

# Modular Configuration

*Interactive guidance in selecting complex products*

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## Abstract

Interactive Product Configuration, which is commonly seen as interactive constraint solving, is an NP-complete problem. Unfortunately, user interaction requires fast response times, and therefore people have tried to solve this problem using a two-phase approach, where the problem is first compiled offline, so that efficient online userinteraction can be provided. One way of doing this is to compile a configuration problem into a Binary Decision Diagram (BDD).

This thesis shows how two-phase BDD-based interactive product configuration can be extended to support modular products directly. To this end, we have defined the *modular configuration problem*, developed a theory of modular configuration, solved the modular configuration problem, defined a *modular configuration language*, presented a denotational semantics for it, written a prototype modular configurator, and taken a real-world configuration problem and modeled it for validation purposes.

The main features of the developed method are that: complete configuration (soundness, completeness) is preserved, that unbounded-size systems are made possible, but that the user can always reach a finite valid configuration without backtracking. Also, the complexity of the run-time configuration algorithms turns out to be independent of the size of the tree of module instances.