Upper and Lower Loop Bound Estimation by Symbolic Execution and Loop Acceleration

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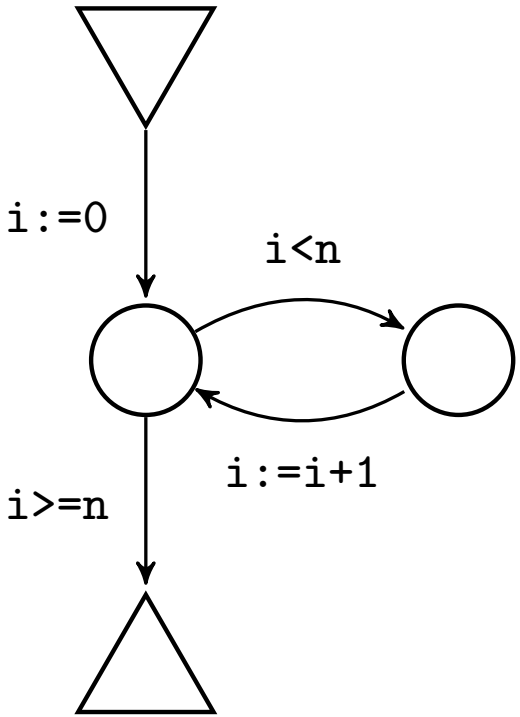
Loop Bound Analysis



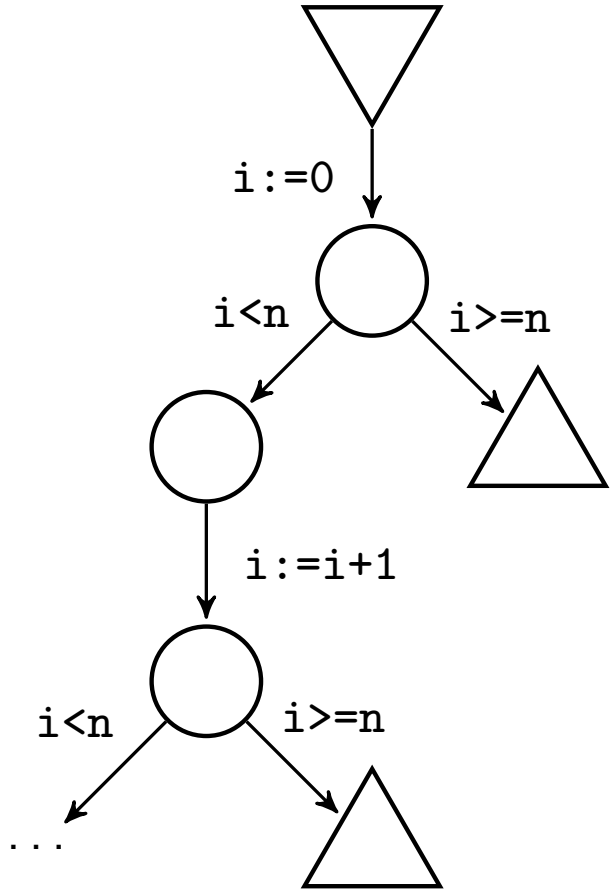
Upper loop bound: $\mathbf{max}\{n, 0\}$

Lower loop bound: $\mathbf{max}\{n, 0\}$

Usage:

- worst case execution time
- memory consumption
- complexity analysis
- ...

Symbolic Execution - Path Explosion



Path conditions:

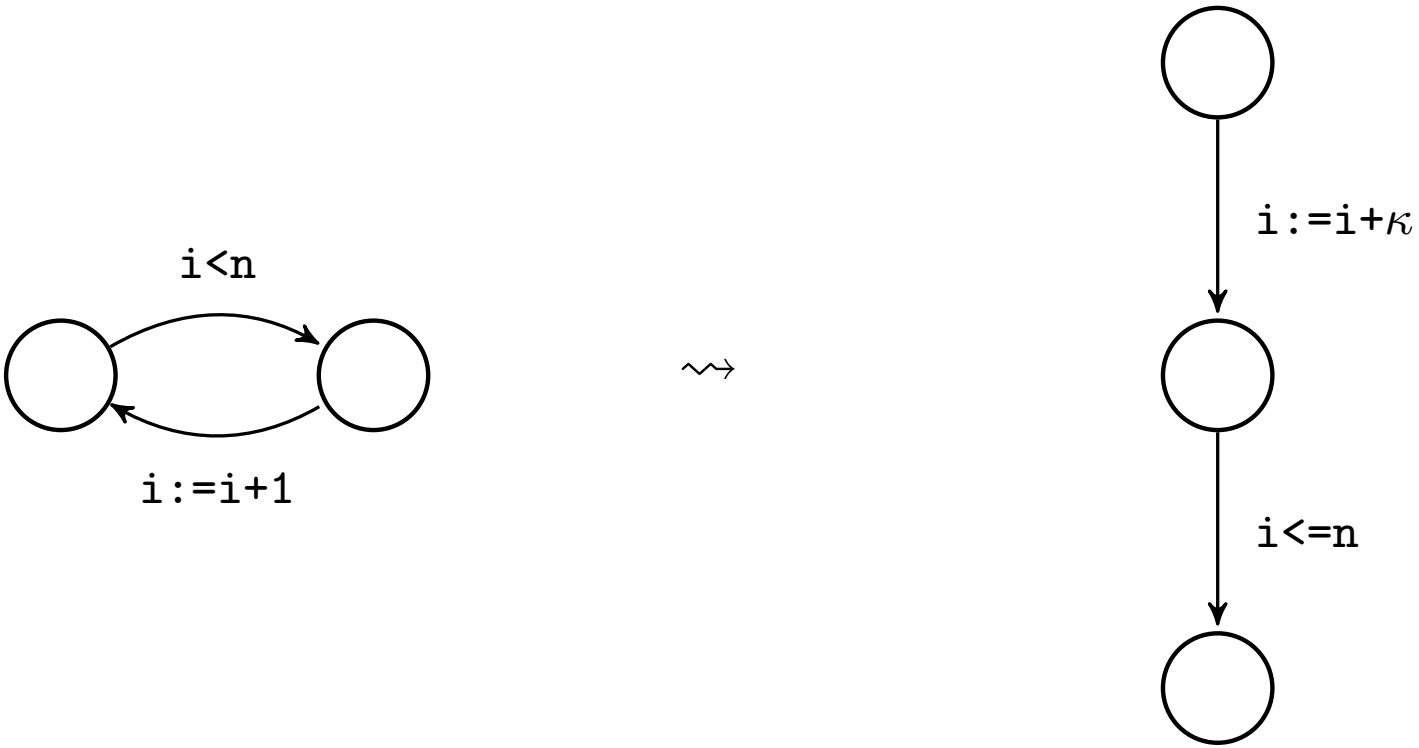
$\varphi_1 \equiv 0 \geq n$

$\varphi_2 \equiv 0 < n \ \wedge \ 1 \geq n$

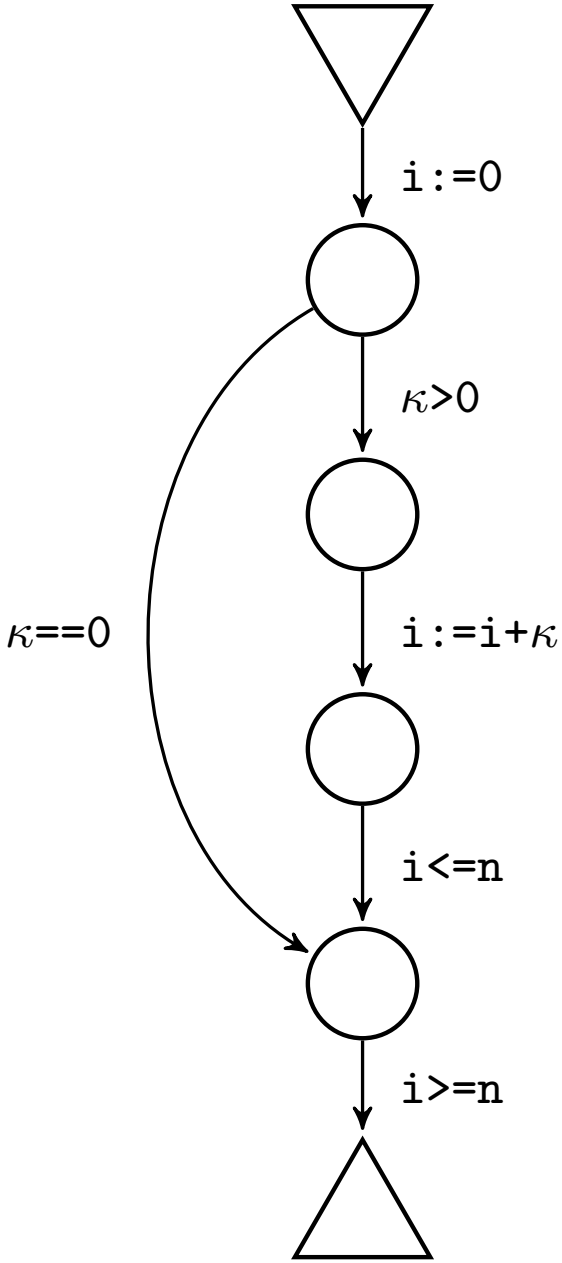
$\varphi_3 \equiv \ldots$

$\ldots$

Loop Acceleration



Combination



Path conditions:

$\varphi_1 \equiv \kappa = 0 \ \wedge \ 0 \geq n$

$\varphi_2 \equiv \kappa > 0 \ \wedge \ \kappa \leq n \ \wedge \kappa \geq n$

$\Longrightarrow \ \kappa = \mathbf{max}\{n, 0\}$