Computing Science Course Outlines

CMPT 886 - G100 Special Topics in Operating Systems

Instructor(s): Rob Cameron

Calendar Objective/Description: None

Instructor's Objectives:

Compiler Technology for SIMD Parallel Programming:

The most significant changes to modern instruction set architecture are the deployment of additional single-instruction, multiple-data (SIMD) parallel programming capabilities. For example, Intel Haswell chips have recently incorporated AVX and AVX2 technology for simultaneously processing 256 bits of data at a time, arranged as 4 64-bit doubles or long long integers, 8 32-bit floats or integers, 16 16-bit integers, 32 bytes or 256 bits. General purpose programming on GPUs can similarly exploit the SIMT (single-instruction, multiple thread) model. Parallel programming using such capabilities can dramatically increase software performance, but at a significant cost in programmer productivity. In order to increase both performance and productivity, new SIMD and SIMT programming facilities are needed to automate the generation of high-quality software. In this course, students will study the development of new parallel programming facilities implemented using the LLVM compiler infrastructure as well as the Parabix parallel bit stream technology developed at Simon Fraser University. Students will implement at least one significant compiler component using the LLVM and/or Parabix framework.

Prerequisites:

None

Grading:

This is a research seminar course graded largely based on active in-class participation (including quizzes) plus a final project. 50% in-class participation, 50% final project.

Academic Honesty Statement:

Academic honesty plays a key role in our efforts to maintain a high standard of academic excellence and integrity. Students are advised that ALL acts of intellectual dishonesty will be handled in accordance with the SFU Academic Honesty and Student Conduct Policies (http://www.sfu.ca/policies/gazette/student.html).