———————————— MODULE *XJupiterImplCJupiter* ————————————

We show that *XJupiter* (*XJupiterExtended*) implements *CJupiter*.

5 EXTENDS *XJupiterExtended*

Variables for defining refinement mapping from *XJupiter* to *CJupiter*.

9 VARIABLES

10   *op2ss*,   a function from an operation (represented by its *Oid*)

11   to the part of $2D$ state space produced while the operation is transformed

12   *c2ssX*   *c2ssX*[*c*]: redundant (*eXtra*) $2D$ state space maintained for client $c \in Client$

14 $varsImpl \triangleq \langle varsEx,\ op2ss,\ c2ssX \rangle$

15 ├──

16 $TypeOKImpl \triangleq$

17    $\wedge\ TypeOKEx$

18    $\wedge\ \forall\ oid \in \text{DOMAIN}\ op2ss : oid \in Oid \wedge IsSS(op2ss[oid])$

19    $\wedge\ \forall\ c \in Client : IsSS(c2ssX[c])$

20 ├──

21 $InitImpl \triangleq$

22    $\wedge\ InitEx$

23    $\wedge\ op2ss\ =\ \langle\rangle$

24    $\wedge\ c2ssX = [c \in Client \mapsto EmptyGraph]$

26 $DoImpl(c) \triangleq$

27    $\wedge\ DoEx(c)$

28    $\wedge\ \text{UNCHANGED}\ \langle op2ss,\ c2ssX \rangle$

30 $RevImpl(c) \triangleq$

31    $\wedge\quad RevEx(c)$

32    $\wedge\quad$ LET $cop \triangleq Head(cincoming[c])$

33   IN $c2ssX' = [c2ssX\ \text{EXCEPT}\ ![c] = @ \oplus op2ss[cop.oid]]$

34    $\wedge\quad$ UNCHANGED $op2ss$

36 $SRevImpl \triangleq$

37    $\wedge\ SRevEx$

38    $\wedge$ LET $cop \triangleq Head(sincoming)$

39        $c \triangleq cop.oid.c$

40      $xform \triangleq xForm(cop,\ s2ss[c],\ ds[Server])$ *TODO*: performance!!!

41        $ss \triangleq xform.xss$

42   IN $op2ss' = op2ss\ @@\ (cop.oid :> [node \mapsto ss.node,\ edge \mapsto ss.edge])$

43    $\wedge$ UNCHANGED $c2ssX$

44 ├──

45 $NextImpl \triangleq$

46    $\vee\ \exists\ c \in Client : DoImpl(c) \vee RevImpl(c)$

47    $\vee\ SRevImpl$

49 $FairnessImpl \triangleq$

50    $\wedge\ \text{WF}_{varsImpl}(SRevImpl \vee \exists\ c \in Client : RevImpl(c))$

52 $SpecImpl \triangleq InitImpl \wedge \square[NextImpl]_{varsImpl} \wedge FairnessImpl$

54 $CJ \triangleq$ INSTANCE $CJupiter$
55   WITH $cincoming \leftarrow cincomingCJ,$ $sincoming$ needs no substitution
56                  $css \leftarrow [r \in Replica \mapsto$
57   IF $r = Server$
58   THEN $SetReduce(\oplus, Range(s2ss), EmptyGraph)$
59   ELSE $c2ss[r] \oplus c2ssX[r]]$

61 THEOREM $SpecImpl \Rightarrow CJ!Spec$
62

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