Object-oriented workflow formalization

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Abstract. UML 2.0 Activity partition is very convenient for modeling workflows. However, it still lacks tools and a well-defined semantic basis allowing formal verification and validation tasks. To assure these tasks we propose to transform the activity diagrams to Object Petri Nets. For a more precise checking, we perform the specification and the verification considering objects identified by identities and attribute values. Thus, we suggest to use the object and sequence diagrams to deal with the static and dynamic initializations, respectively. A case study is given to illustrate this technique.

1 Introduction

UML 2.0 [18] succeeds as a standard in the area of organizational process modeling, in other terms workflows, faced with alternative languages used by commercial workflow management systems for this purpose [6]. Nevertheless, it lacks a well-defined semantics which permits the use of formal proof techniques guaranteeing the precision and the correctness of modeling.

A workflow is a set of business activities that are ordered according to a set of procedural rules to deliver services [10]. Two important dimensions of workflows are the control flow dimension and the resource dimension [17], [24]. The control flow dimension concerns the ordering of activities in time. The resource dimension concerns the organizational structure in terms of actors. UML activity diagrams model the control flow dimension while the object diagrams specify the resource dimension.

The activity diagrams are flowchart-like notations with constructs to express sequence, choice and parallel execution of activities [18]. An activity partition is a kind of activity group for identifying actions that have some characteristic in common.The object diagram models the system static structure. Also called instance diagram, it shows the links between the instantiated objects. As for the sequence diagram, it emphasizes the classification of the object interactions by chronological order.

On the other hand, Petri nets [12] are a formal and graphical language that relies on a mathematical theory for proving properties about them. An abundance of tools implement these analysis techniques. In spite of their complex approach, Petri nets

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