AProVE: Automated Program Verification Environment

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joint work with

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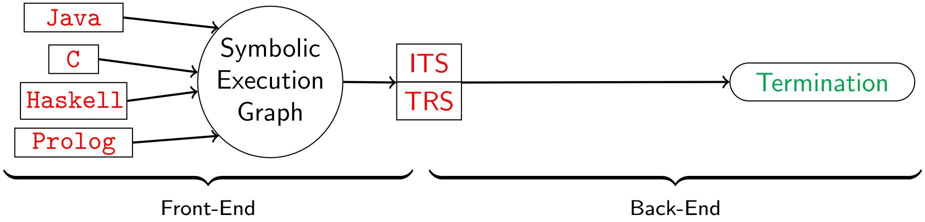
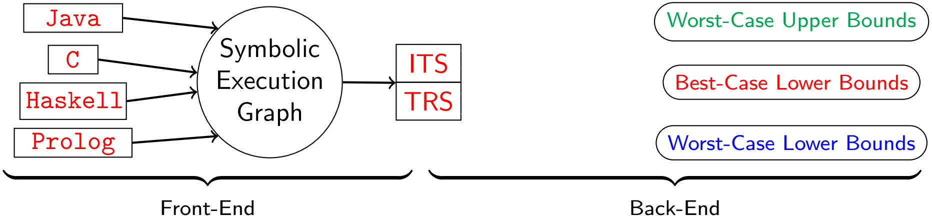
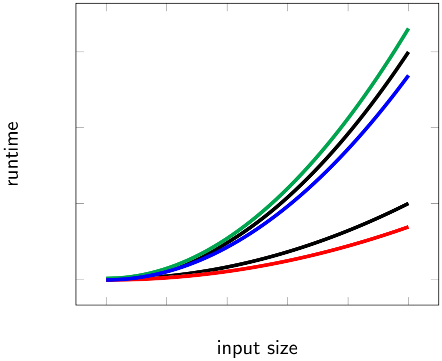
AProVE for Termination Analysis



- language-specific features when generating symbolic execution graph
- back-end analyzes Integer Transition Systems and/or Term Rewrite Systems
- powerful termination analysis
  - Termination Competition since 2004 (Java, C, Haskell, Prolog, TRS)
  - SV-COMP since 2014 (C)

APProVE for Complexity Analysis

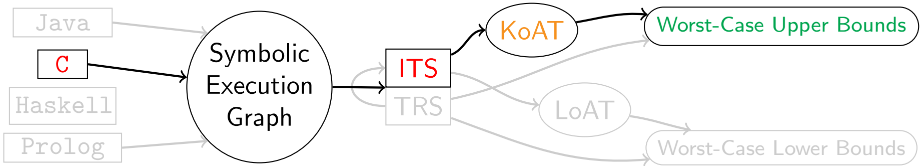




Why worst-case lower bounds?

- *tight* bounds
- detect bugs
- detect potential attacks (*DoS*)

AProVE for Complexity Analysis



ITS:
- alternate inference of size and time upper bounds (TACAS'14, TOPLAS'16)
- lower bounds by adapting ranking functions (IJCAR'16)

TRS:
- upper bounds for innermost rewriting by dep. pairs (CADE'11, JAR'13)
- use upper innermost bounds also for full rewriting (LPAR'17)
- semi-decision procedure for constant upper bounds (IPL'18)
- infer upper bounds for TRSs by ITSs (FroCoS'17)
- lower bounds by induction or syntactic criteria (RTA'15, JAR'17)

`Prolog`:
- infer upper bounds for `Prolog` from complexity of TRSs (PPDP'12)

`Java`:
- adapt transformation of `Java` to ITSs for upper bounds (iFM'17)

`C`:
- upper bounds for bitvector programs (JLAMP'18)