

New Course Announcement for Spring 2001

Dynamic Binary Translation and Optimization

Csci 8980 – Spring 2001

Wei Hsu

TTh 12:45pm-2:00pm in room 208, 1701 Univ;

Call Number: 66063

Are you interested in the technology behind code morphing used in Transmeta Crusoe processors? Have you ever imagined that your favorite application could adapt itself to a new processor without recompiling to the new machine? New processor architectures and micro-architectures often create opportunities for large performance improvement, but legacy object code may not take full advantage of such performance opportunities. Binary translation and optimization techniques, which may be deployed at runtime or offline, have been researched and engineered to ease the migration of application executables.

The course will be devoted to state of the art research and development in dynamic binary optimization methods and related techniques. Examples of methods we will examine are various profiling techniques, profile directed optimizations, trace/region selections, dynamic inlining, I/D cache prefetching, code layout optimizations, software trace cache, and runtime specializations. The course will also briefly overview modern binary translation and optimization techniques used in existing systems such as FX!32, Spike, Aries, Daisy and the Crusoe processor.

Text: A collection of recent research papers will be used for the class.

Prerequisites: Graduate standing. Students should be familiar with basic computer architecture concepts such as pipelining, caches, branch prediction, and superscalar/VLIW architectures (Csci 5201). Exposure to compiler optimization techniques such as instruction scheduling, register allocation, procedure inlining, and redundancy elimination will be very useful. This class is more suitable for students who are interested in high performance processors.

Course Requirements: Students will be responsible for about 20-30 pages of reading per week, from selected research papers. There will be one midterm exam, focusing on the material covered in the basic research papers. In addition, students will have the option of either implementing a term project, or to write a review report on a few chosen technical papers, present the results and lead a class discussion session on the presentation.

Grading:

Midterm.....40%
Project.....50%
Class Participation.....10%

For further information

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