

1995 Paper 9 Question 7

Optimising Compilers

Carefully define what it means for a function to be *strict* in its i^{th} argument.

[4 marks]

Carefully describe how a safe approximation to the strictness properties of a mutually recursive set of functions can be calculated, illustrating your method using the following definitions:

$$f(x,y,z) = h(g(x,y), g(y,z))$$

$$g(a,b) = \text{if } h(a,b)=0 \text{ then } a \text{ else } f(a-1,b,a)$$

$$h(p,q) = \text{if } p=0 \text{ then } f(q,p-1,p) \text{ else if } q=0 \text{ then } 1 \text{ else } 0$$

[10 marks]

Discuss how strictness information can be used in the optimisation of pure functional languages on

- (a) simple single processor machines
- (b) parallel processing hardware

[6 marks]