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Bachelor's Thesis

Abstract Syntax Trees for MicroJava

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In the JKU course "Compiler Construction" a compiler is implemented for a simple programming language called MicroJava. This compiler generates bytecode that is executed by the interpreter of the MicroJava VM.

The goal of this bachelor project is to modify the MicroJava compiler so that it generates abstract syntax trees (ASTs) instead of bytecode. The interpreter has to be modified as well so that it can execute abstract syntax trees. The project comprises the following tasks:

- The MicroJava compiler should be modified so that statements are translated to an AST, while declarations are still entered into the symbol table. The nodes of the AST should be classes that represent the operators (including the statement kinds) and the operands of the language and have methods for the interpretation of the AST. As an example you can look at the AST generator described in [1].

- If the compilation finishes without errors, the generated AST and the symbol table should be visualized (e.g. by a TreeView or by using D3 graphics). It is not necessary to write the AST to a file. Instead, the visualizer should have a button that starts the interpretation of the AST.

- The interpreter is actually in the nodes of the AST. Every node has an *exec()* method that executes the sub-AST rooted in this node. Specific nodes can also have other methods.

Optional feature (if time allows):

- The interpretation of the AST could be visualized by single-stepping through the tree. The currently executed node, its type and value as well as the global variables and their values could be displayed.

The work's progress should be discussed with the advisor at least every 2 weeks. Please follow the guidelines of the Institute for System Software when preparing the written thesis. The deadline for submitting the written thesis is 30.09.2024.

[1] H. Mössenböck: Compilerbau - Grundlagen und Anwendungen. dpunkt.verlag, 2024