

ISAAC GROSOFF

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RESEARCH INTERESTS

Optimization and performance analysis of stochastic scheduling models for modern computing systems, especially multiserver systems, tail latency, and scheduling with predictions.

EDUCATION

2017 - pres: Pursuing PhD in Computer Science. Carnegie Mellon University, Pittsburgh, PA.
Advisor: Prof. Mor Harchol-Balter

2013 - 2017: M.E. and B.S. in Computer Science. Massachusetts Institute of Technology, Cambridge, MA. GPA 4.96/5
Master's Thesis in information-theoretic cryptography: "Secure communication: CDS, PIR, PSM"
Master's Advisor: Prof. Vinod Vaikunathanathan
Bachelor's Advisor: Prof. Frans Kaashoek

REFEREED PUBLICATIONS & SUBMITTED PAPERS

[Link to my publications](#)

Isaac Grosf, Ziv Scully, Mor Harchol-Balter, Alan Scheller-Wolf. "Optimal Scheduling in the Multiserver-job Model under Heavy Traffic." *Under submission*.

Isaac Grosf, Mor Harchol-Balter, Alan Scheller-Wolf. "WCFS: A new framework for analyzing multiserver systems." *Queueing Systems*.

Isaac Grosf, Naifeng Zhang, Marijn Heule. "Towards the shortest DRAT proof of the Pigeonhole Principle." *Pragmatics of SAT 2022*.

Ziv Scully, Isaac Grosf, Michael Mitzenmacher. "Uniform Bounds for Scheduling with Job Size Estimates." 13th Innovations in Theoretical Computer Science Conference (ITCS 2022): Volume 215, Article 114 (2022), pp. 114:1 – 114:30, January 2022.
Invited Paper at STOC 2022: Algorithms with Predictions

Isaac Grosf, Kunhe Yang, Ziv Scully, Mor Harchol-Balter. "Nudge: Stochastically improving upon FCFS." *Proceedings of the ACM Measurement and Analysis of Computer Systems – SIGMETRICS: Volume 5, Number 2, Article 99 (2021)*, pp. 99:1 – 99:25, June 2021, Beijing, China.
Winner of SIGMETRICS 2021 Best Paper Award.

Ziv Scully, Isaac Grosf and Mor Harchol-Balter. "The Gittins Policy is Nearly Optimal in the M/G/k under Extremely General Conditions." *Proceedings of the ACM Measurement and Analysis of Computer Systems – SIGMETRICS: Volume 4, Number 3, Article 43 (Dec 2020)*, pp. 43:1 – 43:29, June 2021, Beijing, China.
George Nicholson Award finalist at INFORMS 2022 Annual Meeting

Ziv Scully, Isaac Grosf, Mor Harchol-Balter. "Optimal Multiserver Scheduling with Unknown Job Sizes in Heavy Traffic." *Performance Evaluation*, vol. 145, 2021, pp. 1-31.
Conference version appeared in *38th International Symposium on Computer Performance, Modeling, Measurements, and Evaluation (Performance 2020)*, Milan, Italy, November 2020.

Ben Berg, Daniel Berger, Sara McAllister, Isaac Grosf, Sathya Gunasekar, Jimmy Lu, Michael Uhlar, Jim Carrig, Nathan Beckmann, Mor Harchol-Balter, Greg Ganger. "The CacheLib Caching Engine: Design and Experiences at Scale." 14th USENIX Symposium on Operating Systems Design and Implementation (OSDI 2020), Banff, Canada, November 2020.

Isaac Grosf, Ziv Scully, Mor Harchol-Balter. "Load Balancing Guardrails: Keeping Your Heavy Traffic on the Road to Low Response Times." *Proceedings of the ACM Measurement and Analysis of Computer Systems – SIGMETRICS: Volume 3, Issue 2, Article 42 (June 2019)*, pp. 42:1 – 42:31, 2019.
Conference version appeared in *Proceedings of ACM Simetrics/Performance 2019 Conference on Measurement and Modeling*

of Computer Systems (SIGMETRICS 19), Pheonix, AZ. June 2019.

Winner of SIGMETRICS 2019 Best Student Paper Award.

Invited mini-plenary paper at STOC 2021 TheoryFest

Isaac Grosof, Ziv Sculy, Mor Harchol-Balter. “SRPT for Multiserver Systems.” *Performance Evaluation*, vol. 127-128, Nov. 2018, pp. 154-175.

Conference version appeared in *36th International Symposium on Computer Performance, Modeling, Measurements, and Evaluation (Performance 2018)*, Toulouse, France, December 2018.

Winner of Performance 2018 Best Student Paper Award.

Erik D. Demaine, Isaac Grosof, Jayson Lynch, and Mikhail Rudoy. “Computational Complexity of Motion Planning of a Robot through Simple Gadgets.” *Ninth International Conference on Fun with Algorithms*. La Maddalena, Italy. 2018.

Erik D. Demaine, Isaac Grosof, and Jayson Lynch. “Push-Pull Block Puzzles are Hard.” *International Conference on Algorithms and Complexity*. Athens, Greece. 2017.

Benjamin Grosof, Janine Bloomfield, Paul Fodor, Michael Kifer, Isaac Grosof, Miguel Calejo, and Theresa Swift. “Automated Decision Support for Financial Regulatory/Policy Compliance, using Textual Rulelog.” *RuleML 2015*. Berlin, Germany. 2015.

OTHER PUBLICATIONS & PAPERS

Isaac Grosof, Michael Mitzenmacher. “Incentive Compatible Queues Without Money”. *Under revision*.

Isaac Grosof, Mor Harchol-Balter, Alan Scheller-Wolf. “Stability for Two-Class Multiserver-job Systems” *Under revision*.

Isaac Grosof. “Open Problem - M/G/k/SRPT Under Medium Load.” *Stochastic Systems*. Sep. 2019.

Isaac Grosof. “Optimal Scheduling in Modern Queueing Systems.” *Thesis Proposal*. Apr. 2022.

TALKS GIVEN

MIT & Harvard Seminars, September 2022: *Optimal Scheduling in the Multiserver-job Model*.

STOC 2022: *Stochastic Scheduling with Predictions*, invited speaker in the Algorithms with Predictions workshop.

MIT LIDS Seminar March 2022, Cors/INFORMS International Meeting 2022: *Work-Conserving Finite-Skip Models*

INFORMS 2021: *Multiserver-Job Systems*.

SIGMETRICS 2021: *Nudge: Stochastically Improving upon FCFS*.

YEQT 2021 & UW Seminar: *Asymptotically Optimal Multiserver Scheduling*, invited speaker.

SIGMETRICS 2019, INFORMS 2019 Annual Meeting: *Load Balancing Guardrails: Keeping Your Heavy Traffic on the Road to Low Response Times*.

INFORMS 2018 Open Problem Session: *M/G/k/SRPT under medium load*.

Performance 2018, MAMA workshop at SIGMETRICS 2018, Columbia Seminar 2018, INFORMS 2018 Annual Meeting: *SRPT for Multiserver Systems*.

TEACHING

Fall 2020: TA for CMU 15-850, Advanced Algorithms (graduate level), assisting Prof. Anupam Gupta.

Fall 2019: TA for CMU 15-857, Analytical Performance Modeling & Design of Computer Systems (graduate level), assisting Prof. Mor Harchol-Balter.

Fall 2016 & Spring 2017: TA for MIT 6.1220 (MIT 6.046 at the time), Design and Analysis of Algorithms (undergraduate level), assisting Profs. Shafi Goldwasser, Nir Shavit, & Vinod Vaikuntanathan in fall 2016 and Profs. Debayan Gupta,

Aleksander Madry & Bruce Tidor in spring 2017.

Fall 2015: LA (lab assistant) for MIT 6.1010 (MIT 6.S04 at the time, 6.009 between), Fundamentals of Programming (undergraduate level), assisting Profs. Adam Chipala and Srini Devadas.

LEADERSHIP AND UNIVERSITY SERVICE

2019 - pres.: President of the CMU Humanist League, a philosophical discussion group devoted to the ideal of discourse over dogma.

2022 - pres.: Founding member of CSD PhD Student Council, a student group which organizes social bonding events within the department.

2021 - pres.: Organizer of CSD weekly board games & socializing dinner event.

2021: Organizer of Computer Science Department (CSD) Introductory Course, which introduces new PhD students to the department.

2020 - 2021: CSD Admissions Committee member for the Theory group, reviewed ~ 200 applications.

Fall 2020: Organizer of CSD Theory Lunch Seminar series.

2020: Led events for CSD Open House.

2016: President of Random Hall, an MIT dorm of 93 residents.

PROFESSIONAL SERVICE

Reviewed papers for ACM SIGMETRICS, IFIP Performance, Management Science, and IEEE/ACM Transactions on Networking, ITCS, INFORMS Journal on Computing, ACM Performance Evaluation Review.

EMPLOYMENT

Summer 2019: Facebook, Menlo Park, CA.

- Research Intern to develop a machine-learning-based SSD admission policy for Facebook's Tao caching architecture.
- Improved the tradeoff between hit ratio and SSD write rate.

Summer 2018: Microsoft Research, Seattle, WA.

- Research Intern to develop novel FPGA algorithms for linear algebra and solving linear programs.

Summer 2016: Jane Street Capital, LLC, New York City, NY.

- Software developer for non-obtrusive data collection about in-house trading.
- Software developer responsible for updating trading simulation package to accommodate new trade specification format.

Summer 2015: Coherent Knowledge, Seattle, WA.

- Knowledge Engineer to build demonstrations for the financial and natural language domains using the declarative logic programming language Ergo.

2013 - 2014: MIT Undergraduate Research Opportunities Program, Cambridge, MA.

- Researcher in Complexity Theory proving computational hardness of block puzzles and related agent motion problems.

Summer 2014: EMC Isilon, Seattle, WA.

- Software developer to replace the previous ad-hoc build platform with a modern Jenkins-based build platform.

PROJECTS

2018 - pres.: Programmatically-generated artwork:

<https://isaacg1.github.io/2018/12/06/programmatically-generated-artwork.html>

2014 - 2017: Author of new programming language: *Pyth*

- Pyth is one of the best programming languages for solving tasks with the shortest possible programs.
- Available at <https://github.com/isaacg1/pyth>