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1 ┌─────────────────────── MODULE CSComm ───────────────────────┐
2 │ EXTENDS SequenceUtils
3 ├─────────────────────────────────────────────────────────────┤
4 │ CONSTANTS
5 │     Client,    the set of clients
6 │     Server,    the (unique) server
7 │     Msg        the set of messages
8 ├─────────────────────────────────────────────────────────────┤
9 │ VARIABLES
10│     cincoming,     cincoming[c]: incoming FIFO channel at client c ∈ Client
11│     sincoming      incoming FIFO channel at the Server
12├─────────────────────────────────────────────────────────────┤
13│ TypeOK ≜
14│     ∧  cincoming ∈ [Client → Seq(Msg)]
15│     ∧  sincoming ∈ Seq(Msg)
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17 $Init \triangleq$
18 $\quad \wedge\ cincoming = [c \in Client \mapsto \langle\rangle]$
19 $\quad \wedge\ sincoming = \langle\rangle$

21 $EmptyChannel \triangleq Init$

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22├─────────────────────────────────────────────────────────────┤
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23 $CSend(msg) \triangleq$ A client sends a message msg to the $Server$.
24 $\quad \wedge\ sincoming' = Append(sincoming,\ msg)$
25 $\quad \wedge$ UNCHANGED $cincoming$

27 $CRev(c) \triangleq$ Client c receives and consumes a message from the $Server$.
28 $\quad\quad \wedge\ cincoming[c] \neq \langle\rangle$
29 $\quad\quad \wedge\ cincoming' = [cincoming$ EXCEPT $![c] = Tail(@)]$
30 $\quad\quad \wedge$ UNCHANGED $sincoming$

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31├─────────────────────────────────────────────────────────────┤
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32 $SRev \triangleq$ The $Server$ receives and consumes a message.
33 $\quad \wedge\ sincoming \neq \langle\rangle$
34 $\quad \wedge\ sincoming' = Tail(sincoming)$

36 $SSend(c,\ cmsg) \triangleq$ The $Server$ sents a message $cmsg[cl]$ to client cl (other than c).
37 $\quad cincoming' = [cl \in Client \mapsto$ IF $cl = c$ THEN $cincoming[cl]$
38 $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ ELSE $Append(cincoming[cl],\ cmsg[cl])]$

40 $SSendSame(c,\ msg) \triangleq$ The $Server$ broadcasts the message msg to all clients other than c.
41 $\quad SSend(c,\ [cl \in Client \mapsto msg])$

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42└─────────────────────────────────────────────────────────────┘
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\ * Modification History
\ * Last modified *Mon Jan* 14 13:16:12 *CST* 2019 by *hengxin*
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