2002 Paper 5 Question 5

Comparative Programming Languages

This question concerns the representation of parse tree nodes for expressions composed of integer constants, identifiers, and integer operators for addition, subtraction, multiplication and division. In a typeless language, such as BCPL, each node can be implemented as a vector whose first element holds an integer identifying the node operator. The size of the vector and the kinds of value held in the other elements then depends on this node operator.

(*a*) Complete the description of how you would represent such integer expressions in a typeless language.   [5 marks]

(*b*) Suggest how you would represent such integer expressions in C and *either* ML *or* Java.   [10 marks]

(*c*) Briefly discuss the relative merits of your C data structure compared with that used in the typeless approach.   [5 marks]