Optimising Compilation optcomp7.tex

Define the notion of a program expressed as a flowgraph of three-address instructions being in *single static assignment* (SSA) form. [4 marks]

Given a program expressed in a language like C, explain how one might deal with

1. temporaries used to express a multi-operator expression in C as a sequence of three-address instructions, and

2. (non-address taken) formal parameters and local variables

so that the resulting flowgraph is in SSA form. [6 marks]

Give a C program for which performing a "map to SSA form" pass before register allocation is likely to result in better code, noting any assumptions you make on how register allocation works. [5 marks]

Commonly SSA form is only discussed for temporaries and non-address-taken local variables. To what extent is it possible to arrange that accesses to address-taken locals or C static variables can be transformed into SSA form. What effect might such a transformation have on register allocation of such variables. [5 marks]

Model Answer

(a)-(c) bookwork. (d) In general it's not possible. Moreover, they're not usually register allocated, so it doesn't matter. Marks for saying sensible things.