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MODULE *Messages*

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EXTENDS *Naturals*, *TLC*

A reserved value.

CONSTANTS *Nil*

A bag of records representing requests and responses sent from one server to another. *TLAPS* doesn't support the Bags module, so this is a function mapping *Message* to *Nat*.

VARIABLE *messages*

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*InitMessageVars*  $\triangleq$  *messages* =  $[m \in \{\} \mapsto 0]$

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Helper for *Send* and *Reply*. Given a message *m* and bag of messages, return a new bag of messages with one more *m* in it.

*WithMessage*(*m*, *msgs*)  $\triangleq$   
 IF *m* ∈ DOMAIN *msgs* THEN  
   [*msgs* EXCEPT ![*m*] = *msgs*[*m*] + 1]  
 ELSE  
   *msgs* @@ (*m* :> 1)

Helper for *Discard* and *Reply*. Given a message *m* and bag of messages, return a new bag of messages with one less *m* in it.

*WithoutMessage*(*m*, *msgs*)  $\triangleq$   
 IF *m* ∈ DOMAIN *msgs* THEN  
   [*msgs* EXCEPT ![*m*] = *msgs*[*m*] - 1]  
 ELSE  
   *msgs*

Add a message to the bag of messages.

*Send*(*m*)  $\triangleq$  *messages*' = *WithMessage*(*m*, *messages*)

Remove a message from the bag of messages. Used when a server is done processing a message.

*Discard*(*m*)  $\triangleq$  *messages*' = *WithoutMessage*(*m*, *messages*)

Combination of *Send* and *Discard*

*Reply*(*response*, *request*)  $\triangleq$   
   *messages*' = *WithoutMessage*(*request*, *WithMessage*(*response*, *messages*))

The network duplicates a message

*DuplicateMessage*(*m*)  $\triangleq$   
    $\wedge$  *messages*[*m*] = 1  
    $\wedge$  *Send*(*m*)

The network drops a message  
 $DropMessage(m) \triangleq$   
 $\wedge messages[m] > 0$   
 $\wedge Discard(m)$

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\ \* Modification History  
\ \* Last modified *Wed Jan 31 20:55:09 PST 2018* by *jordanhalterman*  
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