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MODULE AJupiterImplXJupiter
EXTENDS AJupiterExtended, GraphStateSpace
VARIABLES c2ss, s2ss

varsImpl ≜ ⟨varsEx, c2ss, s2ss⟩

TypeOKImpl ≜
    ∧ TypeOKEx
    ∧ ∀ c ∈ Client : IsSS(c2ss[c]) ∧ IsSS(s2ss[c])

InitImpl ≜
    ∧ InitEx
    ∧ c2ss = [c ∈ Client ↦ EmptySS]
    ∧ s2ss = [c ∈ Client ↦ EmptySS]

DoOpImpl(c, op) ≜
    ∧ DoOpEx(c, op)
    ∧ LET cop ≜ [op ↦ op, oid ↦ [c ↦ c, seq ↦ cseq[c]], ctx ↦ ds[c]]
      IN  c2ss′ = [c2ss EXCEPT ![c] =
                        @ ⊕ [node ↦ {ds′[c]},
                             edge ↦ {[from ↦ ds[c], to ↦ ds′[c], cop ↦ cop]}]]
    ∧ UNCHANGED s2ss

DoImpl(c) ≜
    ∧ DoCtx(c)
    ∧ DoInt(DoOpImpl, c)  TODO: refactor to use DoEx(c)
    ∧ UNCHANGED ⟨sbuf, srec⟩

RevImpl(c) ≜
    ∧  RevEx(c)
    ∧  LET m ≜ Head(cincoming[c])
           cBuf ≜ cbuf[c]
           cShiftedBuf ≜ SubSeq(cBuf, m.ack + 1, Len(cBuf))
           xform ≜ xFormCopCops(m.cop, cShiftedBuf)  [xcop, xss, lss]
       IN  c2ss′ = [c2ss EXCEPT ![c] = @ ⊕ xform.xss]
    ∧  UNCHANGED s2ss

SRevImpl ≜
    ∧ SRevEx
    ∧ LET m ≜ Head(sincoming)
          c ≜ ClientOf(m.cop)
          cBuf ≜ sbuf[c]
          cShiftedBuf ≜ SubSeq(cBuf, m.ack + 1, Len(cBuf))
          xform ≜ xFormCopCops(m.cop, cShiftedBuf)  [xcop, xss, lss]
      IN  s2ss′ = [cl ∈ Client ↦
                      IF cl = c THEN s2ss[cl] ⊕ xform.xss ELSE s2ss[cl] ⊕ xform.lss]
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48      ∧ UNCHANGED c2ss
49  ----------------------------------------------------------------
50  NextImpl ≜
51      ∨ ∃ c ∈ Client : DoImpl(c) ∨ RevImpl(c)
52      ∨ SRevImpl

54  FairnessImpl ≜
55      WF_varsImpl(SRevImpl ∨ ∃ c ∈ Client : RevImpl(c))

57  SpecImpl ≜ InitImpl ∧ □[NextImpl]_varsImpl  ∧ FairnessImpl
58  ----------------------------------------------------------------
59  XJ ≜ INSTANCE XJupiter WITH Msg ← Cop,
60                  cincoming ← cincomingXJ, sincoming ← sincomingXJ

62  THEOREM SpecImpl ⇒ XJ!Spec
63  ================================================================
    \* Modification History
    \* Last modified Sat Jan 12 21:10:50 CST 2019 by hengxin
    \* Created Sat Dec 29 18:36:51 CST 2018 by hengxin
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