

Trabajo Practico I, Alta Seguridad nos cuida

Algoritmos y Estructuras de Datos II, DC, UBA.

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1. TAD UNIVERSIDAD

TAD UNIVERSIDAD

géneros uni

exporta uni, Generadores, Observadores Basicos

usa NAT, CONJU(α), BOOL, TUPLA($\alpha_1, \dots, \alpha_n$)

igualdad observacional

$$(\forall u, u' : \text{uni}) \left(u =_{\text{obs}} u' \iff \begin{pmatrix} \text{alto?}(u) =_{\text{obs}} \text{alto?}(u') \wedge \text{ancho?}(u) =_{\text{obs}} \text{ancho?}(u') \wedge \text{obstaculos?}(u) =_{\text{obs}} \text{obstaculos?}(u') \wedge \text{agentes?}(u) =_{\text{obs}} \text{agentes?}(u') \wedge \text{estudiantes?}(u) =_{\text{obs}} \text{estudiantes?}(u') \wedge \text{hippies?}(u) =_{\text{obs}} \text{hippies?}(u') \end{pmatrix} \right)$$

observadores básicos

alto? : uni \rightarrow nat

ancho? : uni \rightarrow nat

obstaculos? : uni \rightarrow conj(*pos*)

agentes? : uni \rightarrow conj($\langle as, pos \rangle$)

estudiantes? : uni \rightarrow conj($\langle est, pos \rangle$)

hippies? : uni \rightarrow conj(*pos*)

generadores

nuevaUni : nat \times nat \times conj(*pos*) \times conj($\langle as \times pos \rangle$) \rightarrow uni

agregarE : uni \times ($\langle est \times pos \rangle$) \rightarrow uni

agregarH : uni \times pos \rightarrow uni

otras operaciones

cuantosE : uni \rightarrow nat

cuantosH : uni \rightarrow nat

masVigilante : uni \rightarrow As

queHay : uni \times pos \rightarrow tipoEnum

moverTodo : conj($\langle as \times pos \rangle$) \times conj(*pos*) \times conj($\langle est \times pos \rangle$) \times nat \times nat \times conj(*pos*) \rightarrow $\langle \text{conj}(\langle as, pos \rangle), \text{conj}(pos) \rangle$

axiomas \forall :

Observadores Basicos

agentes?(nuevaUni(al,an,co,cAs)) $\equiv \Pi_1(\text{moverTodo}(cAs, \emptyset, \emptyset, al, an, co))$

agentes?(agregarH(uni,pos)) $\equiv \Pi_1(\text{moverTodo}(\text{agentes?}(uni), pos \cup \text{hippies?}(uni), \text{estudiantes?}(uni), \text{alto?}(uni), \text{ancho?}(uni), \text{obstaculos?}(uni)))$

agentes?(agregarE(uni, $\langle est, pos \rangle$)) $\equiv \Pi_1(\text{moverTodo}(\text{agentes?}(uni), \text{hippies?}(uni), \langle est, pos \rangle \cup \text{estudiantes?}(uni), \text{alto?}(uni), \text{ancho?}(uni), \text{obstaculos?}(uni)))$

hippies?(nuevaUni(al,an,co,cAs)) $\equiv \emptyset$

hippies?(agregarH(uni,pos)) $\equiv \Pi_2(\text{moverTodo}(\text{agentes?}(uni), pos \cup \text{hippies?}(uni), \text{estudiantes?}(uni), \text{alto?}(uni), \text{ancho?}(uni), \text{obstaculos?}(uni)))$

hippies?(agregarE(uni, $\langle est, pos \rangle$)) $\equiv \Pi_2(\text{moverTodo}(\text{agentes?}(uni), \text{hippies?}(uni), \langle est, pos \rangle \cup \text{estudiantes?}(uni), \text{alto?}(uni), \text{ancho?}(uni), \text{obstaculos?}(uni)))$

estudiantes?(nuevaUni(al,an,co,cAs)) $\equiv \emptyset$

estudiantes?(agregarH(uni,pos)) $\equiv \Pi_3(\text{moverTodo}(\text{agentes?}(uni), pos \cup \text{hippies?}(uni), \text{estudiantes?}(uni), \text{alto?}(uni), \text{ancho?}(uni), \text{obstaculos?}(uni)))$

$$\text{estudiantes?}(\text{agregarE}(\text{uni}, \langle \text{est}, \text{pos} \rangle)) \equiv \Pi_3(\text{moverTodo}(\text{agentes?}(\text{uni}), \text{hippies?}(\text{uni}), \langle \text{est}, \text{pos} \rangle \cup \text{estudiantes?}(\text{uni}), \text{alto?}(\text{uni}), \text{ancho?}(\text{uni}), \text{obstaculos?}(\text{uni})))$$

$$\text{alto?}(\text{nuevaUni}(\text{al}, \text{an}, \text{co}, \text{cAs})) \equiv \text{al}$$

$$\text{alto?}(\text{agregarH}(\text{uni}, \text{pos})) \equiv \text{alto?}(\text{uni})$$

$$\text{alto?}(\text{agregarE}(\text{uni}, \langle \text{est}, \text{pos} \rangle)) \equiv \text{alto?}(\text{uni})$$

$$\text{ancho?}(\text{nuevaUni}(\text{al}, \text{an}, \text{co}, \text{cAs})) \equiv \text{an}$$

$$\text{ancho?}(\text{agregarH}(\text{uni}, \text{pos})) \equiv \text{ancho?}(\text{uni})$$

$$\text{ancho?}(\text{agregarE}(\text{uni}, \langle \text{est}, \text{pos} \rangle)) \equiv \text{ancho?}(\text{uni})$$

$$\text{obstaculos?}(\text{nuevaUni}(\text{al}, \text{an}, \text{co}, \text{cAs})) \equiv \text{co}$$

$$\text{obstaculos?}(\text{agregarH}(\text{uni}, \text{pos})) \equiv \text{obstaculos?}(\text{uni})$$

$$\text{obstaculos?}(\text{agregarE}(\text{uni}, \langle \text{est}, \text{pos} \rangle)) \equiv \text{obstaculos?}(\text{uni})$$

Otras Operaciones

$$\text{cuantosE}(\text{uni}) \equiv \# \text{ estudiantes?}(\text{uni})$$

$$\text{cuantosH}(\text{uni}) \equiv \# \text{ hippies?}(\text{uni})$$

$$\text{masVigilante}(\text{uni}) \equiv \text{maxAtrapados}(\text{agentes?}(\text{uni}))$$

$$\text{maxAtrapados}(\text{cAs}) \equiv \max(\text{hippiesAtrapados}(\text{dameUno}(\text{cAs})), \text{maxAtrapados}(\text{sinUno}(\text{cAs})))$$

Fin TAD

2. TAD AGENTE

TAD AGENTE

géneros as

exporta as, Generadores, Observadores Basicos, hippiesAtrapados

usa NAT, BOOL

igualdad observacional

$$(\forall a, a' : \text{as}) (a =_{\text{obs}} a' \iff ())$$

observadores básicos

$$\text{numPlaca} : \text{as} \longrightarrow \text{nat}$$

$$\text{hippiesAtrapados} : \text{as} \longrightarrow \text{nat}$$

$$\text{numSanciones} : \text{as} \longrightarrow \text{nat}$$

generadores

$$\text{nuevoAs} : \text{nat} \longrightarrow \text{as}$$

$$\text{capturarH} : \text{as } a \longrightarrow \text{as}$$

$$\text{sancionar} : \text{as} \longrightarrow \text{as}$$

otras operaciones

$$\text{inactivo?} : \text{as} \longrightarrow \text{bool}$$

axiomas $\forall :$

Observadores Basicos

$$\text{numPlaca}(\text{nuevoAs}(n)) \equiv n$$

$$\text{numPlaca}(\text{capturarH}(a)) \equiv \text{numPlaca}(a)$$

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numPlaca(sancionar(a))  $\equiv$  numPlaca(a)
hippiesAtrapados(nuevoAs(n))  $\equiv$  0
hippiesAtrapados(capturarH(a))  $\equiv$  1+ hippiesAtrapados(a)
hippiesAtrapados(sancionar(a))  $\equiv$  hippiesAtrapados(a)
numSanciones(nuevoAs(n))  $\equiv$  0
numSanciones(capturarH(a))  $\equiv$  numSanciones(a)
numSanciones(sancionar(a))  $\equiv$  1+ numSanciones(a)

```

Otras Operaciones

```

inactivo?(a)  $\equiv$  if numSanciones(a) > 3 then true else false fi

```

Fin TAD

3. TAD TABLERO

TAD TABLERO

```

géneros      tab
exporta     tab, Generadores, Observadores Basicos
usa         NAT, POS, BOOL, CONJ( $\alpha$ )

```

```

igualdad observacional
  ( $\forall t, t' : \text{tab}$ ) ( $t =_{\text{obs}} t' \iff ()$ )

```

observadores básicos

```

alto? : tab  $\longrightarrow$  nat
ancho? : tab  $\longrightarrow$  nat
ocupadas? : tab  $\longrightarrow$  conj(pos)

```

generadores

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nuevoTablero : nat an  $\times$  nat al  $\longrightarrow$  tab t
agregarFicha : nat id  $\times$  pos p  $\longrightarrow$  tab t

```

axiomas $\forall :$

\equiv

Fin TAD