ECE 298: System-on-Chip Description and Modeling Lecture 9

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Lecture 9: Overview

- UML and other SLDL
  - Invited Talk by Wolfgang Mueller, C-LAB
  - Discussion
- Homework Assignment 4
  - Status, Discussion
- Homework Assignment 5
  - Technical Report

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UML and other SLDL

- Invited Talk by Dr. Wolfgang Mueller, C-LAB
  - – Short Biography
    - 1996 Ph.D., University of Paderborn, Germany
    - Member of C-LAB, a joint R&D institute of
      - – University of Paderborn, Germany
      - – Siemens Business Services
    - Head of groups for
      - – User Interfaces
      - – Human-Computer Interaction
      - – Visual Interactive Systems
    - Served in various program committees (e.g. DATE, FDL)
    - Authored more than 100 publications
    - Research interests
      - – System design methodologies
      - – System description languages
      - – System integration technologies

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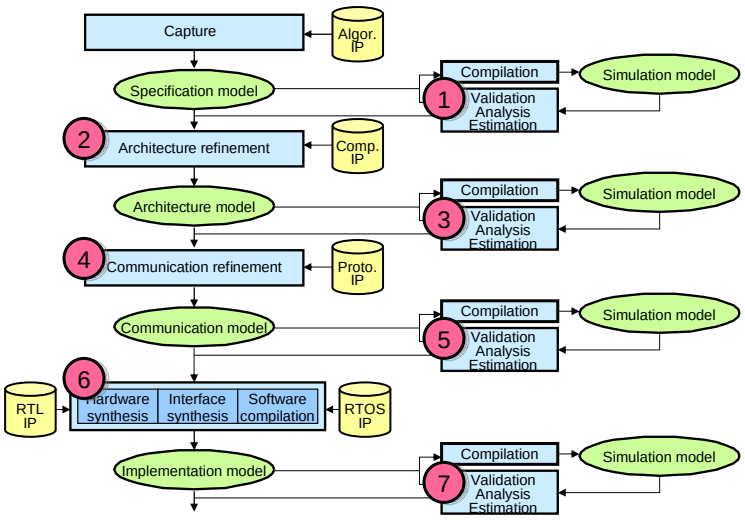
Homework Assignment 4

- Tasks
  - Task 1: Choose design example:
    - Option 1: MPEG-Audio Decoder (from previous homework)
    - Option 2: GSM Vocoder (from SCE tutorial)
  - Task 2: Design Space Exploration with SCE
    - Use different number and type of PEs
      - SW: Motorola DSP56600, Motorola Coldfire, Toshiba TX49
      - HW: Standard custom HW block
      - Memories: Motorola Coldfire Memory, Samsung KM684002
    - Use different clock frequencies (power savings!)
    - Use different mappings (behaviors to PEs, variables to memories)
    - Use different scheduling schemes (dynamic vs. static)
    - Estimate the performance and cost for each option
  - Task 3: Design Refinement with SCE
    - Generate the “best” system architecture for the design
    - Use straightforward communication, HW, SW design
  - *Note/store all results for the final report!*

Homework Assignment 4



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Homework Assignment 5

- Technical Report
  - Summarize the specification and implementation of a System-on-Chip design example
    - MPEG-Audio Decoder
    - GSM Vocoder (alternative)
  - Focus
    - Description and Modeling of Specification Model
    - Lessons learned in this class
  - Also
    - SoC Design Issues
    - Top-down Design flow
    - Design space exploration

Homework Assignment 5

- Technical Report, Skeleton of Contents

1. Title page
   - *Title, authors, date*
2. Introduction to SoC Design
   1. Challenges of SoC Design
      - *General SoC issues, problems and goals*
   2. SoC Specification
      - *Specification capture and modeling, goals*
   3. SoC Exploration
      - *Design flow, stages, exploration cycles*
3. Design Example
   1. Description of the design example
      - *Background, area, algorithm, features*
   2. Source
      - *Origin, C code, properties*
   3. Design considerations
      - *Design constraints, requirements, goals*
4. Specification capture
   1. Testbench
      - *Structure, conversion from C code, validation*
   2. Design Under Test
      - *Structure, hierarchy, parallelism, communication, properties, …*
5. …

Homework Assignment 5

- Technical Report, Skeleton of Contents

5. Design space exploration
   1. System architecture
      - *Number and type of PEs, mapping*
   2. Scheduling
      - *Dynamic vs. static scheduling (if applicable)*
   3. Communication architecture
      - *Bus allocation, mapping (if applicable)*
6. Implementation
   1. Software implementation
      - *Code generation (if applicable)*
   2. Hardware implementation
      - *Behavioral and RTL synthesis (if applicable)*
   3. Cycle-accurate model
      - *Final model, properties*
7. Conclusion
   - *Concluding remarks, lessons learned*
8. References
   - *Applicable literature*