

# Register Allocation via Graph Colouring

Bc. Lukáš Kuklínek

xkukli01@stud.fit.vutbr.cz

## **Abstract**

This presentation is an introduction to graph colouring algorithms and their application for the register allocation task within compilers. First, the process of reducing the register allocation problem to graph colouring is described.

Then a basic algorithm for graph colouring is described. Several modifications to make it a better match for the register allocation problem are introduced afterwards. Most notably, in the case of a particular instance of the problem not being satisfiable, the algorithm has to decide which variable to allocate on a stack instead of in a register. This corresponds to removing nodes from the graph being coloured until the problem eventually becomes satisfiable. This trick is called spilling.

Several commonly used heuristics for the algorithm are presented. These are needed because both problems turn out to be NP-complete and as such are infeasible to be solved exactly using a stock deterministic hardware facility.