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Symbiotic 10

Lazy Memory Initialization and Compact Symbolic Execution

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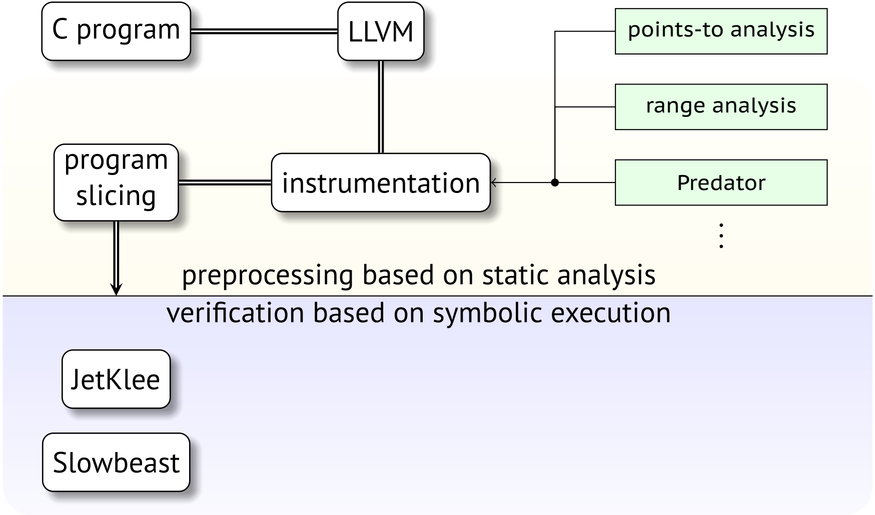
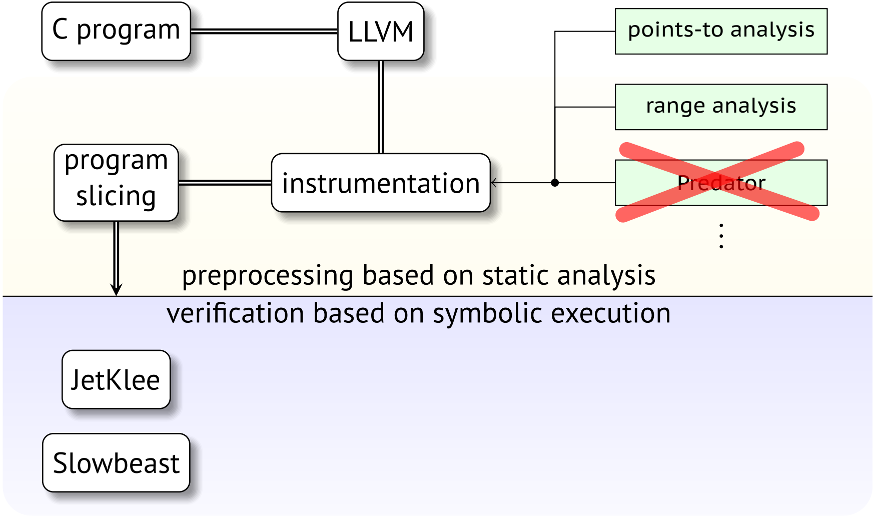
Symbiotic framework



Symbiotic framework: what is new in Symbiotic 10



C program

LLVM

points-to analysis

range analysis

~~Predator~~

program slicing

instrumentation

⋮

preprocessing based on static analysis

verification based on symbolic execution

JetKlee

Slowbeast

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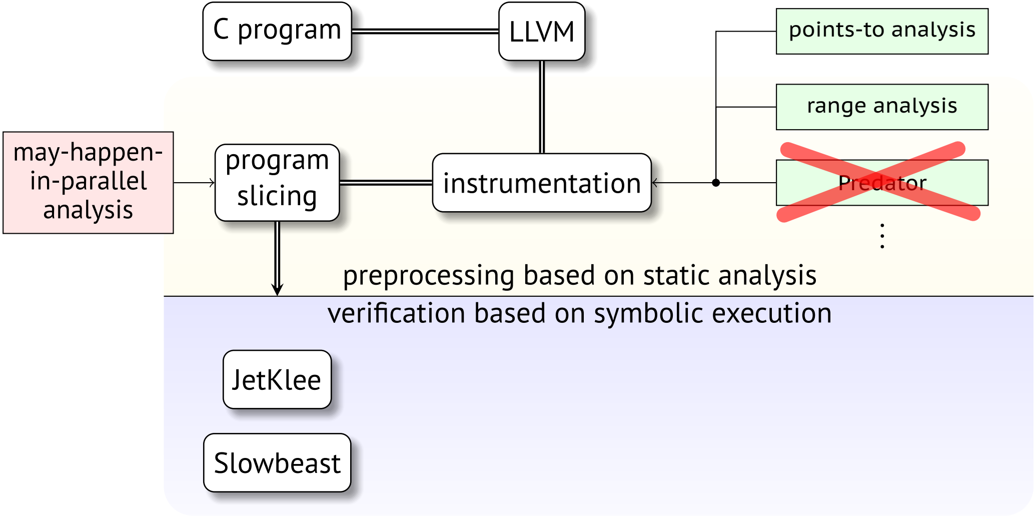

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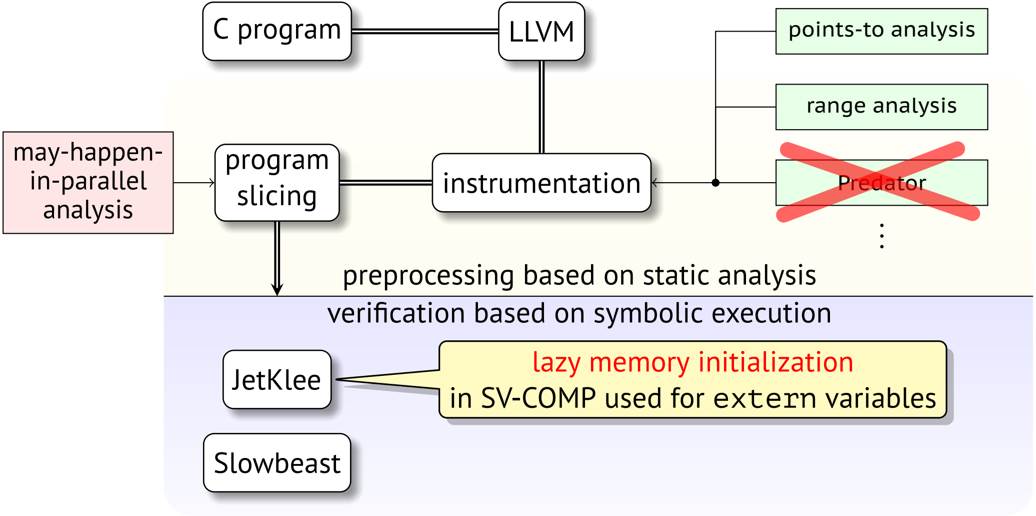

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lazy memory initialization
in SV-COMP used for `extern` variables

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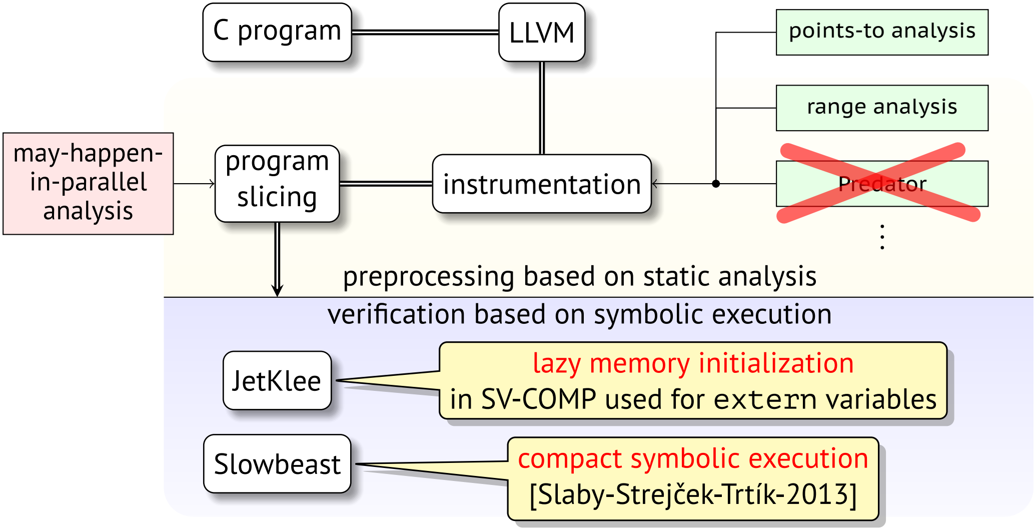

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compact symbolic execution
[Slaby-Strejček-Trtík-2013]

Other improvements in Symbiotic

workflow of *symbolic execution (SE)* engines in *unreach-call*

1. forward SE in JetKlee (for 333s)
2. compact SE in Slowbeast (for 60s)
3. backward SE with loop folding (BSELF) in Slowbeast (no limit)
4. forward SE in Slowbeast (no limit)

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other changes

- JetKlee can generate violation witnesses in format 2.0
- 300+ commits from Klee upstream merged to JetKlee
- all components run on LLVM 14
- many fixes (now we support Juliet benchmarks)

Results in SV-COMP 2024

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results in **MemSafety**	*PredatorHP*	*Symbiotic 10*
correct true	1630	**1643**
correct false	193	**212**
correct-unconfirmed true	0	0
correct-unconfirmed false	**3**	0
incorrect true	0	**5**[*]
incorrect false	**3**	0

[*] bugs caused mostly by imprecise modeling of `setlocale` and `getopt_long`