

**MACHINE****M\_Plasticity\_2****SEES****C\_Plasticity****VARIABLES**

MULTISETS

**INVARIANTS**inv1 : MULTISETS  $\subseteq$  TYPES  $\times$  N  $\times$  SYMBOLS  $\times$  N**EVENTS****INITIALISATION**  $\triangleq$ **STATUS**

ordinary

**BEGIN**act1 : MULTISETS := {(S1  $\mapsto$  1  $\mapsto$  a  $\mapsto$  2), (S1  $\mapsto$  1  $\mapsto$  n2  $\mapsto$  2), (S1  $\mapsto$  1  $\mapsto$  n3  $\mapsto$  2), (S3  $\mapsto$  1  $\mapsto$  a  $\mapsto$  1) }**END****S1\_R1**  $\triangleq$ **STATUS**

ordinary

**ANY**

multiset

cell\_no

**WHERE**grd1 : multiset  $\subseteq$  MULTISETSgrd2 : cell\_no  $\in$  Ngrd3 : multiset(S1  $\mapsto$  cell\_no  $\mapsto$  a)=2grd4 : multiset(S1  $\mapsto$  cell\_no  $\mapsto$  n2)=2grd5 : multiset(S1  $\mapsto$  cell\_no  $\mapsto$  n3)=2**THEN**

MULTISETS := ( MULTISETS  $\cup$   
 {  
 (S1  $\mapsto$  cell\_no  $\mapsto$  n2  $\mapsto$  (multiset(S1  $\mapsto$  cell\_no  $\mapsto$  n2) - 1)),  
 (S1  $\mapsto$  cell\_no  $\mapsto$  a  $\mapsto$  (multiset(S1  $\mapsto$  cell\_no  $\mapsto$  a) - 1)),  
 (S2  $\mapsto$  1  $\mapsto$  a  $\mapsto$  1)  
 })  
 \  
 {  
 (S1  $\mapsto$  cell\_no  $\mapsto$  n2  $\mapsto$  (multiset(S1  $\mapsto$  cell\_no  $\mapsto$  n2))),  
 (S1  $\mapsto$  cell\_no  $\mapsto$  a  $\mapsto$  (multiset(S1  $\mapsto$  cell\_no  $\mapsto$  a)))  
 })

**END****S1\_R2**  $\triangleq$ **STATUS**

ordinary

**ANY**

multiset

cell\_no

**WHERE**grd1 : multiset  $\subseteq$  MULTISETSgrd2 : cell\_no  $\in$  Ngrd3 : multiset(S1  $\mapsto$  cell\_no  $\mapsto$  a)=2grd4 : multiset(S1  $\mapsto$  cell\_no  $\mapsto$  n2)=2grd5 : multiset(S1  $\mapsto$  cell\_no  $\mapsto$  n3)=2**THEN**

act1 : MULTISETS := ( MULTISETS  $\cup$   
 {  
 (S1  $\mapsto$  cell\_no  $\mapsto$  n3  $\mapsto$  (multiset(S1  $\mapsto$  cell\_no  $\mapsto$  n3) - 1)),  
 })

```

(S1 ↦ cell_no ↦ a ↦ (multiset(S1 ↦ cell_no ↦ a) - 1)),
(S3 ↦ 1 ↦ a ↦ 1)
})
\
{
(S1 ↦ cell_no ↦ n3 ↦ (multiset(S1 ↦ cell_no ↦ n3))),
(S1 ↦ cell_no ↦ a ↦ (multiset(S1 ↦ cell_no ↦ a)))
}

```

END

S1\_R3 ≐

STATUS

ordinary

ANY

multiset

cell\_no

WHERE

grd1 : multiset ⊆ MULTISSETS

grd2 : cell\_no ∈ N

grd3 : multiset(S1 ↦ cell\_no ↦ a)=1

grd4 : multiset(S1 ↦ cell\_no ↦ n2)=1

grd5 : multiset(S1 ↦ cell\_no ↦ n3)=2

THEN

```

MULTISSETS := ( MULTISSETS ∪
{
(S1 ↦ cell_no ↦ n2 ↦ 2),
(S1 ↦ cell_no ↦ a ↦ 0)
})
act1 : \
{
(S1 ↦ cell_no ↦ n2 ↦ 1),
(S1 ↦ cell_no ↦ a ↦ 1)
}

```

END

S1\_R4 ≐

STATUS

ordinary

ANY

multiset

cell\_no

WHERE

grd1 : multiset ⊆ MULTISSETS

grd2 : cell\_no ∈ N

grd3 : multiset(S1 ↦ cell\_no ↦ a)=1

grd4 : multiset(S1 ↦ cell\_no ↦ n2)=2

grd5 : multiset(S1 ↦ cell\_no ↦ n3)=1

THEN

```

MULTISSETS := ( MULTISSETS ∪
{
(S1 ↦ cell_no ↦ n3 ↦ 2),
(S1 ↦ cell_no ↦ a ↦ 0)
})
act1 : \
{
(S1 ↦ cell_no ↦ n3 ↦ 1),
(S1 ↦ cell_no ↦ a ↦ 1)
}

```

END

S2 ≐

```

STATUS
ordinary
ANY
multiset
cell_no
WHERE
  grd1 : multiset  $\subseteq$  MULTISETS
  grd2 : cell_no  $\in$  N
  grd3 : multiset(S2  $\mapsto$  cell_no  $\mapsto$  a)=1
THEN
  MULTISETS := ( MULTISETS  $\cup$ 
    {
      (S2  $\mapsto$  cell_no  $\mapsto$  a  $\mapsto$  (multiset(S2  $\mapsto$  cell_no  $\mapsto$  a) - 1)),
      (SA1  $\mapsto$  cell_no  $\mapsto$  a  $\mapsto$  1),
      (SA2  $\mapsto$  cell_no  $\mapsto$  a  $\mapsto$  1)
    }
    \
    {
      (S2  $\mapsto$  cell_no  $\mapsto$  a  $\mapsto$  (multiset(S2  $\mapsto$  cell_no  $\mapsto$  a)))
    }
  )
END

S3  $\triangleq$ 
STATUS
ordinary
ANY
multiset
cell_no
WHERE
  grd1 : multiset  $\subseteq$  MULTISETS
  grd2 : cell_no  $\in$  N
  grd3 : multiset(S3  $\mapsto$  cell_no  $\mapsto$  a)=1
THEN
  MULTISETS := ( MULTISETS  $\cup$ 
    {
      (S3  $\mapsto$  cell_no  $\mapsto$  a  $\mapsto$  (multiset(S3  $\mapsto$  cell_no  $\mapsto$  a) - 1)),
      (Environment  $\mapsto$  cell_no  $\mapsto$  a  $\mapsto$  1)
    }
    \
    {
      (S3  $\mapsto$  cell_no  $\mapsto$  a  $\mapsto$  (multiset(S3  $\mapsto$  cell_no  $\mapsto$  a)))
    }
  )
END

SA1  $\triangleq$ 
STATUS
ordinary
ANY
multiset
cell_no
WHERE
  grd1 : multiset  $\subseteq$  MULTISETS
  grd2 : cell_no  $\in$  N
  grd3 : multiset(SA1  $\mapsto$  cell_no  $\mapsto$  a)=1
THEN
  act1 : MULTISETS := ( MULTISETS  $\cup$ 
    {
      (SA1  $\mapsto$  cell_no  $\mapsto$  a  $\mapsto$  (multiset(SA1  $\mapsto$  cell_no  $\mapsto$  a) - 1)),
      (S1  $\mapsto$  cell_no  $\mapsto$  a  $\mapsto$  1)
    }
  )

```

```

\
{
(SA1 ↦ cell_no ↦ a ↦ (multiset(SA1 ↦ cell_no ↦ a)))
}

END

SA2 ≐
STATUS
ordinary
ANY
multiset
cell_no
WHERE
  grd1 : multiset ⊆ MULTISETS
  grd2 : cell_no ∈ N
  grd3 : multiset(SA2 ↦ cell_no ↦ a)=1
THEN
  MULTISETS := ( MULTISETS ∪
  {
    (SA2 ↦ cell_no ↦ a ↦ (multiset(SA2 ↦ cell_no ↦ a) - 1)),
    (S1 ↦ cell_no ↦ a ↦ 1)
  })
  act1 : }
  \
  {
    (SA2 ↦ cell_no ↦ a ↦ (multiset(SA2 ↦ cell_no ↦ a)))
  }

END

END

```