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VYPa presentation notes
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Practical Optimizations in Compilers

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Abstract

The compilation is a process of transforming the input source program into a target program that has to be functionally equivalent. This presentation focuses on the optimization of such transformation to improve resource management, speed up program execution, decrease its size, and overall make it more efficient.

A general description of the problem is provided in the first part of the presentation. The main reasons, why optimization takes an important part in modern compilers, are covered with a further presentation of general optimization approaches, e.g. program run time, program size, and local or global optimization.

In the second part of the presentation, a sample program in the selected source language (Python), is introduced. New program representation – dataflow diagram – and its advantages in contrast with raw source language are discussed. Further conversion of the example source program to the dataflow diagram representation is processed. The main part of the presentation focuses on selected optimization techniques (dead code elimination, pointer aliasing, constant and expression propagation and folding, busy expression detection, loop unrolling, and invariant finding) and their usage in the provided example. Finally, conversion back to the source program language is shown.

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