MODULE *XJupiter*

VARIABLES $c2ss$, $c2ss[c]$: the $2D$ digraph maintained at client c
$s2ss$ $s2ss[c]$: the $2D$ digraph maintained by the *Server* for client c

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$NextEdge(\_,\, u,\, g) \triangleq$ CHOOSE $e \in g.edge : e.from = u$

$Do(c,\, op) \triangleq$ LET $cop \triangleq [op \mapsto op,\, oid \mapsto [c \mapsto c,\, seq \mapsto cseq[c]],\, ctx \mapsto ds[c]]$
$u \triangleq ds[c] \quad v \triangleq u \cup \{cop.oid\}$
IN $\land\, c2ss' = [c2ss$ EXCEPT $![c] =$ append cop to u (i.e., $ds[c]$)
$@ \oplus [node \mapsto \{v\},\, edge \mapsto \{[from \mapsto u,\, to \mapsto v,\, cop \mapsto cop]\}]]$
$\land$ apply op to $list[c]$; send cop to the *Server*

$Rev(c,\, cop) \triangleq$ LET $xform \triangleq xForm(NextEdge,\, c,\, cop,\, c2ss[c])$ $xform$: $[xcop, xg, lg]$
IN $\land\, c2ss' = [c2ss$ EXCEPT $![c] = @ \oplus xform.xg]$
$\land$ apply $xform.xcop.op$ to $list[c]$

$SRev(cop) \triangleq$
LET $c \triangleq ClientOf(cop)$
$xform \triangleq xForm(NextEdge,\, Server,\, cop,\, s2ss[c])$ $xform$: $[xcop, xg, lg]$
IN $\land\, s2ss' = [cl \in Client \mapsto$ IF $cl = c$ THEN $s2ss[cl] \oplus xform.xg$
ELSE $s2ss[cl] \oplus xform.lg]$
$\land$ apply $xform.xcop.op$ to $list[Server]$
$\land$ broadcast the *transformed* operation $xform.xcop$ to clients other than c