

User manual for Timed-CSP Simulator

Hoang Nga Nguyen, Markus Roggenbach
Swansea University, UK

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1 Introduction

Timed CSP Simulator is based on the presentation of Timed CSP in [3]. For a brief discussion of the tool architecture see [1]. The semantical questions regarding simulating Timed CSP are discussed in [2].

2 Supported operators

In addition to CSP-M operators already defined in ProB, Timed-CSP Simulator supports several timed operators of Timed-CSP.

Name	Pretty print	ASCII
Delay event prefix	$a \xrightarrow{d} P$	<code>a -{d}-> P</code>
Timed event prefix	$a @ x \longrightarrow P$	<code>a @ x -> P</code>
Wait	$WAIT\ d$	<code>WAIT d</code>
Timed timeout	$P \stackrel{d}{\triangleright} Q$	<code>P [{d}]> Q</code>
Timed interrupt	$P \stackrel{d}{\triangle} Q$	<code>P /{d}\ Q</code>

Table 1: Timed Operators in Timed-CSP Simulators

These extra operators are listed in Table 1 where:

- d denotes a time delay which is an arithmetic expression with the following syntax:

$$d ::= i \mid f(\bar{t}) \mid d + d \mid d - d \mid d * d \mid d / d$$

where i is an integer, $f(\bar{t})$ is a function call with terms \bar{t} as parameters. In runtime, an arithmetic expression is evaluated to an integer or a simplest rational number.

- x denotes a timed variable.
- P, Q are Timed-CSP processes.

3 Timed-CSP mode

In the “Animate” menu in the main menubar of ProB, there is a new menu for activating and deactivating the Timed-CSP animation mode, see Figure 1. If the mode is activated, timed transitions are allowed in the animation for simulating executing of Timed-CSP processes. When this mode is deactivated, the animator disallows any timed transition, hence working as usual with untimed CSP.

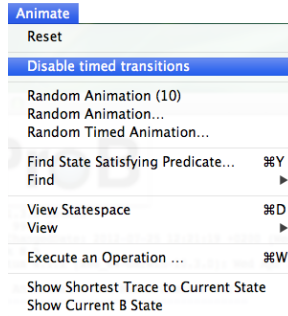


Figure 1: Activate/deactivate the Timed-CSP animation mode in ProB’s menu.

4 Timed-CSP animation

When the Timed-CSP animation mode is activate, the simulator supports automatic animation. The animation strategy can be modified with respect to two parameters and three options.

Parameters:

Max steps: maximal number of steps to animate.

Max time elapsed: maximal time (an integer or a rational number) to animate.

Options:

Maximal progress: if enabled, the animator always select the longest timed transition. If there is no upper bound on timed transition, a random value of time is selected.

Events first: if enable, the animator always randomly select an event before any timed transition.

Time from beginning: if enable, the animator treats the “Max time elapsed” parameter as from the beginning.

To set an animation strategy, users can select the menu item “Random timed animation...” from the Animate menu. The “Random timed execution” dialog will appear, see Figure 2.

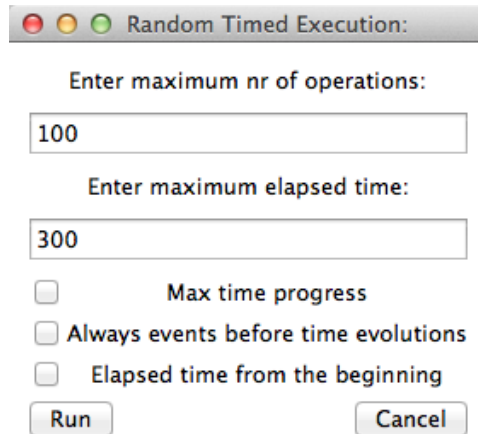


Figure 2: The “Random Timed Execution” dialog.

References

- [1] Marc Dragon, Andy Gimblett, and Markus Roggenbach. A Simulator for Timed CSP. In Jens Bendisposto, Cliff Jones, Michael Leuschel, and

Alexander Romanovsky, editors, *AVoCS'11 – Proceedings of the Eleventh International Workshop on Automated Verification of Critical Systems*. Newcastle University, 2011.

- [2] Faron Moller, Hoang Nga Nguyen, and Markus Roggenbach. Theoretical foundations for simulating timed csp. Technical report, Swansea University, 3 2012.
- [3] S. Schneider. *Concurrent and real-time systems: the CSP approach*. Citeseer, 2000.