



Visualization of Program Dependence Graphs

Master's thesis for Thomas Würthinger
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The key goal of this diploma thesis is to visualize the internal data structure (i.e. the “ideal graph”) and the graph coloring register allocator of Sun Microsystems’ Java HotSpot™ server compiler to make them easier to understand. Currently, trying to find bugs and problems in the server compiler requires one to read through a huge amount of text output. The tool should help compiler developers to get a better overview of what's going on during the compilation process.

Important goals are:

- Instrumentation of the server compiler so that it outputs relevant information to a file during compilation of Java method. It should be implemented in C++ and integrated into the current JDK snapshot.
- Opening and managing the graph files. This includes opening new files, displaying their methods, removing existing methods, searching for methods, and selecting methods for detailed view.
- Visualization of a graph with automatic positioning of nodes and routing of edges, different levels of detail, and manual positioning of nodes.
- Definition of filters that color nodes and group them together automatically based on defined patterns. Also manual modifications should be allowed. The user should be able to define new filters either as Java classes or using a scripting language.
- Finding the difference between two arbitrary graphs using heuristics. Displaying the differences graphically.
- Connecting the visualizer and the compiler via a network stream to make live debugging possible and to reduce the overhead introduced by files.
- Visualization of the graph coloring register allocator of the server compiler.

Both the visualizer application and the master's thesis should be written in English so that the server compiler staff at Sun Microsystems can use the tool.

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