Static Single Assignment

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Recap: What is SSA

• What is SSA?
  • SSA is a rule which states that each variable cannot be assigned more than once in the program text.
Recap: Three Algorithms

• Dominance Frontier
• \( \varphi \) Placement
• Variable Renaming
Dominance Frontier
Dominance Frontier

• What are the definitions of Dominance Frontier?
Dominance Frontier in LLVM

• Implemented in llvm/Analysis/DominanceFrontierImpl.h (line 160) using worklist algorithm.

• Has a wrapper pass that can be used as a prerequisite for other passes (needs to be specified inside AnalysisUsage).
  • There is also similar wrapper pass for Dominator Tree: DominatorTreeWrapperPass
φ Placement
\( \varphi \) Placement

- Where should we place \( \varphi \)?
  - \( i \)?
  - \( j \)?
  - \( k \)?
Rename Variables
Rename Variables

- Traverse through the CFG, and rename variables as we go.