Sépage: Programming assignment

F.Z Medouar

March 2017

The goal of the program is to return a LinkedList of Integer given a tree. The output LinkedList is composed by first all the odd elements of the tree in ascending order then the sum of all elements of the tree and finally the even element in descending order. In an object oriented approach the program is organized around three classes:

- Tree : characterized by a node (an integer representing the value of saved in the node) and a LinkedList$< Tree >$ children pointing to the related Trees.
- Utilis : this class is composed by static methods to calculate the sum of a list (sum), separate the the even elements and the odd elements (evenOdd) and methods to apply a Quicksort algorithm (partition and quicksort) to sort ascending and descending (partitionBW and quicksortBW) .
- Main : contains a main function to test the code with a simple example.

The program first extract all the Integer elements of the tree in a Depth-first search method (we assume the tree finite). This recursive method of complexity O(depth) allows us to extract the element of the tree and save them in a LinkedList. The main of the Main class calls the methods evenOdd (that goes through the Linkedlist once to create the other lists, the complexity is thus of O(n)). We apply then two quicksort algorithm (either ascending or descending), the quicksort is of O($n\hat{2}$) complexity in the worst case. We then calculate the sum of the values in the two lists and concatenate the three lists which is of O(n) complexity. The algorithm is thus of O(n^2) complexity.