

## Introduction

This Model form is a short description of the Vasy2003 model that comes, for the Model Checking Contest 2013 @ Petri Nets (“suprise model category”), with: a set of PNML files, a set of properties to be checked (possibly one file per model instance) and an optional set of properties concerning the model (invariants, etc. – possibly one file per model instance). For Coloured Nets, equivalent PNML P/T net files are proposed too.

## Vasy2003

### Presentation

**Description:** This present benchmark was submitted to the Petri net mailing list on July 28, 2003. It originates from an industrial case study, namely a model (8,500 lines of LOTOS and 3,000 lines of C) developed by Bull for it FAME high-end multiprocessor architecture. The source code of this model (in LOTOS and C) was automatically translated into an interpreted Petri net using the CÆSAR compiler of the CADP toolbox. The present benchmark was obtained by removing all data information (namely, data types, variables, conditions, actions, offers) from the interpreted Petri net in order to obtain a place/transition Petri net. At the time it was submitted, three Petri net tools had failed to handle this benchmark due to a lack of memory (there are nearly  $9.810^{21}$  reachable markings). After the submission, four tools managed to process the benchmark, entirely or at least in part. The purpose of this example is to check how tool capabilities have improved during the last ten years.

#### Origin:

- Regarding this benchmark, see  
<http://www.informatik.uni-hamburg.de/cgi-bin/TGI/pnml/getpost?id=2003/07/2709>  
and  
<http://www.informatik.uni-hamburg.de/cgi-bin/TGI/pnml/getpost?id=2003/09/2736>
- Regarding the CÆSAR model checker, see <http://cadp.inria.fr>

#### Scaling parameter

Name	Description	Values
None	–	–

### Information about the Model

#### Data on the Model

Number of places	Number of transitions	Number of arcs	Scaling parameter value
485	776	2809	all

#### Stated Properties

safe	✓	free choice	✗	event graph	✗
deadlock	✗	state machine	✗	reversible	✗

#### Other Properties (not mandatory)

Because it was generated from a process algebraic specification (LOTOS) the present benchmark has structural properties guaranteed by construction (but that can be checked using Petri tools):

- It contains 60 sequential components (named *units* and noted “u1”...“u60”) that execute concurrently and synchronize on certain transitions. A root unit (noted “u0”) encapsulates all the other 60 units. Units are described in the `<toolspecific>` section of the PNML file. They form a partition of the set of places: each place belongs to a single unit. The places of a given unit are listed between the `<places>` and `</places>` tags.
- The places of the same unit are mutually exclusive (in every reachable marking, at most one of these places has a token) This leads to 61 invariants, one for each unit. For instance, unit u1 has two places p1 and p2, which leads to the corresponding invariant:  $p1 + p2 \leq 1$ .
- Notice that the conjunction of these 61 invariants implies the 1-safe property for the net (here at most one token per place in every reachable marking). It also ensures that each reachable marking has at most 61 tokens (actually 60, because the root unit is mutually exclusive with any other unit).

Properties to be queried, which are not guaranteed by construction and practically useful, are the following:

- Absence/presence of deadlocks
- Quasi-liveness: does the net contain transitions that are not enabled from any reachable marking? (if so, which ones?)