

CS 671 Graduate Seminar

Challenge Problem 2

UD/DU Chains and Constant Propagation

Extend constant propagation algorithm discussed in class to only propagate constants from code regions that are not dead code.

Lattices and MFP

1. Show that the bit-vector problem of Reaching Definitions is distributive, i.e., show that for propagation function f and lattice elements x and y , $f(x \wedge y) = f(x) \wedge f(y)$.
2. Prove that for all fixpoints $p = f(p)$, $f^k(0) \leq p$, where f is a monotone function over a lattice L .

Iterative Algorithms

1. For a rapid bit-vector problem, give the shortest node list and the longest node list in order to reach the maximal fixed point.
2. Modify the worklist algorithm by introducing a node numbering and node selection criteria from the worklist such that the number of nodes visited is minimized in order to compute the maximal fix point for a rapid bit-vector problem (e.g.: Reaching Definitions).

Show the sequence of nodes visited for the control flow graph.

