

```

1  ┌────────────────── MODULE AbsJupiter ───────────────────┐
    Abstract Jupiter, inspired by the COT algorithm proposed by Sun and Sun; see TPDS'2009.
5  EXTENDS JupiterSerial
6  ┌──────────────────┐
7  VARIABLES
8      copss    copss[r]: the state space (i.e., a set) of Cops maintained at replica r ∈ Replica
10 vars ≜ ⟨intVars, ctxVars, serialVars, copss⟩
11 ┌──────────────────┐
12 TypeOK ≜
13     ∧ TypeOKInt
14     ∧ TypeOKCtx
15     ∧ TypeOKSerial
16     ∧ copss ∈ [Replica → SUBSET Cop]
17 ┌──────────────────┐
18 Init ≜
19     ∧ InitInt
20     ∧ InitCtx
21     ∧ InitSerial
22     ∧ copss = [r ∈ Replica ↦ {}]
23 ┌──────────────────┐
24 RECURSIVE xForm(-, -)
25 xForm(r, cop) ≜
26     LET ctxDiff ≜ ds[r] \ cop.ctx THEOREM : cop.ctx ⊆ ds[r]
27     RECURSIVE xFormHelper(-, -, -)
28         xFormHelper(coph, ctxDiffh, copssr) ≜ copssr: state space generated during transformation
29         IF ctxDiffh = {} THEN [xcop ↦ coph, xcopss ↦ copssr]
30         ELSE LET foph ≜ CHOOSE op ∈ ctxDiffh : the first op in serial
31                 ∀ opprime ∈ ctxDiffh \ {op} : tb(op, opprime, serial[r])
32                 fcophDict ≜ {op ∈ copssr : op.oid = foph ∧ op.ctx = coph.ctx}
33                 fcoph ≜ CHOOSE op ∈ fcophDict : TRUE THEOREM : Cardinality(fophDict) = 1
34                 xcoph ≜ COT(coph, fcoph)
35                 xfcoph ≜ COT(fcoph, coph)
36                 IN xFormHelper(xcoph, ctxDiffh \ {foph}, copssr ∪ {xcoph, xfcoph})
37         IN xFormHelper(cop, ctxDiff, copss[r])
39 Perform(r, cop) ≜
40     LET xform ≜ xForm(r, cop) [xcop, xcopss]
41     IN     ∧ copss' = [copss EXCEPT ![r] = xform.xcopss ∪ {cop}]
42           ∧ SetNewAop(r, xform.xcop.op)
44 ServerPerform(cop) ≜
45     ∧ Perform(Server, cop)
46     ∧ Comm!SSendSame(ClientOf(cop), cop)
47 ┌──────────────────┐

```

```

48  $DoOp(c, op) \triangleq$ 
49   LET  $cop \triangleq [op \mapsto op, oid \mapsto [c \mapsto c, seq \mapsto cseq[c]], ctx \mapsto ds[c]]$ 
50   IN  $\wedge Perform(c, cop)$ 
51      $\wedge Comm!CSend(cop)$ 

53  $Do(c) \triangleq$ 
54    $\wedge DoInt(DoOp, c)$ 
55    $\wedge DoCtx(c)$ 
56    $\wedge DoSerial(c)$ 

58  $Rev(c) \triangleq$ 
59    $\wedge RevInt(Perform, c)$ 
60    $\wedge RevCtx(c)$ 
61    $\wedge RevSerial(c)$ 

63  $SRev \triangleq$ 
64    $\wedge SRevInt(ServerPerform)$ 
65    $\wedge SRevCtx$ 
66    $\wedge SRevSerial$ 
67 |-----|
68  $Next \triangleq$ 
69    $\vee \exists c \in Client : Do(c) \vee Rev(c)$ 
70    $\vee SRev$ 

72  $Fairness \triangleq$ 
73    $WF_{vars}(SRev \vee \exists c \in Client : Rev(c))$ 

75  $Spec \triangleq Init \wedge \Box[Next]_{vars} \wedge Fairness$ 
76 |-----|
77  $Compactness \triangleq$ 
78    $Comm!EmptyChannel \Rightarrow Cardinality(Range(copss)) = 1$ 

80 THEOREM  $Spec \Rightarrow Compactness$ 
81 |-----|

\ * Modification History
\ * Last modified Wed Jan 02 20:47:48 CST 2019 by hengxin
\ * Created Wed Dec 05 19:55:52 CST 2018 by hengxin

```