

```

1  |----- MODULE JupiterInterface -----|
   |Interface of a family of Jupiter protocols.
5  |-----|
   |EXTENDS Op
6  |-----|
7  |VARIABLES
8      aop,      aop[r]: the actual operation applied at replica r ∈ Replica
9      state,    state[r]: state (the list content) of replica r ∈ Replica
10     cincoming, cincoming[c]: incoming channel at the client c ∈ Client
11     sincoming, incoming channel at the Server
12     chins      a set of chars allowed to insert; this is for model checking

14  Comm  $\triangleq$  INSTANCE CSComm
15  intVars  $\triangleq$   $\langle aop, state, cincoming, sincoming, chins \rangle$ 
16  |-----|
17  SetNewAop(r, aopr)  $\triangleq$ 
18      aop' = [aop EXCEPT ![r] = aopr]

20  ApplyNewAop(r)  $\triangleq$ 
21      state' = [state EXCEPT ![r] = Apply(aop'[r], @)]
22  |-----|
23  TypeOKInt  $\triangleq$ 
24       $\wedge aop \in [Replica \rightarrow Op \cup \{Nop\}]$ 
25       $\wedge state \in [Replica \rightarrow List]$ 
26       $\wedge Comm!TypeOK$ 
27       $\wedge chins \subseteq Char$ 

29  InitInt  $\triangleq$ 
30       $\wedge aop = [r \in Replica \mapsto Nop]$ 
31       $\wedge state = [r \in Replica \mapsto InitState]$ 
32       $\wedge Comm!Init$ 
33       $\wedge chins = Char$ 

35  DoIns(DoOp(-, -), c)  $\triangleq$  Client c ∈ Client generates and processes an “Ins” operation.
36       $\exists ins \in Ins :$ 
37           $\wedge ins.pos \in 1 \dots (Len(state[c]) + 1)$ 
38           $\wedge ins.ch \in chins$ 
39           $\wedge ins.pr = Priority[c]$ 
40           $\wedge DoOp(c, ins)$ 
41           $\wedge chins' = chins \setminus \{ins.ch\}$  We assume that all inserted elements are unique.

43  DoDel(DoOp(-, -), c)  $\triangleq$  Client c ∈ Client generates and processes a “Del” operation.
44       $\exists del \in Del :$ 
45           $\wedge del.pos \in 1 \dots Len(state[c])$ 
46           $\wedge DoOp(c, del)$ 
47           $\wedge UNCHANGED chins$ 

```

```

49   $DoInt(DoOp(-, -), c) \triangleq$  Client  $c \in Client$  generates an operation.
50   $\wedge \vee DoIns(DoOp, c)$   $DoOp(c \in Client, op \in Op)$ 
51   $\vee DoDel(DoOp, c)$ 
52   $\wedge ApplyNewAop(c)$ 

54   $RevInt(ClientPerform(-, -), c) \triangleq$  Client  $c \in Client$  receives and processes a message.
55   $\wedge Comm!CRev(c)$ 
56   $\wedge ClientPerform(c, Head(cincoming[c]))$   $ClientPerform(c \in Client, m \in Msg)$ 
57   $\wedge ApplyNewAop(c)$ 
58   $\wedge UNCHANGED\ chins$ 

60   $SRevInt(ServerPerform(-)) \triangleq$  The Server receives and processes a message.
61   $\wedge Comm!SRev$ 
62   $\wedge ServerPerform(Head(sincoming))$   $ServerPerform(m \in Msg)$ 
63   $\wedge ApplyNewAop(Server)$ 
64   $\wedge UNCHANGED\ chins$ 
65  |
    * Modification History
    * Last modified Sun Jan 13 10:04:18 CST 2019 by hengxin
    * Created Tue Dec 04 19:01:01 CST 2018 by hengxin

```

```
\ * Modification History
\ * Last modified Sun Jan 13 10:04:18 CST 2019 by hengxin
\ * Created Tue Dec 04 19:01:01 CST 2018 by hengxin
```