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1  |----- MODULE JupiterSerial -----|
   | Specification of serial views used by AbsJupiter and CJupiter. |
5  | EXTENDS JupiterCtx |
6  |-----|
7  VARIABLES
8      serial, serial[r]: the serial view of replica  $r \in \text{Replica}$  about the serialization order established at the Server
9      cincomingSerial, sincomingSerial

11 serialVars  $\triangleq \langle \text{serial}, \text{cincomingSerial}, \text{sincomingSerial} \rangle$ 
12 commSerial  $\triangleq$  INSTANCE CSComm WITH  $\text{Msg} \leftarrow \text{Seq}(\text{Oid})$ ,
13      cincoming  $\leftarrow \text{cincomingSerial}$ , sincoming  $\leftarrow \text{sincomingSerial}$ 
14 |-----|
15 tb(oid1, oid2, sv)  $\triangleq$  Is oid1 totally ordered before oid2 according to the serial view sv (of some replica)?
16   LET pos1  $\triangleq \text{FirstIndexOfElementSafe}(\text{sv}, \text{oid1})$  0 if oid1 is not in sv
17   pos2  $\triangleq \text{FirstIndexOfElementSafe}(\text{sv}, \text{oid2})$  0 if oid2 is not in sv
18   IN   IF  $\text{pos1} \neq 0 \wedge \text{pos2} \neq 0$  at the server or at a client but both are remote operations
19       THEN  $\text{pos1} < \text{pos2}$ 
20       ELSE IF  $\text{pos1} = 0 \wedge \text{pos2} = 0$  at a client: both are local operations (may happen in AbsJupiter)
21           THEN  $\text{oid1.seq} < \text{oid2.seq}$ 
22           ELSE  $\text{pos1} \neq 0$  at a client: one is a remote operation and the other is a local operation
23 |-----|
24 TypeOKSerial  $\triangleq$ 
25    $\wedge \text{serial} \in [\text{Replica} \rightarrow \text{Seq}(\text{Oid})]$ 
26    $\wedge \text{commSerial}! \text{TypeOK}$ 

28 InitSerial  $\triangleq$ 
29    $\wedge \text{serial} = [r \in \text{Replica} \mapsto \langle \rangle]$ 
30    $\wedge \text{commSerial}! \text{Init}$ 

32 DoSerial(c)  $\triangleq$ 
33   UNCHANGED serialVars

35 RevSerial(c)  $\triangleq$ 
36    $\wedge \text{commSerial}! \text{CRev}(\text{c})$ 
37    $\wedge \text{serial}' = [\text{serial} \text{ EXCEPT } ![c] = \text{Head}(\text{cincomingSerial}[c])]$ 

39 SRevSerial  $\triangleq$ 
40    $\wedge \text{LET } \text{cop} \triangleq \text{Head}(\text{sincoming})$ 
41   IN    $\wedge \text{serial}' = [\text{serial} \text{ EXCEPT } ![Server] = \text{Append}(@, \text{cop.oid})]$ 
42        $\wedge \text{commSerial}! \text{SSendSame}(\text{ClientOf}(\text{cop}), \text{serial}'[Server])$ 
43    $\wedge \text{UNCHANGED } \text{sincomingSerial}$ 
44 |-----|

\ * Modification History
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