

TAD alumno es String
TAD Baño :

obs fila : seq(alumno)
obs Ocupado : Bool
obs historial : dict(alumno , \mathbb{Z})
obs alumEnBaño : alumno

```

proc InitBaño (alumnos : seq(alumno)) : Baño
  requiere  $\{(\forall i : \mathbb{Z}) (0 \leq i < |\text{alumnos}| \longrightarrow_L \text{alumnos}[i] > 0) \wedge_L \text{SinRepetidos}(\text{alumnos})\}$ 
  asegura  $\{\text{res.fila} = [] \wedge \text{res.Ocupado} = \text{false} \wedge \text{res.historial} = \{\} \wedge \text{res.alumEnBanio} = 0\}$ 
  asegura  $\{(\forall k : \mathbb{Z}) (k \in \text{alumnos} \leftrightarrow k \in \text{res.historial})\}$ 
  asegura  $\{(\forall i : \mathbb{Z}) (0 \leq i < |\text{alumnos}| \longrightarrow_L \text{res.historial}[i] = 0)\}$ 
  pred SinRepetidos (s : seq( $\mathbb{Z}$ )) {
     $(\forall i, j : \mathbb{Z}) (0 \leq i, j < |\text{alumnos}| \wedge_L i \neq j \longrightarrow_L \text{alumnos}[i] \neq \text{alumnos}[j])$ 
  }

proc IrAlBaño (inout b : Baño, in a : alumno)
  requiere  $\{b = b_0 \wedge b.\text{alumEnBanio} \neq a \wedge a \notin b.\text{fila} \wedge a > 0\}$ 
  asegura  $\{q_0.\text{historial}[a] = 3 \longrightarrow_L (q_0.\text{historial} = q.\text{historial} \wedge q_0.\text{ocupado} = q.\text{ocupado} \wedge q.\text{fila} = q_0.\text{fila} \wedge q.\text{alumEnBanio} = q_0.\text{alumEnBanio})\}$ 
  asegura  $\{q_0.\text{ocupado} = \text{false} \wedge q_0.\text{historial}[a] < 3 \longrightarrow_L (q.\text{ocupado} = \text{true} \wedge q.\text{alumEnBanio} = a \wedge)\}$ 
  asegura  $\{q_0.\text{ocupado} = \text{true} \wedge q_0.\text{historial}[a] < 3 \longrightarrow_L (q.\text{historial}[a] = \text{setKey}(q_0.\text{historial}, a, q_0.\text{historial}[a] + 1))\}$ 

proc SalirDelBaño (inout b : Baño)
  requiere  $\{b.\text{ocupado} = \text{true} \wedge b = b_0\}$ 
  asegura  $\{b_0.\text{fila} = [] \longrightarrow_L (b.\text{ocupado} = \text{false} \wedge \text{alumEnBanio} = 0)\}$ 
  asegura  $\{b_0.\text{fila} \neq [] \longrightarrow_L (\text{alumEnBanio} = b_0.\text{fila}[0] \wedge b.\text{fila} = \text{subseq}(b_0.\text{fila}, 1, |b_0.\text{fila}| \wedge b.\text{ocupado} = \text{true} \wedge b.\text{alumEnBanio} = b_0.\text{fila}[0])\}$ 
  asegura  $\{b.\text{historial} = b_0.\text{historial}\}$ 

```