# Problem 2

## 1   The basic problem

Suppose you have an integrated development environment (IDE) in which each kind of node in the abstract syntax tree is represented by a separate class; you have classes AssignmentNode, VariableRefNode and so on, all of which are specialised subclasses of an abstract class Node.

Now the IDE must provide many different operations on the program: for example, type checking, code generation, and pretty printing. Each operation needs, conceptually, to make requests of each node in the AST, with each kind of node responding differently to the request.

## 2   An initial solution...

## 3   Criteria for a good solution

- You may assume that it doesn't need to be particularly easy to add a new kind of node to the AST – the syntax of the programming language is not going to change.

- However, the capabilities of the IDE will need to be improved, so it should be easy to add a new operation.

- It should be easy to understand how an operation works.

## 4   A better solution...