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Master's Thesis

Generation of Java Interfaces for Accessing Foreign Objects

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Polyglot programming is the practice of writing code in multiple programming languages, which gives software engineers a much broader choice in terms of software libraries and frameworks they can use for building applications. GraalVM is a polyglot virtual machine and enables fast and direct interaction between programming languages. However, this level of language integration is comparatively new and consequently, tooling support is limited.

This thesis should explore how to support the polyglot programming experience with a focus on integrating with existing Java development environments. GraalVM currently provides a reflective API to access objects from languages such as Python, JavaScript, Ruby, et cetera. However, a Java developer usually prefers to access objects from foreign languages in the same way as Java objects. The idea is to leverage existing static type information to generate Java classes or interfaces for accessing foreign objects.

Widely used Python packages these days already have type information. TypeScript, which builds on JavaScript, also allows adding type information. In order to make it easy for Java developers to use common packages in Python, TypeScript or other programming languages, the idea is to generate Java classes and interfaces for commonly used packages such as Python's NumPy.

The goal of this Master's thesis is to implement a generator for Java classes and interfaces based on existing type information of other programming languages. The generated classes should then delegate to the opaque objects using the Polyglot API.

The work's progress should be discussed with the advisor at least every two weeks. Please follow the guidelines of the Institute for System Software when preparing the written thesis. The deadline for submitting the written thesis is 29.2.2024.