

Configit Modular Extension

Exploit modularity of your product models with the most powerful Virtual Table-based constraint solver ever



Configit Modular Extension is an extension module to Configit Product Modeler and Configit Runtime providing support for exploiting modularity in product models. It automatically detects the inherent modular structure in a product model and utilizes the structure to improve performance of the constraint solver in the configurator. Based on the identified modularity, a set of separate Virtual Tables are generated by the Configit Modular Compiler. These tables are then combined at runtime by the Configit Modular Runtime to obtain the well-known benefits of complete and full deduction in the configurator.

With Configit Modular Extension very large product models can efficiently be compiled and configured; models that otherwise would not be compilable or would require converting rules into functions in order to reduce the need for making deductions.

Configit Modular Extension contains the following components:

- Configit Modular Compiler
- Configit Modular Runtime
- Configit Modular Analytics (from 2009)

The module follows the release schedule for Configit Product Modeler.

Benefits

- **Fully integrated.** The module is fully integrated into Configit Product Modeler for easy adaptation into existing product modeling workflow.
- **Automatic modularity detection.** The module automatically detects modularity based on the rules defined in the product model. No manual effort is required to use the Configit Modular Compiler.
- **Improved performance and larger models.** The sizes of the generated modular Virtual Tables are typically much smaller than with the non-modular compiler. This gives largely improved performance at runtime and extends the range of models that can be immediately compiled.
- **Variable orders are less important.** Small modular Virtual Tables are typically generated directly from the default ordering.
- **Modularity beyond what is defined.** The detected modularity is typically much more fine-grained than the modeled group structure in the product model allowing improvements beyond the defined modular structures.
- **Consistent runtime API.** The Configit Modular Runtime has the same API as the standard runtime. It includes all the core functions needed for determining valid domains, making user assignments, resolving conflicts, and supporting user interface contracts. A few functions depends on having the full model compiled into one Virtual Table are therefore not available in the Modular Runtime.
- **Analysis of modularity.** Configit Modular Analytics is a component that generates analyses of the modularity of product models. It assists in identifying what parts of the model could be improved in order to increase modularity. (Available from 2009.)

Features

The Configit Modular Compiler is invoked either from within Configit Product Modeler or as a command line tool. The Modular Compiler initially analyses the product model in order to detect modularity. The analysis first identifies cyclic dependencies among rules. It then decomposes the product model into a tree of modules each containing a subset of the rules. The modules in the tree fulfill certain conditions with respect to their dependencies to other modules so that in effect the dependencies now form a tree, i.e., a graph with no cycles. This operation is called *tree decomposition*.

Figure 1 shows the dependency structure of a product model. Each circle is a constraint in the model and each edge shows sharing of one or more variables.

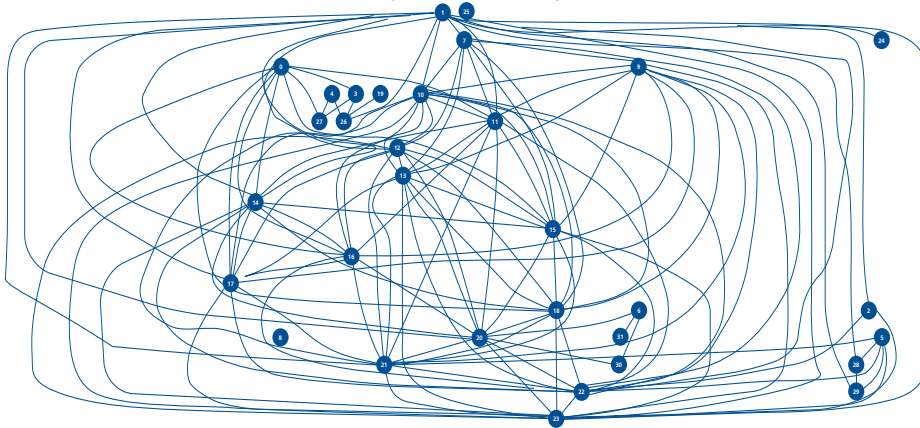
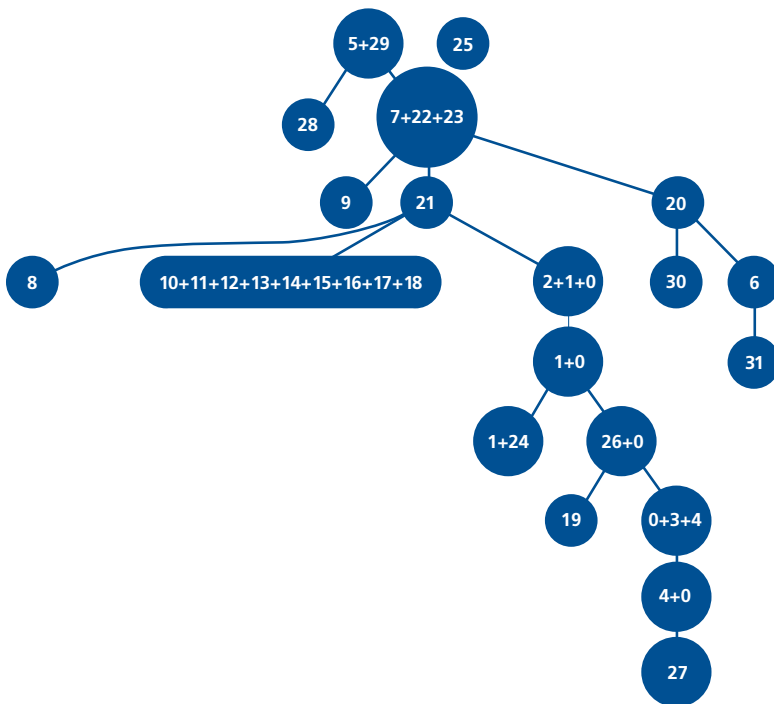


Figure 2 illustrates the situation after the modular compiler has decomposed the product model. The structure has no cycles and the constraints are organized into modules, that are compiled separately and then combined at runtime.



In general, for systems that have a star-like structure with one or more central groups having dependencies to a large collections of otherwise independent groups, there is a lot of modularity to be detected and utilized.



Configit Modular Compiler is developed from years of research on how to solve large constraint systems. The key technique of making tree decompositions has been known for some years but not until the release of Configit Modular Compiler has it been made practical available for general use. Recent research has shown that the combination of tree decomposition and the Virtual Table technology provides the most efficient compiled approach to solve large constraint systems ever developed.

Configit Modular Extension is available directly from Configit or any of our partners. Please visit our website www.configit.com or contact sales@configit.com for further information.

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