PART II - TALK 2

AND THEN THERE WAS COLOUR
- COLOURED PETRI NET -

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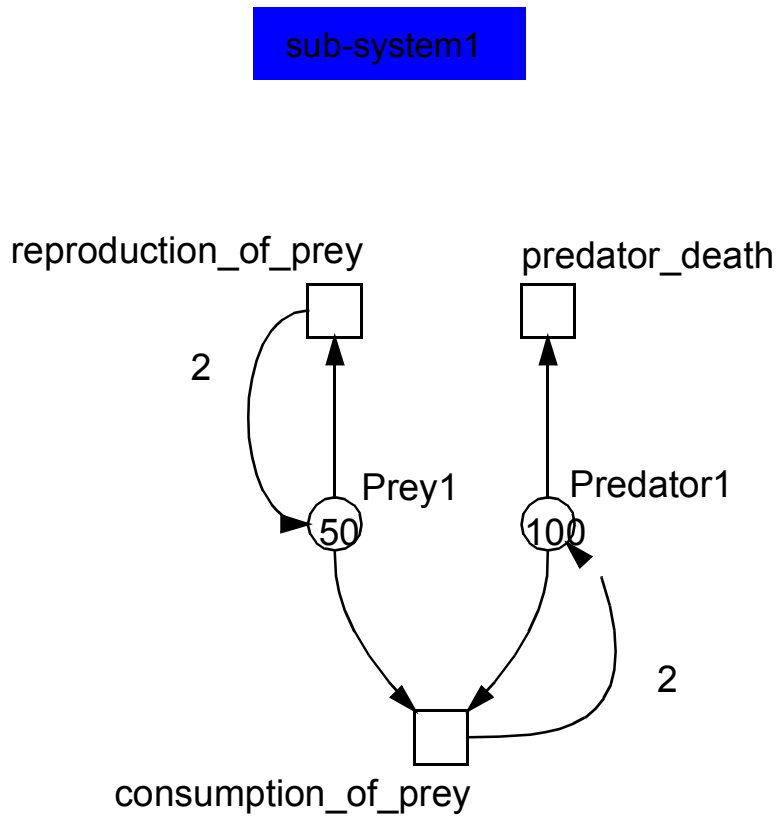
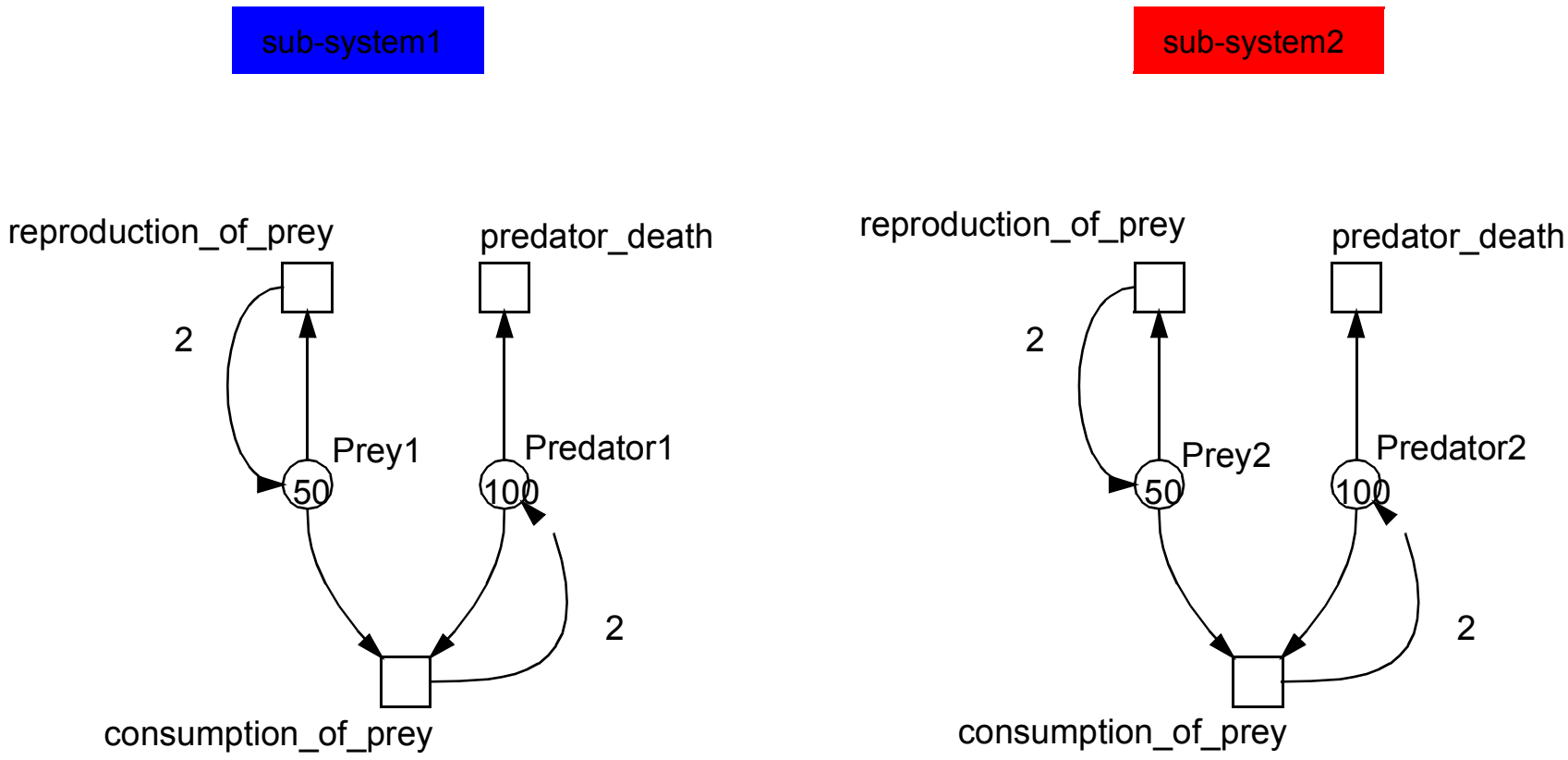
Brandenburg University of Technology Cottbus

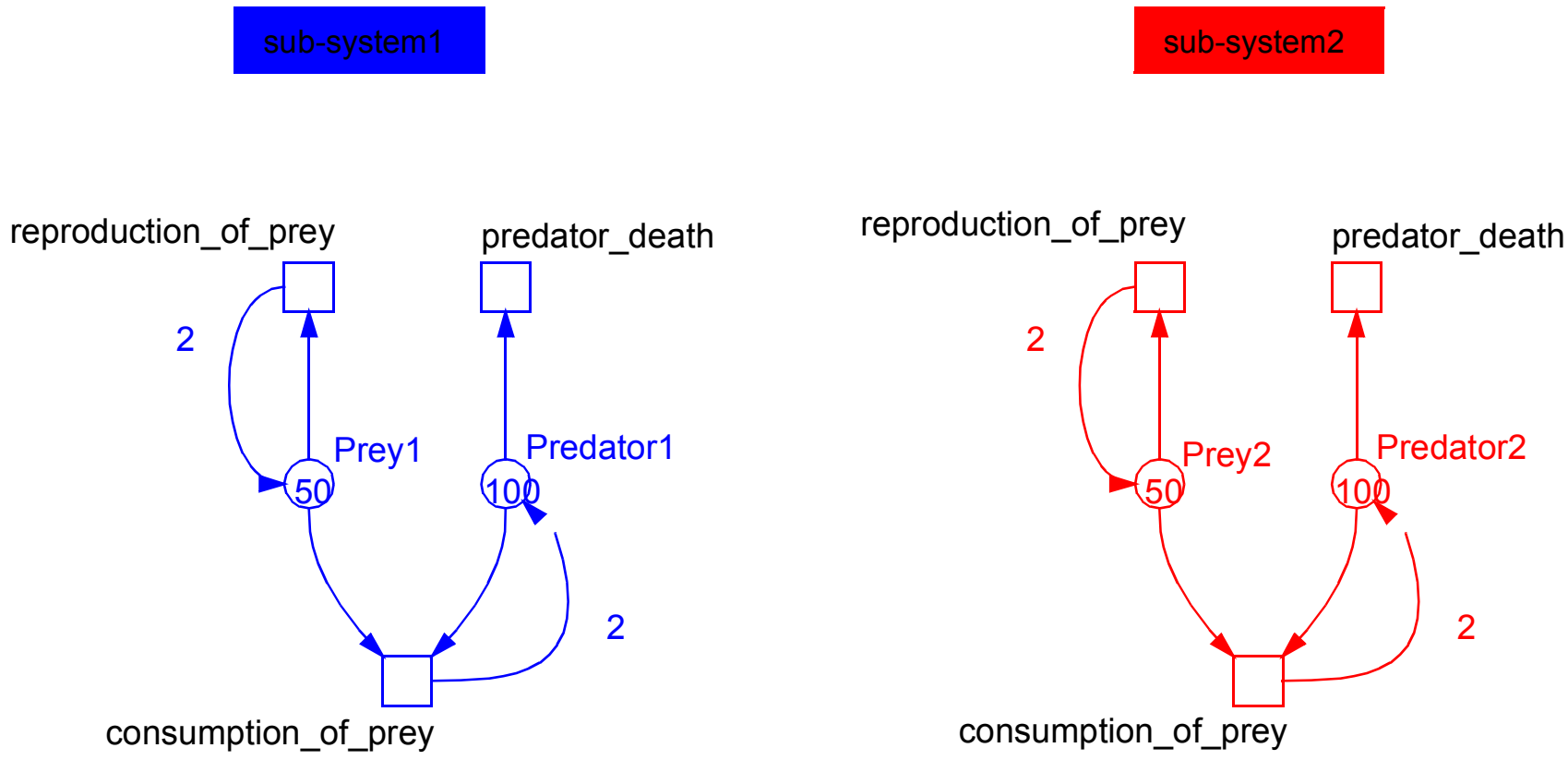
Ex1: Prey - Predator



Ex1: Prey - Predator



Ex1: Prey - Predator



Ex1: Prey - Predator

- **definitions**

  colourset *CS = 1-2;*

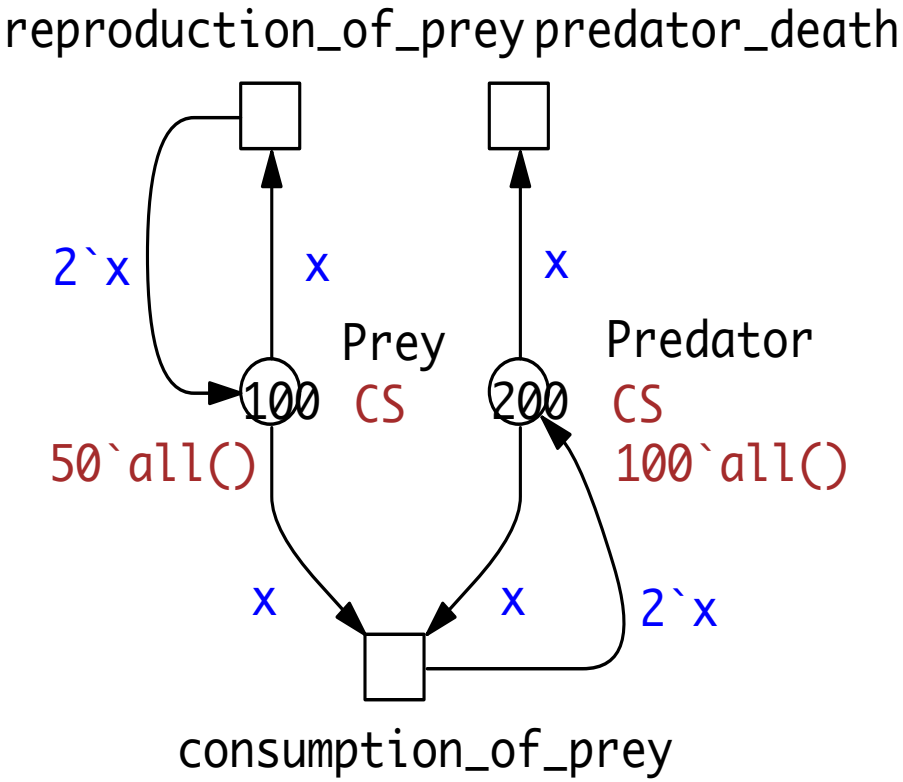
  var *x : CS;*

- **better:**

  const *SIZE = 2;*

  colourset *CS = 1-SIZE;*

  var *x : CS;*



Ex1: Prey - Predator

- **definitions**

  colourset *CS = 1-2;*

  var *x : CS;*

- **better:**

  const *SIZE = 2;*

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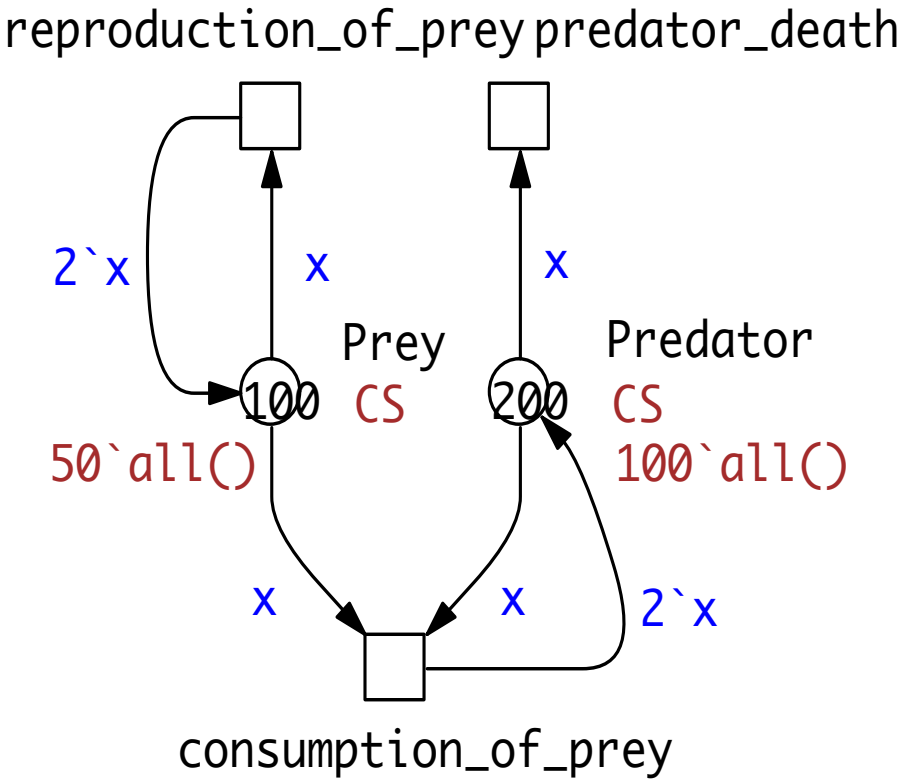
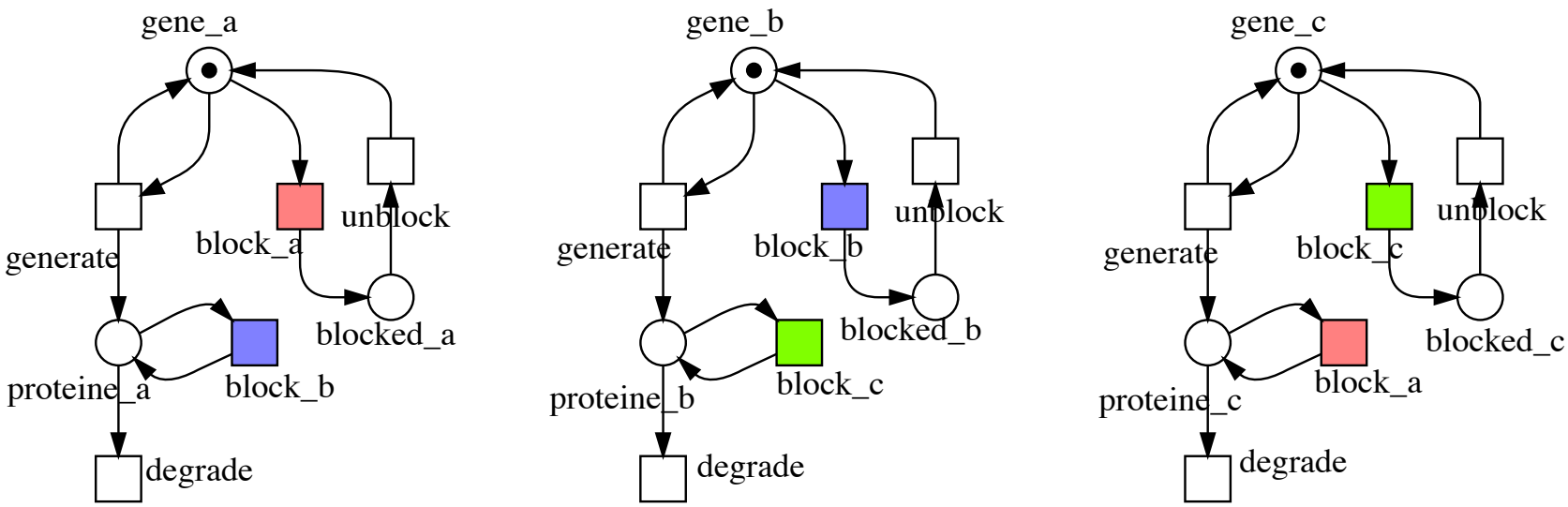
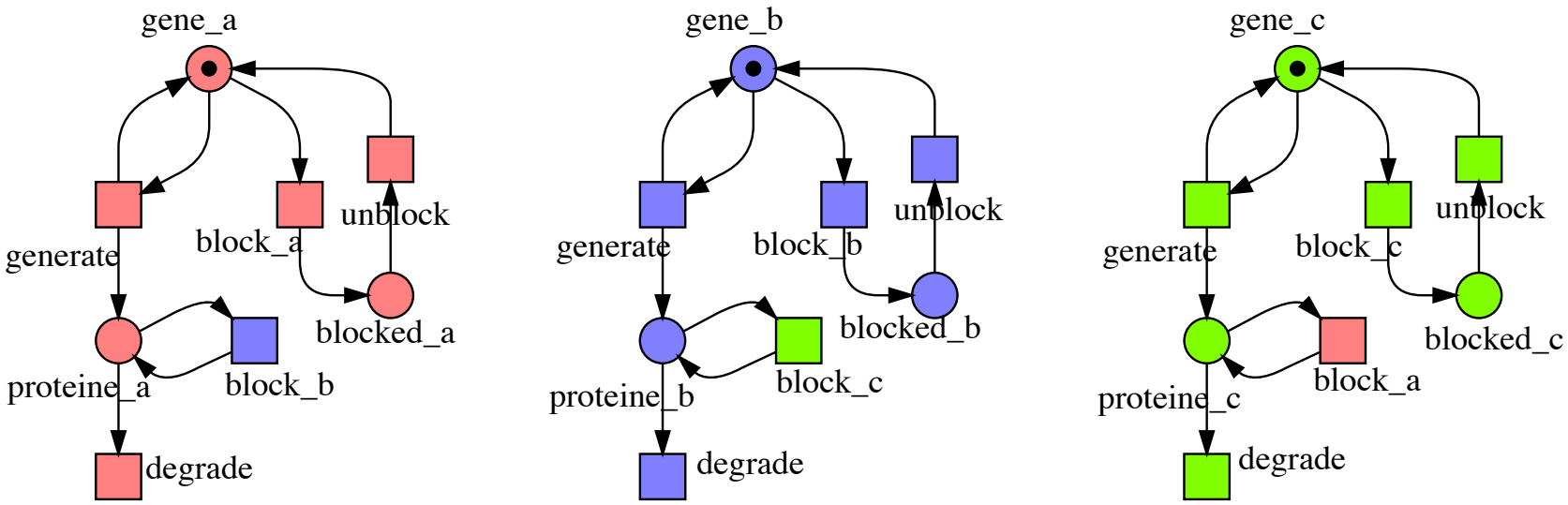


- **changing SIZE adapts the model to various scenarious**

Ex2: Repressilator



Ex2: Repressilator

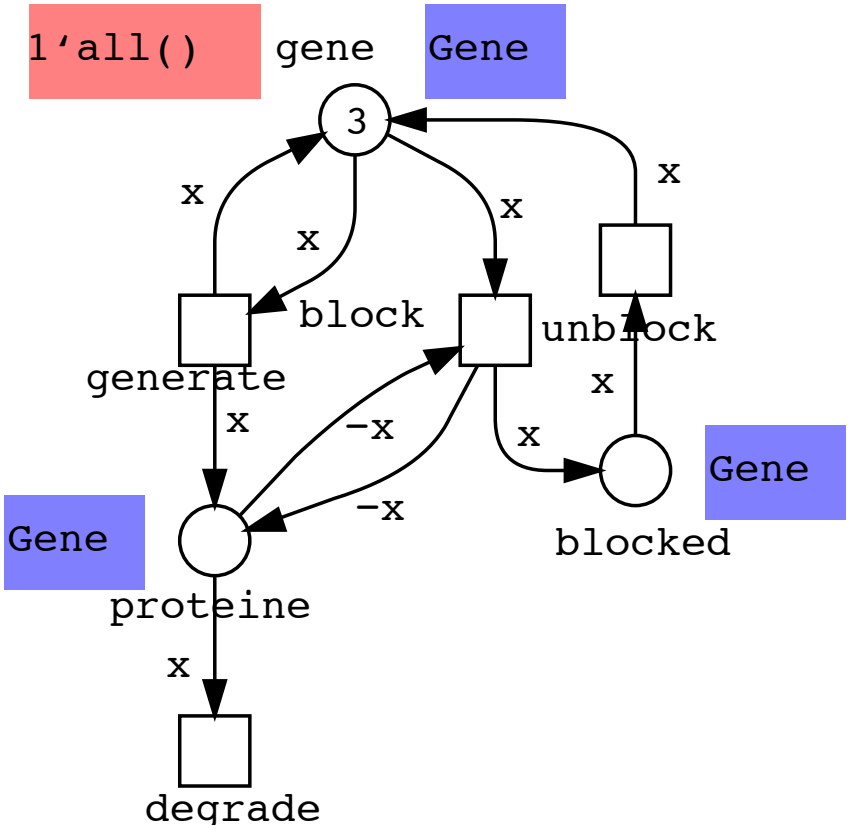


Ex2: Repressilator

- **definitions**

  colorset *Gene = enum a-c;*

  var *x : Gene;*



Ex2: Repressilator

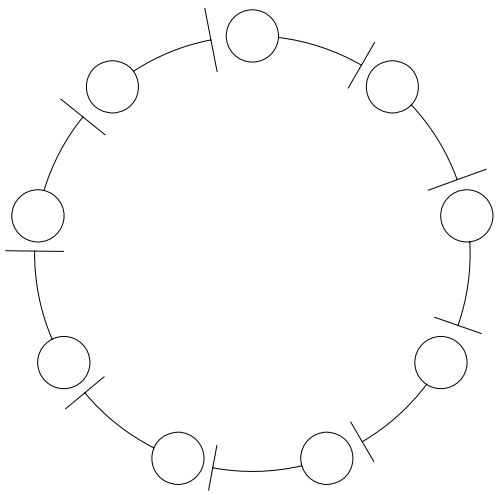
- **definitions**

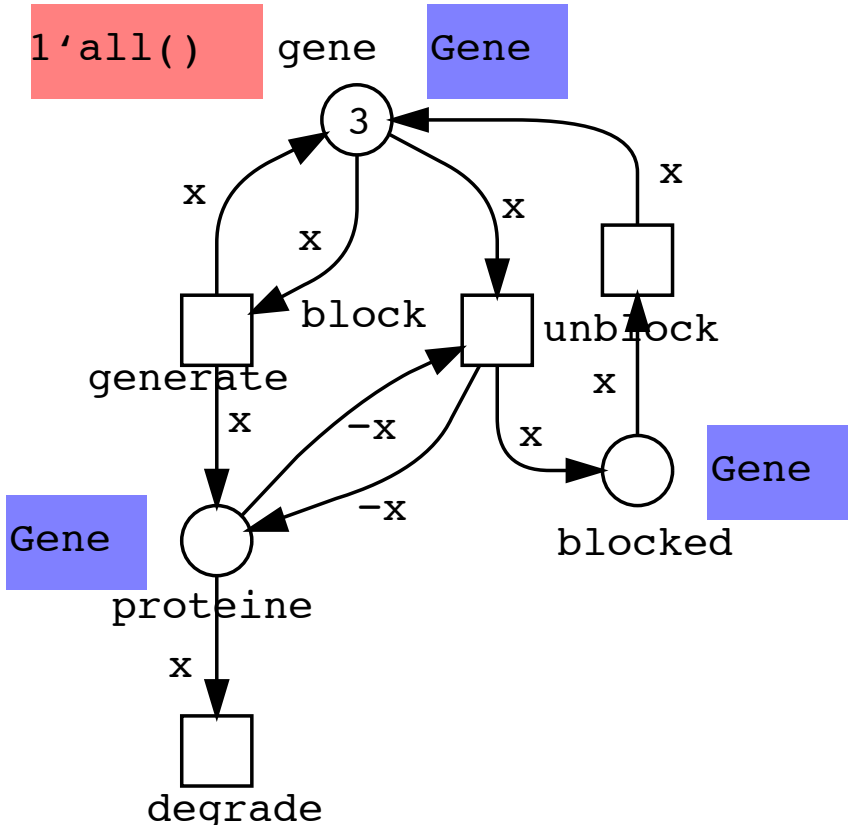
  colorset *Gene = enum a-c;*

  var *x : Gene;*

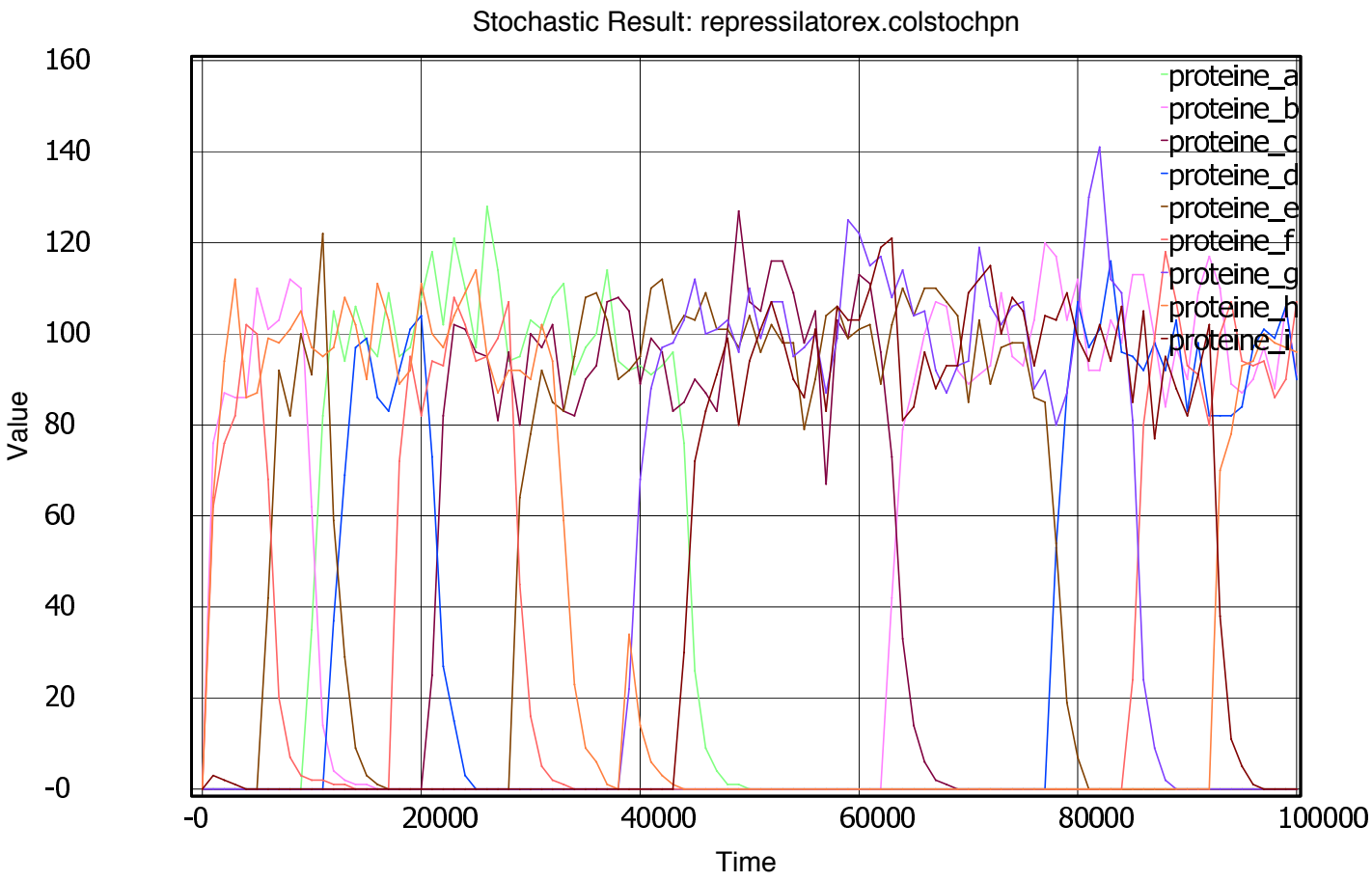
- **model scaling**

  colorset *Gene = enum a-i;*

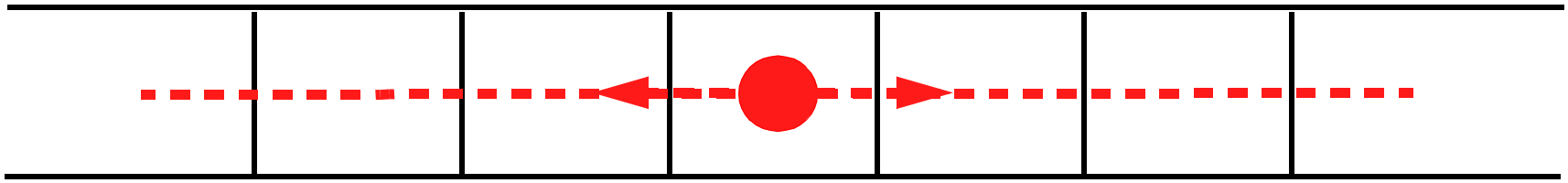




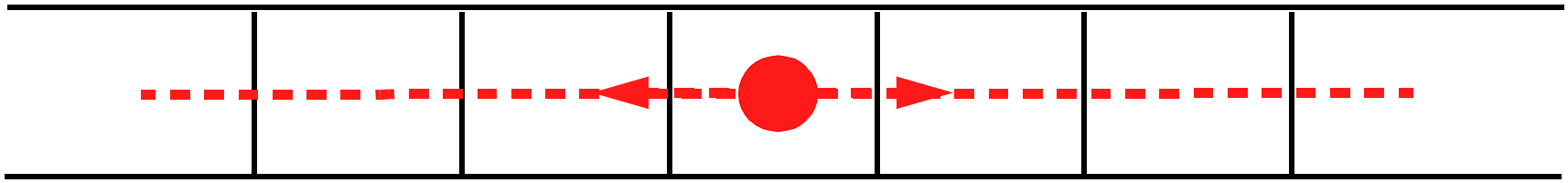
Ex2: Repressilator

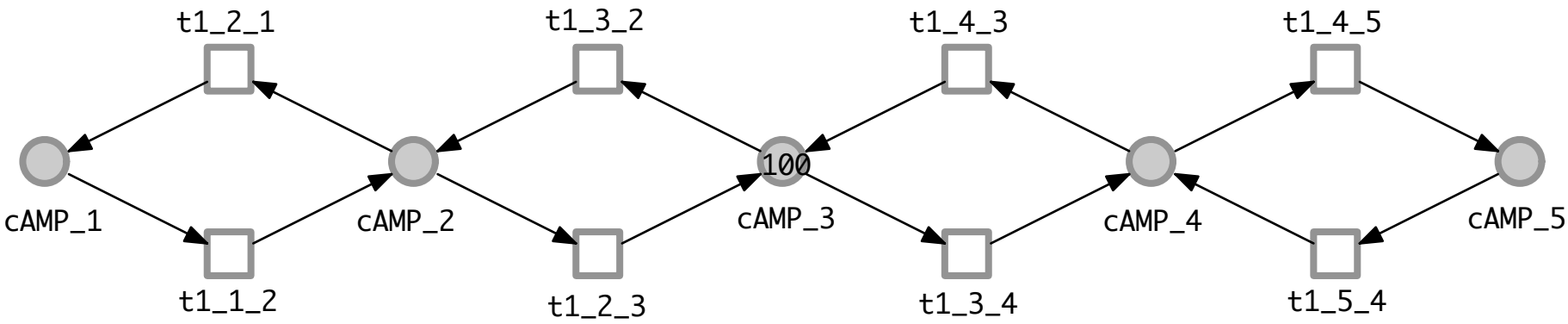


Ex3: Diffusion - 1D



Ex3: Diffusion - 1D

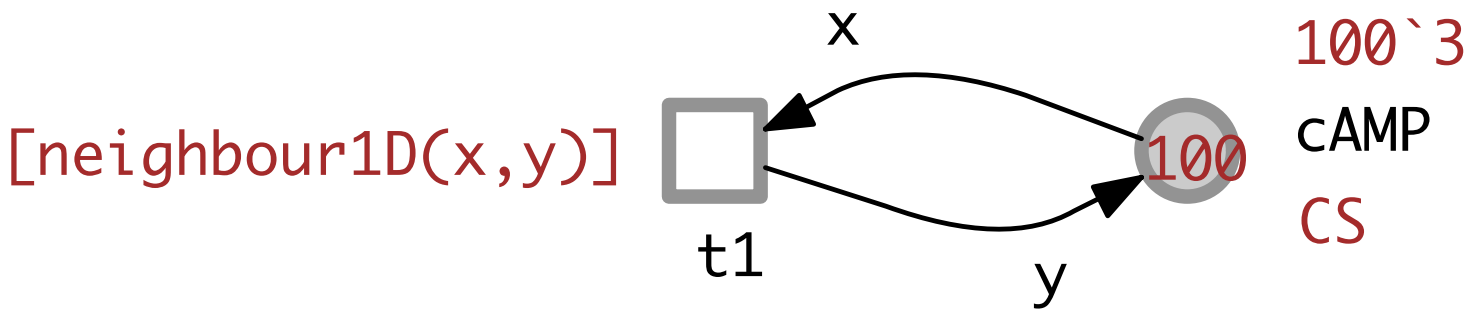




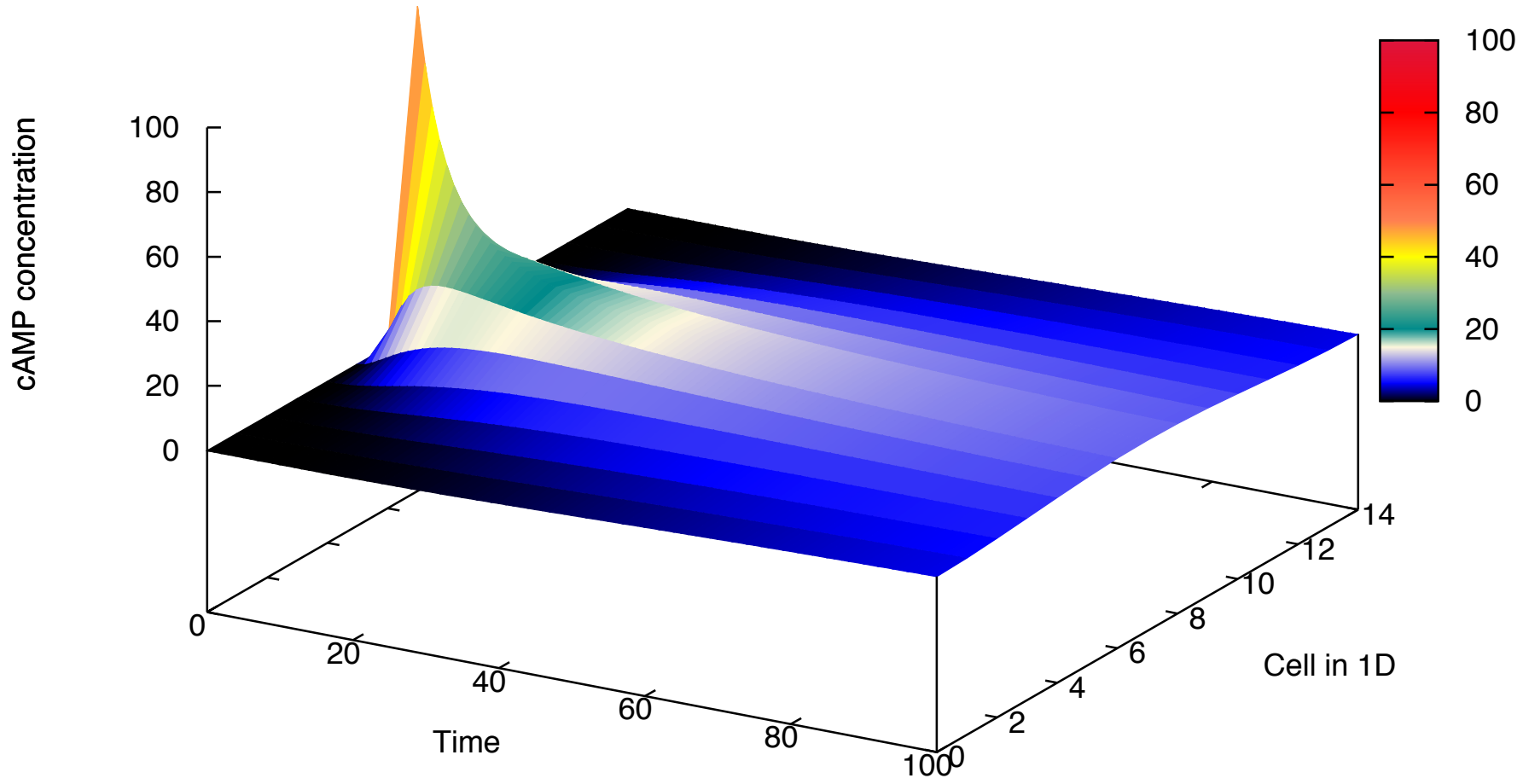
Ex3: Diffusion - 1D

- **definitions**

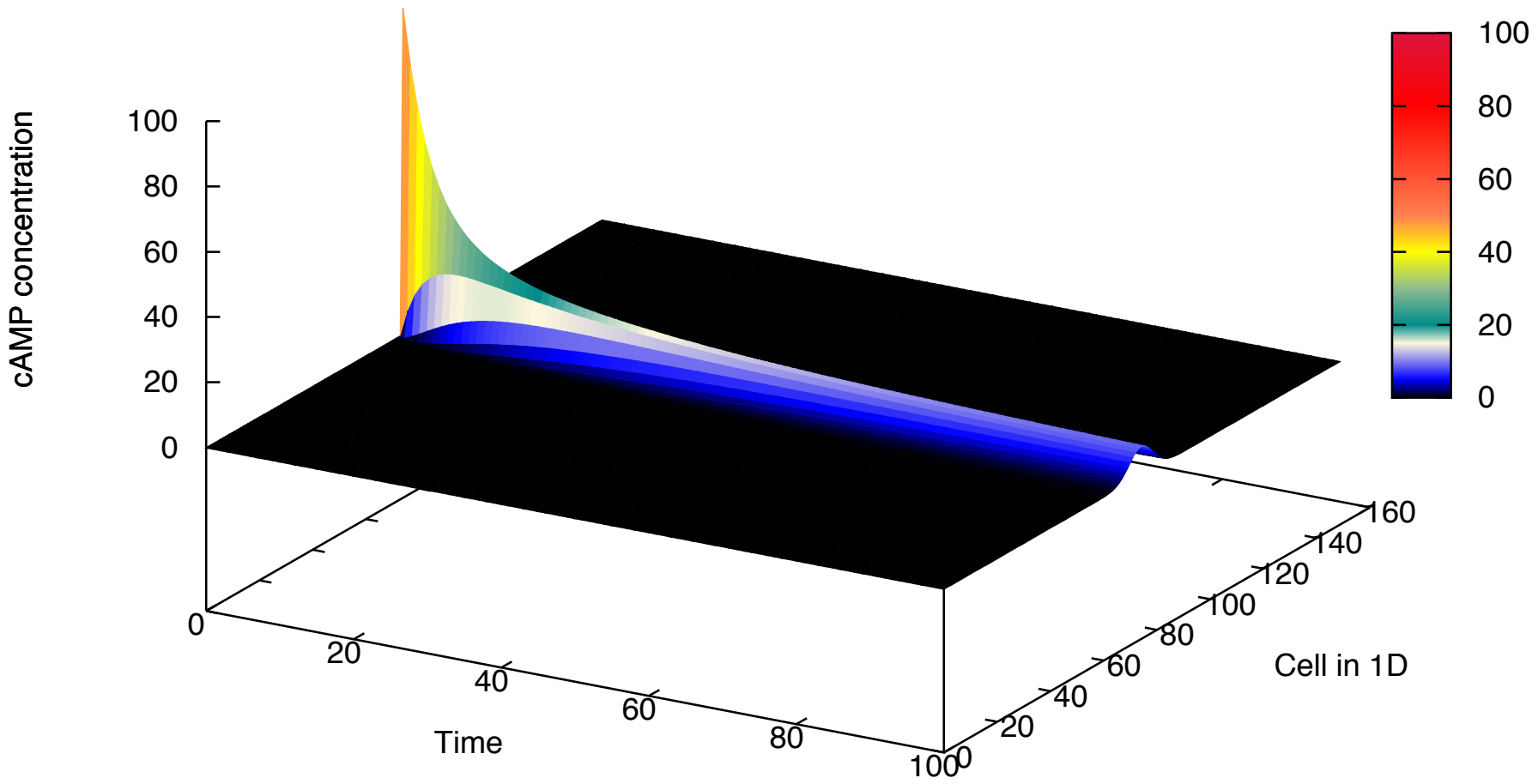
```
const D1 = 5;              // grid size
colorset CS = 1-D1;        // grid positions
var x,y : CS;

function neighbour1D (CS x,a) bool:
  // a is neighbour of x
  ( a=x-1 | a=x+1)  & (1<=a) & (a<=D1);
```



Ex3: Diffusion - 1D

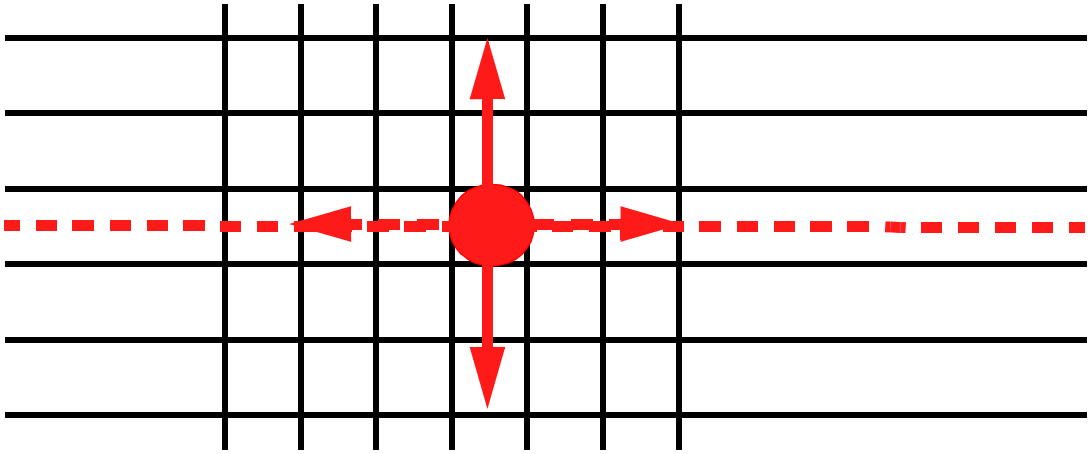


Ex3: Diffusion - 1D



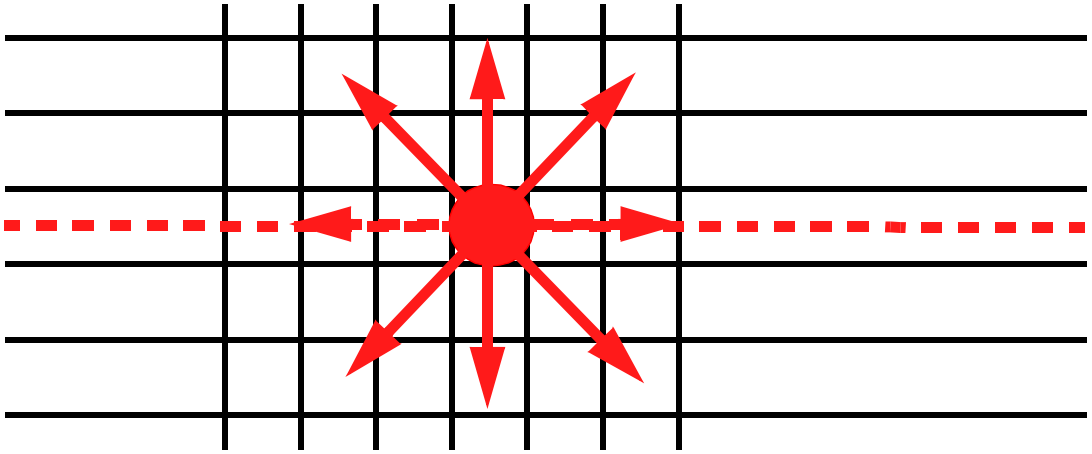
Ex3: Diffusion - 2D

❑ SCHEME



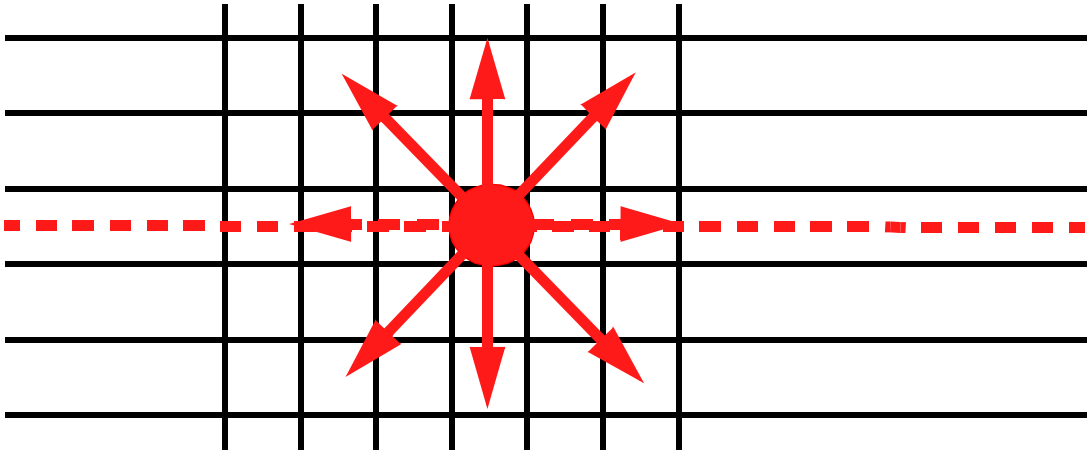
Ex3: Diffusion - 2D

❑ SCHEME



Ex3: Diffusion - 2D

SCHEME



definitions

```
const D1 = 5;                    // grid size first dimension
const D2 = 5;                    // grid size second dimension
colorset CD1 = 1-D1;             // row index
colorset CD2 = 1-D2;             // column index
colorset Grid2D = CD1 x CD2;     // 2D grid

var x, a : CD1;
var y, b : CD2;
```

Ex3: Diffusion - 2D

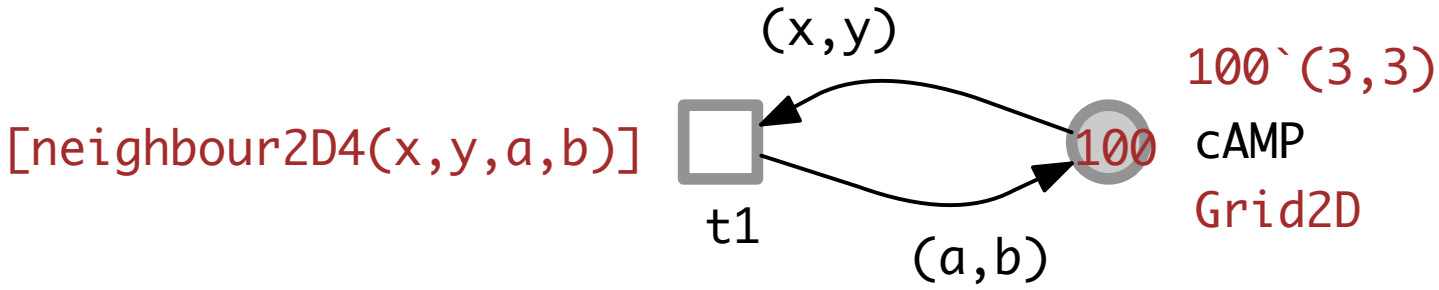
- **four neighbours**

  function *neighbour2D4 (CD1 x, CD2 y, CD1 a, CD2 b)* ***bool****:*

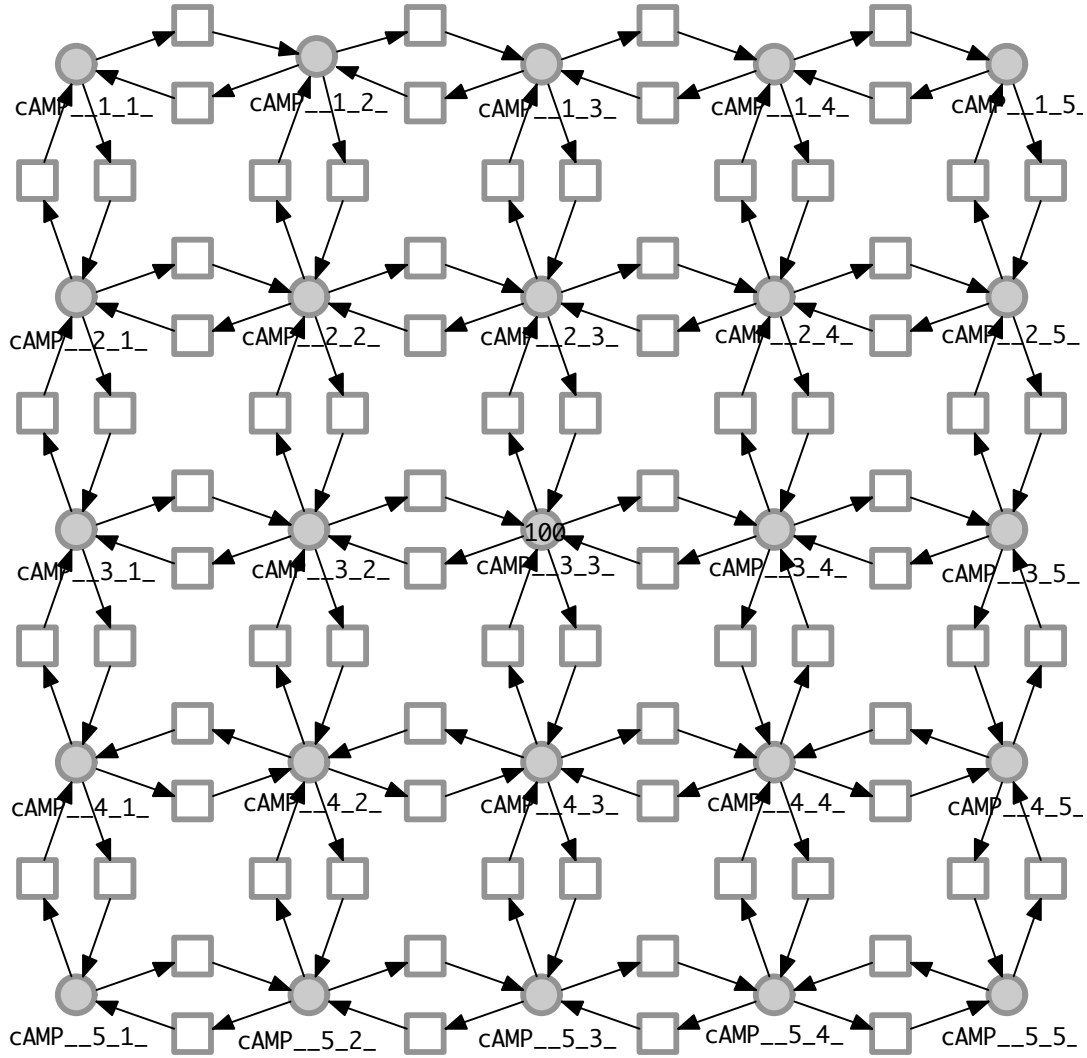
  // (a,b) is one of the up to four neighbours of (x,y)

  (a=x & b=y-1) | (a=x & b=y+1)

  | (b=y & a=x-1) | (b=y & a=x+1);



Ex3: Diffusion - 2D4 Neighbourhood



Ex3: Diffusion - 2D

- **eight neighbours**

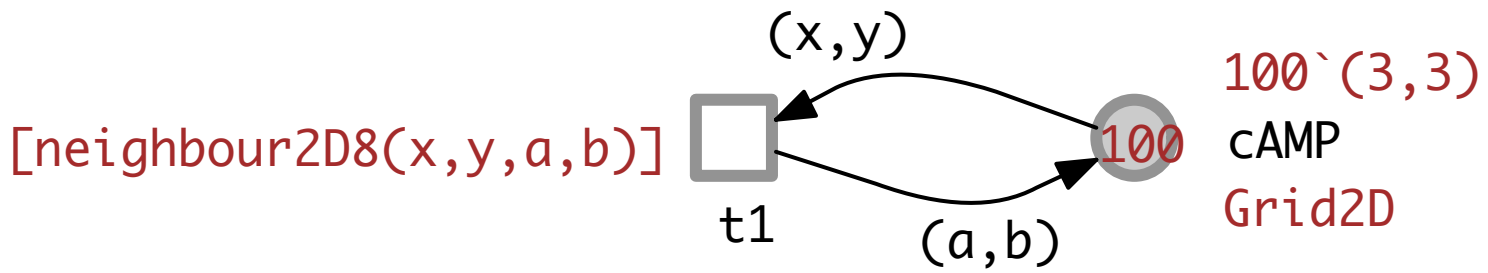
function *neighbour2D8 (CD1 x, CD2 y, CD1 a, CD2 b)* ***bool****:*

// (a,b) is one of the up to eight neighbours of (x,y)

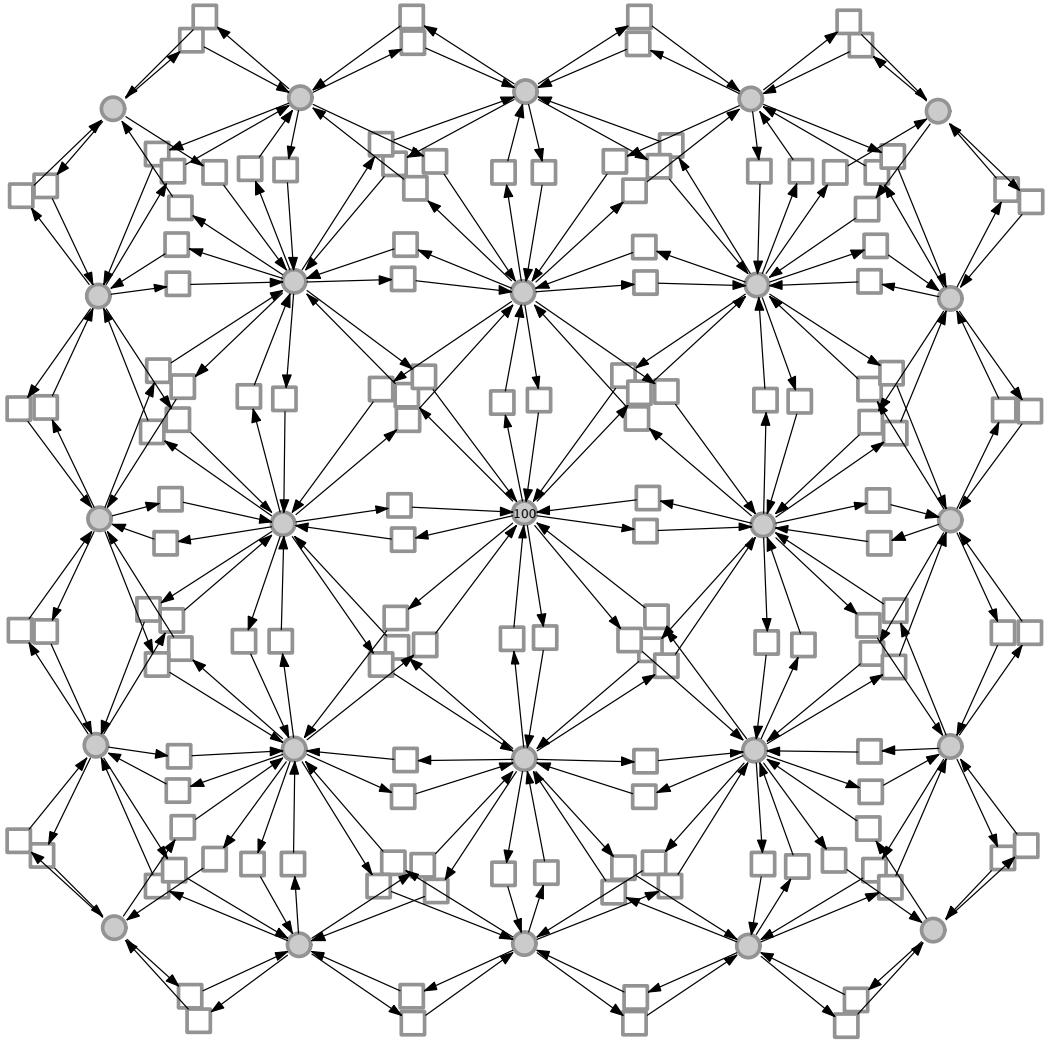
(a=x | a=x+1 | a=x-1) & (b=y | b=y+1 | b = y-1)

& (!(a=x & b=y))

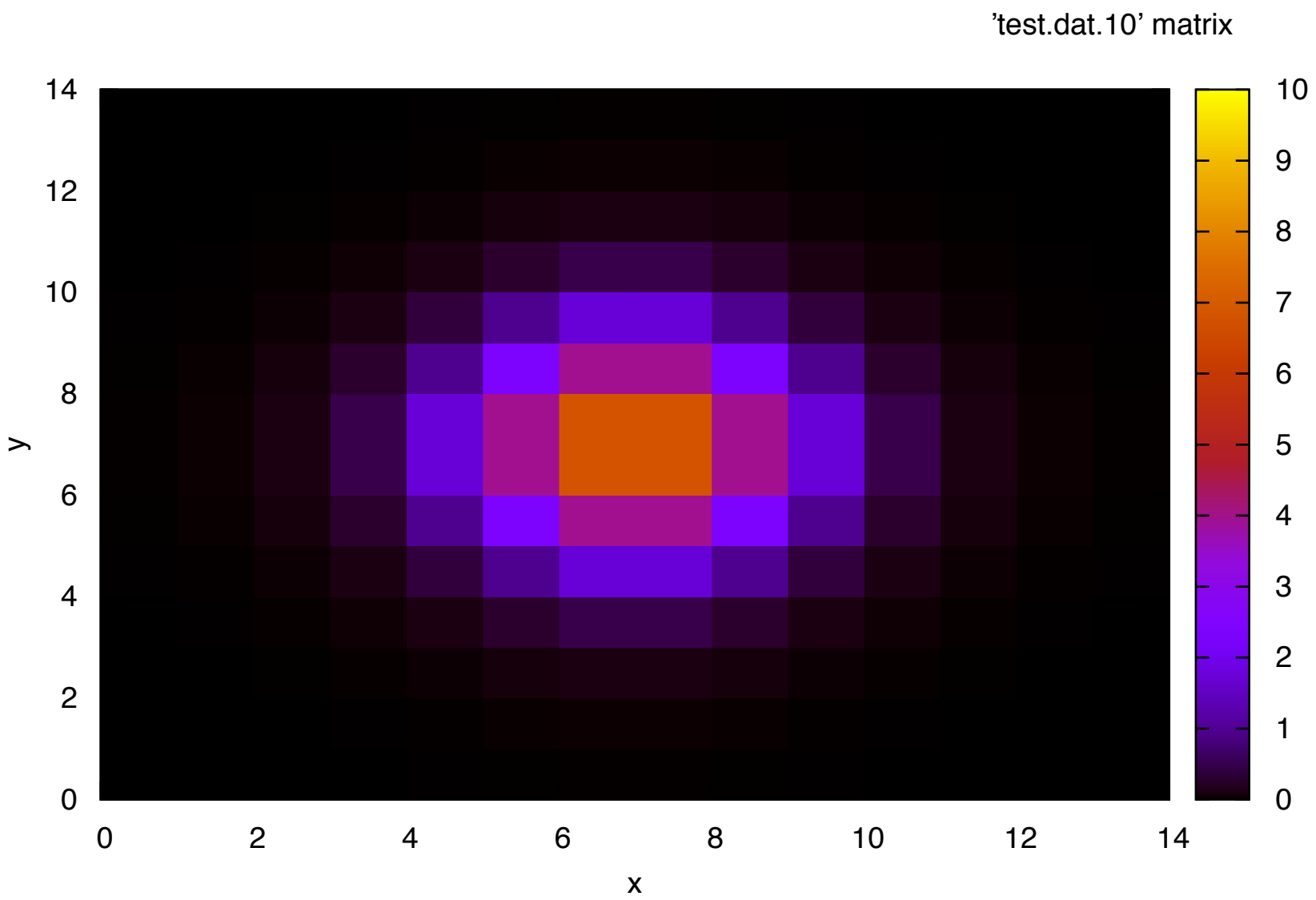
& (1<=a & a<=D1) & (1<=b & b<=D2);



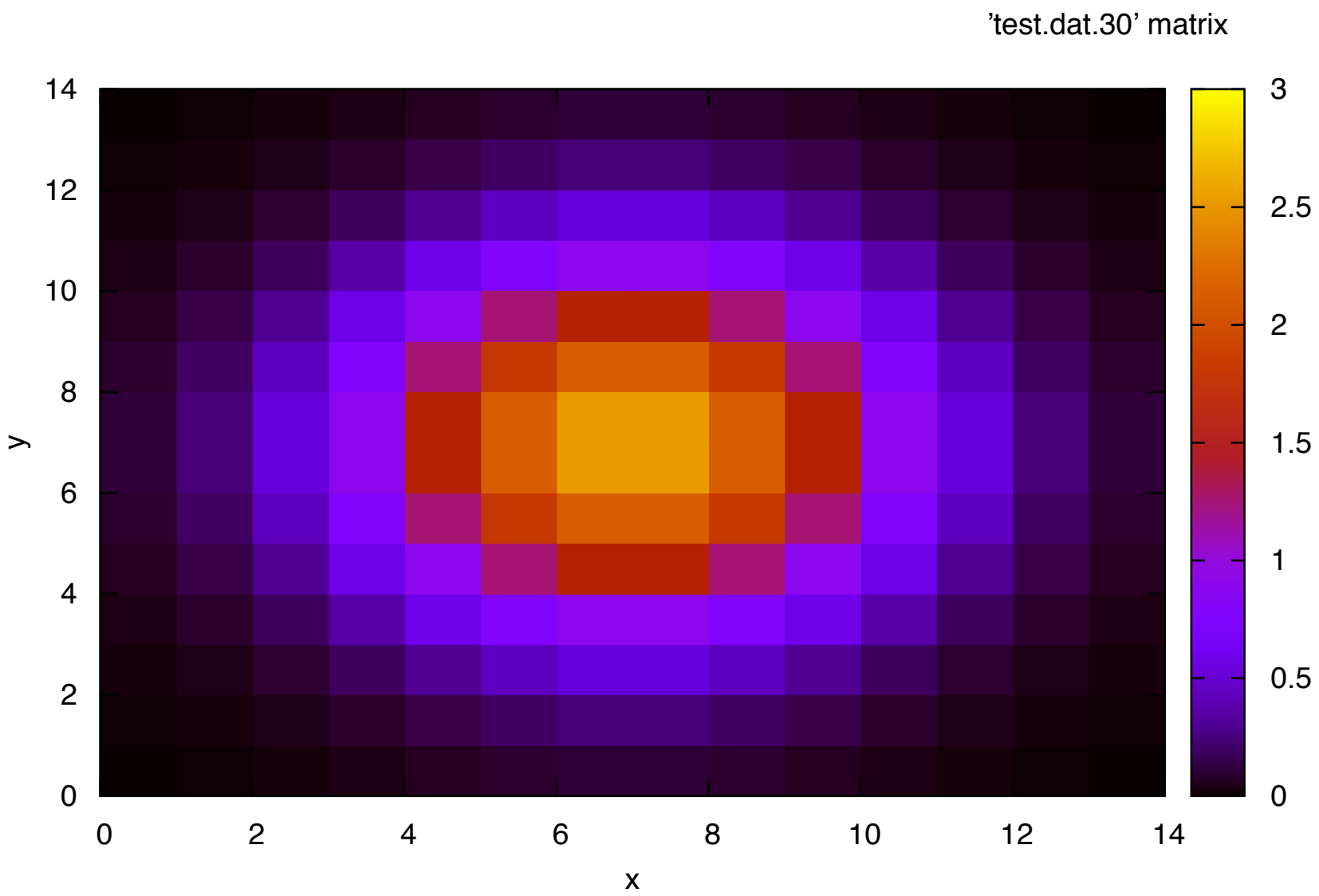
Ex3: Diffusion - 2D8 Neighbourhood



Ex3: Diffusion - 2D8 Neighbourhood



Ex3: Diffusion - 2D8 Neighbourhood



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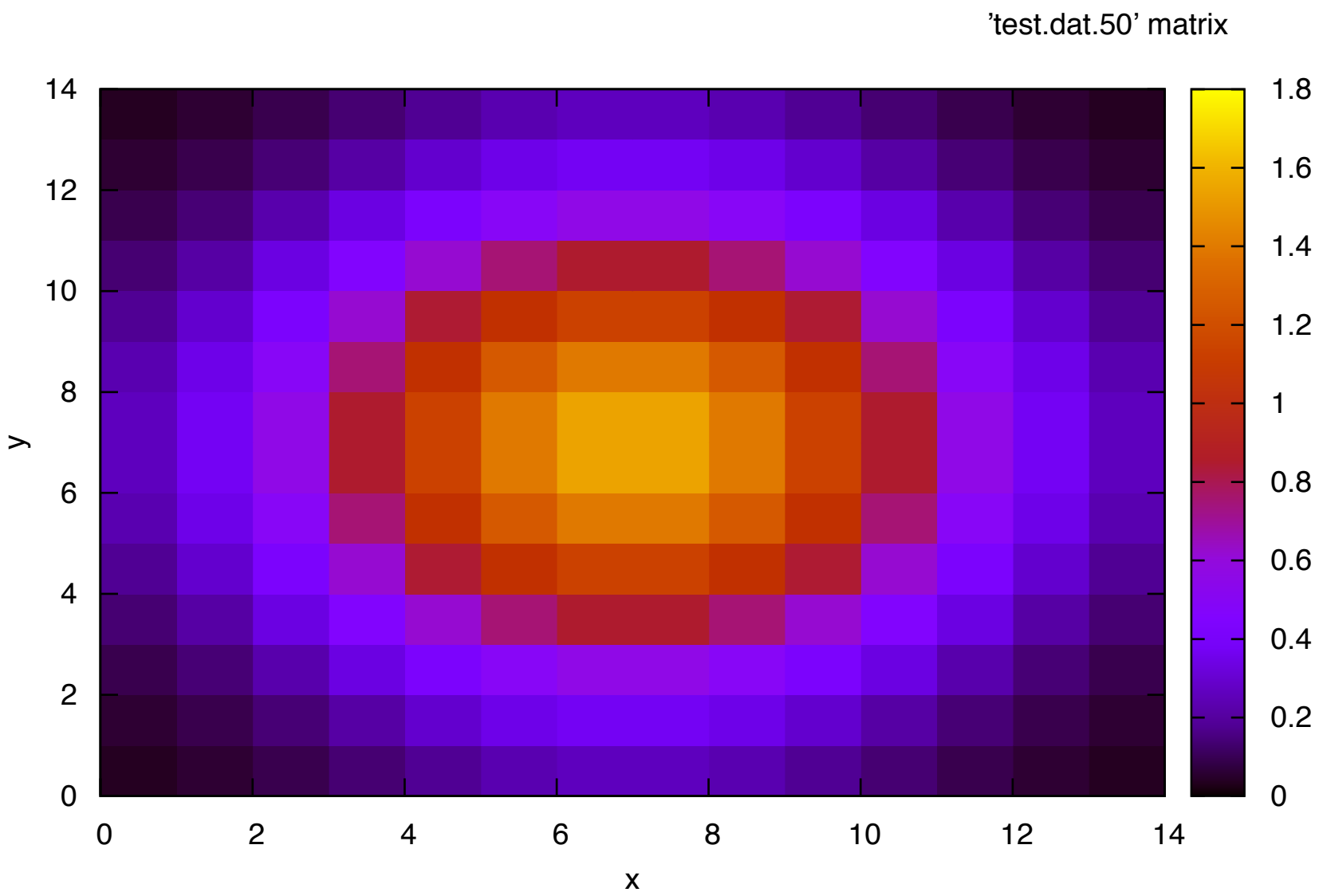
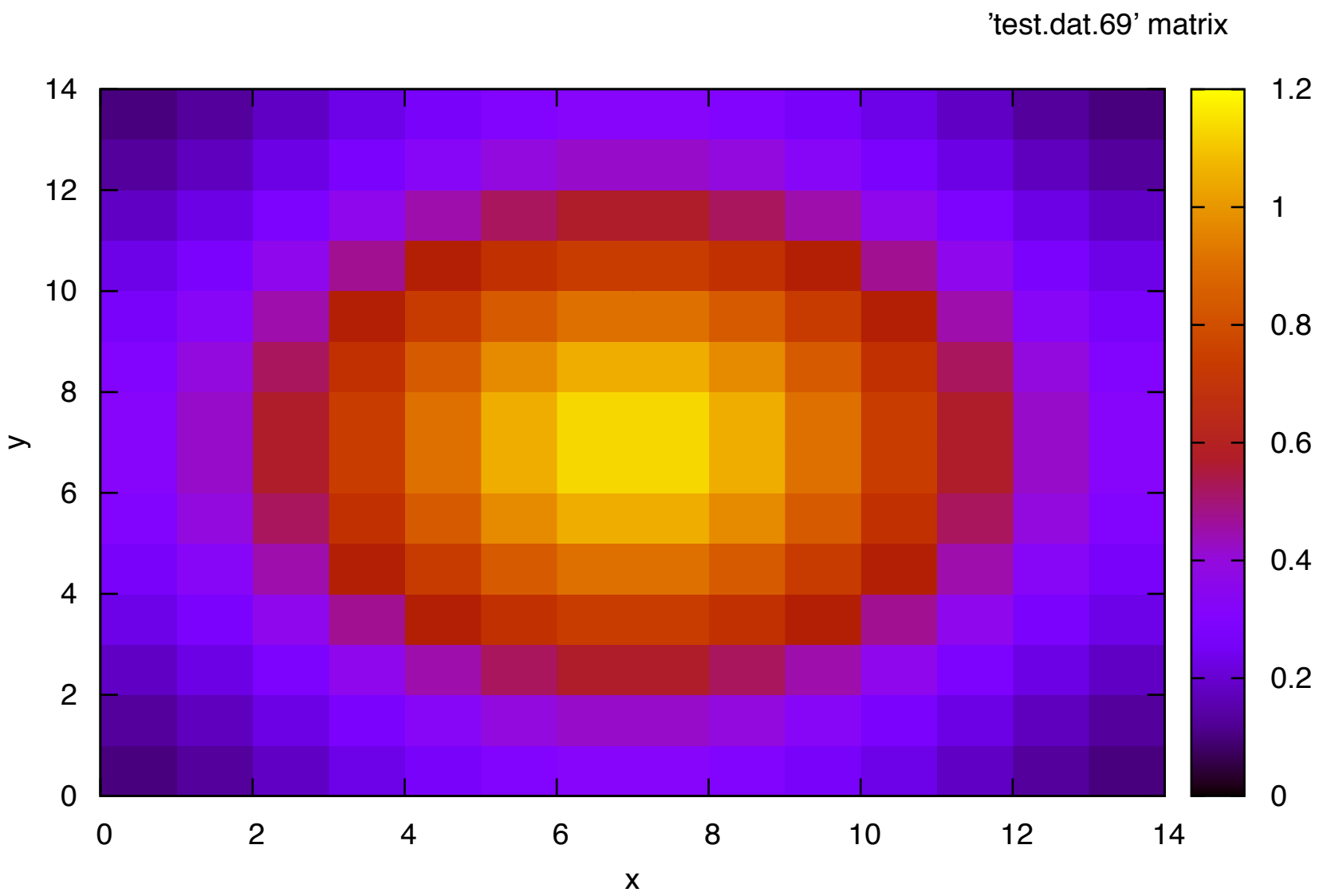
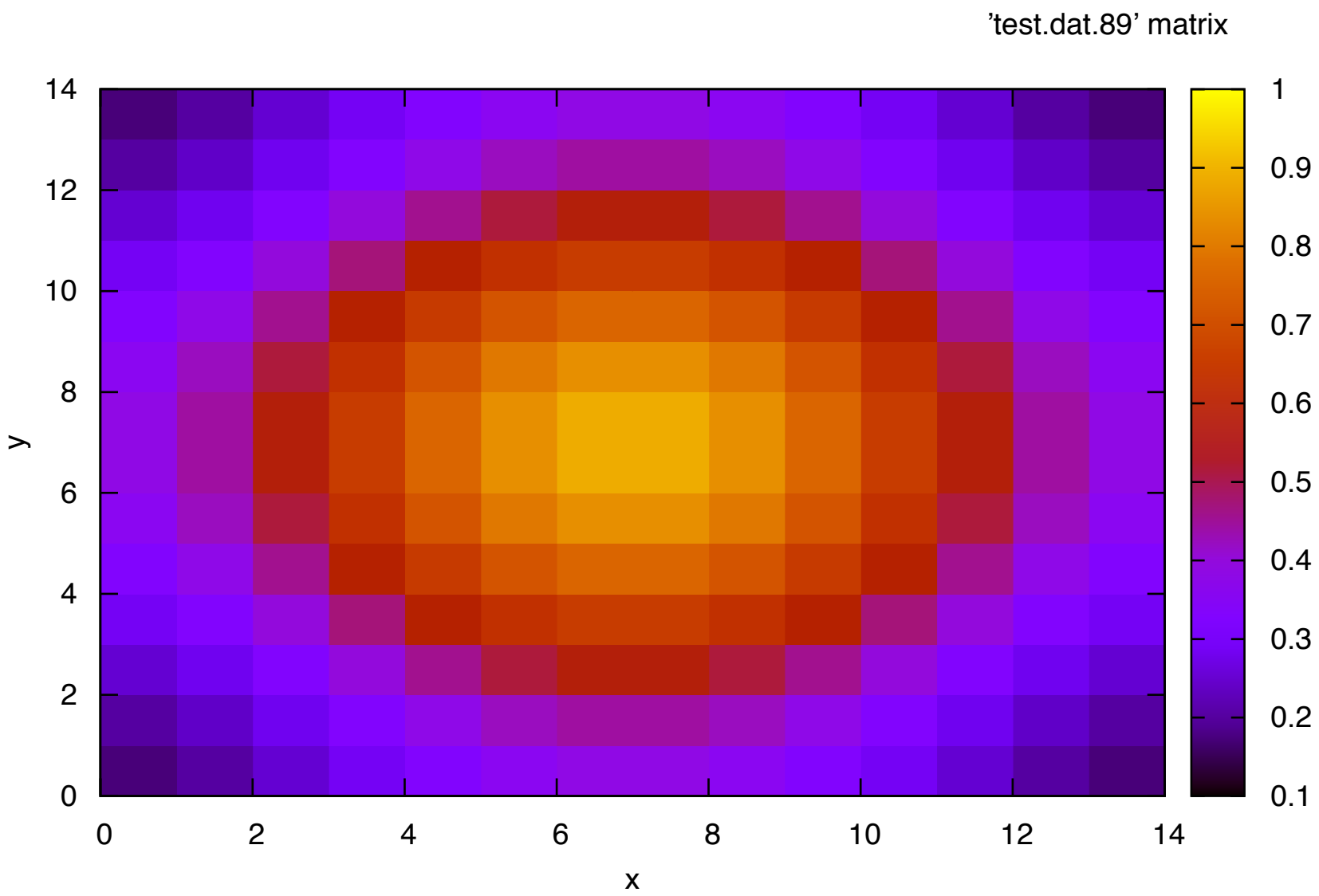


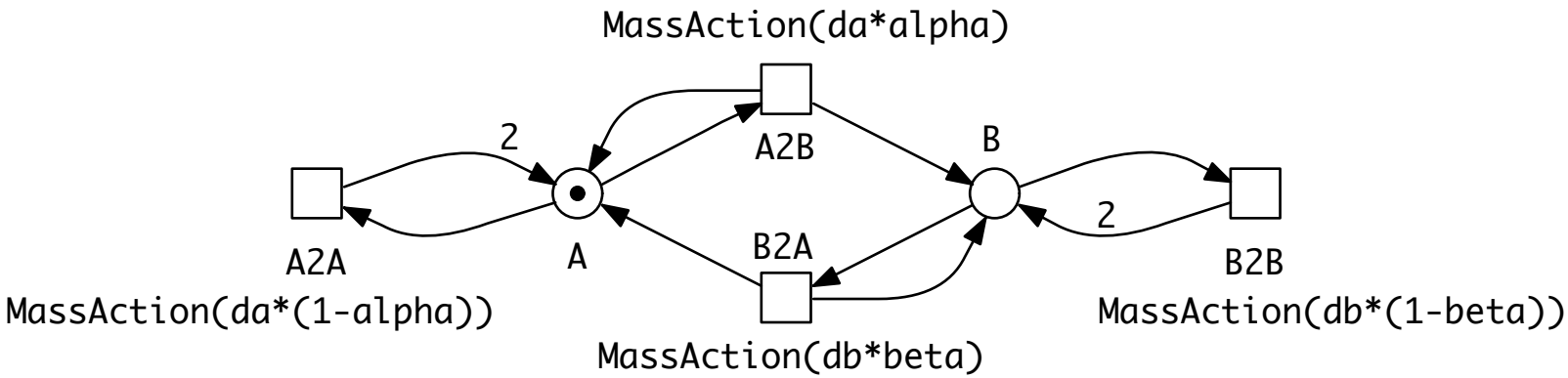
Ex3: Diffusion - 2D8 Neighbourhood

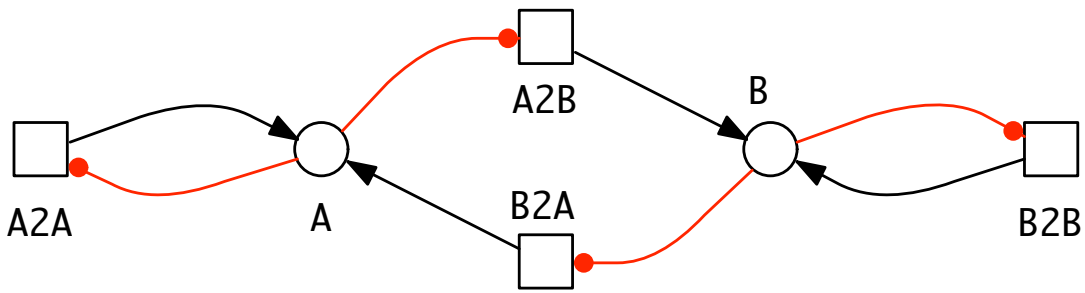


Ex3: Diffusion - 2D8 Neighbourhood

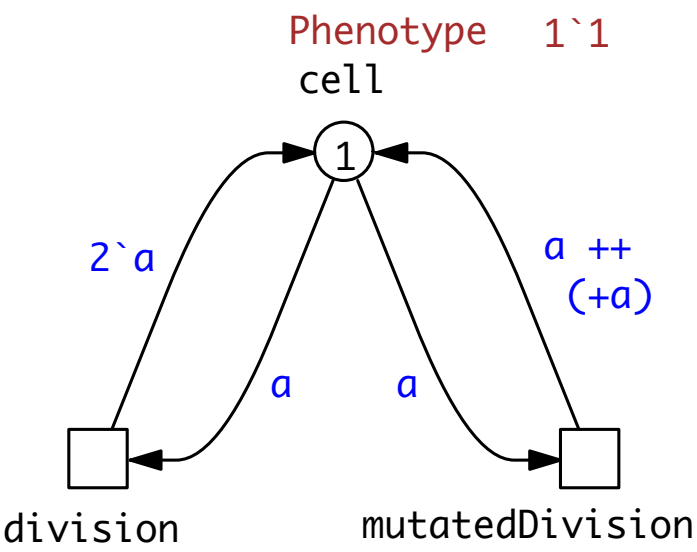


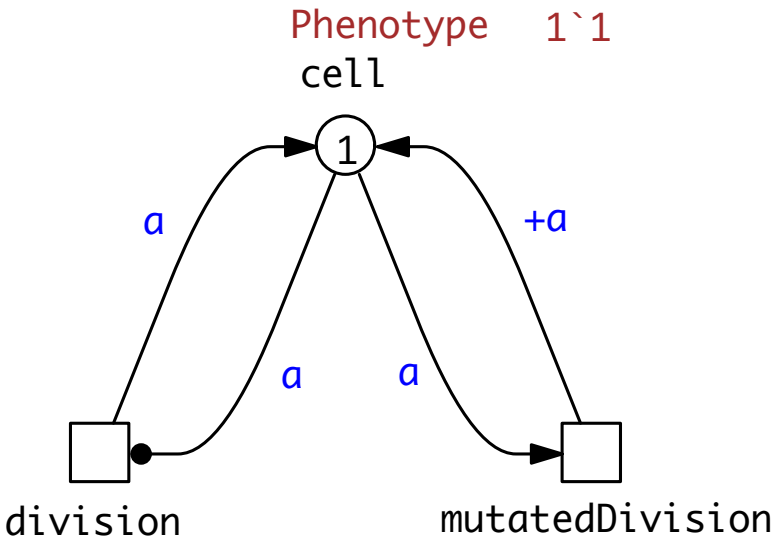
MULTICELL COLONIES





MULTICELL COLONIES

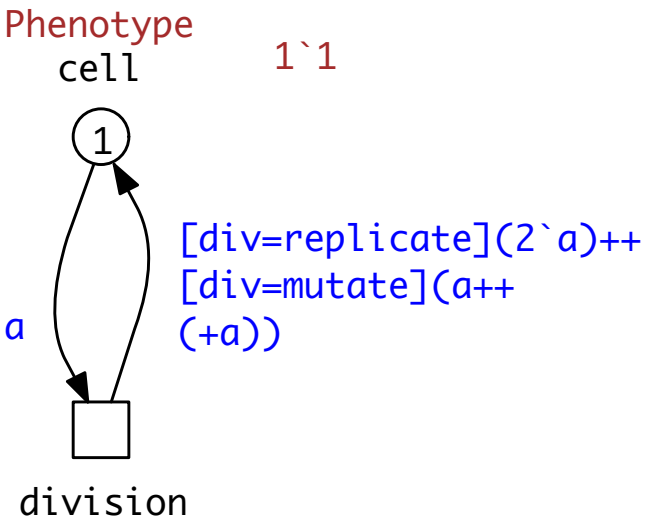


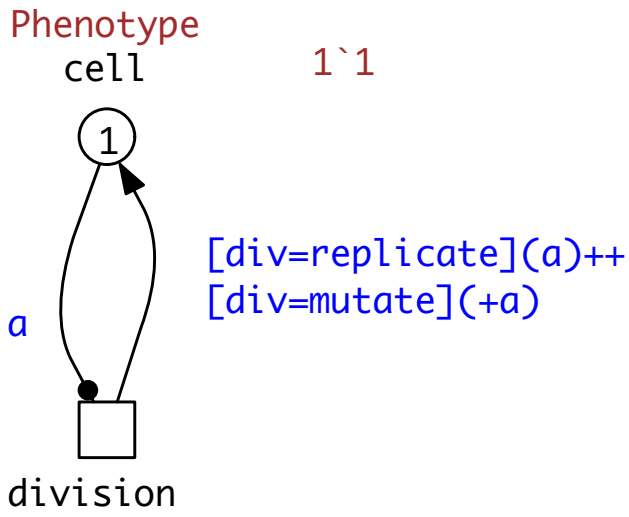



```
a=1 : da*(1-alpha)*cell
a=2 : db*(1-beta)*cell
```

```
a=1 : da*alpha*cell
a=2 : db*beta*cell
```

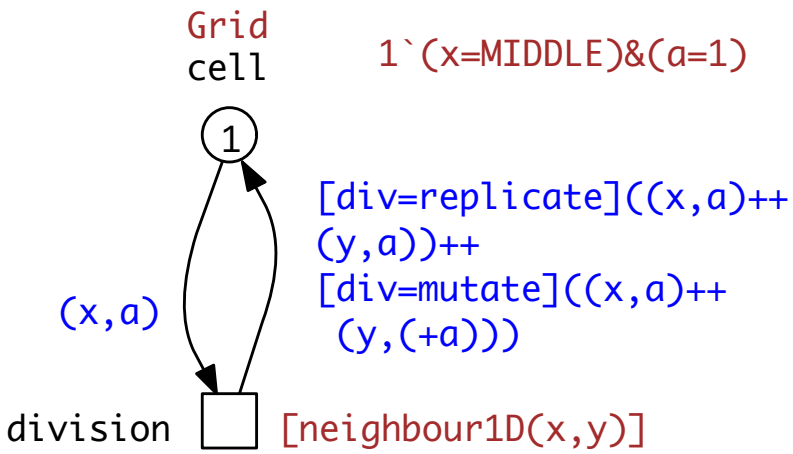
MULTICELL COLONIES

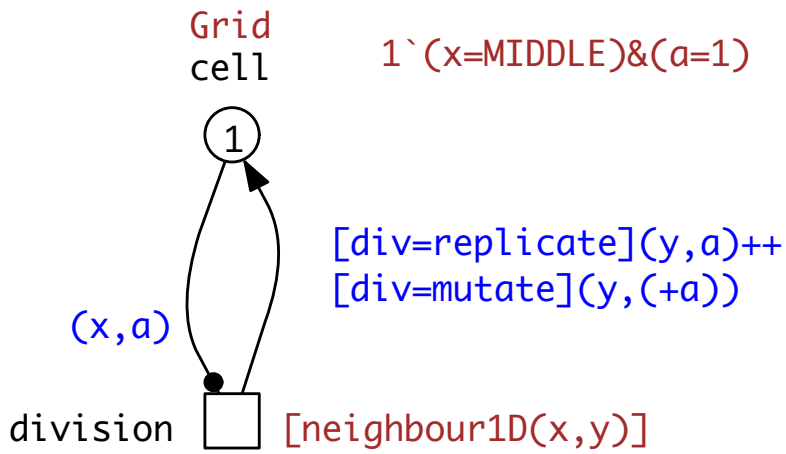





```
(a=1) & (div=replicate) : cell*da*(1-alpha)
(a=1) & (div=mutate) : cell*(da*alpha)
(a=2) & (div=replicate) : cell*(db*(1-beta))
(a=2) & (div=mutate) : cell*(db*beta)
```

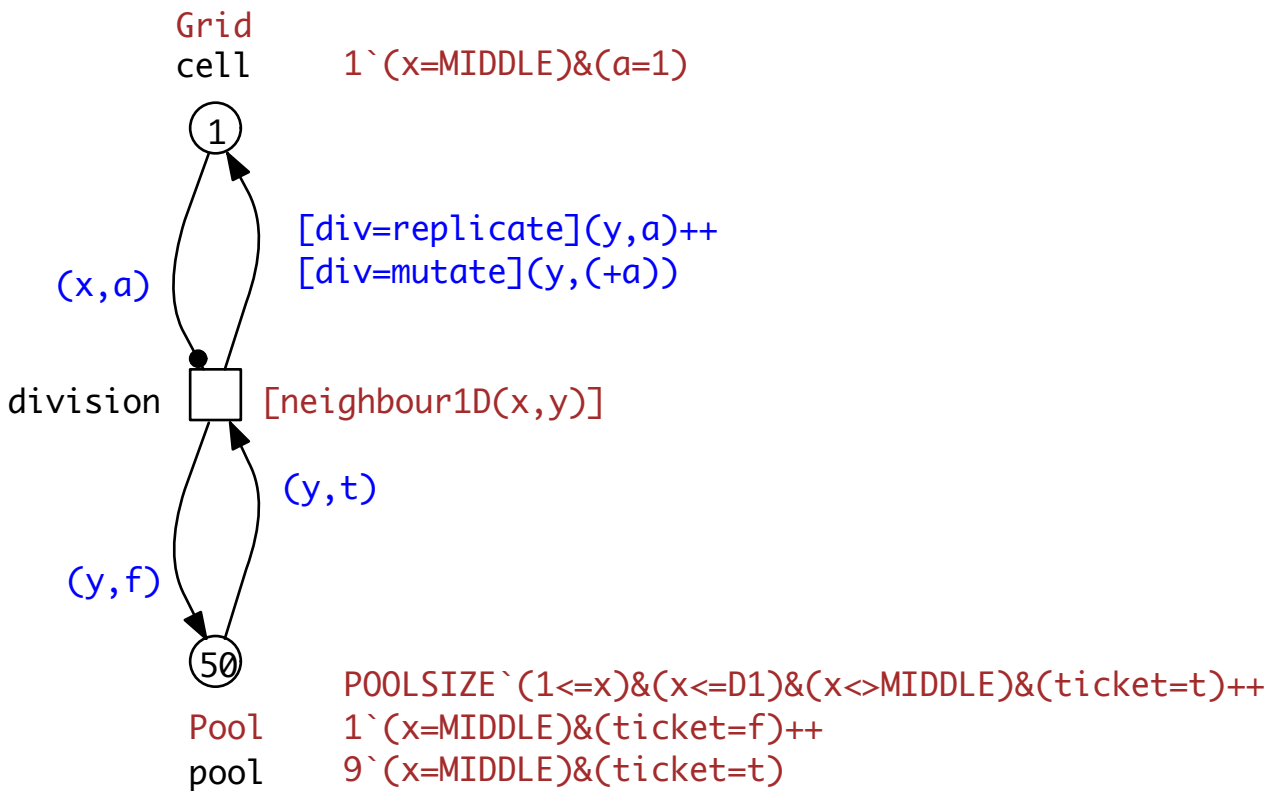
MULTICELL COLONIES



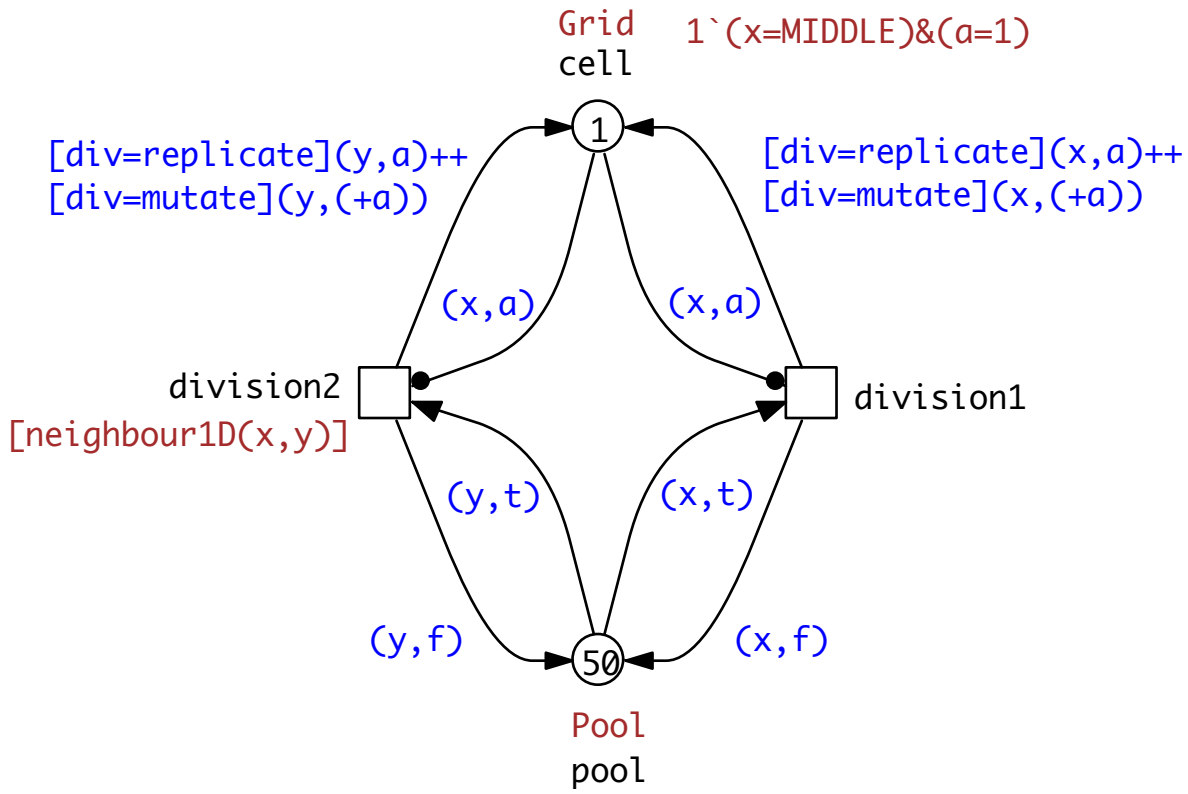



```
(a=1) & (div=replicate) : cell*da*(1-alpha)
(a=1) & (div=mutate) : cell*(da*alpha)
(a=2) & (div=replicate) : cell*(db*(1-beta))
(a=2) & (div=mutate) : cell*(db*beta)
```

MULTICELL COLONIES

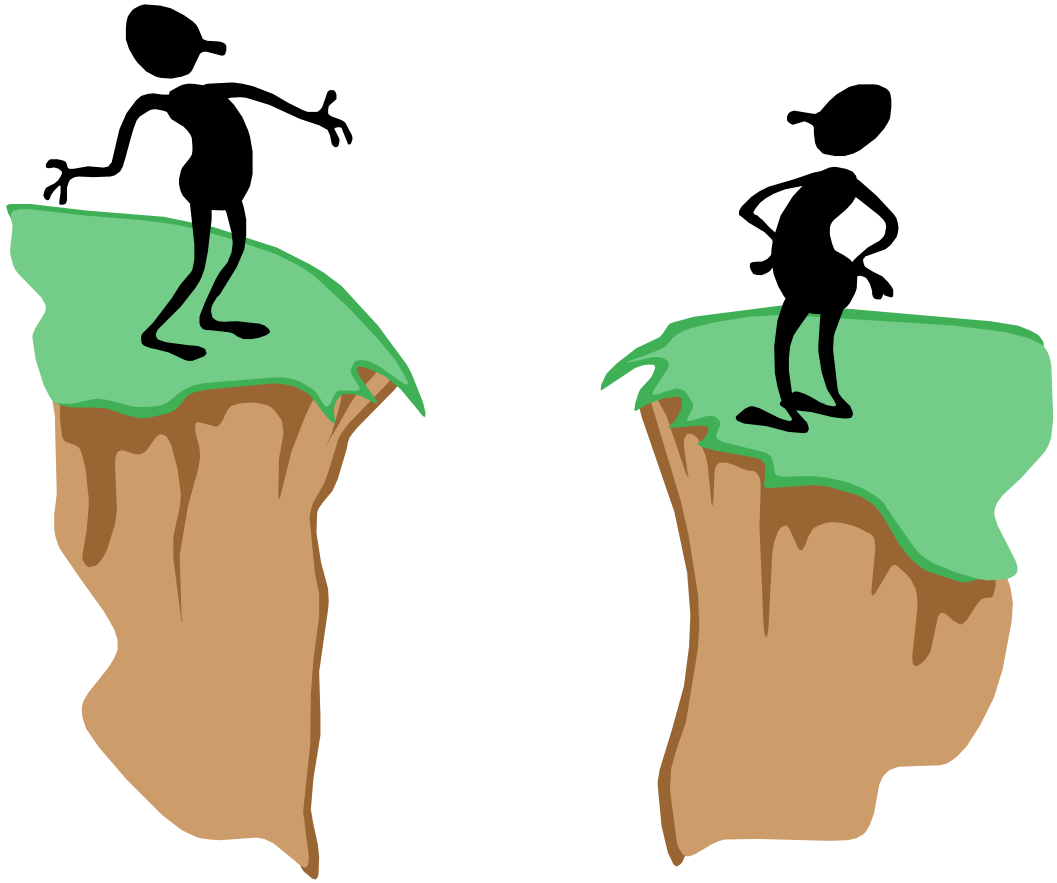


MULTICELL COLONIES




```
POOLSIZE`(1<=x)&(x<=D1)&(x<>MIDDLE)&(ticket=t)++
1`(x=MIDDLE)&(ticket=f)++
9`(x=MIDDLE)&(ticket=t)
```

OUTLOOK



THANKS !

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