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Program Optimisation

Winter Semester 2004

4. Homework *Deadline: 23 Nov 2004 12:00*

Exercise 1: *6 Points*

Simplify the constant propogation discussed in the lecture so that only the signs of values (i.e. whether they are positive or negative) are considered.

a) Define a suitable partial order over values for this analysis.
b) What does Δ look like?
c) Define useful abstract operators over values.
d) Show that they respect Δ.
e) Give edge-transformations for conditions, and argue that they are correct.

Exercise 2: *6 Points*

Show that the abstract multiplication for intervals respects the description relation Δ, i.e. if $z_1 \Delta I_1$ and $z_2 \Delta I_2$ then also $(z_1 * z_2) \Delta (I_1 *^{\#} I_2)$.

Exercise 3: *4 Points*

Define the abstract operations ! (Not) and $\neq$ (inequality) for the interval-analysis.

Exercise 4: *6 Points*

Give an example program for which interval analysis without widening does not terminate.