

Introduction

This Model form is a short description of the Reader/Writer Mutual Exclusion model that comes, for the Model Checking Contest 2012 @ Petri Nets, 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.

Reader/Writer Mutual Exclusion

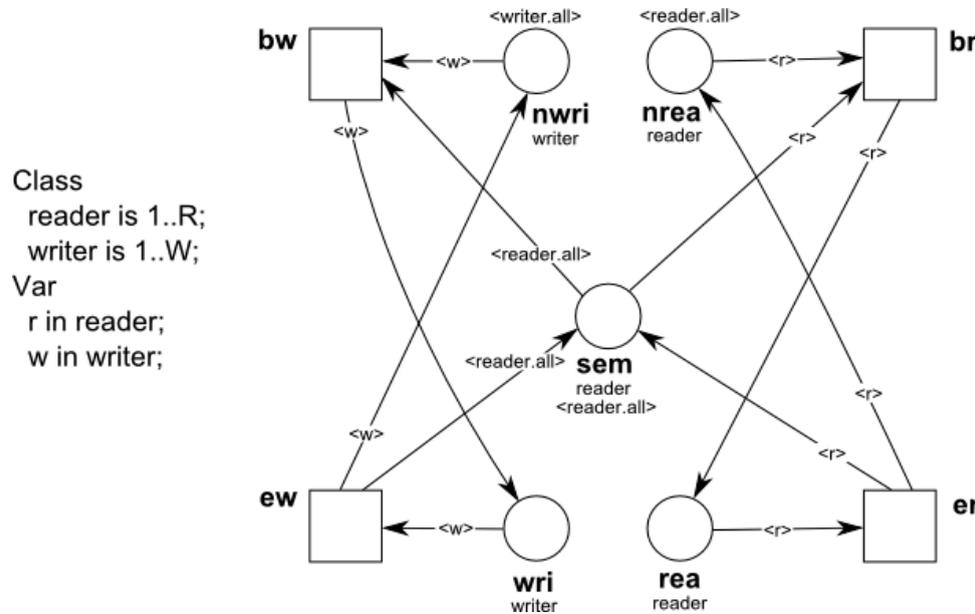


Figure 1: Presentation of the model for instance (generic algebraic description)

Presentation

Description: The net models a system with readers and writers. Reading can be conducted concurrently whereas writing has to be done exclusively. This is modeled by a number of semaphores (one for each reader) that need to be collected by a writer prior to writing.

Net formalism: This submission contains unfolded versions of the net for a variety of scaling parameters. These nets are given in LoLA low-level format and PNML. The original net has been modeled as an algebraic Petri net in LoLA high-level format, see <http://service-technology.org/files/lola/lola.pdf>.

The model is sketched in the figure. The two sorts R and W model the number of readers and writers, respectively.

Origin: Wolfgang Reisig. *Elements of Distributed Algorithms. Modeling and Analysis with Petri Nets.*, Springer, 1998.

Scaling parameter

Name	Description	Values
(readers, writers)	see description	(10,10)–(10,2000), (20,10), (50,50), (100,10)–(100,100), (500,10)–(500,700), (700,500)–(700,1000), (1000,10)–(1000,1000), (2000,10)

Information about the Model

Stated Properties

Data on the Model

Number of places	Number of transitions	Number of arcs	Scaling parameter value
50	40	300	(10,10)

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

Other Properties (not mandatory)

A mutual exclusion violation (two concurrent writers) can be checked using a CTL formula like

$$\forall i \neq j: \mathbf{EF} (\text{wri}.i \wedge \text{wri}.j)$$

This formula is given for the unfolded low-level models.