─────────────────────────── MODULE *Op* ───────────────────────────

1

Model checking basic operations on strings (*i.e.*, list of characters).

6 EXTENDS *Naturals*, *Sequences*

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8 CONSTANTS   *Char*

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10 $List \triangleq Seq(Char)$ The set of all lists.

The set of all operations. In this specification, we will focus on "Ins" and "Del".

15 $Op \triangleq [type : \{ \text{"Rd"} \}] \cup$ a read specifies no arguments

16 $\qquad [type : \{ \text{"Del"} \}, pos : Nat \setminus \{0\}] \cup$ a deletion specifies a position (from 1)

17 $\qquad [type : \{ \text{"Ins"} \}, pos : Nat \setminus \{0\}, ch : Char, pr : Nat]$ an insertion specifies a position (from 1), a character, and

18 $Nop \triangleq$ CHOOSE $v : v \notin Op$ *Nop*: an operation representing "doing nothing"

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Some operations for test.

23 $Del1 \triangleq [type \mapsto \text{"Del"}, pos \mapsto 1]$

24 $Del2 \triangleq [type \mapsto \text{"Del"}, pos \mapsto 2]$

25 $Del3 \triangleq [type \mapsto \text{"Del"}, pos \mapsto 3]$

26 $Del4 \triangleq [type \mapsto \text{"Del"}, pos \mapsto 4]$

27 $Ins1 \triangleq [type \mapsto \text{"Ins"}, pos \mapsto 1, ch \mapsto \text{"a"}, pr \mapsto 1]$

28 $Ins2 \triangleq [type \mapsto \text{"Ins"}, pos \mapsto 2, ch \mapsto \text{"b"}, pr \mapsto 2]$

29 $Ins3 \triangleq [type \mapsto \text{"Ins"}, pos \mapsto 3, ch \mapsto \text{"c"}, pr \mapsto 3]$

30 $Ops \triangleq \langle Ins2, Del3, Ins1, Del2, Ins3, Del1 \rangle$

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The "Apply" operator which applies an operation *op* on the list *l*.

35 $Apply(op, l) \triangleq$

36 $\quad$ LET $len \triangleq Len(l)$

37 $\qquad pos \triangleq op.pos$

38 $\quad$ IN   CASE $op.type = \text{"Del"} \rightarrow SubSeq(l, 1, pos - 1) \circ SubSeq(l, pos + 1, len)$

39 $\qquad \square \quad op.type = \text{"Ins"} \rightarrow Append(SubSeq(l, 1, pos - 1), op.ch) \circ SubSeq(l, pos, len)$

40 └──┘

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