Tao Luo

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Research interests: Security, Systems, Networking.

EDUCATION

08, 2019-05, 2021 **Master, Computer Science – thesis track, Columbia University.**
Advisor: Prof. Asaf Cidon
Courses: Operating Systems; Computer Networks; Security; Distributed Storage Systems (seminar); Delivering Modern Services on the Internet (seminar audited).

03, 2011-01, 2015 **Bachelor (honors), Financial Math, Southern University of Sci. and Tech.**（SUSTech）

09, 2013-12, 2013 **Visiting student, City University of Hong Kong**

PUBLICATION

Tao Luo, Mingen Pan, Pierre Tholoniat, Asaf Cidon, Roxana Geambasu, Mathias Lecuyer *Privacy Budget Scheduling and Orchestration*, accepted to appear at OSDI' 2021

SKILLS

- **Programming:** **Intermediate:** Python **Basic:** C/C++, Java, SQL, Bash, MATLAB, R, LaTeX
- **Other skills:** Statistics, Simulation, Numerical Optimization, Data Visualization, System Programming.

RESEARCH PROJECTS

***Co-allocation of Data Privacy and Computational Resources*, with Prof. Asaf Cidon and Roxana Geambasu, Columbia University, (2020-2021)**

- Framed the research problem, proposed DPF algorithm, gave rigorous proofs, and owned algorithm simulation.
- Derived a weaker condition for algorithm, charted solution space, and investigated tradeoff of different solutions.
- Proposed a technique to adapt the DPF scheduling algorithm to Renyi Differential Privacy composition.
- Designed implemented and tuned a discrete-event simulator of resource scheduler (2k LoC in Python).
- Evaluated different algorithms via simulation experiment.

***Domain name popularity via DNS cache probing*, with Prof. Ethan Katz-Bassett, Columbia University, (2021)**

- Preparing ECS prefix from BGP prefix dump and traceroute dump dataset. (work in progress)

***Syscall-less Kernel Space I/O with Fast Storage Device*, with Prof. Asaf Cidon and Ryan Stutsman, Columbia University and University of Utah, (2019-2020)**

- Framed a research problem discussed implementation and evaluation ideas.
- Owned microbenchmark experiments (in Bash and Python).
- Ported io_uring based IO engine from FIO to KVell key-value store (in C).
- Added microburst workloads to FIO (in C), among other feature enhancements and bug fixes.

***Copyset-merging Algorithm Design and Evaluation*, with Prof. Asaf Cidon, Columbia University, (2019)**

- Framed and solved the Copyset-merging problem and implemented a prototype (in Python).
- Conducted microbenchmarks via a modified HDFS (in Java) cluster on CloudLab.
- Reduced data-loss probability by 15-40% under concurrent node failures with minimal performance degradation.

***Novel Finite Difference Method for Multi-asset Options*, with Prof. Dejun Xie, SUSTech, Shenzhen, CN (2014)**

- Proposed and implemented a numerical scheme, which exploited the structure of option-pricing model and employed the operator-splitting technique to decouple iteration matrix into a sequence of tridiagonal matrices.
- Mitigated the curse of dimensionality by reducing the computational cost, from $O(n^4)$ to $O(n^2)$ for two-asset case, while maintaining same accuracy as Crank-Nicolson scheme.

***Simulation and Optimization of Silicon Solar Cells*, with Prof. Hongyu Yu, SUSTech, Shenzhen, CN (2012)**

- Simulated the sun-light absorption of silicon based on finite-element method.
- Investigated and optimized absorption efficiency of different surface textures.

WORK EXPERIENCE

11, 2019-present Research Assistant of Prof. Asaf Cidon, Columbia University, NYC, NY, US.

- Researched on syscall-less kernel IO with fast storage device and storage systems.
- Researched on differential privacy resource scheduling in machine learning platform.

01, 2020-present Visiting graduate student, Storage Research Group, Tsinghua University, Beijing, CN.

- Researched on topics related to kernel io_uring and key-value store.
- Organized with others a weekly reading group seminar.

12, 2017-04, 2019 Algorithm Engineer, R&D Center, DataYes Inc., Shanghai, CN.

- Provided production-level algorithms for quantitative investment.
- Constructed asset allocation algorithm in object-oriented style, implemented via solvers investment portfolio optimization policies, dealt with discrete constraints.
- Led a group and built quantitative investment toolkit, including features like alpha factor analysis, portfolio optimization, asset allocation, and portfolio risk attribution.

05, 2015-12, 2017 Quantitative Developer, Quantitative Investment Dept., Infore Capital Co., Shenzhen, CN.

- Created analytical solution and streamlined the quantitative research and investment process.
- Designed and developed web-based analytical and visualization tools for real-time portfolio monitoring and analytic reports, worked with coworkers for a full-stack implementation combined with DevOps technique.
- Built a data pipeline that collects data, transforms into structured formats and stores in the database.
- Worked with researchers to build quantitative tools for alpha research, back-testing and risk management.

HONORS AND AWARDS

- ACM CoNEXT 2020 Registration Grant (2020).
- Financial Risk Manager (FRM) certification granted by Global Association of Risk Professionals (2015).
- Academic Excellence Scholarships awarded by SUSTech three years in succession (2011-2014).
- Undergraduate Full-tuition Fellowship awarded by SUSTech (2011-2015).
- First Prize in China High School Biology Olympiad (top 15 in Jiangsu Province, 2010).