An LLVM Refinement Checker and its Applications

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Compilers should not miscompile!

A problem has been detected and Windows has been shut down to prevent damage to your computer.
The problem seems to be caused by the following file: kbvhid.sys

MANUALLY INITIATED CRASH

If this is the first time you've seen this stop error screen, restart your computer. If this screen appears again, follow these steps:

Check to make sure any new hardware or software is properly installed.
If this is a new installation, ask your hardware or software manufacturer for any Windows updates you might need.
If problems continue, disable or remove any newly installed hardware or software. Disable EFS memory options such as caching or shadowing.
If you need to use safe mode to remove or disable components, restart your computer, press F8 to select Advanced Startup Options, and then select Safe Mode.

Technical Information:

*** STOP: 0x000000e2 (0x00000000, 0x00000000, 0x00000000, 0x00000000)
*** kbvhid.sys - Address 0x94Fd8a2 base at 0x94Fb000 DateStamp 0x4a5bc7b5
What could go wrong?

Compilation: sequence of transformations

source code $\rightarrow$ IR $\rightarrow$ ... (IR) ... $\rightarrow$ IR $\rightarrow$ machine code

our focus: optimizations

*IR: Intermediate Representation
Verifying compiler

Examples: CompCert, Vellvm etc.
Validating each translation

Examples: TVI, TVOC etc.

Validated?
Translation validation by witnessing

source program \[\rightarrow\] compiler \[\rightarrow\] target program

Witness: expected relation

Validated?
source LLVM program → refinement relation → target LLVM program

Pre-coder

pre-coded source

Smack

pre-coded target

Smack

source Boogie program → Boogie Program Combiner → combined program

Boogie (& Z3)

validation result
Thank you!

Any questions
Contact: Yiji Zhang, yzhan79@uic.edu

("Sorry that I could not be there due to Visa issues 😞. -- Yiji")