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Lawrence Cabac, Michael Haustermann, David Mosteller

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Software Development with Petri Nets and Agents: Approach, Frameworks and Tool Set

Lawrence Cabac^{a,*}, Michael Haustermann^a, David Mosteller^a

^a*University of Hamburg, Faculty of Mathematics, Informatics and Natural Sciences,
Department of Informatics, Vogt-Kölln-Straße 30, 22527 Hamburg
<http://www.informatik.uni-hamburg.de/TGI/>*

Abstract

Software development – especially of distributed and concurrent systems – requires sophisticated frameworks and tool support for the individual and collaborative development. We present an approach for the development of such systems, which applies concepts, technologies and techniques from agent and Petri net theory as well as from software engineering. The approach is backed by a set of elaborated frameworks and a powerful tool set.

The Petri Net-based Agent-Oriented Software Engineering approach (PAOSE) follows the multi-agent paradigm and applies Petri net formalisms as implementation languages. PAOSE is a comprehensive approach that provides techniques, tools, methods, principles and defined processes. PAOSE depends on MULAN (Multi-Agent Nets), which is a conceptual framework for a multi-agent platform based on Petri net models. MULAN is modeled and executed in RENEW (The Reference Net Workshop), which is an extensible modeling and execution environment for Reference Net-based systems and other modeling techniques. The whole framework landscape constitutes a Petri net IDE (Integrated Development Environment) that supports the development and execution of concurrent and distributed multi-agent systems. The Reference Net formalism includes concepts such as net instances (object-orientation), synchronous channels (communication / synchronization) and a seamless Java integration.

In this contribution we present an overview of the frameworks and the tool sets in the context of the PAOSE approach. We focus in detail on the highlights and the IDE features of RENEW, without which the collaborative development of distributed PAOSE-based software would not be feasible.

Keywords: High-level Petri nets, Nets-within-nets, Reference Nets, Integrated Development Environment (IDE), Java, Tool, Plugin architecture, Modeling, Agents, Multi-agent systems, Software development approach, PAOSE

*Corresponding author

Email addresses: cabac@informatik.uni-hamburg.de (Lawrence Cabac),
haustermann@informatik.uni-hamburg.de (Michael Haustermann),
mosteller@informatik.uni-hamburg.de (David Mosteller)

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