



Seminar Advanced Topics in Semantics, Summer 2008 Session 3

Dr. Jan Schwinghammer, Prof. Dr. Gert Smolka
www.ps.uni-sb.de/courses/seminar-ss08/

Typed Assembly Language

Small-group work

Discuss some or all of the following questions about Greg Morrisett's article "Typed Assembly Language."

- a) What kinds of properties does "control flow safety" guarantee?
- b) In the abstract machine, labels are treated as abstract, rather than viewed (more realistically) as arbitrary integers. How does this simplify the technical development? What difficulties would have to be solved otherwise? (See also Exercise 4.1.3.)
- c) Explain the different TAL-0 typing judgements and typing rules. What role do polymorphic types play - think of jumping to (statically unknown) labels stored in registers, typing join-points, and enforcing calling conventions (callee-saves registers) through the type system.
- d) In which sense does the preservation theorem (Theorem 4.2.10) differ from the ones you know from typed lambda calculi?
- e) TAL-1 extends TAL-0 by heap-allocated objects and a stack. Why is it necessary to include (so-called "strong") type-changing updates of memory locations? Explain the difficulties caused by aliasing.
- f) What safety properties, beyond control flow safety, are proved for TAL-1?
- g) Explain how the type of the compiled multiplication function (p. 165) reflects the calling convention. Show how the types would change when passing all arguments on the stack, or where all arguments are passed in registers (with callee-saves registers), ...
- h) Sketch why existential types are important when compiling realistic languages to TAL.

Discuss any further problems, or questions you find interesting about the chapter.