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Master's Thesis

Running Swift-compiled LLVM IR code on Sulong

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Start:	15. March 2021

Sulong[1,2] is an interpreter for LLVM IR. It is based on the Truffle[3,4] framework for implementing interpreters for programming languages and part of the GraalVM[5] project. Currently, Sulong supports execution of LLVM IR where its source language is C, C++ and others.

Swift[6] is a programming language designed by Apple Inc. in 2014 with the main purpose to support concepts of Objective-C, but in a less “unsafe” way. It is compiled using the LLVM compiler framework.

The main goal of this thesis is to run Swift programs on GraalVM using Sulong.

Specific sub-goals:

- Analyze LLVM bitcode produced by Swift compiler
- Investigate how to compile Swift projects producing LLVM bitcode
- Make a proof of concept running that bitcode on GraalVM
- Find an existing Swift application and make a demo running it on GraalVM

Optional sub-goals:

- cross-language interoperability between Swift and other GraalVM languages

Explicit non-goals:

- 100% compatibility of Swift code for GraalVM/Sulong

The progress of the thesis should be discussed on regular basis with the supervisors. A time schedule with milestones must be presented 3 weeks after the work starts. This schedule will be continuously refined as the work progresses. The final thesis should be submitted not later than 15. March 2022.

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[1] M. Rigger, R. Schatz, R. Mayrhofer, M. Grimmer, and H. Mössenböck, “Sulong, and Thanks for All the Bugs: Finding Errors in C Programs by Abstracting from the Native Execution Model,” in Proceedings of the Twenty-Third International Conference on Architectural Support for Programming Languages and Operating Systems, New York, NY, USA, 2018, pp. 377–391.

[2] https://github.com/oracle/graal/tree/master/sulong

[3] T. Würthinger et al., “One VM to Rule Them All,” in Proceedings of the 2013 ACM International Symposium on New Ideas, New Paradigms, and Reflections on Programming & Software, New York, NY, USA, 2013, pp. 187–204

[4] https://github.com/oracle/graal/tree/master/truffle

[5] https://www.graalvm.org

[6] https://swift.org/

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