

# ***Two-Level Grammars***

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Fundamental idea of Two-Level grammar is that we can express long-range relations. A context-free grammar can express them as well, but only finite number of them. Infinitely large grammar allows us to express any number of these relations, even full context-sensitivity can be achieved. There are several types of two-level grammars. The goal of this presentation is to introduce the concepts and techniques of a van Wijngaarden grammar. An informal construction of such a grammar for the language  $L = a^n b^n c^n, n \geq 1$ , will be shown. We will use notation typical for context-free van Wijngaarden grammars, which is very useful and powerful tool for specifying semantics of programming languages.

We will also talk about parsing of input program with VW grammars. Since a general parser for such a grammars does not exist, some reasonable restrictions are needed to be able to do so. Using few well known techniques, such as context-free skeleton technique, definite cause/Prolog technique or LL(1) parsing technique, which is very complicated and powerful, we can achieve a state, where parsing of van Wijngaarden grammars can be done.

## **References**

1. Dick Grune, Criel J.H. Jacobs: Parsing Techniques: A Practical Guide, Second Edition, ISBN 978-0-387-20248-8, New York: Springer, 2008