

CSE 5239: Compile-Time Program Analysis and Transformations

Autumn 2014

Basic Information

- Instructor: Atanas (Nasko) Rountev
- Contact: DL 685, tel. 292-7203, email: rountev@cse.ohio-state.edu
- Credits: 2 semester credits
- Class meetings: Dreese Labs 266, Wednesday and Friday 2:20 pm – 3:15 pm
- Course page: <http://www.cse.ohio-state.edu/~rountev/5239>
- Office hours: Wednesday and Friday, 1:00 pm – 2:00 pm, or by appointment

Prerequisites

(1) CSE 6341 or CSE 5343, and (2) basic knowledge of C, C++, or Java. Instruction permission can override these prereqs.

Course Overview

The goal of this course is to introduce the foundations of static (compile-time) program analysis as well as some related program transformations. Static program analyses are traditionally used in compilers for performance optimizations, as well as in software engineering tools for software understanding, evolution, debugging, and testing. The material will be useful for students working in compilers, systems, software engineering, and programming languages.

Topics

Examples of topics that may be discussed include control-flow analysis, data-flow analysis, SSA form, type analysis, pointer/alias analysis, side-effect analysis, and program slicing. These topics apply both to imperative languages and object-oriented languages.

Course Organization

Lectures

I will present a series of lectures on foundational topics in static analysis. The goal of these lectures is to establish some background for the homeworks and the project. No previous knowledge of program analysis is expected.

Homeworks

There will be several homeworks targeting technical problems related to the material discussed in class. The goal of these homeworks is to strengthen the students' technical skills and insights.

Project

There will be several projects. The first few projects will be common for everyone, and will focus on developing simple control-flow and data-flow analyses. After this, projects will diverge in three tracks, depending on research interests and goals: (1) default Java projects, (2) default LLVM projects, and (3) customized projects for more advanced students, related to their ongoing research.

Grading

Projects 75%, homeworks 25%

Academic Integrity

I will treat you as professionals, and you should conduct yourselves as such. You are free to discuss the homeworks and projects with others. However, the solutions you submit should be developed entirely by yourself, independently of the solutions developed by others. Additional details on academic integrity are available at <http://oaa.osu.edu/coamresources.html>. Please read this information carefully.

Students with Disabilities

Any student who feels he or she may need an accommodation based on the impact of a disability should contact me privately to discuss his or her specific needs. Please contact the Office of Disability Services at (614) 292-3307, or visit 150 Pomerene Hall, to coordinate reasonable accommodations for students with documented disabilities.

Religious Obligations

I will do my best to accommodate any religious obligations you may have. Please contact me privately, at least a week in advance, to work out any relevant details.