

EECS 222A: System-on-Chip Description and Modeling Lecture 9

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Lecture 9: Overview

- Course Administration
 - Final course evaluation
- Homework Assignment 6
 - Automated Source Re-Coding
 - Discussion
- Unified Modeling Language (UML)
 - Overview
 - Online resources
- Homework Assignment 7
 - Develop a SpecC Model of your choice
 - Final Report on System Modeling

Course Administration

- Final Course Evaluation
 - Open until end of 10th week
 - Nov. 26, 2007, 12pm - Dec. 9, 2007, 11:45pm
 - Online via EEE Evaluation application
- Mandatory Evaluation of Course and Instructor
 - Voluntary
 - Anonymous
 - Very valuable
- Help to improve this class!
- Please spend 5 minutes!

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Homework Assignment 6

- Tasks
 - Creating behaviors in C code
 - converting function calls into behaviors
 - converting statement sequences into behaviors
 - Pointer elimination
 - replace pointers by their actual references
- Tools
 - Automated Source Re-Coder
 - Cute editor!
 - See posted detailed instructions!

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Homework Assignment 6

- Deliverables
 - 1-paragraph description about the tasks
 - How far did you get?
 - What were the problems?
 - How did you solve it?
 - Report the time stamps
 - How long did it take to do the tasks?
- Due
 - Week 9 (this week)

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Unified Modeling Language (UML)

- Status
 - UML 2.0 Superstructure
 - developed and maintained by OMG (Object Management Group)
- Goals
 - Raising the Level of Abstraction
 - Modeling of software applications
 - before coding
 - Specification of software architecture
 - High-level description of software architecture to enable
 - scalability
 - security
 - robustness
 - maintenance
 - extendability
 - code reuse
 - Model Driven Architecture (MDA)

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Unified Modeling Language (UML)

- What is UML?
 - 13 Standard Diagrams
 - Specification
 - Design
 - Documentation
 - Graphical Representation of
 - Software architecture
 - Software structure
 - Software behavior
 - Object relations
 - ...
 - Not executable!
 - Tools available
 - Graphical capture
 - Editing
 - Code generation

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Unified Modeling Language (UML)

- UML Standard Diagrams
 - Structure Diagrams
 - Class Diagram
 - Object Diagram
 - Component Diagram
 - Composite Structure Diagram
 - Package Diagram
 - Deployment Diagram
 - Behavior Diagrams
 - Use Case Diagram
 - Activity Diagram
 - State Machine Diagram
 - Interaction Diagrams
 - Sequence Diagram
 - Communication Diagram
 - Timing Diagram
 - Interaction Overview Diagram

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Unified Modeling Language (UML)

- UML Resources
 - Online Documents
 - Object Management Group (OMG)
 - www.uml.org
 - Online Tutorial
 - Borland's UML Tutorial
 - bdn.borland.com
 - Talk at UCI in 2004
 - Dr. Wolfgang Mueller, C-LAB, Paderborn, Germany
 - [UML.pdf](#)

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Homework Assignment 7

- Tasks
 - Develop a System Specification Model in SpecC
 - Option 1: extended Elevator Control System (ECS)
 - Option 2: an embedded system of your choice
 - Simulate and document your model
- Model Structure
 - Test bench behavior Main
 - Stimulus behavior
 - Design Under Test (DUT)
 - multiple levels of hierarchy
 - sequential, FSM, parallel, or pipelined composition
 - Monitor behavior

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Homework Assignment 7

- Deliverables
 - Source code (in SpecC) of the model
 - Successful simulation run (log file)
 - Final Report on System Modeling
 - Documentation of your system
 - Description of functionality
 - Schematic view of DUT in the test bench
 - max. 10 pages (plus appendix, if applicable)
- Due
 - December 14, 2007, 4pm (Final Week)
 - Email or hardcopy

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Option 1: Elevator Control System

- Example Project
 - Elevator Control System (ECS)
 - Distributed embedded system
 - Set of communicating Elevator Control Units (ECU)
- Project Documentation
 - D. Castellanos, R. Dömer:
"System-Level Modeling and Simulation of an Elevator Control System",
CECS Technical Report 07-04, June 2007.
 - http://www.cecs.uci.edu/~doemer/publications/CECS_TR_07_04.pdf
- Tasks
 - Extend and document the given system (see Assignment 3)
 - Specify an intelligent Main Control Unit
 - Simulate a scenario with elevator cars servicing multiple requests

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Option 1: Elevator Control System

- Decomposition of ECS into multiple ECUs
 - Floor panel
 - panel at each floor and each shaft with up/down controls
 - Floor display
 - display of current floor and direction at each floor
 - Floor door
 - Control unit to open/close doors at each floor
 - Car panel
 - panel in each car with request controls
 - Car display
 - display of current floor and direction in each car
 - Car door
 - Control unit to open/close doors in each car
 - Main control unit
 - central control unit to control the entire ECS
 - Motor control unit
 - control unit for the motor atop each shaft