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MODULE *gRPC*

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LOCAL INSTANCE *Naturals*

LOCAL INSTANCE *Sequences*

LOCAL INSTANCE *FiniteSets*

LOCAL INSTANCE *TLC*

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CONSTANT *Nil*

CONSTANT *OK*

CONSTANT *Error*

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LOCAL  $Min(s) \triangleq \text{CHOOSE } x \in s : \forall y \in s : x \geq y$

LOCAL  $Max(s) \triangleq \text{CHOOSE } x \in s : \forall y \in s : x \leq y$

VARIABLE *conns*

$vars \triangleq \langle conns \rangle$

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MODULE *Errors*

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CONSTANT

*Unknown,*

*Canceled,*

*NotFound,*

*AlreadyExists,*

*Unauthorized,*

*Forbidden,*

*Conflict,*

*Invalid,*

*Unavailable,*

*NotSupported,*

*Timeout,*

*Internal*

$IsOK(m) \triangleq m.status = OK$

$IsUnknown(m) \triangleq m.status = Error \wedge m.error = Unknown$

$IsCanceled(m) \triangleq m.status = Error \wedge m.error = Canceled$

$IsNotFound(m) \triangleq m.status = Error \wedge m.error = NotFound$

$IsAlreadyExists(m) \triangleq m.status = Error \wedge m.error = AlreadyExists$

$IsUnauthorized(m) \triangleq m.status = Error \wedge m.error = Unauthorized$

$IsForbidden(m) \triangleq m.status = Error \wedge m.error = Forbidden$   
 $IsConflict(m) \triangleq m.status = Error \wedge m.error = Conflict$   
 $IsInvalid(m) \triangleq m.status = Error \wedge m.error = Invalid$   
 $IsUnavailable(m) \triangleq m.status = Error \wedge m.error = Unavailable$   
 $IsNotSupported(m) \triangleq m.status = Error \wedge m.error = NotSupported$   
 $IsTimeout(m) \triangleq m.status = Error \wedge m.error = Timeout$   
 $IsInternal(m) \triangleq m.status = Error \wedge m.error = Internal$

$Errors \triangleq \text{INSTANCE } Errors \text{ WITH}$

$Unknown \leftarrow \text{"Unknown"},$   
 $Canceled \leftarrow \text{"Canceled"},$   
 $NotFound \leftarrow \text{"NotFound"},$   
 $AlreadyExists \leftarrow \text{"AlreadyExists"},$   
 $Unauthorized \leftarrow \text{"Unauthorized"},$   
 $Forbidden \leftarrow \text{"Forbidden"},$   
 $Conflict \leftarrow \text{"Conflict"},$   
 $Invalid \leftarrow \text{"Invalid"},$   
 $Unavailable \leftarrow \text{"Unavailable"},$   
 $NotSupported \leftarrow \text{"NotSupported"},$   
 $Timeout \leftarrow \text{"Timeout"},$   
 $Internal \leftarrow \text{"Internal"}$

MODULE *Client*

$Connect(src, dst) \triangleq$   
 $\text{LET } maxId \triangleq Max(\text{DOMAIN } conns)$   
 $\text{connId} \triangleq Min(\{i \in 1 \dots (maxId + 1) : i \notin \text{DOMAIN } conns\})$   
 $\text{IN } conns' = conns @ @ (connId :> [id \mapsto connId, src \mapsto src, dst \mapsto dst, req \mapsto \langle \rangle, res \mapsto \langle \rangle])$   
 $Disconnect(c) \triangleq$   
 $conns' = [x \in \text{DOMAIN } conns \setminus \{c.id\} \mapsto conns[x]]$   
 $Send(c, m) \triangleq$   
 $conns' = [conns \text{ EXCEPT } ![c.id] = [conns[c.id] \text{ EXCEPT } !.req = Append(conns[c.id].req, m)]]$   
 $Receive(c) \triangleq$   
 $conns' = [conns \text{ EXCEPT } ![c.id] = [conns[c.id] \text{ EXCEPT } !.res = SubSeq(conns[c.id].res, 2, Len(conns[c.id].res))]]$   
 $Reply(c, m) \triangleq$   
 $conns' = [conns' \text{ EXCEPT } ![c.id] = [conns'[c.id] \text{ EXCEPT } !.req = Append(conns'[c.id].req, m)]]$   
 $Handle(c, f(-, -)) \triangleq Len(c.res) > 0 \wedge f(c, c.res[1])$

$Client \triangleq \text{INSTANCE } Client$

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

┌────────────────── MODULE *Server* ───────────────────┐

$Send(c, m) \triangleq$

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

$Receive(c) \triangleq$

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

$Reply(c, m) \triangleq$

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

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

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$Server \triangleq \text{INSTANCE } Server$

$Init \triangleq$

$\wedge conns = [c \in \{\}] \mapsto [src \mapsto Nil, dst \mapsto Nil, req \mapsto \langle \rangle, res \mapsto \langle \rangle]]$

$Next \triangleq$

$\vee \text{UNCHANGED } \langle conns \rangle$

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\ \* Modification History

\ \* Last modified *Mon Sep 13 15:28:02 PDT 2021* by *jordanhalterman*

\ \* Created *Mon Sep 13 12:23:50 PDT 2021* by *jordanhalterman*