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MODULE InsertTree
EXTENDS Integers, Sequences, Naturals, TLC

CONSTANT Char, Charnum

node  $\triangleq$  [ch : Char, time : Int, father : Char  $\cup$  {"o"}]

nodechar  $\triangleq$  {"o"}
RECURSIVE Readtree2set(-)
Readtree2set(T)  $\triangleq$  IF T = {} THEN {}
ELSE LET t  $\triangleq$  CHOOSE x  $\in$  T : TRUE
IN {t.ch}  $\cup$  Readtree2set(T \ {t})

RECURSIVE Createtree(-, -)
Createtree(num, tree)  $\triangleq$  IF num = 0 THEN tree
ELSE LET i  $\triangleq$  CHOOSE x  $\in$  node : x.time = Charnum - num + 1  $\wedge$  x.father  $\in$  Re
IN Createtree(num - 1, tree  $\cup$  {i})

RECURSIVE max(-, -, -, -)
max(T, root, curmax, readchar)  $\triangleq$ 
CASE  $\exists i \in T : i.father = root \wedge i.time > curmax \wedge \neg i.ch \in readchar \rightarrow$ 
LET i  $\triangleq$  CHOOSE x  $\in$  T : x.father = root  $\wedge$  x.time > curmax  $\wedge$   $\neg x.ch \in readchar$ 
IN max(T \ {i}, root, i.time, readchar)
 $\square \exists i \in T : i.father = root \wedge i.time \leq curmax \wedge \neg i.ch \in readchar \rightarrow$ 
LET i  $\triangleq$  CHOOSE x  $\in$  T : x.father = root  $\wedge$  x.time  $\leq$  curmax  $\wedge$   $\neg x.ch \in readchar$ 
IN max(T \ {i}, root, curmax, readchar)
 $\square$  OTHER  $\rightarrow$  curmax

RECURSIVE Readtree2list(-, -, -, -)
Readtree2list(T, root, tomb, readchar)  $\triangleq$ 
IF  $\exists x \in T : x.father = root \wedge \neg x.ch \in tomb$ 
 $\wedge x.time = \max(T, root, 0, readchar) \wedge \neg x.ch \in readchar$ 
THEN LET i  $\triangleq$  CHOOSE x  $\in$  T : x.father = root  $\wedge \neg x.ch \in tomb$ 
 $\wedge x.time = \max(T, root, 0, readchar) \wedge \neg x.ch \in readchar$ 
IN {i.ch}  $\circ$  Readtree2list(T, i.ch, tomb, readchar  $\cup$  {i.ch})
ELSE IF  $\exists x \in T : x.father = root \wedge x.ch \in tomb$ 
 $\wedge x.time = \max(T, root, 0, readchar) \wedge \neg x.ch \in readchar$ 
THEN LET i  $\triangleq$  CHOOSE x  $\in$  T : x.father = root  $\wedge x.ch \in tomb$ 
 $\wedge x.time = \max(T, root, 0, readchar) \wedge \neg x.ch \in readchar$ 
IN Readtree2list(T, i.ch, tomb, readchar  $\cup$  {i.ch})
ELSE IF  $\exists x \in T : root = x.ch$ 
THEN LET i  $\triangleq$  CHOOSE x  $\in$  T : root = x.ch
IN Readtree2list(T, i.father, tomb, readchar)
ELSE {}

Readtree2list(Createtree(3, {}), "o", {}, {})

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* Modification History
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