

CS 8803 : Project

Total points : 100

Due dates : Phase I : July 6th Monday (35 points), Phase II : July 29th Wednesday (65 points)

Important Policies:

1. **Phase I of the project is individual, phase II is in teams of 2 persons. Please direct questions regarding clarifications to the TA**
2. **Although some project problems may have solutions available in books, internet sources etc. you are supposed to solve them on your own without looking up such solutions. This rule will be STRICTLY enforced and any act of such lookup will be considered an act of plagiarism and will result in the strict penalty as per Georgia Tech honor code.**
3. **Document your solution making suitable reasonable assumptions and clearly stating them..**

Goal of the project: In this project, our goal will be to study internals of LLVM ARM compiler and make some changes to its optimization phases to improve code quality. The project will be carried out in phase I and phase II. Phase I will be to install the compiler, study its optimization phases and IR (intermediate representation) and learn how to use the infrastructure. Phase II will be to write a pass that will allow us to perform an optimization. Phase II details will be announced soon.

Phase I : In this phase, we will download and install the LLVM ARM compiler and build it – I believe currently the stable target is ARMv6. You will then run the supplied benchmarks and will go through the LLVM documentation and passes and insert instrumentation in the LLVM IR to get the following information

- **Total number of basic blocks in the benchmark and average number of basic blocks per function or procedure call in the benchmark.**
- **Total and average number of static branches per function call.**
- **Total and average number of loops per function call.**
- **Execute the code after inserting the instrumentation and from the profile data identify functions that constitute 80% of execution time and another set that covers 80% of execution frequency. You can use a suitable simulator to get these numbers.**