15745 Milestone

Yichen Ni (yichenn@andrew.cmu.edu)
Chase Norman (chasen@cmu.edu)

November 2024

Project Webpage: `chasenorman.com/compiler.html`

1 Major Changes

There have been no significant changes in the goals or implementation as described in the project proposal. The project has progressed according to plan and the implementations were as expected.

2 Accomplishments

We have created a data structure for the control flow graph of a logic program. With this data structure, we implemented a Dataflow pass system just as we did in class.

Using this system, we implemented the liveness and reachability passes, which are structurally very similar to their counterparts in imperative code. With these passes, we successfully implemented Dead Code Elimination for both unreachable and unused statements.

Unlike imperative code, where the control flow graph follows directly from the targets of branches, it was a significant portion of our work to produce a CFG from a logic program. Determining which instructions can invoke which basic blocks was an iterative refinement process. This has been completed, allowing us to use Dead Code Elimination in real logic programming examples.

3 Meeting Milestone

Yes, the milestone of implementing Dead Code Elimination, as outlined in the proposal, has been met. The creation of the CFG and the successful integration of DCE align with the original milestone goals.

4 Surprises

While it was clear that logic programming and imperative programming have conceptual similarities, implementing these algorithms has made this relationship concrete and observable in a pleasantly surprising way.

Another surprise has been that we are able to use the compiler analysis to precompute information that would have otherwise been computed at runtime. The compiler and the runtime are able to benefit from each other in a way we did not anticipate fully.

5 Revised Schedule

We continue to expect completion of our 100% goal (and other bonus results), with the following timeline:

Week	Yichen	Chase
11/18	Path-Sensitive Analysis	Compiled Unification
11/25	Benchmarking and begin report	Benchmarking and begin report

6 Resources Needed

No additional software, hardware, or computational resources are required.