

# Single Static Assignment Form

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Marek Milkovič, Oliver Nemček

{`xmilko01,xnemce03`}@stud.fit.vutbr.cz

Optimizations are inherent part of the most modern compilers. There is a constant effort on how to make the optimizations less time consuming and how to perform them more easily. The single static assignment (SSA) form is a special form of an intermediate representation (IR), which fulfills these requirements. It stands on two basic principles. Single definition for every variable and  $\Phi$ -functions. We talk about these principles in our presentation. We introduce variable versioning and how it can be used to achieve single definition of every variable. The problematics of  $\Phi$ -functions and their placement is discussed together with a dominance and dominance frontiers of the basic blocks in a control flow graph. We also give an overview on how to perform selected optimizations and what are their benefits when applied on SSA form. In the end, we cover the transformation out of the SSA form and explain why we cannot keep IR in the SSA form.