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Extending the UML use case metamodel with behavioral information to facilitate model analysis and interchange

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Abstract Use case diagrams are primary artifacts used for modeling functional requirements. Use case diagrams are part of the Unified Modeling Language (UML) suite of models that has become a de facto standard for modeling object oriented languages. Each model in this suite is described by a metamodel that dictates its syntax and semantics. The use case diagram is considered the most controversial diagram in UML. Practitioners claim that the use case diagram cannot be used as a valuable artifact for requirement analysis. The main reason behind this concern is the lack of behavioral description of a use case depicted within the model. Quite a few extensions to the use case metamodel have been proposed in literature to incorporate behavioral aspect of a use case within the metamodel. All these extensions omit a few important features like generalization and most of them can only be used for model representation and cannot be used for model analysis and evaluation. In this paper, we propose an extension to the UML use case metamodel with use case behavior specification elements. The main objective of the proposed extension is to provide a complete metamodel for use case diagrams which includes representation for all its elements and relationships in a conflict-free manner and one that includes information for model analysis, evaluation, and interchange among modeling tools. In order to include all valuable information related to a use case, a number of use case representation templates were considered for the proposed extension. Simultaneously, to enable the use case models generated based on the proposed metamodel to be used for analysis, pertinent information related to model usage in analysis such as effort estimation, use case scheduling, and use case metrics evaluation were considered from published studies, tools, and paradigms and included within the proposed metamodel.

Keywords UML · Use case diagram · Metamodel · Behavior specification

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