─────────────────────── MODULE $GRPC$ ───────────────────────

LOCAL INSTANCE $Naturals$

LOCAL INSTANCE $Sequences$

LOCAL INSTANCE $FiniteSets$

LOCAL INSTANCE TLC

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CONSTANT Nil

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LOCAL $Min(s) \triangleq$ CHOOSE $x \in s : \forall\, y \in s : x \geq y$

LOCAL $Max(s) \triangleq$ CHOOSE $x \in s : \forall\, y \in s : x \leq y$

VARIABLE $servers$

VARIABLE $conns$

$vars \triangleq \langle servers,\ conns \rangle$

───────────────────────── MODULE $Client$ ─────────────────────────

$Connect(c,\ s) \triangleq$
  LET $maxId \triangleq Max($DOMAIN $conns)$
      $connId \triangleq Min(\{i \in 1\,..\,(maxId + 1) : i \notin$ DOMAIN $conns\})$
  IN $conns' = conns @@ (connId :> [id \mapsto connId,\ src \mapsto c,\ dst \mapsto s,\ req \mapsto \langle\rangle,\ res \mapsto \langle\rangle])$

$Disconnect(c) \triangleq$
  $conns' = [x \in$ DOMAIN $conns \setminus \{c.id\} \mapsto conns[x]]$

$Send(c,\ m) \triangleq$
  $conns' = [conns$ EXCEPT $![c.id] = [conns[c.id]$ EXCEPT $!.req = Append(conns[c.id].req,\ m)]]$

$Receive(c) \triangleq$
  $conns' = [conns$ EXCEPT $![c.id] = [conns[c.id]$ EXCEPT $!.res = SubSeq(conns[c.id].res,\ 2,\ Len(conns[c.i$

$Reply(c,\ m) \triangleq$
  $conns' = [conns'$ EXCEPT $![c.id] = [conns'[c.id]$ EXCEPT $!.req = Append(conns'[c.id].req,\ m)]]$

$Handle(c,\ f(\_,\ \_)) \triangleq Len(c.res) > 0 \land f(c,\ c.res[1])$

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$Client \triangleq$ INSTANCE $Client$

$Connections \triangleq \{conns[c] : c \in$ DOMAIN $conns\}$

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─────────────────── MODULE $Server$ ───────────────────

$Start(s) \triangleq$
    $\land servers' = servers \cup \{s\}$
    $\land$ UNCHANGED $\langle conns \rangle$

$Stop(s) \triangleq$
    $\land servers' = servers \setminus \{s\}$
    $\land conns' = [c \in \text{DOMAIN } conns \setminus \{c \in conns : conns[c].dst \neq s\} \mapsto conns[c]]$

$Send(c, m) \triangleq$
    $conns' = [conns \text{ EXCEPT } ![c.id] = [conns[c.id] \text{ EXCEPT } !.res = Append(conns[c.id].res, m)]]$

$Receive(c) \triangleq$
    $conns' = [conns \text{ EXCEPT } ![c.id] = [conns[c.id] \text{ EXCEPT } !.req = SubSeq(conns[c.id].req, 2, Len(conns[c.i$

$Reply(c, m) \triangleq$
    $conns' = [conns' \text{ EXCEPT } ![c.id] = [conns'[c.id] \text{ EXCEPT } !.res = Append(conns'[c.id].res, m)]]$

    $Handle(c, f(\_, \_)) \triangleq Len(c.req) > 0 \land f(c, c.req[1])$

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$Servers \triangleq servers$

$Server \triangleq$ INSTANCE $Server$

$Init \triangleq$
    $\land servers = \{\}$
    $\land conns = [c \in \{\} \mapsto [e2n \mapsto Nil, e2t \mapsto Nil, req \mapsto \langle \rangle, res \mapsto \langle \rangle]]$

$Next \triangleq$
    $\lor \land$ FALSE
        $\land$ UNCHANGED $\langle servers, conns \rangle$

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* Modification History
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