

1996 Paper 12 Question 8

Prolog for Artificial Intelligence

An *ordered integer binary search tree* (or OIBS tree) is either empty or a tuple (T, N, U) , where T and U are also OIBS trees and N is an integer. Every node in T has a value less than N , which in turn is less than the value of every node in U .

- (a) Give two Prolog terms which are suitable for representing an empty OIBS tree and a node in the OIBS tree respectively. [2 marks]
- (b) Define a Prolog procedure `insert(Item, T, NT)`, where `Item` is an integer being inserted into OIBS tree `T`, producing an OIBS tree `NT`. If `Item` is already present in `T`, then `NT` equals `T`. [9 marks]
- (c) Define a Prolog procedure `lookup(Item, T)`, where `Item` is to be looked for in OIBS tree `T`. A `lookup` goal will succeed if `Item` is found, or fail otherwise. [9 marks]