
Overview

For the last part of the semester, you are free to pursue a project of your own choosing. You may work with anyone you like, although please keep your group size to three people or less. Possible topics include, but are not limited to, new language features, additional optimizations, a new back end for a different architecture, and so on. Pretty much anything related to programming languages or compilers is fair game. The scope of this project is roughly 2–2.5 weeks, so you should focus on a non-trivial, but not enormous, project. Here are a few projects that come to mind:

- Add an exception handling mechanism to IC.
- Add Java-style interfaces to IC. Evaluate the performance penalties for using interface methods. Improve their performance by extending the IC run time to include polymorphic in-line caching.
- Add reflective method calls to IC. These are method calls that invoke a method by providing its string name. For example,

```
String s = "fa";  
s = s + "ct";  
o.invoke(s, 3);
```

results in a call to `o.fact(3)`. This requires method lookups by name, similar to interfaces. Evaluate the performance penalties for using reflection. Improve their performance by extending the IC run time to include polymorphic in-line caching.

- Add partial redundancy elimination or loop optimizations to your optimizer, and evaluate their performance.
- Implement low-level instruction selection and register allocation for basic blocks. That is, implement a tiling algorithm to replace your back end.
- Implement a garbage collector, or thread support for IC.
- Implement Class Hierarchy Analysis and measure its performance improvement.
- Implement method inlining.

There are many, many other options, depending on what you'd most like to learn more about. And if you are burned out on coding, a survey of literature on an appropriate topic is also perfectly fine. We can work to narrow down a topic that would be of interest to you.

Schedule

April 22: Come to the tutorial meetings with some ideas on what you'd like to do. We will narrow down the focus to something of the appropriate scale. After that meeting, I'll help you gather reading material and information on your topic.

April 29 and May 6: We'll spend parts of the tutorial meetings discussing the project design and implementation strategy. You should have a one page project summary prepared by April 29 and be able to clearly articulate the goals and any code design for the project.

TBD (Tues/Wed/Thurs, May 14/15/16): Project presentations. More details later, but plan on doing a *short* presentation to the class.