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|----- MODULE gRPC -----|

LOCAL INSTANCE Naturals

LOCAL INSTANCE Sequences

LOCAL INSTANCE FiniteSets

LOCAL INSTANCE TLC

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CONSTANT Nil

CONSTANT OK

CONSTANT Error

CONSTANT
  Unknown,
  Canceled,
  NotFound,
  AlreadyExists,
  Unauthorized,
  Forbidden,
  Conflict,
  Invalid,
  Unavailable,
  NotSupported,
  Timeout,
  Internal

|-----|

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 conns

vars  $\triangleq$   $\langle \textit{conns} \rangle$ 

|----- MODULE Client -----|

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

Disconnect(c)  $\triangleq$ 

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$$\begin{aligned}
& \text{conns}' = [x \in \text{DOMAIN } \text{conns} \setminus \{c.id\} \mapsto \text{conns}[x]] \\
& \text{Send}(c, m) \triangleq \\
& \quad \text{conns}' = [\text{conns} \text{ EXCEPT } ![c.id] = [\text{conns}[c.id] \text{ EXCEPT } !.req = \text{Append}(\text{conns}[c.id].req, m)]] \\
& \text{Receive}(c) \triangleq \\
& \quad \text{conns}' = [\text{conns} \text{ EXCEPT } ![c.id] = [\text{conns}[c.id] \text{ EXCEPT } !.res = \text{SubSeq}(\text{conns}[c.id].res, 2, \text{Len}(\text{conns}[c.id].res))] \\
& \text{Reply}(c, m) \triangleq \\
& \quad \text{conns}' = [\text{conns}' \text{ EXCEPT } ![c.id] = [\text{conns}'[c.id] \text{ EXCEPT } !.req = \text{Append}(\text{conns}'[c.id].req, m)]] \\
& \text{Handle}(c, f(-, -)) \triangleq \text{Len}(c.res) > 0 \wedge f(c, c.res[1])
\end{aligned}$$


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

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MODULE *Server*

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$$\begin{aligned}
& \text{Send}(c, m) \triangleq \\
& \quad \text{conns}' = [\text{conns} \text{ EXCEPT } ![c.id] = [\text{conns}[c.id] \text{ EXCEPT } !.res = \text{Append}(\text{conns}[c.id].res, m)]] \\
& \text{Receive}(c) \triangleq \\
& \quad \text{conns}' = [\text{conns} \text{ EXCEPT } ![c.id] = [\text{conns}[c.id] \text{ EXCEPT } !.req = \text{SubSeq}(\text{conns}[c.id].req, 2, \text{Len}(\text{conns}[c.id].req))] \\
& \text{Reply}(c, m) \triangleq \\
& \quad \text{conns}' = [\text{conns}' \text{ EXCEPT } ![c.id] = [\text{conns}'[c.id] \text{ EXCEPT } !.res = \text{Append}(\text{conns}'[c.id].res, m)]] \\
& \text{Handle}(c, f(-, -)) \triangleq \text{Len}(c.req) > 0 \wedge f(c, c.req[1])
\end{aligned}$$


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$\text{Server} \triangleq \text{INSTANCE } \text{Server}$   
 $\text{Init} \triangleq$   
 $\quad \wedge \text{conns} = [c \in \{\}] \mapsto [src \mapsto \text{Nil}, dst \mapsto \text{Nil}, req \mapsto \langle \rangle, res \mapsto \langle \rangle]$   
 $\text{Next} \triangleq$   
 $\quad \vee \text{UNCHANGED } \langle \text{conns} \rangle$

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$\backslash$  \* Modification History  
 $\backslash$  \* Last modified *Mon Sep 13 15:12:09 PDT 2021* by *jordanhalterman*  
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