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Master's Thesis

A Truffle-based Compiler for IEC Languages

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Advisor: Prof. Hanspeter Mössenböck

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Industrial automation systems are often implemented in a language from the IEC family (e.g., IEC 61499 or IEC 61131). Our industrial partner has developed a compiler for IEC 61499 that should now be re-implemented under Truffle [1]. A grammar is available [2] and can be partly reused to generate the scanner and the parser of the new compiler with Coco/R [3].

The tasks of this thesis are

- To produce a scanner and a parser for the compiler using the compiler generator Coco/R. The parser should in particular be able to cope with pragmas and the non-LL(1) case statement.
- To write an attributed grammar that generates a Truffle AST for a given IEC program.
- To write classes for the nodes of the Truffle AST that execute the IEC program by interpretation.

Optionally, the thesis should also try to find solutions for the following problems:

- Generation of the AST if the input comes from XML instead of from source code.
- Ideas for implementing access control to variables in function blocks (IEC 61131).
- Ideas for solving problems related to the separate compilation of library elements.

Our industry partner offers proper payment as well as a success fee if the result is highly satisfactory. The company also offers support for getting familiar with the task at hand. For this purpose, it would be advisable to spend a few weeks at our partner's office in Leonding.

The progress of the project should be regularly discussed with the advisor. A time schedule and a milestone plan must be set up within the first 3 weeks. It should be continuously refined and monitored to make sure that the thesis will be completed in time. The final version of the thesis must be submitted not later than ....

[1] Würthinger, T. et al.: One VM to Rule Them All. Onward! Conference, October 26-31, 2013, Indianapolis, USA, http://dl.acm.org/citation.cfm?id=2509581

[2] Grammar for IEC 61499-1 (proprietary document)

[3] http://ssw.jku.at/Coco/

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