CSCD70H3S: Compiler Optimization
Winter 2018
Syllabus

Instructor: Gennady Pekhimenko

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1 Course Details at a Glance

Lectures: Thursday, 3pm–5pm, **IC 326**
Tutorials: Monday, 10am–11am, **HW 215**
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Webpage: `http://www.cs.toronto.edu/~pekhimenko/courses/cscd70-w18`
Discussion: `http://piazza.com/utoronto.ca/winter2018/cscd70/home`

2 Course Overview and Objectives

The goal of this course is introduce students to the theoretical and practical aspects of building optimizing compilers that effectively exploit modern architectures. The course will begin with the fundamentals of compiler optimization, and will build upon these fundamentals to address issues in state-of-the-art commercial and research machines. Topics include: intermediate representations, basic blocks and flow graphs, data flow analysis, partial evaluation and redundancy elimination, loop optimizations, register allocation, instruction scheduling, interprocedural analysis, memory hierarchy optimizations, extracting parallelism, and dynamic optimizations. Students will implement significant optimizations within LLVM, a modern research compiler framework.

3 Prerequisites

This course is not intended to be your C++ course. Formal prerequisites are CSCB63H3 and CSCC69H3. Previous knowledge on compiler is recommended but not required. If you feel uncertain about whether you are adequately prepared to take this class, please discuss this with the instructor.

4 Course Work

Grades will be based on a homeworks, midterm, and final exam.

Homeworks (45%): One of the major focus of this course is getting hands-on experience with the the state-of-the-art complier, LLVM. This will be achieve through three programming-mostly assignments. Each assignment involves a non-trivial amount of programming and several theoretical questions.

Midterm (20%): There will be one midterm exam covering the earlier (and more fundamental) portion of the course material. The exam will be closed book, closed notes.

Final Exam (35%): There will be a final exam covering the whole course material. The exam will be closed book, closed notes.

5 Textbook

There is no required textbook for this class as all required material will be given in the lectures, tutorial, and hangouts. But we recommend reading:

Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques, and Tools (2nd Edition). Addison Wesley, 2006. ISBN: 978-0321486814. (NOTE: It is important to use the 2nd Edition, rather than an earlier edition.)