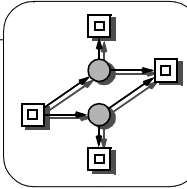
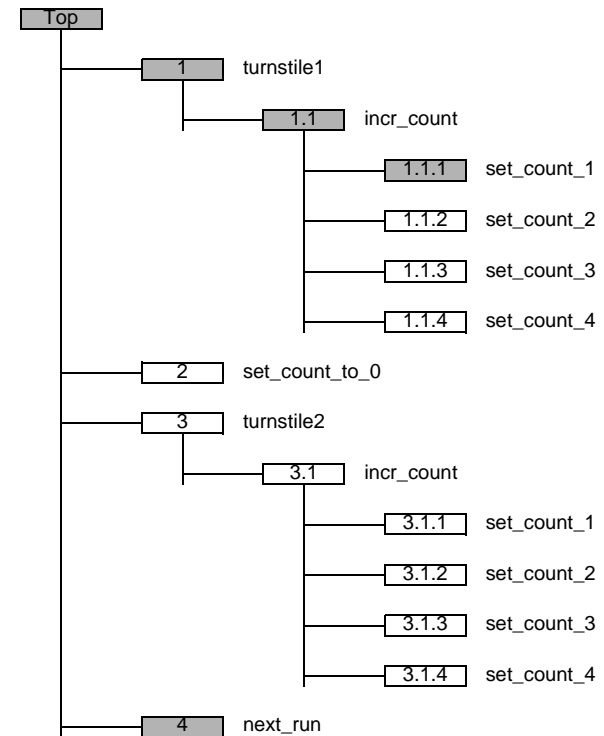


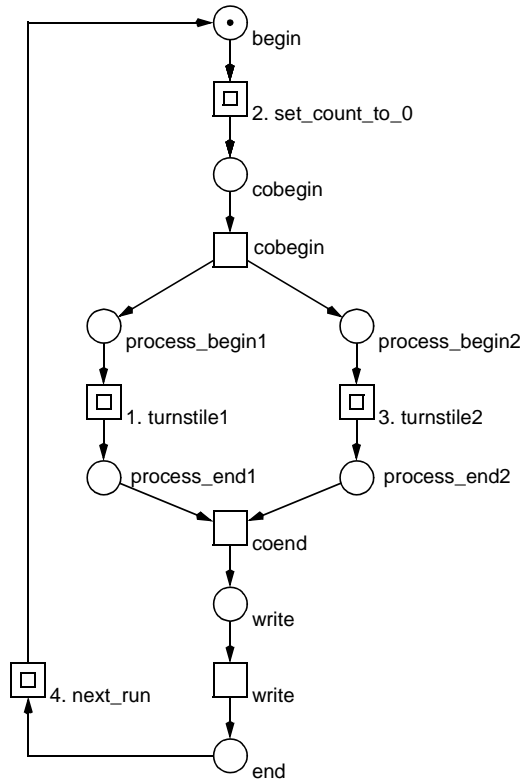
# SHARED OBJECTS AND MUTEX - BOTANICAL GARDEN



## GARDENS, HIERARCHY TREE



# GARDENS, TOP LEVEL



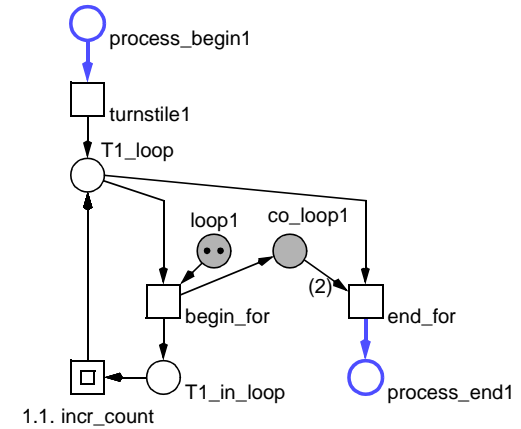
```

pnt:
ORD HOM NBM PUR CSV SCF CON SC Ft0 tF0 Fp0 pF0 MG SM FC EFC ES
N Y N N N N N Y Y N N N N N N N N N
DTP CPI CTI B SB REV DST BSt DTr DCF L LV L&S
? Y Y Y Y N N ? Y N N N N

cnt:
ORD HOM NBM PUR CSV SCF CON SC Ft0 tF0 Fp0 pF0 MG SM FC EFC ES
N Y N N N N N Y Y N N N N N N N N N
DTP CPI CTI B SB REV DST BSt DTr DCF L LV L&S WL CL
? Y Y Y Y N N ? Y N N N N N Y
    
```

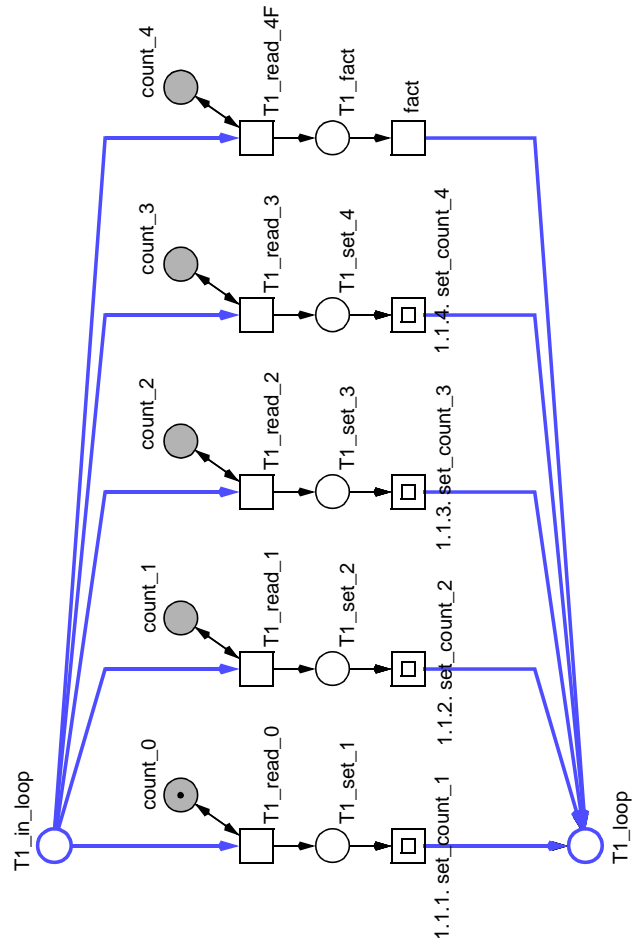
# GARDENS

## 1. turnstile1



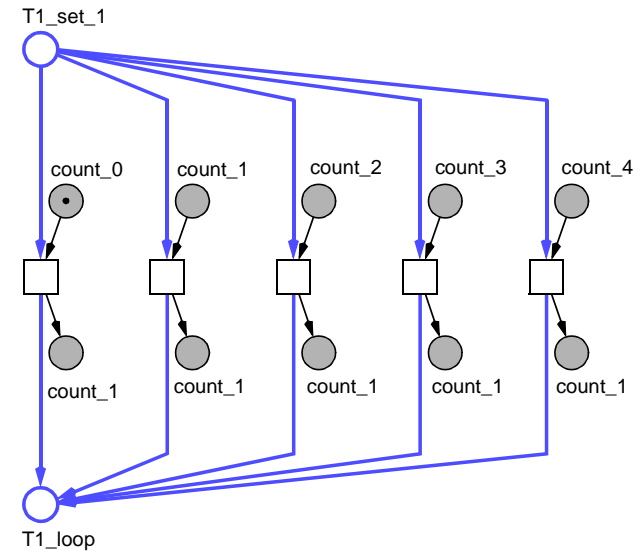
# GARDENS

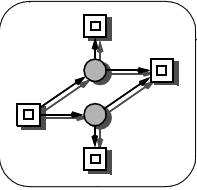
## 1.1. incr\_count



# GARDENS

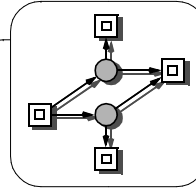
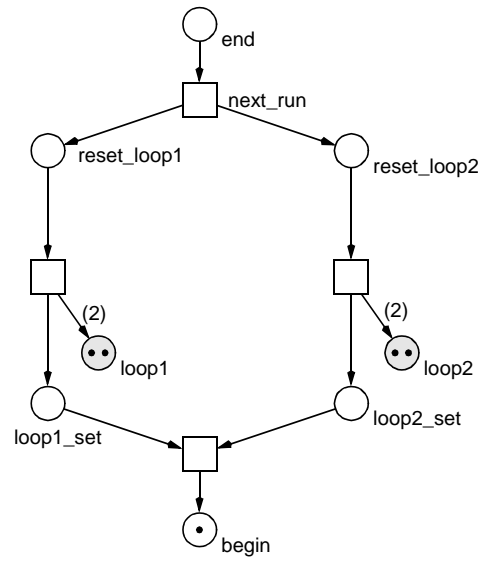
## 1.1.1. set\_count\_1





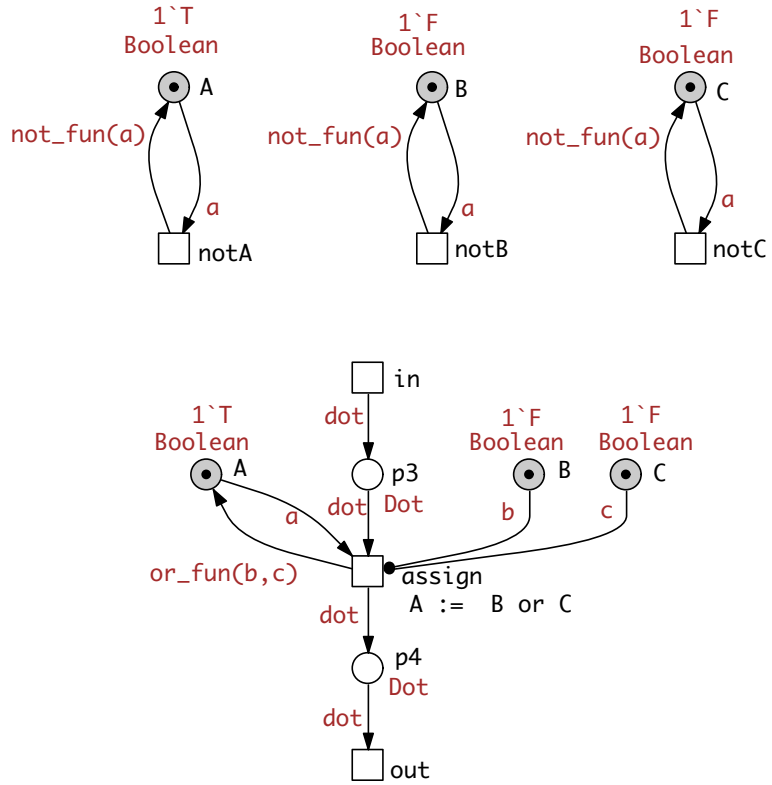
# GARDENS1

## 4. next\_run

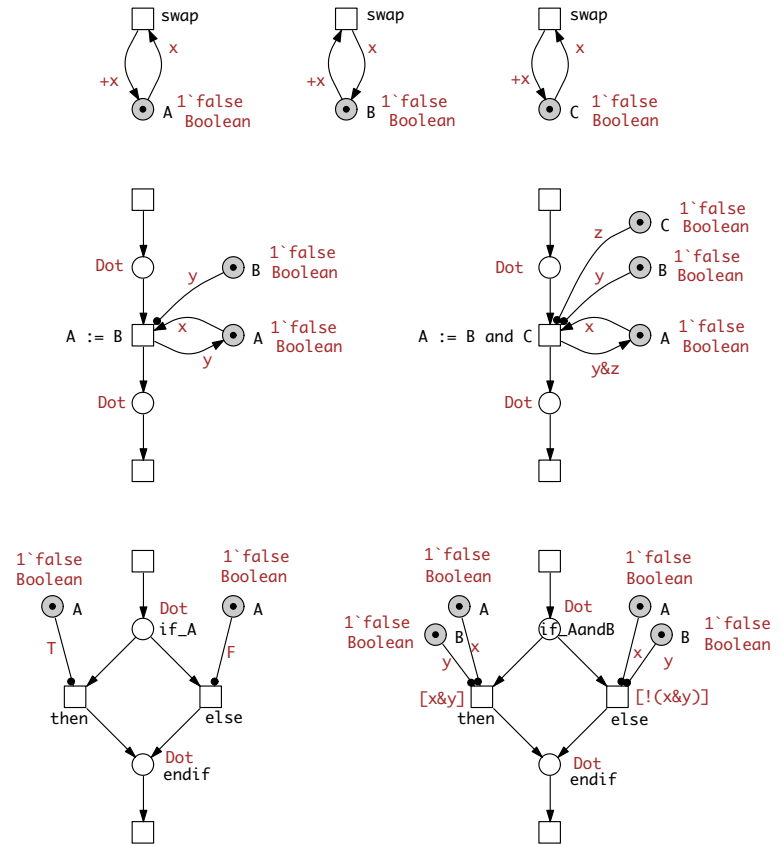


AND THEN  
THERE WAS COLOUR

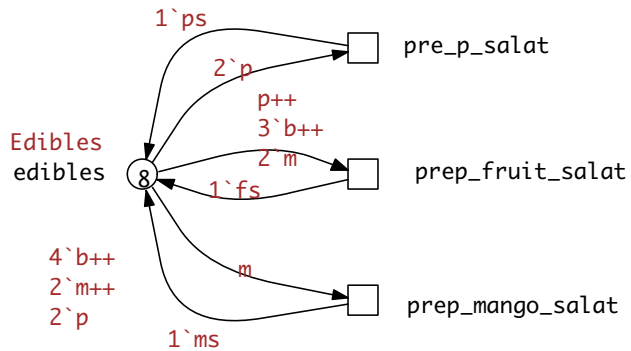
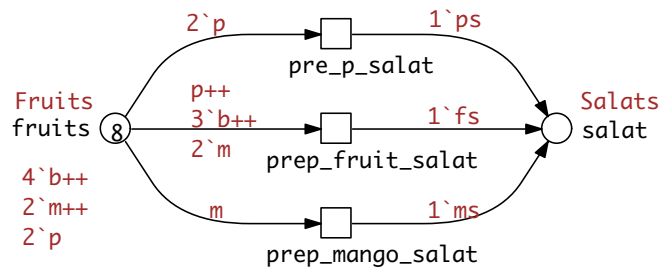
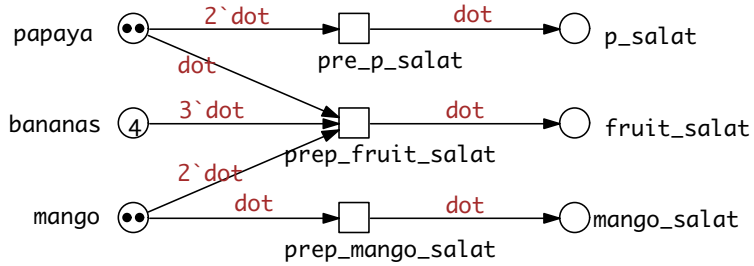
# COLOUR, BOOLEAN OPERATIONS



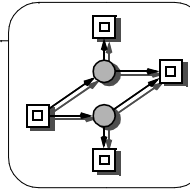
# COLOUR, CONTROL FLOW



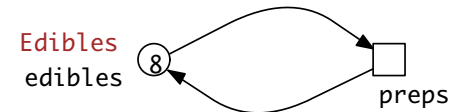
# COLOUR



# COLOUR



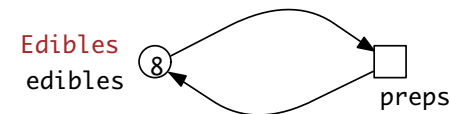
$[y=t1]2`p++$   
 $[y=t2]1`p++$   
 $[y=t2]3`b++$   
 $[y=t2]2`m++$   
 $[y=t3]1`m$



$4`b++$   $[y=t1]1`ps++$   
 $2`m++$   $[y=t2]1`fs++$   
 $2`p$   $[y=t3]1`ms$

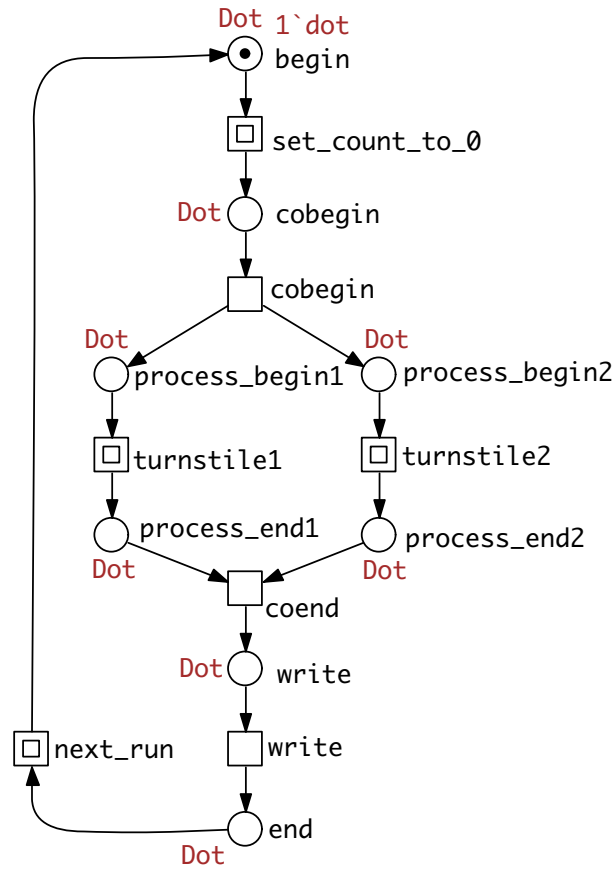
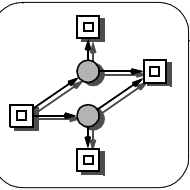
it should be possible to combine equal guards.

$[y=t1]2`p++$   
 $[y=t2](1`p++$   
 $3`b++$   
 $2`m)++$   
 $[y=t3]1`m$

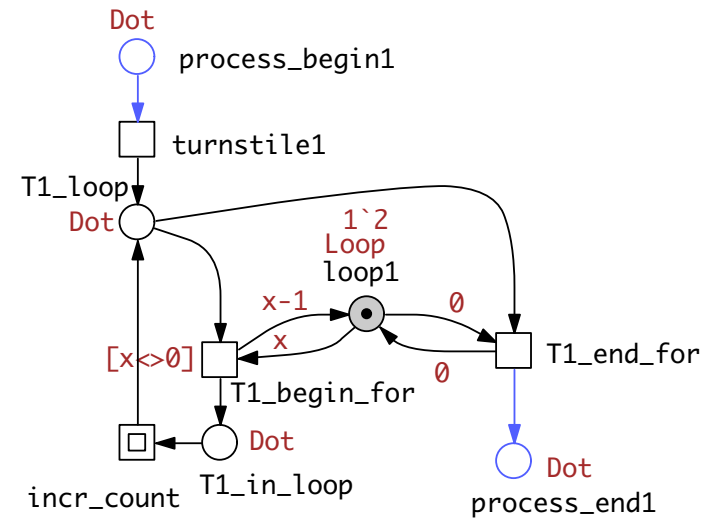
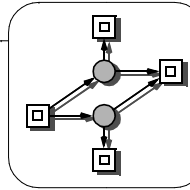


$4`b++$   $[y=t1]1`ps++$   
 $2`m++$   $[y=t2]1`fs++$   
 $2`p$   $[y=t3]1`ms$

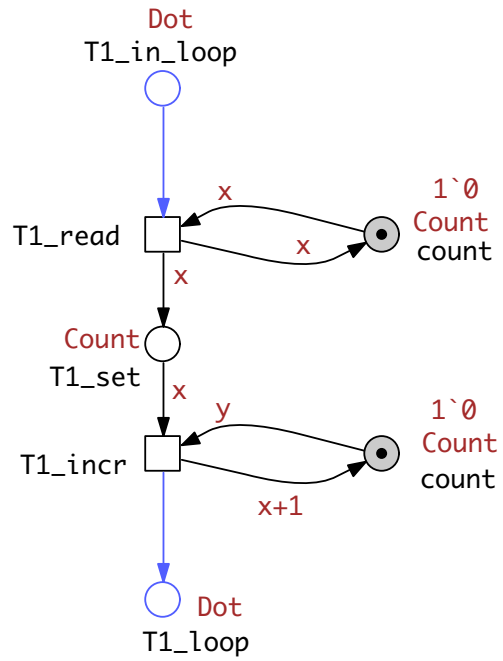
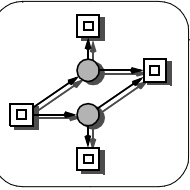
### COLOURED GARDEN



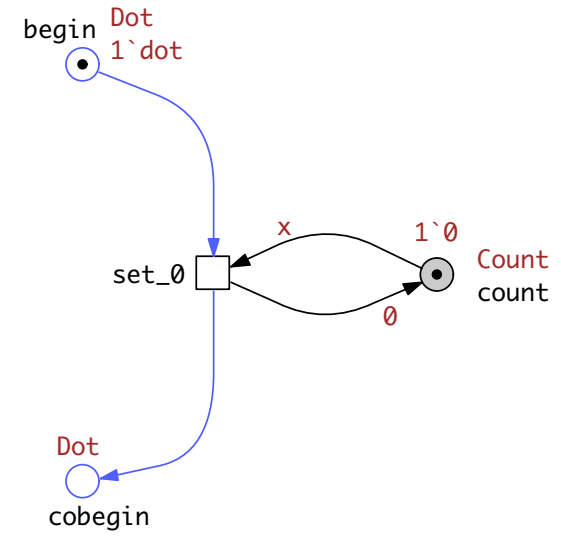
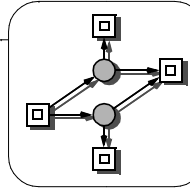
### COLOURED GARDEN



# COLOURED GARDEN

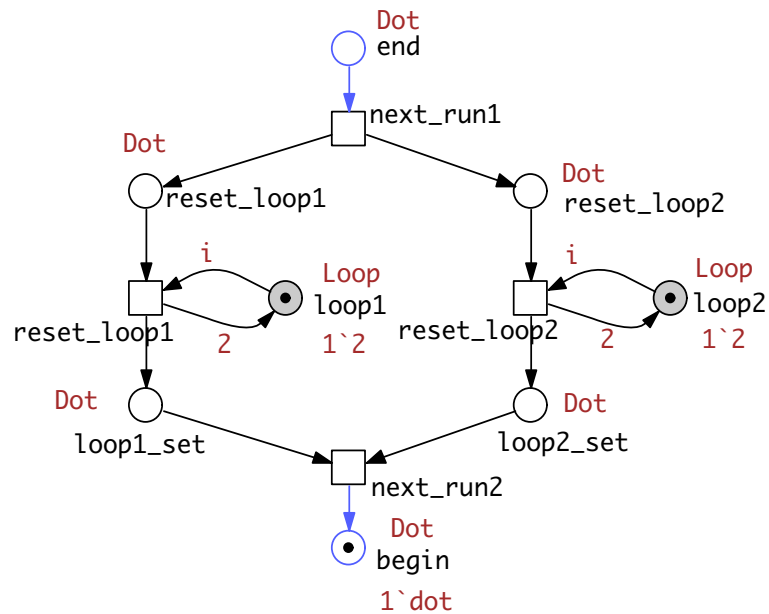
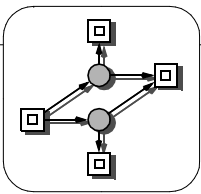


# COLOURED GARDEN

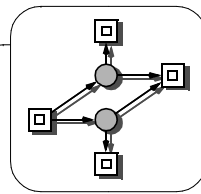




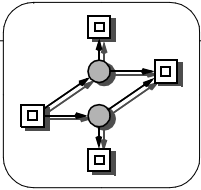
## COLOURED GARDEN



## COLOURED NETS, OBSERVATIONS

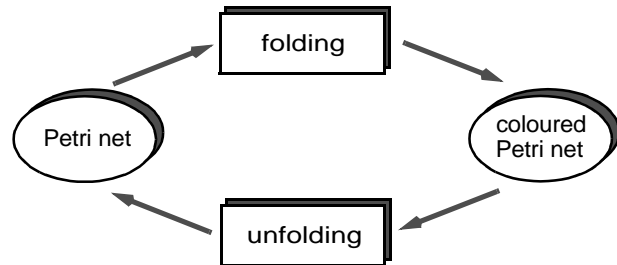


- ❑ coloured Petri nets may serve as a short-hand notation for place/transition Petri nets
- ❑ a coloured place has (like a program variable)
  - > *a name*
  - > *a colour set = data type = set of values (colours)*
- ❑ any token on a given place has a specific colour of the place's colour set
- ❑ a coloured place contains generally a multiset (bag) of coloured tokens
- ❑ the arc inscriptions consist of
  - > *constants*
  - > *"formal sums" of coloured tokens*
  - > *variables*
  - > *functions*
  - ... *or a combination of all those*
- ❑ **arc inscriptions's readability = net readability !**



## COLOURED PETRI NETS, SUMMARY

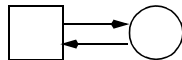
- information-preserving transformation



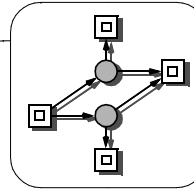
- folding needs user interaction
  - > *partitions of transition set and place set*

- trivial transformation:
  - only one colour (black colour)
  - > *no structure compression*

- any Petri net may be transformed into



- > all structure information in arc inscriptions



## COLOURED PETRI NETS, ANALYSIS

- by unfolding
  - > *reuse of all P/T net analysis techniques*
  - > *symmetrically reduced rg*
- without unfolding
  - > *reachability graph (CPN - occurrence graph)*
  - > *invariants (tools ?)*
  - > *CTL model checking (tools ?)*
- dedicated notion of liveness: collectively live transitions
  - > *all transition colours of a given coloured transition guarantee together the liveness*
  - > *very useful for control flow models*
    - >> *garden example*
    - >> *mutex examples*