Konstantin Weitz

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Education & Research Interest

I'm a PhD student in Computer Science at the University of Washington, expecting to graduate in February 2017. My research is focused on **applying Programming Language techniques to aid Systems development**. My advisors are Michael D. Ernst and Zachary Tatlock.

- **PhD:** Computer Science and Engineering, University of Washington (expected GPA 3.87, expected 2017)
- **MS:** Computer Science and Engineering, University of Washington (GPA 3.83, 2014)
- **BS:** Applied Computer Science, Baden-Wuerttemberg Cooperative State University (GPA 4.0, 2012)

Experience

- **PhD Research**:
  - **BGP Verification:** I built Bagpipe, an SMT solver based tool to automatically verify Border Gateway Protocol (BGP) policy specifications. Bagpipe found 19 bugs in 240kloc of real BGP configurations,
  - **BGP Semantics:** I developed the first formal semantics of BGP (in Coq), which I used to verify Bagpipe, and to formalize Gao & Rexford's proof on the convergence of BGP (revealing a necessary extension).
  - **Solver-Aided Tool Verification:** I developed a library to verify SMT based tools using a proof assistant, e.g. an x86 verifier that found 1 bug in STOKE, 7 bugs in Rocksalt, and once fixed, proved their equivalence.
  - **SQL Optimization Verification:** I developed a homotopy type theory based SQL semantics in Coq, and formally verified over 20 SQL optimizations. Many of these had never been proven correct before.
  - **A Type System for Format Strings:** I developed a type system that prevents invalid format method (e.g. printf) invocations, revealing 104 bugs in 2,777kloc of well-maintained open-source projects.
- **Google Intern**: I added a dataflow analysis to Google's internal bug finding tool (called error-prone). The analysis is run on every Java code commit within Google. (3 months, 2014)
- **VMware Intern**: I evaluated and extended VMware's hypervisor memory overprovisioning. (3 months, 2013)
- **IBM Student Employee**:
  - **Linux Kernel:** I extended the Linux KVM to use guest information about memory usage and spinlocks to improve memory allocation and scheduling decisions. My code is upstream. (8 months, 2010/2012)
  - **IBM Research Intern:** I worked on Blink/BLU at the Almaden Research Center. (4 months, 2011)
- **Apache Flink:** I implemented a map-reduce combiner and join algorithm for Flink. (1 year, 2011-2012)
- **Internet Service Provider:** I volunteered for my undergraduate university's ISP. (2 years, 2010-2012)

Technical Proficiency

- **Programming Languages** include C/C++, Coq, Haskell, Java, JavaScript, Python, SQL
- **Developer Tools** include Docker, Emacs, Eclipse, Git, Linux, Make, Maven, Vim

Selected Publications

- S. Chu, C. Wang, **K. Weitz**, et al. *Cosette: An automated SQL solver.* CIDR'17.
- **Weitz**, et al. *Scalable verification of border gateway protocol configurations with an SMT solver*. OOPSLA'16.
- **K. Weitz**, et al. *A type system for format strings.* ISSTA'14.