

# Sarah Morin

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## Education

2017–2021 **BS Computer Science**, *The George Washington University*, Washington, DC  
**Summa Cum Laude**, Technical GPA: 3.97/4.0, GPA: 3.89/4.0  
**Minor in Mathematics**  
Relevant Coursework: Operating Systems, Systems Programming, Computer Architecture, Algorithms, Cryptography, Foundations of Computing, Discrete Structures, Abstract Algebra, Number Theory

## Professional Experience

Oracle Cloud Infrastructure, Oracle

2023–2024 **Member of Technical Staff**, *File Storage Service*

- Led development of data-plane implementation of user quota enforcement, including persistent metadata store, efficient scan and aggregation of usage data for all users across the filesystem B-tree, and synchronization between client servers and persistent store to rapidly detect and alert when a quota is exceeded.
- Collaborated with control-plane, platform, and product management teams to design a user quota enforcement system that a) allows administrators to set space usage limits on users, and b) does not have any significant effect on throughput of requests within quota limits.
- Architected lock-free algorithm for efficient garbage collection of ACLs without reference counting to minimize the performance impact on ACL-related operations. Guaranteed cleanup within 3 hours of becoming unreferenced. (C)
- Collaborated with 3 developers to provide data-plane level support for SMB protocol. (C, Go)
- Reformatted file-system direntries to support case-insensitive lookup and devised strategy to update existing direntries (including live, snapshotted, and replicated) to new format. (C, Go)
- Increased flexibility of File Storage Service by introducing support for ARM hardware, served as lead data-plane developer. (C, x86, and ARM asm)

2021–2023 **Software Engineer**, *File Storage Service*

- Designed and implemented a background thread to enforce a new expiration principle by cleaning server keyrings which enhanced file system security and helped to secure a contract for a new customer with extensive security standards. (C)
- Refined IO time-out metrics and alarms to reflect an increase in scale; reduced unnecessary operations ticket load related to these alarms by 75%. (C, Python)
- Automated weekly data plane KPI report generation, saving 10 hours per week of manual reporting work.
- Improved service resiliency by developing internal tooling, improving documentation, and increasing integration test coverage. (Python)

## Academic Experience

2024–Present **Independent Researcher**

Collaborating with Professor Gabe Parmer

- Developing a compiler for executable specifications for safety-critical real-time systems.
- Collaborating with Professor Parmer to develop oslog, a low-level systems-optimized Datalog variant and a compiler, written in Rust, to produce optimized, executable code.

- Designing a semi-naive evaluation protocol stratified over time which allows an oslog program to run continuously as a real-time system.
- Investigating compiler optimizations to take a declarative specification of a real-time system in Datalog and produce an implementation as computationally efficient as one optimized by hand.

The George Washington University, Washington, DC

2019-2021 **Research Assistant**, *Department of Computer Science*

Professor Poorvi Vora

- Led development of R2B2 Risk-Limiting Audit Python library and CLI to execute both Bayesian and ATHENA audits.
- Built simulation engine and MongoDB database to store results. Simulated millions of trials to experimentally verify theoretical risk and stopping probabilities of ATHENA audits.
- Simulated Bayesian risk-limiting audits (BRLAs) on a variety of election cases.
- Explored adapting the 2-candidate BRLA (based on a bivariate distribution) to a multi-candidate BRLA based on the multivariate hypergeometric distribution capable of handling more complex election cases.
- Resulted in 4 publications and 1 research poster, listed below.

2019-2020 **Teaching Assistant**, *Department of Computer Science*

- Taught weekly lab/recitation section, held weekly office hours (5 hours/week), assisted professor with development of course materials.
- Developed Processor Design (Computer Architecture) and Embedded Systems Signal Processing and Analysis projects (Systems Programming)

**CSCI 2461 Computer Architecture**

*Fall 2019, 2020*

**CSCI 3410 Systems Programming**

*Spring 2020*

**CSCI 1311 Discrete Structures I**

*Spring 2019*

## Service

2024-Present **Senior Design Mentor**, *Department of Computer Science*, The George Washington University

- Mentoring a team of 3 students as they develop an ASL translation app.
- Providing feedback and guidance on software engineering practices such as leading weekly sprint meetings, reviewing design documentation, and practicing code reviews.
- Presented a mini-lecture on writing effective design documentation to the entire cohort of senior design students during a weekly lab session.

## Publications

In Conference Proceedings

2022 *VOTING*

Oliver Broadrick, **Sarah Morin**, Grant McClearn, Neal McBurnett, Poorvi L. Vora, and Filip Zagórski. "Simulations of Ballot Polling Risk-Limiting Audits". In *Seventh Workshop on Advances in Secure Electronic Voting*. Financial Cryptography, 2022.

2021 *USENIX Security*

Filip Zagórski, Grant McClearn, **Sarah Morin**, Neal McBurnett, and Poorvi L. Vora. "Minerva—An Efficient Risk-Limiting Ballot Polling Audit". In *30th USENIX Security Symposium, USENIX Security 21*, pages 3059–3076. USENIX Association, August 2021.

2020 *VOTING*

**Sarah Morin**, Grant McClearn, Neal McBurnett, Poorvi L. Vora, and Filip Zagórski. "A Note on Risk-Limiting Bayesian Polling Audits for Two-Candidate Elections". In *Fifth Workshop on Advances in Secure Electronic Voting*. Financial Cryptography, 2020.

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## Technical Reports

- 2021 Filip Zagórski, Grant McClearn, **Sarah Morin**, Neal McBurnett, and Poorvi L. Vora. "The Athena Class of Risk-Limiting Ballot Polling Audits". The George Washington University, 2021.

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## Research Posters

- 2019 Grant McClearn, **Sarah Morin**, Neal McBurnett, Poorvi L. Vora, Filip Zagórski. "A New Statistical Audit for Real Elections", 2019.
- o Honorable mention, GWU SEAS R&D Showcase 2019.
  - o Secure and Trustworthy Cyberspace biennial PI meeting 2019 in NSF Undergraduate Track.

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## Achievements

- 2021 **SEAS Distinguished Scholar**, *The George Washington University*  
For outstanding achievement in the School of Engineering and Applied Sciences.
- 2019–2021 **Clare Boothe Luce Scholar**, *The George Washington University*  
Awarded to undergraduate women in the School of Engineering and Applied Sciences pursuing research.
- 2019–2021 **Karlgard Scholarship in Computer Science**, *The George Washington University*  
For excellence in computer science.
- 2019–2020 **SUPER**, *The George Washington University*  
Summer Undergraduate Program for Engineering Research
- 2019 **Steve and Shelly Heller Prize**, *The George Washington University*  
Awarded to sophomore women for excellence in computer science.
- 2018–2021 **Dean's List**, *The George Washington University*

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## Projects

- 2024 **Real-Estate Statistics App** *Python, SQLite*
- o Designed and developed a real-estate statistics app to generate tables and graphs given listing data for quarterly reports.
  - o SQLite database serves as a persistent store for MLS listing data. New data is uploaded as a .csv file, processed, and stored in the database through the app interface.
  - o UI in Python (Pandas, Streamlit) for exploring data in database, computing summary statistics given a query, and generating charts/graphs.
- 2019 **Container Manager in xv6** *C, x86 Assembly*
- o Developed a protected file system, shared memory regions, mutexes, and priority scheduling in xv6 operating system on 3 person team.
  - o Implemented mutexes and futexes to protect shared memory regions and provide synchronization across the system.
- 2019 **Multivarhypergeom** *Python*
- o Python library to simulate sampling from the multivariate hypergeometric distribution without replacement.

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## Skills

Programming	Python, C, Java, Rust, Datalog, Assembly, $\text{\LaTeX}$ , Markdown, MATLAB, PHP, HTML/CSS
Technologies	Linux, Windows, Shell (Bash/Zsh), Git, OCI, AWS, Docker, Grafana, Jira, BitBucket, TeamCity
Database	SQL, MySQL, SQLite, MongoDB