Part I
Introduction to Graph and Model Transformation
This first part of the book provides a general introduction to graph transformation and model transformations. After a general introduction in Chap. 1, we present in Chap. 2 graphs, typed graphs and attributed graphs in the sense of [EEPT06] and graph transformation with application conditions. In contrast to basic application conditions in [EEPT06] we introduce the more powerful nested application conditions in the sense of [HP05] and present the following main results in this more general framework: Local Church–Rosser and Parallelism Theorem, Concurrency, Amalgamation, Embedding and Extension Theorem as well as Critical Pair Analysis and Local Confluence Theorem. All these results have been shown without application conditions in [EEPT06], except amalgamation, which is an important extension in this book. These theorems are carefully motivated by running examples, but they are stated without proofs in Chap. 2, because they are special cases of corresponding results in the general framework of $\mathcal{M}$-adhesive transformation systems presented in Part II. In Chap. 3, we introduce model transformations in general and model transformation based on graph transformation as motivated in Sect. 1.1.4. Especially, we introduce triple graph grammars and show how they can be used to define model transformation, model integration and model synchronisation. Moreover, the main results concerning analysis of model transformations are illustrated by running examples, while the full theory, including proofs, is given in Part III.