

CEN 6070 – Software Verification

Catalog Description

Study of formal verification of software systems; verification methods; verification of sequential and concurrent software systems. (3 credits)

Prerequisites

Undergraduate level mathematics: discrete mathematics (set theory, logic, algebra) and advanced software engineering (CEN 5011).

Type

Can be an elective for MSCS, MSIT, and Ph.D.

Course Objectives

Students, after taking this course, are expected to know the benefits of formal verification in the software development process, and to understand a variety of formal verification methods and their applicability. Furthermore, students are expected to learn several well developed formal verification methods for both sequential and concurrent software systems and be able to apply them to verify small benchmark systems. In particular, this course will cover the new verification paradigm of model checking, which has become the focal research area in the past decade and has become very successful in industrial applications. Several well-established model checking techniques will be studied. Further research issues with regard to overcoming the limitations and improving the efficiency of model checking will be discussed.

Topics

The Fundamentals of Software Verification
The Basic Concepts of Model Checking Paradigm
Temporal Logics CTL*
Binary Decision Diagram
Symbolic Model Checking
Model Checking for the μ -Calculus
Model Checking in Practice
Model Checking and Automata Theory
Partial Order Reduction
Equivalence and Preorders between Structures
Compositional Reasoning
Abstraction
Symmetry
Infinite Families of Finite State Systems

Textbook

Edmund M. Clarke, Orna Grumberg, and Doron A. Peled, *Model Checking*, Third Printing (The MIT Press 2001)

Last Update

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