
MODULE *Messaging*

LOCAL INSTANCE *Naturals*

LOCAL INSTANCE *Sequences*

LOCAL INSTANCE *FiniteSets*

LOCAL INSTANCE *TLC*

CONSTANT *Nil*

VARIABLE *servers*

VARIABLE *conns*

CONSTANT *IsValid*(-)

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

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

MODULE *Client*

Connect(*c*, *s*) \triangleq

 LET *maxId* \triangleq *Max*(DOMAIN *conns*)

connId \triangleq *Min*($\{i \in 1 \dots (maxId + 1) : i \notin \text{DOMAIN } conns\}$)

 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' = [$x \in \text{DOMAIN } conns \setminus \{c.id\} \mapsto conns[x]$]

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.id*].*res*)))]

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 \wedge *f*(*c*, *c.res*[1])

Client \triangleq INSTANCE *Client*

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

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┌────────────────────────── MODULE Server ───────────────────────────┐
  Start(s)  $\triangleq$ 
     $\wedge$  servers' = servers  $\cup$  {s}
     $\wedge$  UNCHANGED  $\langle$ conns $\rangle$ 

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

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

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

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

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

└────────────────────────────────────────────────────────────────────────┘

Servers  $\triangleq$  servers

Server  $\triangleq$  INSTANCE Server

┌────────────────────────────────────────────────────────────────────────┐

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

  Next  $\triangleq$ 
     $\vee$  TRUE

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\ * Modification History
\ * Last modified Fri Aug 13 04:30:26 PDT 2021 by jordanhalterman
\ * Created Tue Aug 10 05:35:32 PDT 2021 by jordanhalterman

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