Deformable models have been widely studied by the CG community for more than two decades. Many issues had to be addressed and many problems had to be solved before the quality of the deformable models reached an acceptable level. The aim of the work is to simulate interactions of several deformable bodies in realtime. First, we unveil the basic ideas behind several deformable models created for solids represented by a surface or volumetric mesh. We prefer the physicallybased approaches as they tend to yield more convincing results. We consider elastic materials only. We also briefly discuss the topic of collision detection for deformable models with its speci c aspects. A special attention is paid to contact resolution because it greatly influences the final impression. The result of this thesis is an overview of the proposed algorithm, detailed description of its parts, and its implementation. We also perform several benchmarks to prove its applicability in virtual environments and its capability to run in realtime.