

1994 Paper 12 Question 6

Programming Language Compilation

Suggest how you would represent Lambda-expressions in a form suitable for a simple Lambda-evaluator in which the environment is represented as a linked list of name-value pairs. [5 marks]

Outline the design of the evaluator, paying particular attention to the treatment of bound variables, abstractions and applications. [5 marks]

Augment your evaluator to cope with sufficient expression operators, including a built-in version of the Y operator so that when the evaluator is given the abstract syntax tree for

$$Y (\lambda f. \lambda n. n=0 \rightarrow 1, n*f(n-1)) 5$$

it will yield 120.

[10 marks]