

Preface

A common problem in recent years is the growth of software development complexity due to customer demand for more features and fewer errors. Furthermore, due to recent advancements in technology, it has become necessary to utilize software in multiple domains and professional areas. This leads to problems such as development teams becoming experts in one particular area, necessitating an adjustment period when the team starts new projects in other professional areas.

However, software engineering continually offers new tools that, when properly used, can help in the difficult task of developing software complying with the triple constraint of project management (scope, time, and cost) that is cited in numerous sources. Thus, a relatively new software development approach called Model-Driven Engineering (MDE) has appeared.

MDE is an important and emerging approach in software engineering to increase the level of abstraction of the development tasks. In recent years, Model-Driven Engineering has become a critical area of study, as companies and research institutions have started to emphasize the importance of using models as first-class artifacts in the software development process of complex systems.

The mission of this book is to bring researchers, practitioners, and students to one of the most promising fields in computer science, helping all to understand the current state-of-the-art and to know what the future will bring. The objectives include:

- Bringing together the most relevant research on model-driven engineering.
- Updating the scientific literature on model-driven engineering.
- Identifying and address the complexities encountered in the application of model-driven engineering technologies.
- Identifying the most important issues to be addressed by scientists in the coming years.

The target audience of this book is composed of professionals and researchers working in the field of model-driven software engineering in various disciplines. Moreover, the book will also be a reference for researchers, professionals, and students in computer science and related fields. The book will provide a much needed reference on the state-of-the-art of advanced tools and techniques that are either available or under development to support the maximization of the efficacy and efficiency of model-driven software development. It will also provide foundations to professionals, researchers, and academics on the underlying theory and current applications for use in the future advancement of the existing body of knowledge. This combination of theory, applications, and success stories will provide the reader with an important and detailed view of recent developments in the field and lay the background for future research.

Regarding the distribution of chapters, they are distributed as follows:

- Chapter 1 focuses on the development of a temporal meta-data framework for enterprise information systems applications, avoiding large costs during their lifecycle when customizations may need to be re-engineered.
- Chapter 2 focuses on concerns in programming and tries to identify the ones that may be incurred in the development of software, such as the designing phase, when the product is molded.
- Chapter 3 focuses on how to bridge the gap between business and information technology, using a model as a mediator between humans, computers, and the real world.
- Chapter 4 focuses on the possibility of using models to create applications for smart things such as smartphones or sensor networks, obtaining similar but at the same time very different applications due to the huge number of options.
- Chapter 5 focuses on user interface personalization, providing the right information, at the right time, and on the right support. It proposes a context-aware Model-Driven Architecture approach for content personalization.
- Chapter 6 focuses on a novel approach for designing domain-specific languages to automate their design, which are very closely related, preventing repetitions of work.
- Chapter 7 focuses on the process of requirement elicitation, which plays a primary role in model-driven software engineering, trying to improve the use of survey methods in the gathering of requirements.
- Chapter 8 focuses on agile methodologies that are defined in terms of best practices and their relation with modeling, which has a particular impact on quality assurance.
- Chapter 9 focuses on the evolution of models and metamodels because they are in constant evolution. Metamodel evolution may cause conforming models to become invalid so a new proposed framework can help deal with this issue.
- Chapter 10 focuses on the Rosetta specification language, which aims to enable system designers to abstractly design complex heterogeneous systems. This work improves it by defining the denotation of the composition operators.
- Chapter 11 focuses on transformations design, a key step in model-driven engineering, proposing a new methodology by using machine-learning techniques to automatically derive transformation rules in data warehousing.
- Chapter 12 focuses on the integration between design models of software systems and analytical models of non-functional properties, proposing a parameterized transformation for a model of performance properties.
- Chapter 13 focuses on solving the business “software problem” of inflexibility with poor user experience, proposing a graphical-based solution after 20+ years of research and development.
- Chapter 14 focuses on the consistency among UML diagrams so that quality of the model is maintained, and through inconsistency checking and removal, the model moves towards completeness.
- Chapter 15 focuses on viewpoint-based modeling, an important recent development in software engineering that is likely to boost the wider use of modeling techniques. The results of the project ViBaM are reported.
- Chapter 16 focuses on Smartphones, mobile devices that should conserve battery power to provide maximum possible autonomy. Three contributions to the study of applying model-driven engineering to analyze power consumption are provided.

As a conclusion, we think that the book can be used to learn new the challenges related to software modeling and new lines of research in which we will work in the coming years regarding the Model-Driven Engineering.

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