Interaction and Automation[1]

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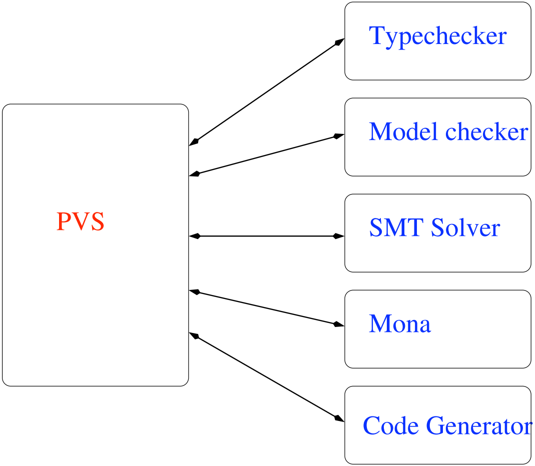
Overview

- Proof construction is an important formal activity, but there are others: *modeling, testing, refutation, abstraction, evaluation, search, exploration, synthesis, and simplification.*
- There's a range of verification techniques: *model checking, test generation, simulation, abstraction, SAT, SMT, and static analysis.*
- Interactive proof checkers are great for some things, but . . .
- *How can we expand the range of tools that can be integrated and used interactively?*

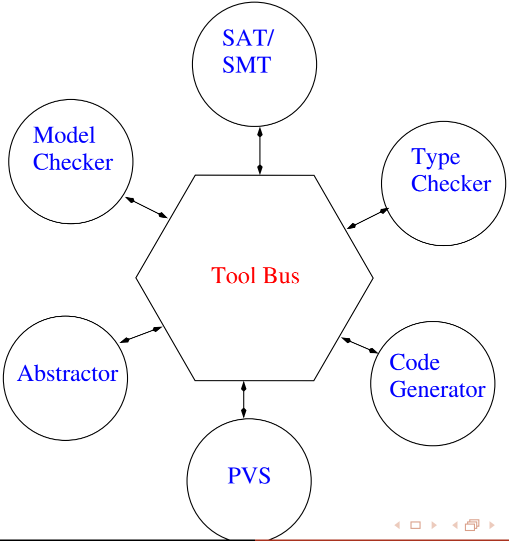
Example: SMT Solvers

- SAT/SMT solvers (Yices 1, Yices 2, Z3) have been, used for proving, constraint solving, planning, test generation, predicate abstraction, breaking/verifying crypto, synthesis, and image construction.
- Yices has been integrated into PVS and Isabelle/HOL (Erkok/Matthews).

PVS: ITP as a Front-End



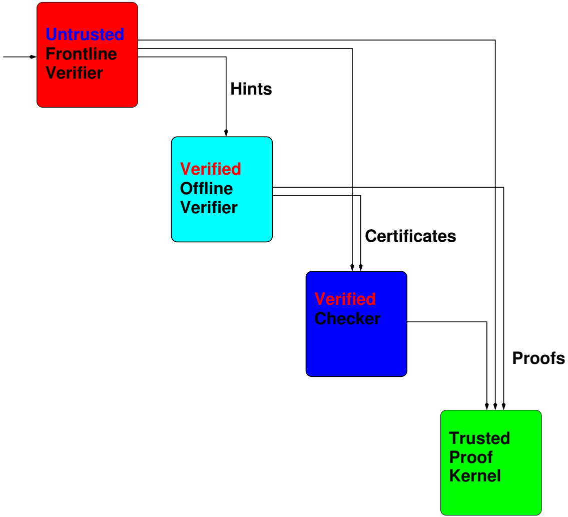
Toolbus: P2P Integration



Open Verification Platform (OVP)

- Verification involves requirements, models, domains, assertions, programs, test cases, abstractions, and proofs.
- It is going to involve multiple tools and multiple collaborators.
- OVP is a framework for sustaining such a collaboration.
- The foundation for OVP is provided by a *hyperfile* system (HyFile) that keeps file systems *functionally synchronized*.
- When files are checked in, HyFile executes actions needed to update the files, e.g., LaTeX, `make`, clones, regressions, profiling, notifications, email, provenance, workflow, distributed computing, file sharing, . . .

Verified Reference Kernel (V Kernel)



Interaction + Automation

- Interaction without automation is laborious.
- Automation without interaction is misguided.
- There's more to formality than proof.
- The evidential tool bus is a P2P architecture for gathering evidence.
- HyFile manages the consistency of a file system and supports collaboration between multiple, distributed users and tools.
- The V Kernel efficiently certifies the claims.