

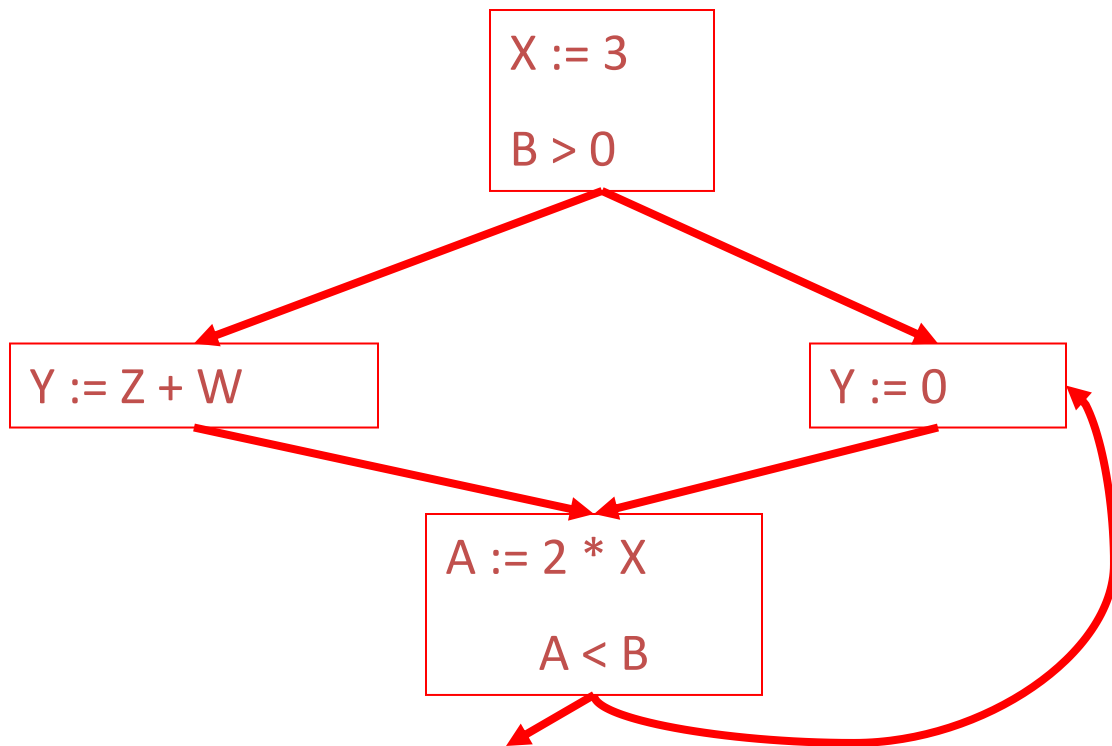


# Compilers

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## Analysis of Loops

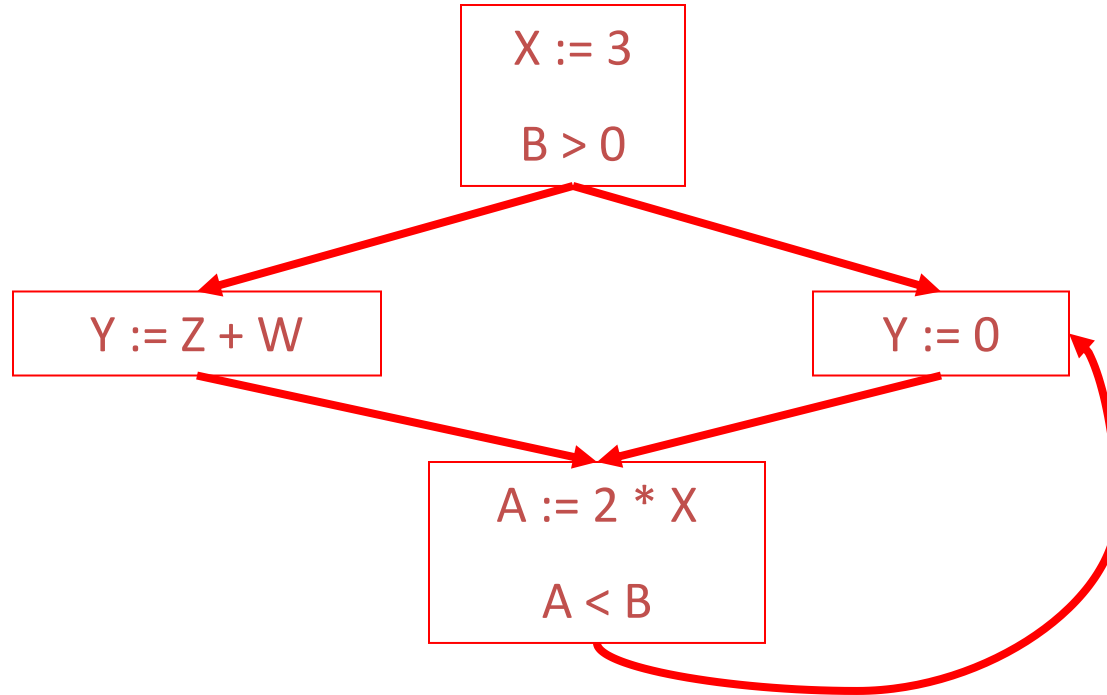
- To understand why we need  $\perp$ , look at a loop



- Consider the statement  $Y := 0$
- To compute whether  $X$  is constant at this point, we need to know whether  $X$  is constant at the two predecessors
  - $X := 3$
  - $A := 2 * X$
- But info for  $A := 2 * X$  depends on its predecessors, including  $Y := 0$ !

- Because of cycles, all points must have values at all times
- Intuitively, assigning some initial value allows the analysis to break cycles
- The initial value  $\perp$  means “So far as we know, control never reaches this point”

# Analysis of Loops



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After running the constant propagation algorithm to completion, choose the correct dataflow information for  $X$ ,  $Y$ , and  $Z$  at the program point labeled at right.

	$X$	$Y$	$Z$
<input type="radio"/>	T	1	T
<input type="radio"/>	4	T	5
<input type="radio"/>	4	1	5
<input type="radio"/>	4	T	T

