Applying Associative Petri Net to Enhance the Activity Diagram of UML and Its Applications

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ABSTRACT

Unified Modeling Language (UML) is the Object Management Group (OMG) standard notation for object-oriented modeling and software engineering. In early software development, the UML Activity Diagram (AD) is widely used to describe system, analysis workflow and dataflow for system evaluation, analysis and planning. However, the AD lacks support for simulation, dynamic semantics limits and verifiability capabilities. Petri net (PN) is a popular technique for modeling the control flow dimension of workflows. Associative Petri net (APN) not only take all the advantages of PN but also has a complete semantics, simulation and verifiability capabilities. Therefore, in this paper, we propose a methodology to map ADs into APNs. This work can enhance the simulation and verifiability capabilities of the AD and provides the systematic procedure to reduce complexity of translating activity diagrams into an APN. Reachability tree and ncidence matrix and state equation are powerful for checking many qualitative properties of PN such as reachability, safeness and boundedness. After the transformation, they are adopted to verify those properties of APN. Finally, an example of online ordering and paying procedure is used to explain and illustrate our provide methodology.

Keywords : unified modeling language、associative petri net、activity diagram、software engineering、transformation

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