



Bachelor's Thesis

Jimble Code Generation for Sequential Function Charts

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The Institute of System Software is currently working on static software analysis methods and tools for analysis of programmable logic controller (PLC) programs. Such programs are used to control physical devices, e.g., manufacturing machines, and are usually written in domain-specific programming languages defined by the IEC 61131-3 standard (<http://www.iec.org>). The project is conducted in cooperation with Keba AG, a provider for software and hardware solutions in the automation domain.

The static analysis tool works by reading the PLC programs' source code and building an abstract system tree (AST) representation. Then, the AST representation is transformed into an equivalent *Jimble* code representation which is the input for the Soot [2] program analysis tool. Further analyses, e.g., control flow and data flow analyses, are then performed using the SOOT framework.

The IEC 61131-3 standard defines a set of different programming languages for PLC programming, e.g., *Structured Text* (ST), *Instruction List* (IL), and *Sequential Function Charts* (SFC). Currently our static analysis tool supports ST and IL code, but support for SFC code is missing.

The task of this project is therefore to extend our tool by writing a transformer which generates *Jimble* code out of an abstract syntax tree (AST) representation of SFC programs. The work should be based on the available analysis framework which already provides a set of helpful facility methods and where similar transformers have already been developed in the past.

Students interested in this project should have basic knowledge on compiler construction (e.g. as taught in "Übersetzerbau").

If you are interested or if you have any further questions, please contact us per email (herbert.praehofer@jku.at, florian.angerer@jku.at).

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[1] J. McWhinnie, "Sequential Function Charts for All," [Online]. Available: http://www.plcdev.com/sequential_function_charts_all. [Accessed Dec 2014].

[2] "Soot: A Java Optimization Framework," [Online]. Available: <http://www.sable.mcgill.ca/soot/>. [Accessed Dec 2014].