JINGYUAN CHEN

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EDUCATION

Princeton University   2022 - 2027 (expected)
Master & PhD in Computer Science   *Princeton, US*
- Advisor: Amit Levy
- Research Interest: Debugging, Program Analysis, Program Synthesis, Code Generation

University of North Carolina at Chapel Hill   2018 - 2022
Bachelor of Science in Computer Science, Bachelor of Science in Mathematics   *Chapel Hill, US*
- Graduated with highest honor, GPA: 3.99/4.0

RESEARCH EXPERIENCE

Princeton University   Princeton, NJ
Research Assistant (advised by `Amit Levy`)

Provenance-Guided Automatic Runtime Debugging   Sep 2022 - Present

Built an *online* debugger that automatically instruments tracepoints to record the data-flow provenances of cross-component bugs in deployed distributed systems upon debugging queries. Developed *dynamic-trace-assisted* static analysis algorithms to prune the number of activated instrumentation according to traces collected at the manifestation of bugs. Engineered a lightweight runtime that supports *sliced recording* where only bug-relevant program statements incurs recording overheads. Evaluated the tool against reported latent bugs in realistic distributed systems (TrainTicket and HDFS) and demonstrated its capability to reduce the burden of root-cause debugging with practical runtime overheads.

Auditing Resource Interference-Freedom of Cloud Platforms   Nov 2024 - Present

Identified a new type of threat in cloud platforms where providers break promises of resource-isolation. Designed a mechanism to detect side-channel interference over shared resources in cloud platforms with compiler-instrumented auditing operations. Proposed methods to defend against providers' cheating strategies where only temporary isolation is provided when auditing operations execute. Currently engineering an efficient runtime that incurs minimal overheads on victim applications.

University of North Carolina at Chapel Hill   Chapel Hill, NC
Research Assistant (advised by `James H. Anderson` and `F. Don Smith`)

Making Powerful Enemies on NVIDIA GPUs   Aug 2021 - Aug 2022

Empirically evaluated the sensitivity of common GPU workloads to a wide range of interference channels in NVIDIA GPUs. Engineered "enemy" GPU kernels that maximize contention over hardware resources for approximating the worst-case execution times of real-time GPU kernels. Evaluated the enemies against real-world kernels and showed the effectiveness of the enemies in maximizing resource contention.

PUBLICATIONS

Provenance-Guided Automatic Runtime Debugging   In submission

Making Powerful Enemies on NVIDIA GPUs   IEEE RTSS'22
Tyler Yandrofski, **Jingyuan Chen**, Nathan Otterness, James H. Anderson and F. Donelson Smith

Minimizing DAG Utilization by Exploiting SMT   IEEE RTAS'22
Sims Hill Osborne, Joshua Bakita, **Jingyuan Chen**, Tyler Yandrofski, and James H. Anderson

Simultaneous Multithreading in Mixed-Criticality Real-Time Systems   IEEE RTAS'21
Joshua Bakita, Shareef Ahmed, Sims Hill Osborne, Stephen Tang, **Jingyuan Chen**, F. Donelson Smith, and James H. Anderson

TECHNICAL SKILLS

Programming Languages | Proficient: Java, C, Python, Go, Javascript, Datalog; Prior Experience: C++, Rust, Haskell, CLisp, Ocaml, Prolog

Tools | Proficient: Linux, bash, Git, Vim, Spring, Docker, Distributed Tracing (Jaeger, OpenTelemetry), Soot, Doop, Tensorflow, PyTorch, CUDA; Prior Experience: Coq, Dafny