

Master's Thesis

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## **Capture & Replay of JavaWiz Applications in GraalVM Espresso**

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JavaWiz is a Java visualization tool developed at JKU Linz. It is best described as a visual debugger, as it offers different views tailored to different problems and tasks with the main goal of being helpful and easy to understand especially for novice programmers. For example, a graphical view of executed statements allows users to see the history of statements executed and what changes were made to which program variables. Another view allows students to observe the current state of the call stack as well as the heap, with a focus on depicting how they change during program execution.

The frontend of JavaWiz is implemented in TypeScript using the D3.js visualization library. The backend is a Java application executing the application in debug mode. Currently, there are two versions of the backend, one using the JDI debugging interface and a second based on GraalVM Espresso. GraalVM Espresso (<https://www.graalvm.org/latest/reference-manual/java-on-truffle>) is an interpreter of Java Bytecode written in Java.

This thesis aims to develop a debugger based on GraalVM Espresso that allows recording an application and replaying it later. The primary concept involves intercepting native methods to record inputs, enabling the replay of the application with the same inputs. This functionality should facilitate replaying an application in JavaWiz and sharing application recordings over the internet. Additionally, the thesis will explore the possibility of capturing snapshots of an application's current state and subsequently starting the application from that state.

The thesis will be carried out in close collaboration with the JavaWiz team at SSW and Oracle Labs. Financial support may be available through a student employment.