

# Concolic Execution for Fuzzing in Julia

Final project for 6.858 (Spring 2018)

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Welcome to Lab 3

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General strategy

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Based on [4, 3]

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- Iterate until all branches are visited, record which branches throw exceptions

Based on [4, 3]

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AD in 5s

Example time!

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- Filter concolic trace to get a trace that only depends on the tainted arguments
- Cut trace at branch and negate branch condition
- Translate symbolic trace to SMT2/Z3, if satisfiable use the input value to continue exploration

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  - Context specific primitives of operations (like addition) to propagate taint or to create tain (rand)

## Extensible design: `rand`

One problem in concolic execution is how to deal with random variables, concolic execution depends on being able to *deterministically* execute programs. `rand` is implemented as a primitive that generates taint and the return value of a seen execution of `rand` can be controlled and during fuzzing Z3 will generate values for `rand` much in the same way it does for other inputs. This could be extended to other foreign-calls like reading from the filesystem.

- Proof some properties
- Fuzzing!
- Loops, structs, random variables

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- Arithmetic on Bool

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- Better analysis of function to taint usage of global variables and foreigncalls

Where to find this work

<https://github.com/vchuravy/ConcolicFuzzer.jl>







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## If you want to learn more about Julia!

- 1 Write me an e-mail or go to <https://julialang.org>
- 2 Find me in 32-G785

-  Jeff Bezanson et al. 'Julia: A Fast Dynamic Language for Technical Computing'. In: (Sept. 2012). arXiv: 1209.5145 [cs.PL].
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