CMPT 473
Software Quality Assurance

A Brief Intro to Automated Test Generation

Nick Sumner

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    run_program(test)
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How might this be pragmatically useful?

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  - Fuzz Testing
  - Symbolic Execution

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It was distressingly effective at finding buffer overflows (25%-33% of programs).

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     - Modify an existing test suite
     - Seeing a resurgance via *AFL* & *libFuzzer*

American Fuzzy Lop

- Increasingly used mutational fuzzer
  - Effective at finding buffer overflows

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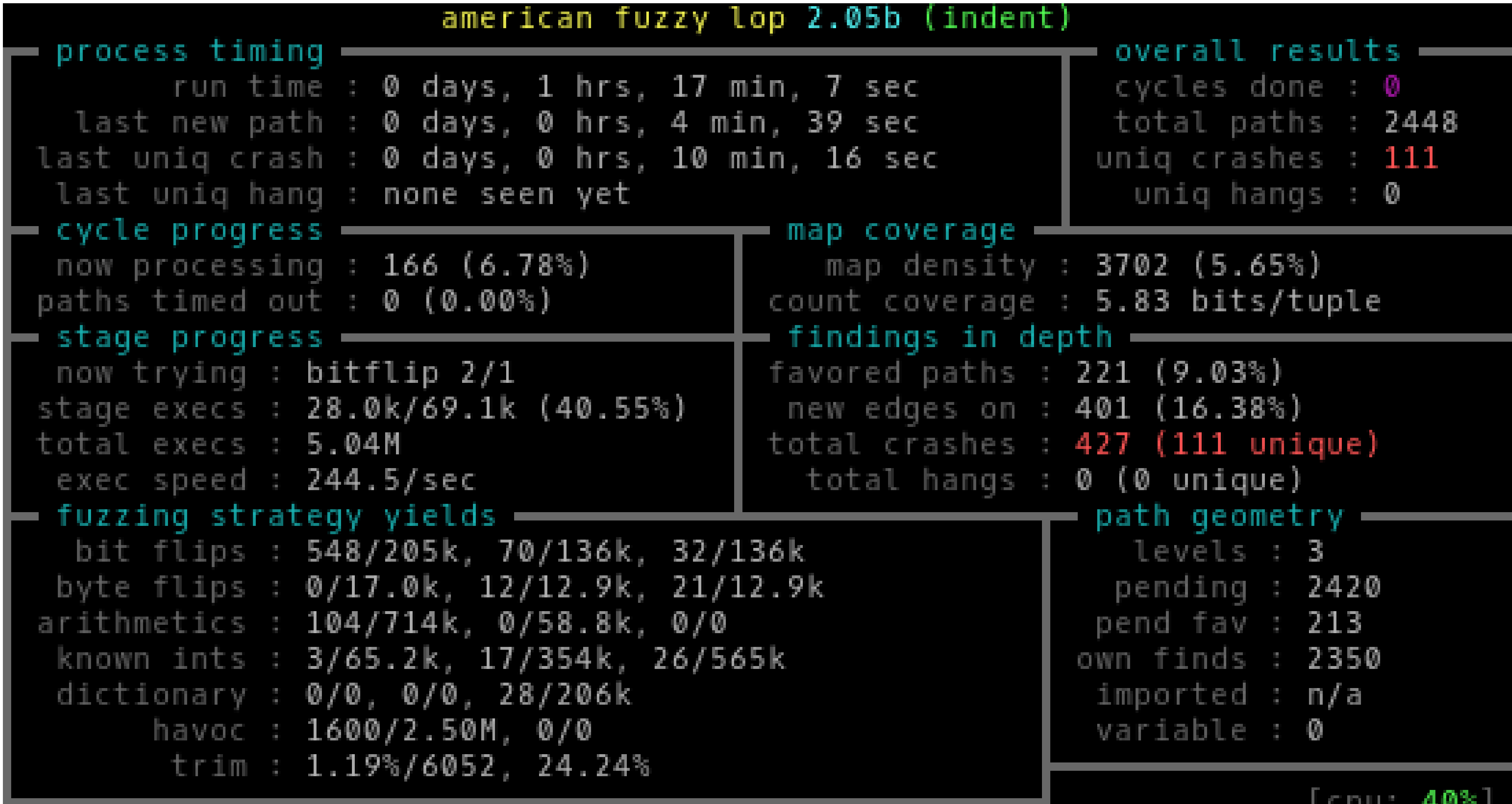

Symbolic Execution

Cadar & Sen, 2013

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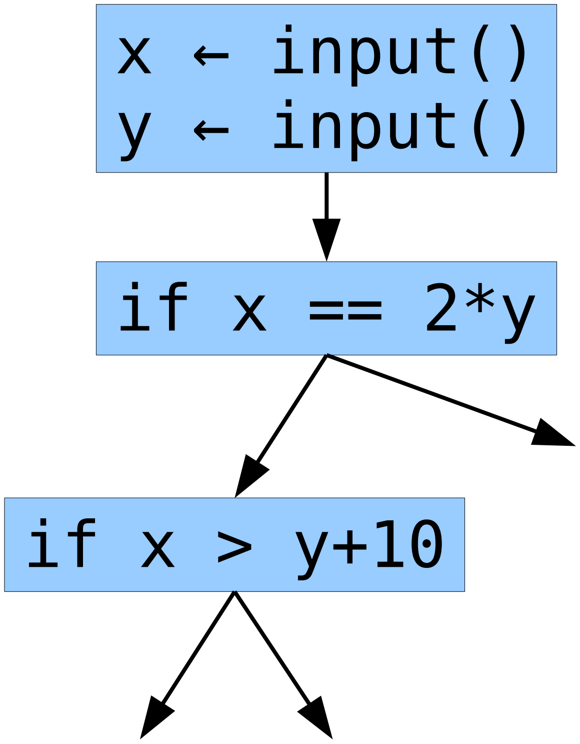

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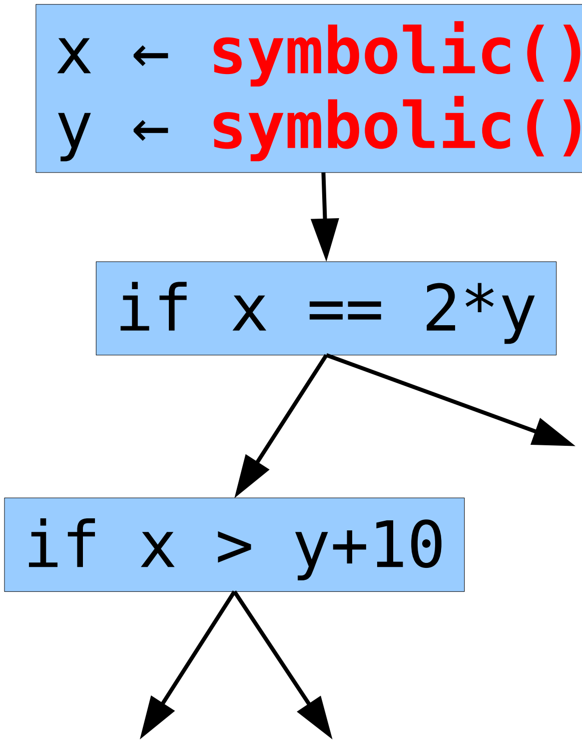

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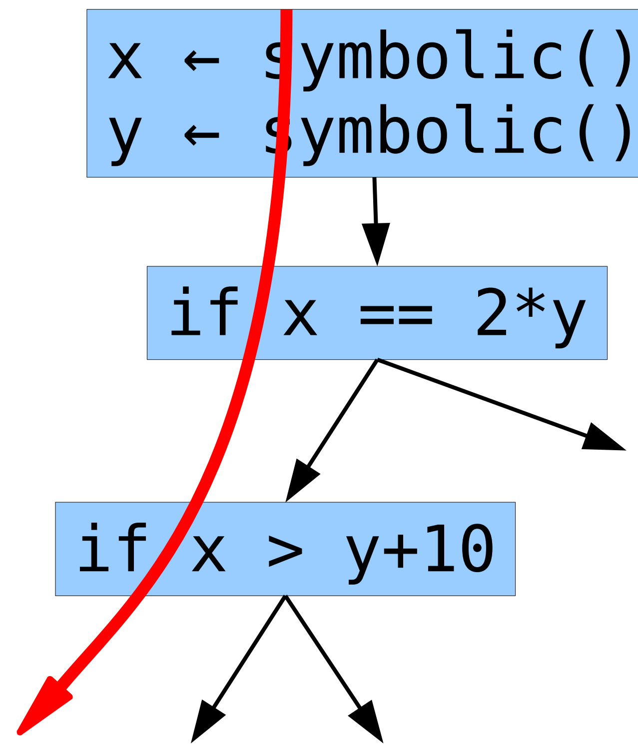

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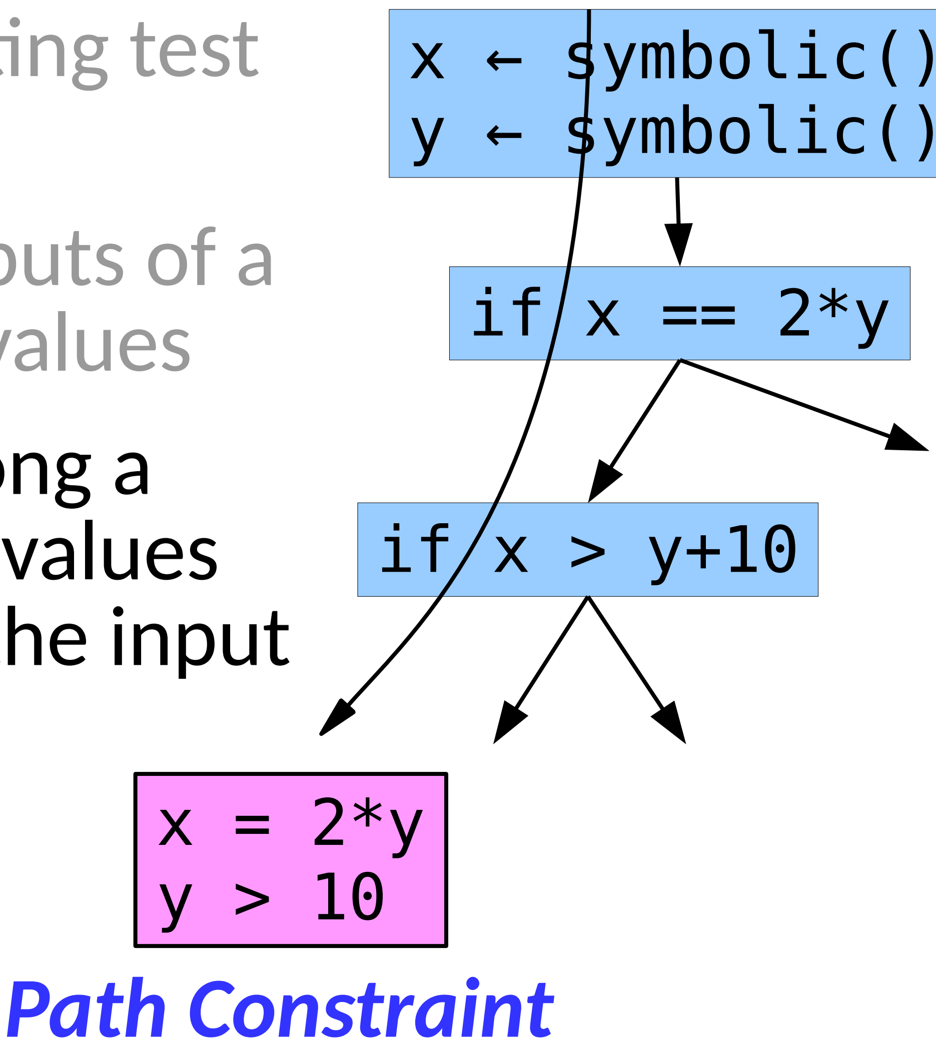

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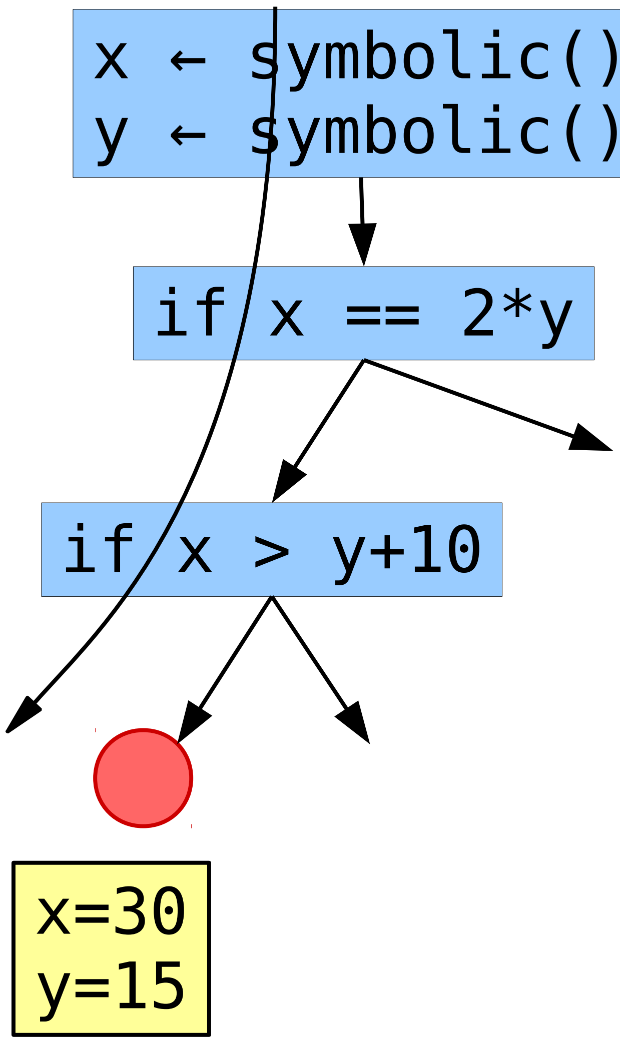

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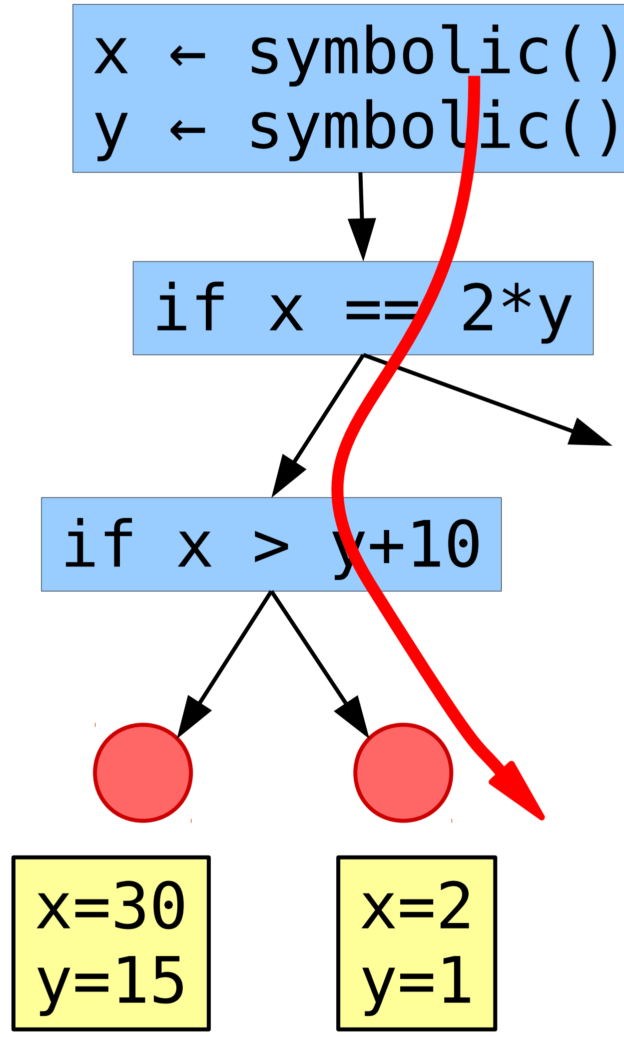

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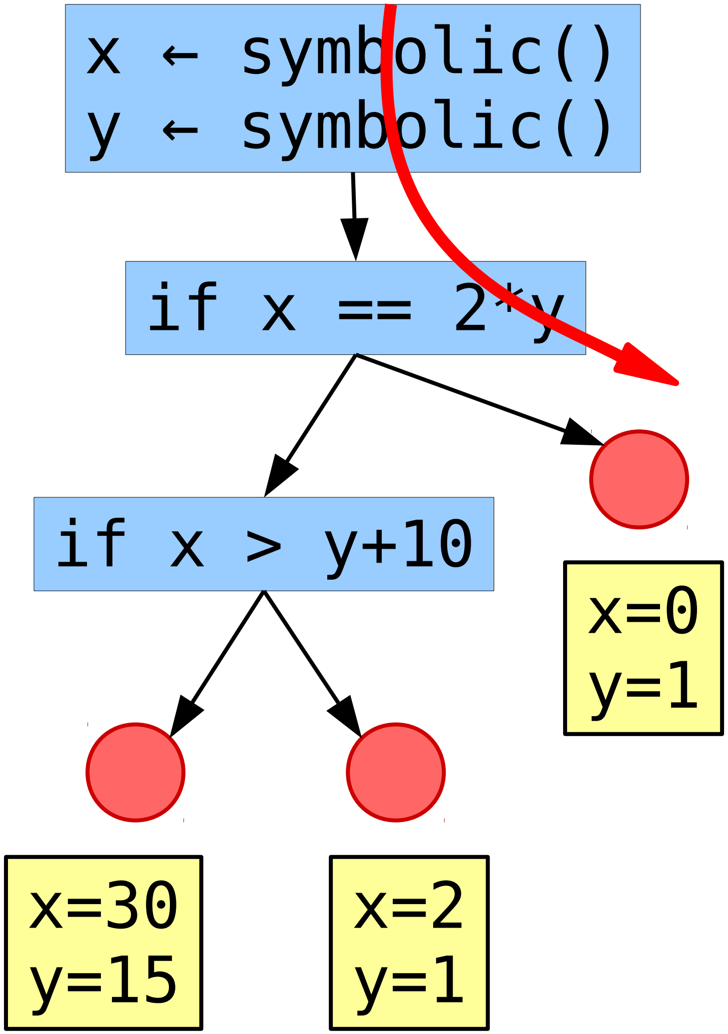

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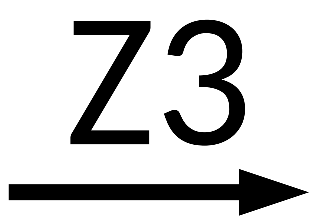

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Try it online:
http://www.rise4fun.com/Z3/tutorial/

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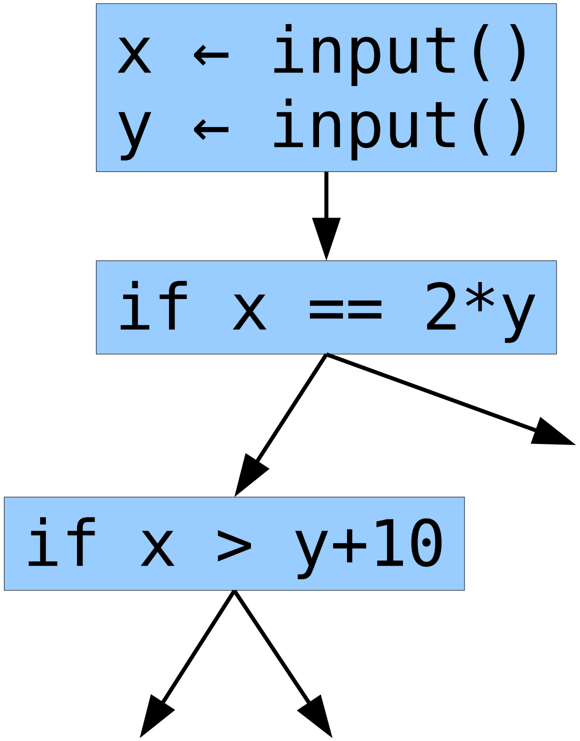

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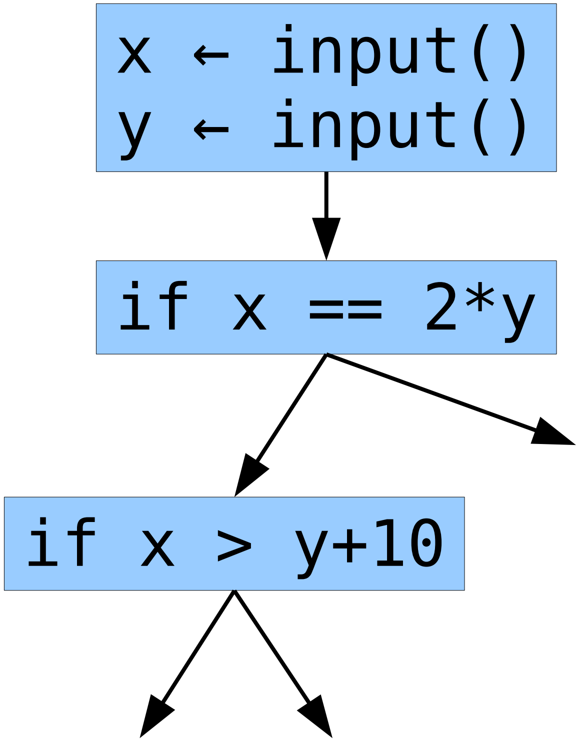

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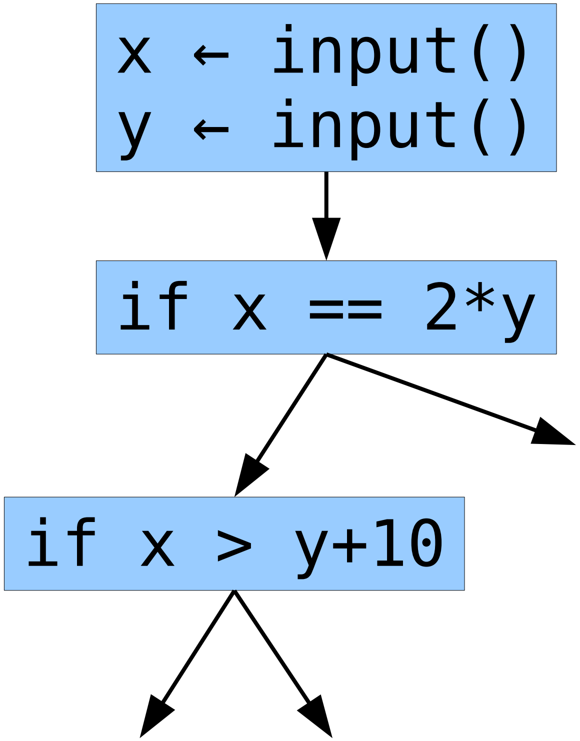

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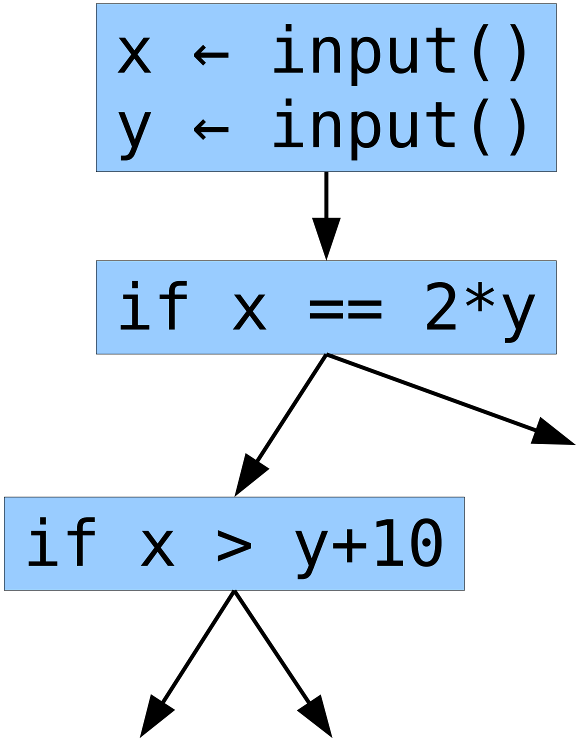

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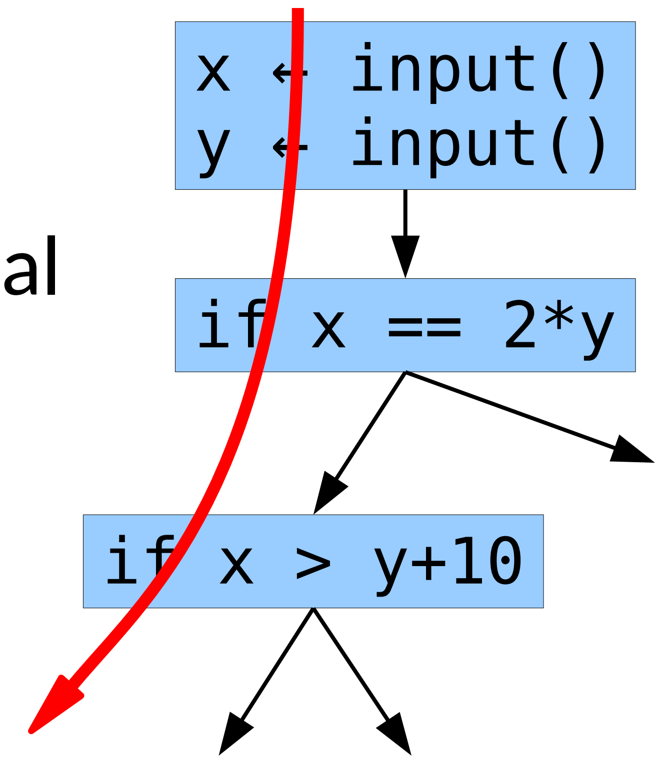

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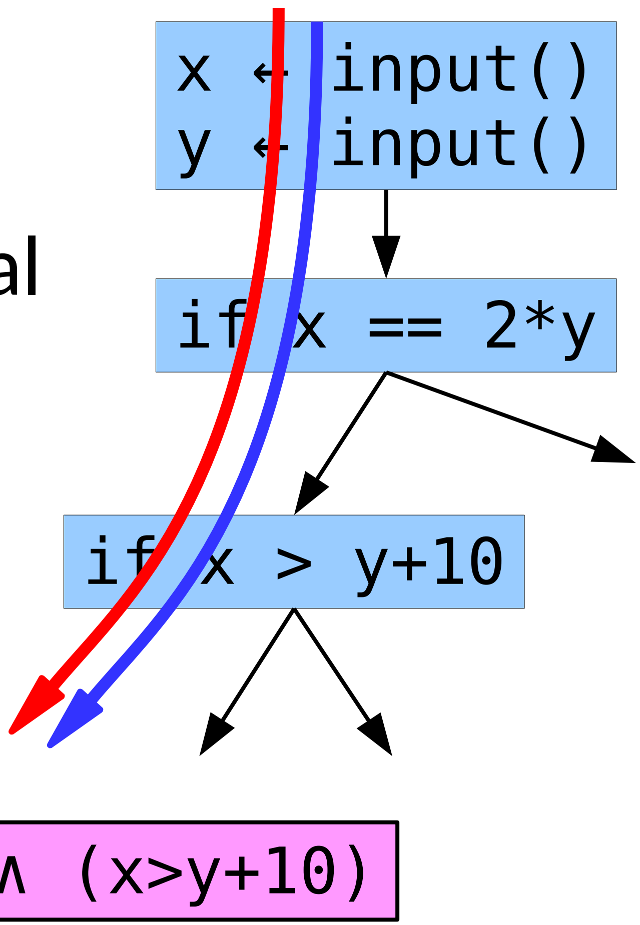

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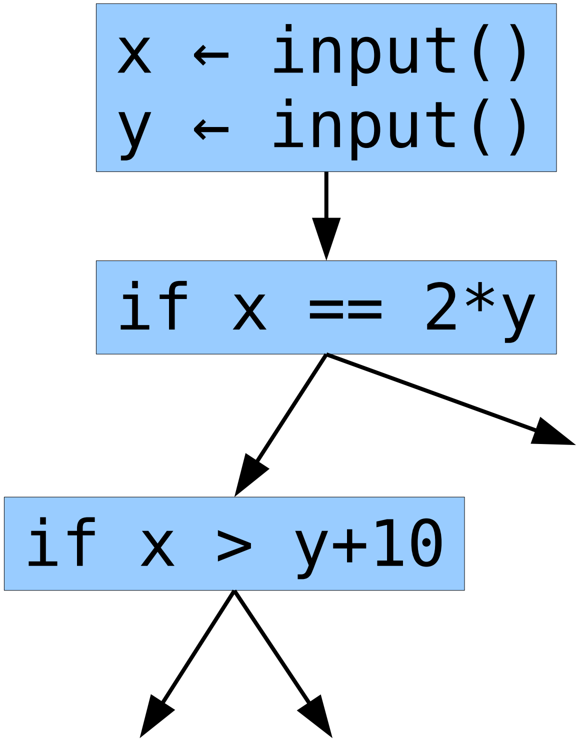

$(x=2*y) \land \neg(x>y+10)$

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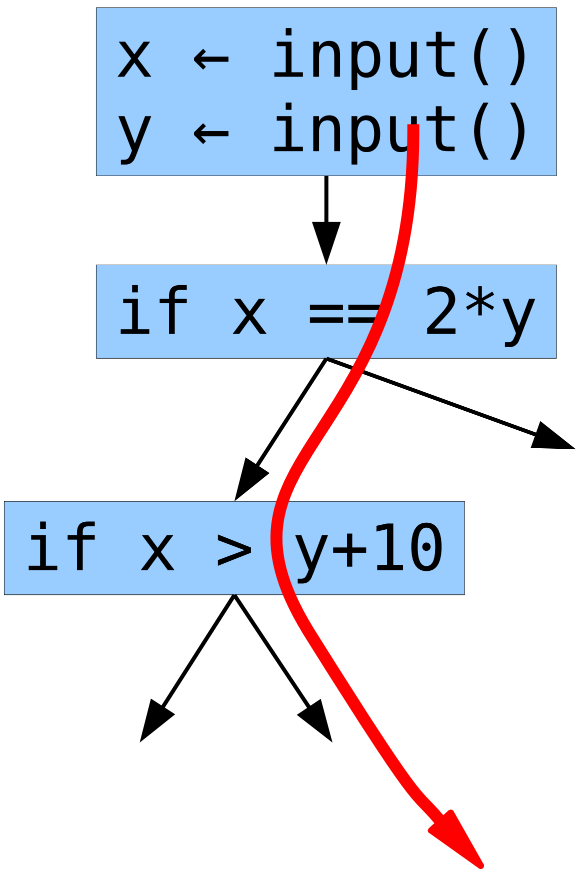

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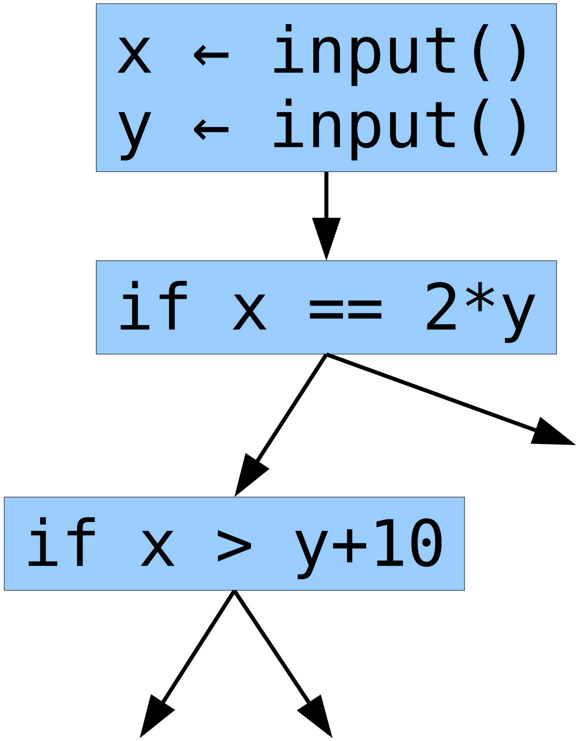

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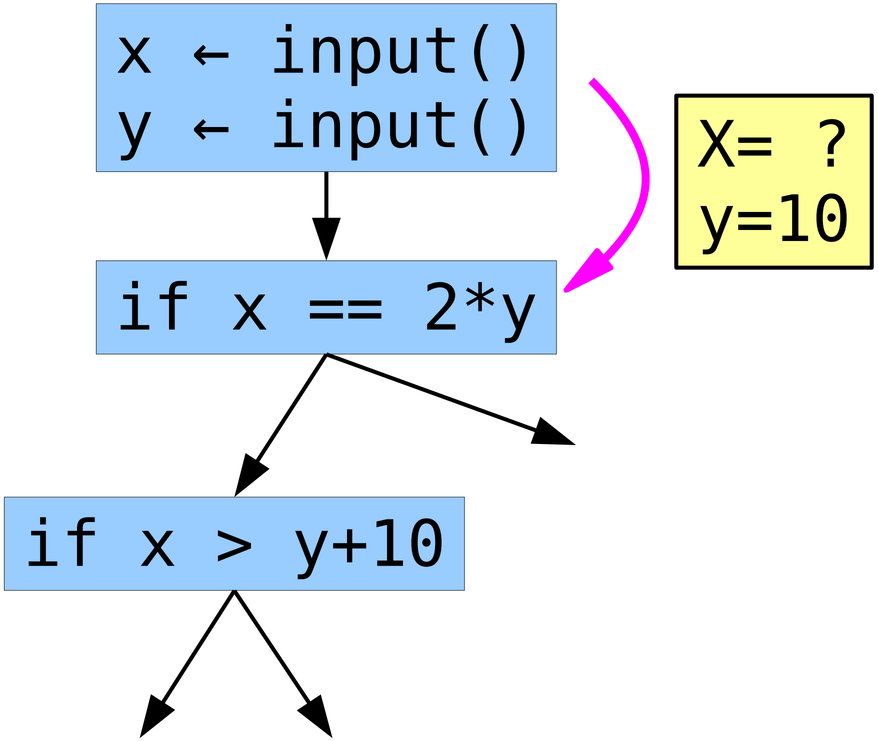

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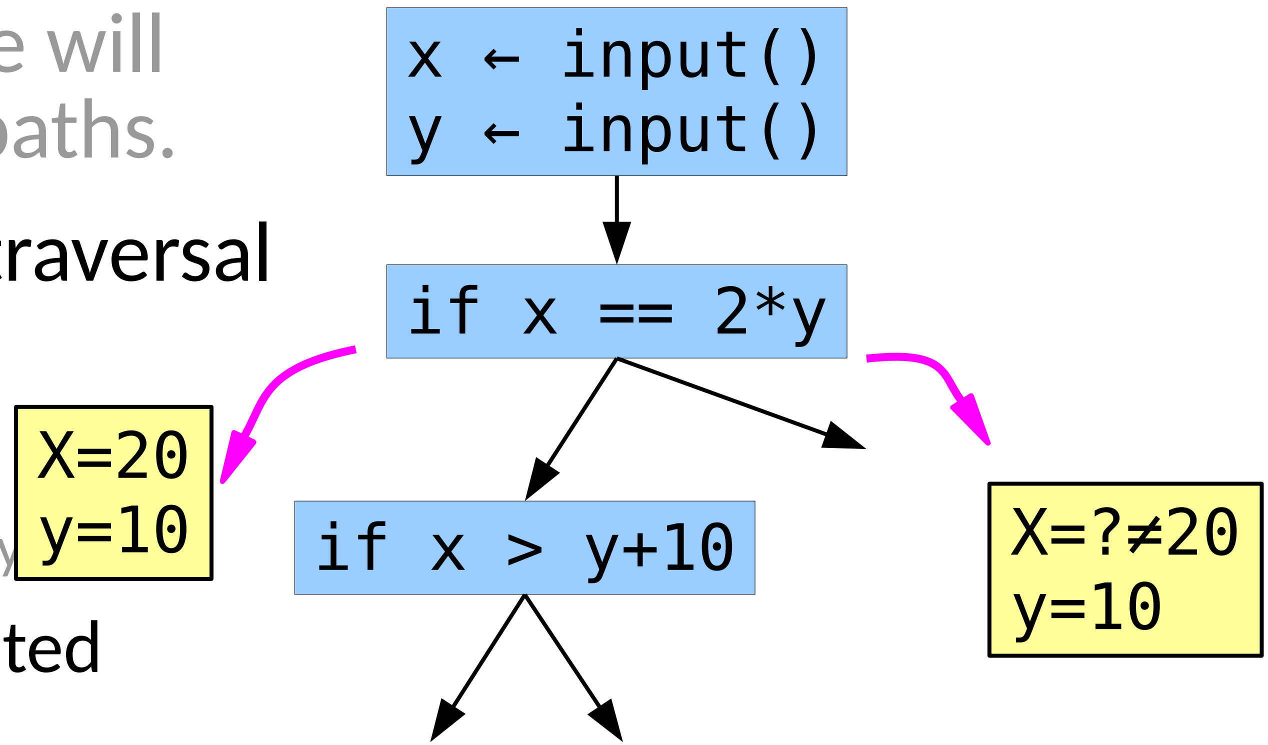

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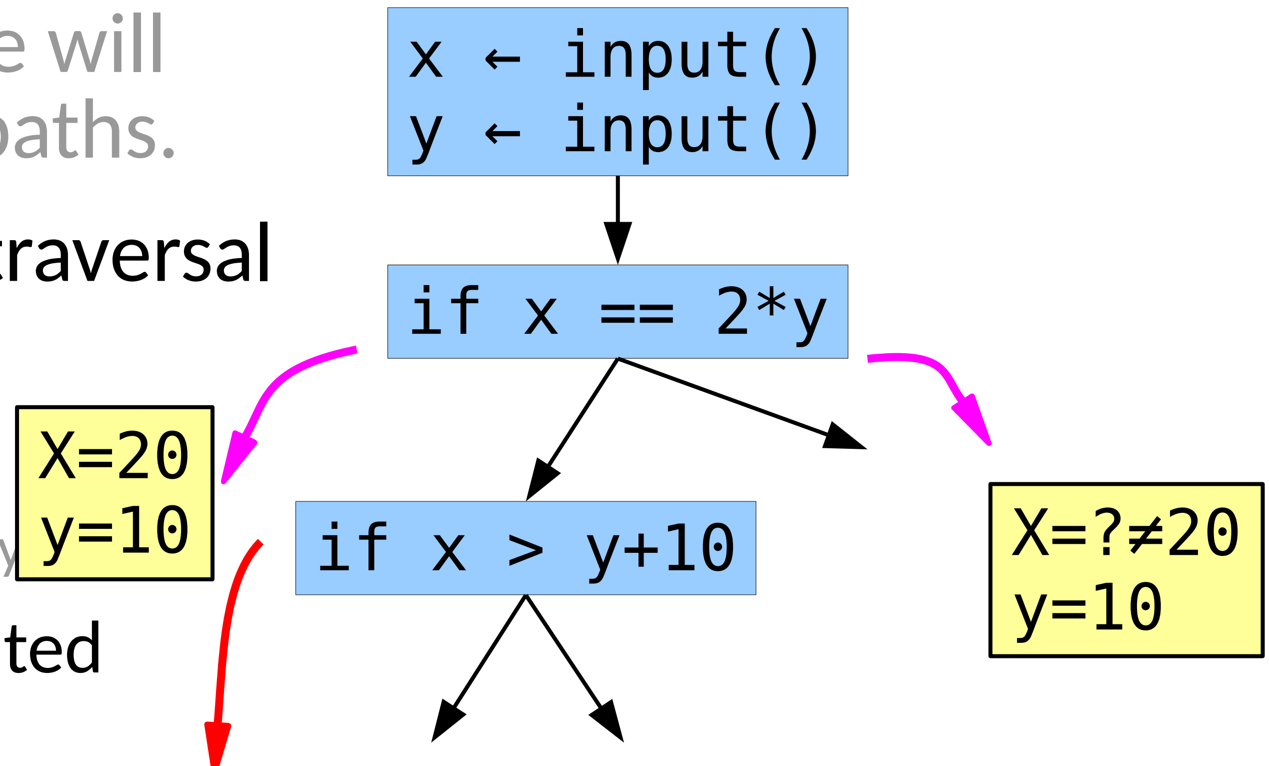

Execution on this side is concrete from this point on.

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Try it out:
https://github.com/klee/klee

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- Especially crucial as part of maintaining security (more on this later!)