



Homework H3

1 Description

Write an LLVM pass starting from the code you have developed for H2.

The goal of this new pass is to compute IN and OUT sets of reaching definition data-flow analysis **for the CAT language** starting from the GEN and KILL sets you've already defined for H2. As it was for H2, even for this homework the definitions you need to analyze are only those related to CAT variables.

You need to compute the IN and OUT sets for every instruction of a program given as input. At the end of your pass, you need to have stored all IN and OUT sets in your data structures. Before ending your pass, you need to print IN and OUT sets for each instruction.

1.1 Assumptions

For the H2 homework, you can take advantage of the following assumptions about the C code that invokes CAT functions.

1. A C variable used to store the return value of `CAT_create_signed_value` (i.e., reference to a CAT variable) is defined statically not more than once in the C function it has been declared.
2. A C variable that includes a reference to a CAT variable cannot be copied to other C variables (no aliasing).
3. A C variable that includes a reference to a CAT variable cannot be copied into a data structure.
4. A C variable that includes a reference to a CAT variable does not escape the C function where it has been declared.

Run all tests Go to `H3/tests` and run

`make`

to test your work.

2 LLVM API and Friends

This section lists the set of LLVM APIs and headers I have used in my (multiple) H3 solutions that I did not use for the past assignments. You can choose whether or not using these APIs.

- Methods `begin`, `end`, and `getTerminator` of the class `BasicBlock`

3 What to submit

Submit via Canvas the C++ file you've implemented (`CatPass.cpp`).

For your information: my solution for H3 added 55 lines of C++ code to H2 (computed by `sloccount`).

4 Homework due

10/19 at noon.

Good luck with your work!