Metamodeling and Formalisms for Representation of Behavior *
(thesis abstract)

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Nowadays there exists a plethora of methodologies, techniques, languages, methods, tools, etc. that can be used to develop complex software systems [1]. In particular, many of these techniques and languages are involved in the representation of aspects related to the behavior of systems, and most of the object-oriented analysis and design methodologies and languages [13, 15, 17] include components devoted to structural modeling together with other devoted to behavioral modeling. This situation is particularly relevant when the system to be modeled is dynamic in essence, as for instance in the case of reactive systems or real-time systems. Several formalisms, such as Statecharts [8] or Petri Nets [14], have been developed specifically to model this kind of systems, and a good deal of variants of each of these formalisms have been created [21]. This complex situation suggests the usefulness of a framework that allows to describe the essential concepts linked to the representation of behavior irrespectively of each particular technique. This framework would allow to study in detail these languages and techniques, and this study is a preliminary step to analyze some issues regarding these languages such as comparison, adaptation, transformation, among others. This thesis presents a solution to this problem, by means of the introduction of a generic architecture, called Noesis architecture. We use a metamodeling perspective to disassociate from the particularities of each language or technique. Metamodeling is being increasingly used as a software and method engineering tool [2, 3, 7, 9–12, 16, 20], and it has been proven in the literature [18, 19] that the use of a metamodeling perspective is effective to improve the usability, understandability and legibility during the study (analysis, design, comparison, adaptation, etc.) of languages and techniques. More specifically, in our work we use a particular metamodeling technique, the Noesis technique [6]. We explain the basic constructs of this technique by means of a metamodel of the database model RM/T. The use of the Noesis technique together with the guidelines that the Noesis architecture provides, has allowed us to develop a metamodel of Statecharts that fully captures the expressive power of this formalism, in a way similar to the syntactic aspects as well as in the purely behavioral aspects [5]. To prove the versatility of the Noesis architecture, in this work we also include a metamodel of UML State Machines, the object-oriented version of Statecharts gathered in UML. Following the definition style of UML, that uses UML itself, in this second metamodel we

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have used UML as metamodeling language [4]. These examples prove that the Noesis architecture can be used irrespectively of the metamodeling perspective adopted, and therefore this architecture is a flexible approach to represent behavioral aspects.

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