─────── MODULE *JupiterCtx* ───────

Definitions for context-based *Jupiter* protocols, including *AbsJupiter*, *CJupiter*, and *XJupiter*.

EXTENDS *JupiterInterface*, *OT*

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VARIABLES

$\quad cseq,\qquad$ *cseq[c]*: local sequence number at client $c \in Client$

$\quad ds \qquad\quad$ *ds[r]*: document state (*i.e.*, a set of *Oids*) of replica $r \in Replica$

$ctxVars \triangleq \langle cseq,\ ds \rangle$

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$Oid \triangleq [c : Client,\ seq : Nat] \quad$ operation identifier

$Cop \triangleq [op : Op \cup \{Nop\},\ oid : Oid,\ ctx : \text{SUBSET } Oid] \quad$ context-based *op*

$ClientOf(cop) \triangleq cop.oid.c$

$COT(lcop,\ rcop) \triangleq \quad$ OT of $lcop \in Cop$ against $rcop \in Cop$
$\qquad [lcop \text{ EXCEPT } !.op = OT(lcop.op,\ rcop.op),\ !.ctx = @ \cup \{rcop.oid\}]$

$UpdateDS(r,\ oid) \triangleq \quad$ update *ds[r]* to include new $oid \in Oid$
$\qquad ds' = [ds \text{ EXCEPT } ![r] = @ \cup \{oid\}]$

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$TypeOKCtx \triangleq$
$\qquad \wedge cseq \in [Client \rightarrow Nat]$
$\qquad \wedge ds \in [Replica \rightarrow \text{SUBSET } Oid]$

$InitCtx \triangleq$
$\qquad \wedge cseq = [c \in Client \mapsto 1]$
$\qquad \wedge ds = [r \in Replica \mapsto \{\}]$

$DoCtx(c) \triangleq$
$\qquad \wedge cseq' = [cseq \text{ EXCEPT } ![c] = @ + 1]$
$\qquad \wedge UpdateDS(c,\ [c \mapsto c,\ seq \mapsto cseq[c]]) \quad$ *oid* for newly generated operation

$RevCtx(c) \triangleq$
$\qquad \wedge \text{UNCHANGED } cseq$
$\qquad \wedge UpdateDS(c,\ Head(cincoming[c]).oid)$

$SRevCtx \triangleq$
$\qquad \wedge \text{UNCHANGED } cseq$
$\qquad \wedge UpdateDS(Server,\ Head(sincoming).oid)$

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$ClientConstraint \triangleq \quad$ Each client generates at most 2 operations.
$\qquad \forall c \in Client : cseq[c] \leq 3$

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* Modification History
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