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May 6, 2015

Mr. Thomas M. Keating
Assistant Teaching Professor
School of Computer Science
Pittsburgh, PA 15289

Dear Mr. Keating:

Included with this letter is our team's final report for the browser-based debugger for the C0 language called c0db, the C0 Debugger. The purpose of the report is to update you on our progress and to explain and discuss our results.

The report describes the problem addressed by our project, our approach to solve it, the results we were able to achieve, our challenges and struggles, the lessons we learned throughout the progress we made, and some recommendations on how we or another group can continue to build on our existing platform.

If you have any further questions or comments, please contact us at shyamsur@andrew.cmu.edu.

Sincerely,

Shyam Raghavan

encl: project final paper for c0db

Final Report

c0db
The C0 Debugger

Submitted to
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Abstract

Finding problems in code is a difficult and time consuming task, one especially difficult for programmers learning a new language. To help students more quickly find bugs and understand how their programs run, we created an online debugger for the C0 programming language. The C0 debugger, c0db, enables users to run programs in their browser and break apart the execution when they don't run correctly.

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We originally aimed to evaluate our performance against user feedback from both current and past students. However, due to setbacks in the early stages of development we were unable to receive significant use feedback from students. That said, we were able to gather feedback and support from current 15-122 course staff.

In terms of our original vision, `c0db` includes almost every feature we planned to implement. Users can input code and either run the program straight through or step through execution instruction by instruction. The only significant feature that is not currently implemented completely is breakpoints. Implementing breakpoints turned out to be significantly more difficult than we anticipated, and given our limited time frame, we were unable to come up with an adequate solution. We are currently working with Rob Simmons, 15-122 instructor and maintainer for the `C0` language standard, to extend the language to support breakpoints more easily going forward.

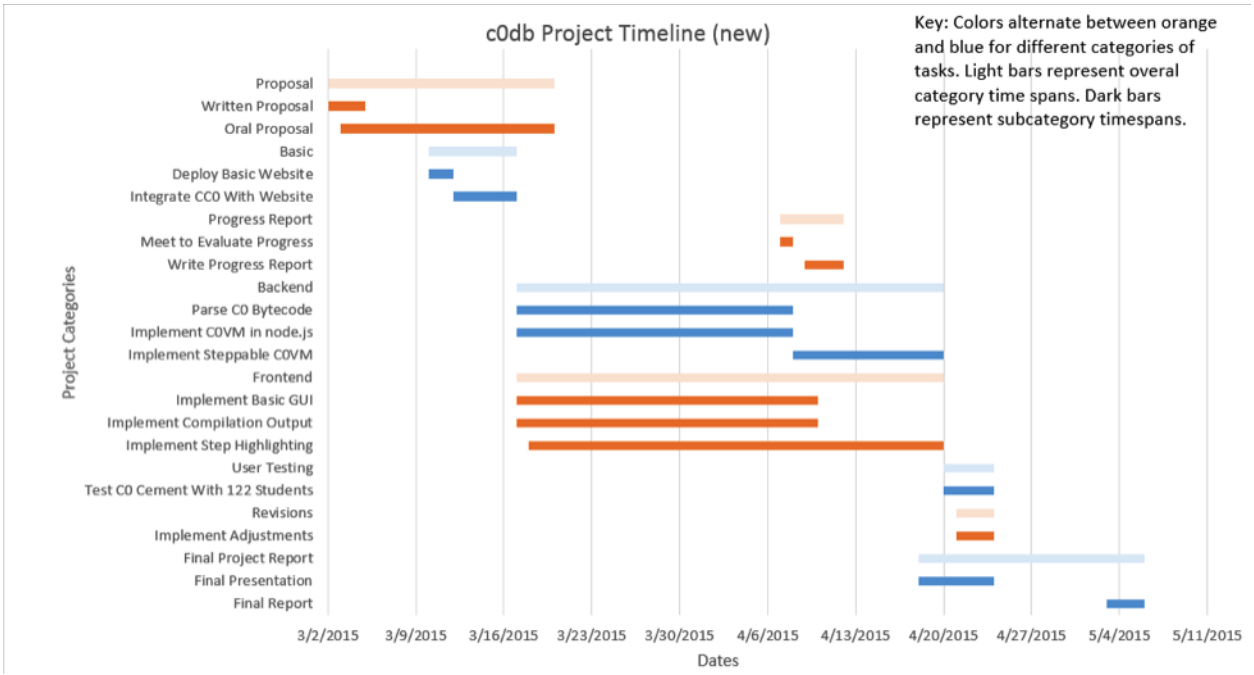

Figure 1: Revised project Gantt chart

Relative to our revised Gantt Chart (Figure 1) we hit every milestone on time. Both the front-end and back-end teams completed their tasks by the end of April, at which point we transitioned everyone to user testing, revisions, and polishing. Both teams were able to recover from the lag reported in our progress report to complete `c0db`.

4 Discussion

4.1 Reflection

Our team learned several useful skills while working on this project, ranging from technical tricks to communication insights. For several of us, this project represents the most collaboration on a single code base. We effectively employed the git version control system to manage our code to lesson the work needed to integrate each person's features. Additionally, several members of our team had never worked with node.js or JavaScript extensively before this project. Everyone quickly picked up the new framework and started producing useful output.

We did face some issues communicating early on, but fortunately we were able to learn from our problems. Communicating strictly online was not sufficient and resulted in a lack of ownership and drive that put us behind schedule early on. We overcame our communication problems by holding brief but regular meetings face to face to cover what has been accomplished and what tasks come next.

4.2 Future

`C0db` is most of what we imagined, but not all. Our overall goal, to make a tool useful for 15-122 students, may be realized in the fall, but we have more work to ensure that we present them with the best tool possible. Before the next semester starts we aim to complete the remaining features we originally planned to implement: source-level breakpoints, multi-file support, and a refined interface. If we can implement these three features, `c0db` could see proper adoption by 15-122 in the fall, where it would be used by over 300 students from across Carnegie Mellon. If `c0db` is adopted by 15-122, we would truly have achieved the goal for our project: create a tool to better the CMU community.

5 Sources Cited