

SSA-based Program Analysis

Detecting equality of variables in programs

Full Text:  [PDF](#)

Authors: [B. Alpern](#) IBM Thomas J. Watson Research Center, Yorktown Heights, NY
[M. N. Wegman](#) IBM Thomas J. Watson Research Center, Yorktown Heights, NY
[F. K. Zadeck](#) Department of Computer Science, Brown University, Providence, RI

 1988 Article

 Bibliometrics

- Downloads (6 Weeks): 66
- Downloads (12 Months): 181
- Citation Count: 104

Published in:

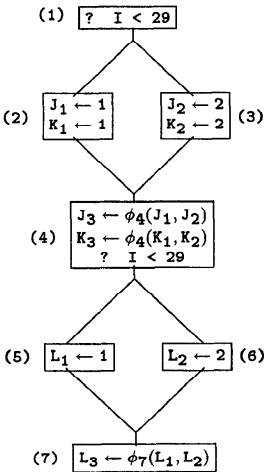
- Proceeding
- POPL '88 Proceedings of the 15th ACM SIGPLAN-SIGACT symposium on Principles of programming languages
- [ACM](#) New York, NY, USA ©1988
- [table of contents](#) ISBN: 0-89791-252-7 doi> [10.1145/73560.73561](#)

```
if P then J ← 5 else J ← 6
if P then K ← 5 else K ← 6
```

Are J and K equivalent?

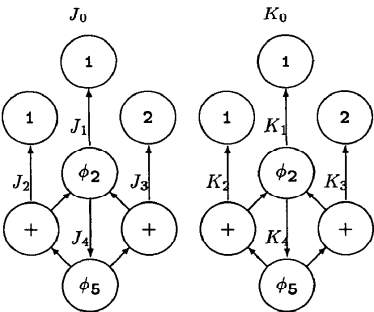
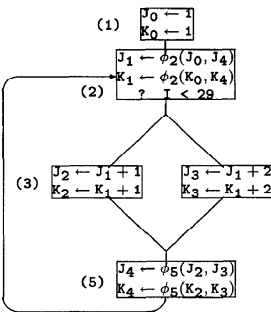
```
if Q
  then do
    I ← 5
    J ← 5
  end
else do
  I ← 6
  J ← 7
end
```

Are variables I and J equivalent?



congruence classes:

- (J₁, K₁, L₁)
- (J₂, K₂, L₂)
- (J₃, K₃)
- (L₃)



SOFTWARE—PRACTICE AND EXPERIENCE, VOL. 27(6), 701–724 (JUNE 1997)

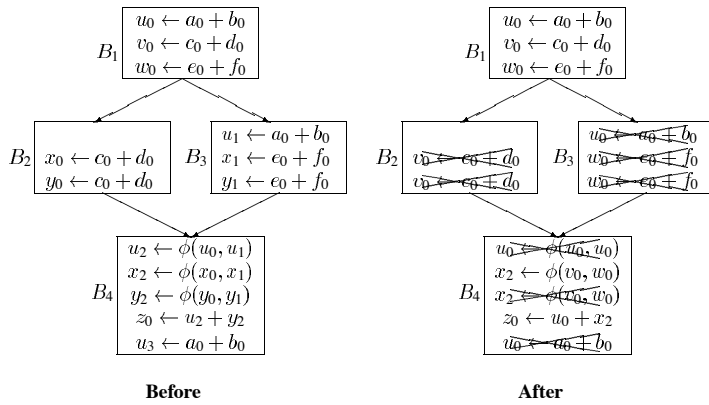


Value Numbering

PRESTON BRIGGS
Tera Computer Company, 2815 Eastlake Avenue East, Seattle, WA 98102, U.S.A.

KEITH D. COOPER AND L. TAYLOR SIMPSON
Rice University, 6100 Main Street, Mail Stop 132, Houston, TX 77005, U.S.A.

Benefits in VN and Data flow



Value numbering

- same name cannot have different value numbers
 - substitution is guaranteed when redundancy is found
- phi function as "control flow" operation
- in DVN, there is no kill from intervening blocks

Data flow analysis

- no kill set in data flow equations

Problems

- copy statements inserted at deconstruction
- register allocation pass removes the copies

Preston Briggs et al, "Value Numbering", Software -- Practice and Experience, 1997.