Assignment 5: Choose-Your-Own-Adventure Proposal

15-411/611: Course Staff

Due Thursday, November 19, 2020 (11:59pm)

Note: Please complete this written assignment with your compiler partner. You should complete this assignment regardless of whether you intend to pursue the "chose your own adventure" option for Lab 6. (If you are going to CYOA for Lab 6, we will consider 11/19 as a draft submission, turn around a review of the proposal, and you can handin a final version of the proposal on 11/25.)

A Project Proposal

For Lab 6, each team is asked to choose one of a set of options for their project; these options include (among others TBD):

- extending the source language of your compiler to C1 (and beyond),

- implementing garbage collection, or

- defining and implementing your own project ("choose your own adventure").

To prepare for Lab 6, we ask you to provide a thorough written description of a possible "choose your own adventure" project. **You should complete this written description of a new, unique project even if you intend to implement one of the preset options for Lab 6.**

In more than one page but less than two (single spaced, 12pt font), tell us about a project that you think would be interesting and fun to implement by augmenting your compiler. This project should involve a reasonable amount of work but be something you think you can achieve in the allotted amount of time for the Lab 6 compiler. Ideas that have been pursued in the past include:
- Algebraic datatypes
- Compiling C0 to SML
- Compiling C0 to Whitespace
- Compiling C0 to Clac
- Rust-style variable lifetimes
- Control flow integrity (protections against buffer overflows and similar exploits)
- Exception handling à la `try-catch` in Python or Java
- Optimizations to SIMD instructions

You should propose a project that is not one of the predefined ones and not one of the "Compiling C0 to *" ones listed above. In your proposal, you should be sure to include:

- A description of what you plan to do. This should be about 1/3 of the proposal.

- A brief motivation of why it is interesting.

- How you plan to implement it: what changes do you need to make to the high level structure of your compiler? Are there phases that you would like to add, and how do they interact with the end goal? This should be about 1/3 of the proposal.

- How you plan to test it: how do you know if your project is successful? What sort of testing suite would you provide?

- Indicate whether or not you are serious about doing this project as the CYOA option for Lab 6 and want feedback. If so, we will review this proposal, provide feedback in a timely fashion, and you can re-submit without penalty by 11/25.)

Again, to reiterate: even if you are planning to do one of the preset options for Lab 6, please explore a novel idea for this proposal. This is meant to get you thinking about ways to extend your compiler beyond what people have done in the past, and beyond the standard ways presented in the preset options for Lab 6. In addition, the idea that you present in this proposal is not binding—we will not require you to implement it for Lab 6. However, it should be comparable in difficulty to the other labs. The topic you explore in your writeup should be reasonable to complete within the 2.5 weeks allotted for the assignment.

Have fun! If you have any questions about this assignment (or would like to talk out if something is a "reasonable" amount of work), please post on Piazza or talk to the course staff at office hours.

Grading

You can earn 30 points for this assignment. We will roughly divide the points as follows: 5 points for the general idea, 5 points for the motivation, 10 points for the description, 5 points for the implementation plan, and 5 points for testing.

What to Hand In

Submit before the deadline a 1-2 page, single spaced, 12pt font PDF file with your proposal to Gradescope. Make sure that the PDF contains a header with the following information:

Secret team name:	YOUR TEAM
Title:	YOUR TITLE

We will activate team submissions, and either team member is able to submit.