

High Value Design Services
- Complex CAD tools
- Early planning for performance attainment

Low Cost Teams

Logic Design to Spec (RTL)
Circuit Design to Spec
C, Java coding to Spec
Design Flow

High Value Teams

Verification
- System model and metrics
- Speeding up verification convergence
- Debug and repair

Performance Verification
- Achieving clock and power goals
- CAD flow management
- Debug and repair

Low Cost Teams

Coding for verification

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Design Flow

High Value Teams

- System Integration & Verification
  - Packaging and component integration
  - Prototyping and transition to manufacturing
  - Debug and repair

Low Cost Teams

- Detailed Package Design and Signal Integrity Verification
- Manufacturing transition and scale-up / cost-reduction

Marketing
Defense and Security

Entire Design usually done in the United States

- Often using commercially provided chips, and sub-systems not originally intended for defense
- Tends to emphasize
  - Unique System Integration Approach
  - Lots of embedded software
  - Lots of FPGAs
  - Specialized ultra-high-performance defense-specific components (which are often new chips)
  - All new design (logic, analog, etc.) done in the United States
What this means to you

Assuming you want a high value (i.e. high wage) job.

Defense and Security
- US Citizenship
- Wide variety of point skills particularly at high performance edge
- Develop system integration skills (breadth as well as depth, project management, etc.)

Commercial
- Have to know detailed design in order to do system design and manage design process
- Need broad knowledge in order to have system view
- Need to be on the leading edge of innovation (patents, IP, techniques)
  - PhD beneficial
- Develop deep skills in design services speciality
What this means at NCSU

Innovations in Curricula:

- Introduced ASIC Verification as a graduate course (deep skill set)
- Introducing Electronic System Level (ESL) design in Fall 2010 (hopefully)
  - Pre-requisite: ECE 520
- Encourage students to obtain application domain knowledge
- Encourage students to deepen software engineering skills
- Broaden “breadth” components of ECE 546 and ECE 520
- Introduce physical-circuit codesign in ECE 733