

# User manual for Timed-CSP Simulator

Hoang Nga Nguyen, Markus Roggenbach  
Swansea University, UK

October 22, 2012

## 1 Introduction

Timed CSP Simulator is based on the presentation of Timed CSP in [4]. For a brief discussion of the tool architecture see [1, 2]. The semantical questions regarding simulating Timed CSP are discussed in [3].

## 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}-&gt; P</code>
Timed event prefix	$a @ x \longrightarrow P$	<code>a @ x -&gt; P</code>
Wait	$WAIT\ d$	<code>WAIT d</code>
Timed timeout	$P \overset{d}{\triangleright} Q$	<code>P [{d}]&gt; Q</code>
Timed interrupt	$P \overset{d}{\triangleleft} Q$	<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.

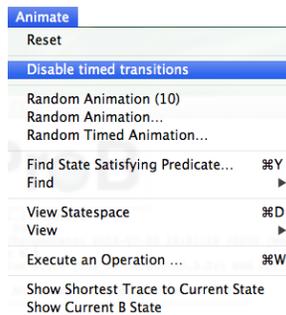


Figure 1: Activate/deactivate the Timed-CSP animation mode in ProB’s menu.

### 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.

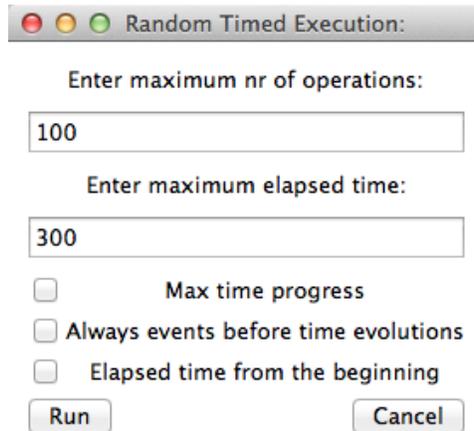


Figure 2: The “Random Timed Execution” dialog.

## 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] Marc Fontaine, Andy Gimblett, Faron Moller, Hoang Nga Nguyen, and Markus Roggenbach. Timed CSP Simulator. In Franco Mazzanti and Gianluca Trentanni, editors, *iFM 2012 & ABZ 2012 - Proceedings of the Posters & Tool demos Session*. CNR-ISTI, 2012.
- [3] Faron Moller, Hoang Nga Nguyen, and Markus Roggenbach. Theoretical foundations for simulating Timed CSP. Technical report, Swansea University, 3 2012.
- [4] S. Schneider. *Concurrent and real-time systems: the CSP approach*. Citeseer, 2000.