Title: IOPT Petri Net State Space Generation Algorithm with Maximal-Step Execution Semantics

Author(s): Pereira, Fernando[1]; Moutinho, Filipe; Gomes, Luis; Campos-Rebelo, Rogério

Source: 2011 9TH IEEE International Conference on Industrial Informatics (INDIN) **Book Series:** IEEE International Conference on Industrial Informatics INDIN

Published: 2011

Document Type: Proceedings Paper

Language: English

Abstract: This paper presents an algorithm to efficiently generate the state-space of systems specified using the IOPT Petri-net modeling formalism. IOPT nets are a non-autonomous Petri-net class, based on Place-Transition nets with an extended set of features designed to allow the rapid prototyping and synthesis of system controllers through an existing hardware-software co-design framework. To obtain coherent and deterministic operation, IOPT nets use a maximal-step execution semantics where, in a single execution step, all enabled transitions will fire simultaneously. This fact increases the resulting state-space complexity and can cause an arc "explosion" effect. Real-world applications, with several million states, will reach a higher order of magnitude number of arcs, leading to the need for high performance state-space generator algorithms. The proposed algorithm applies a compilation approach to read a PNML file containing one IOPT model and automatically generate an optimized C program to calculate the corresponding state-space.

Reprint Address: Pereira, F (reprint author), ISEL, Inst Super Engenharie Lisboa, Lisbon, Portugal

Addresses:
1. ISEL, Inst Super Engenharie Lisboa, Lisbon, Portugal

E-mail Address: fjp@deea.isel.ipl.pt; fcm@uninova.pt; lugo@uninova.pt; rcr@uninova.pt

Publisher: IEEE
Publisher Address: 345 E 47TH ST, New York, NY 10017 USA

ISSN: 1935-4576

ISBN: 978-1-4577-0434-5

Citation: PEREIRA, Fernando; MOUTINHO, Filipe; GOMES, Luis; CAMPOS-REBELO, Rogério - IOPT Petri Net State Space Generation Algorithm with Maximal-Step Execution Semantics. 2011 9TH IEEE International Conference on Industrial Informatics (INDIN). ISS 1935-4576. ISBN 978-1-4577-0434-5. (2011).