

A simplified graph

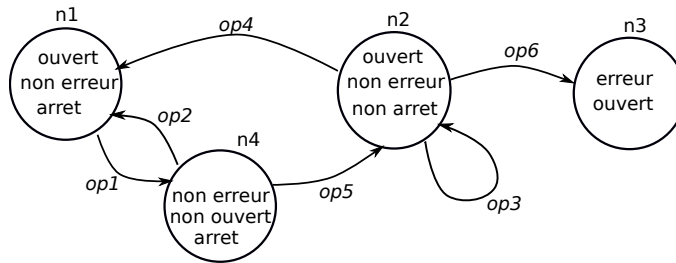


Figure 1: Un graphe d'analyse

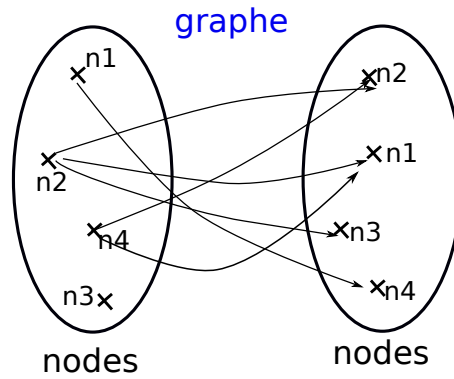


Figure 2: Graphe simplifié

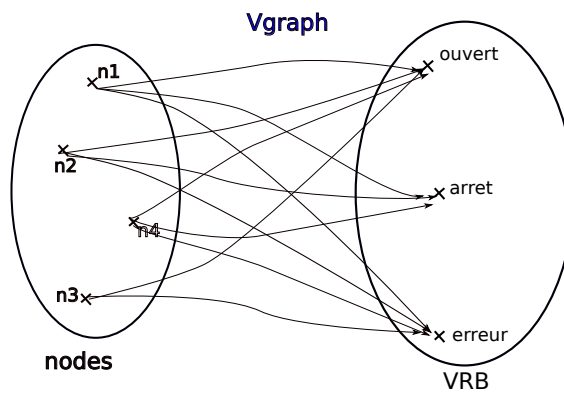


Figure 3: Graphe des variables associées aux noeuds

Modeling in B

/* CtxMC

* Author: attiogbe-c

* Creation date: 03/01/2021

*/

MACHINE

CtxMC

SETS

NODE

; *PROPERTY*

; *VRB* = {*ouvert, arret, erreur*}

CONSTANTS

dgraph /* will be given (at implementation) as a parameter */

PROPERTIES

dgraph ∈ *NODE* ↔ *NODE* /* will be directed graph, when refined with oper labels */

∧ ∀ (*in, fn*).((*in* ∈ *NODE* ∧ *fn* ∈ *NODE* ∧ *dgraph* ≠ ∅ ∧ ((*in, fn*) ∈ *dgraph*))

⇒ ((*fn, in*) ∉ *dgraph*)) /* not necessary, when arcs are labelled */

END

```

/* ModelCheck
* Author: attiogbe-c
* Creation date: 03/01/2021
*/
MACHINE
  ModelCheck
SEES
  CtxMC /* to see a given graph (as a parameter) */
VARIABLES
  nodes /* nodes of the directed graph */
, vgraph /* nodes of the directed graph, with associated variables */
INVARIANT
  nodes  $\subseteq$  NODE
 $\wedge$  nodes = dom(dgraph)  $\cup$  ran (dgraph) /* all the nodes of the dgraph */
 $\wedge$  vgraph  $\in$  nodes  $\leftrightarrow$  VRB /* each node has a set of variables */
INITIALISATION
  nodes := dom(dgraph)  $\cup$  ran (dgraph)
|| vgraph :=  $\emptyset$ 

OPERATIONS

ss  $\leftarrow$  nodesWithaVar(vv) = /* returns nodes having a variable vv given as parameter */
PRE
  vv  $\in$  VRB
THEN
  ss := vgraph-1 [{vv}]
END
;

nodeWSV  $\leftarrow$  nodeWithSameVariables = /* nodes which share a same subset of vars */
BEGIN
  ANY vvs, nns, lbln
  WHERE
  vvs  $\subseteq$  VRB
 $\wedge$  nns  $\subseteq$  NODE  $\wedge$  nns  $\subseteq$  nodes
 $\wedge$  lbln  $\in$  nodes  $\leftrightarrow$  vvs
 $\wedge$  lbln = nns  $\times$  vvs /* it exists a cartesian Product over thenods nns and the vars */
THEN
  nodeWSV := nns
END
END
;

nns  $\leftarrow$  nodesWithGivenVars(vvs) = /* returns the nodes having the set vvs of variables,
given as parameter */
PRE
  vvs  $\subseteq$  VRB

```

```

THEN
  ANY  $ns, sg$ 
  WHERE
     $ns \subseteq NODE$ 
     $\wedge ns \subseteq nodes$ 
     $\wedge sg \in nodes \leftrightarrow VRB$ 
     $\wedge sg = ns \times vvs \quad \wedge sg \subseteq vgraph \quad \mathbf{THEN}$ 
       $nns := ns$ 
    END
  END
END
;
 $rr \leftarrow \mathbf{satisfyProp}(vv) = /* \text{if the graph satisfy a given property (defined as a bool var) } */$ 
PRE
   $vv \in VRB$ 
THEN
   $rr := \mathbf{bool}(nodes \times \{vv\} \subseteq vgraph) /* \text{all the nodes of the graph has vv as variables } */$ 
END
END

```