

Joshua Davis

Brendan Iribe Center | 8125 Paint Branch Drive | College Park, MD 20742

jhdavis@umd.edu | <https://jhdavis8.github.io/>

EDUCATION

University of Maryland, College Park

Ph.D., Computer Science

Flagship Fellow

Expected Graduation May 2026

College Park, MD

University of Delaware

Honors Bachelor of Science, Computer Science

Bachelor of Arts, Philosophy

Mathematics Minor

Graduated May 2021

Newark, DE

SKILLS

Languages: C, C++, Python, Java, Fortran, Javascript, HTML, Racket

Software: OpenMP, NVIDIA profiling tools (Nsight, nvprof), Ubuntu/UNIX, Git, Bash, LaTeX, Pandas, Matplotlib, MPI, Eclipse

Advanced Coursework: Parallel Computing, Artificial Intelligence, Machine Learning, Linear Algebra, Mathematical Statistics, Applied Game Theory, Educational Game Design (New Zealand), Engaging Youth in Computing (New Zealand)

RESEARCH INTERESTS

- High-performance computing and programming languages
- Extending and evaluating programming models for heterogeneous systems
- Automated verification of concurrent software
- HPC compiler performance and correctness evaluation
- AI and machine learning benchmarking, acceleration, and verification
- Developing tools for performance prediction and automatic optimization of parallel programs

WORK EXPERIENCE

University of Delaware, Computational Research & Programming Lab

May 2019 - Present

Undergraduate Researcher Advisor: Prof. Sunita Chandrasekaran; Part-time, 10 hours/week

Newark, DE

- Write programs for an OpenMP test suite for GPU offloading by following the OpenMP 4.5 specification document
- Submit test suite codes for review through GitHub pull requests, and collect results on the world-class Summit (ORNL) and Cori (LBL NERSC) supercomputers
- Maintain testing infrastructure across supercomputing hardware as well as the project results webpage
- Carried out work for this project in an internship at Oak Ridge National Laboratory in January 2020
- https://github.com/SOLLVE/sollve_vv

University of Delaware

February 2020 - Present

Undergraduate Teaching Assistant Part-time, 10 hours/week

Newark, DE

- Hold weekly lab sessions for undergraduate courses in systems programming and introductory computer science for engineering students
- Hold office hours twice a week assisting students with lab assignments and projects
- Grade student submissions for lab assignments and projects

Lawrence Berkeley National Laboratory, Advanced Technologies Group

June - August 2020

HPC Architecture & Performance Student Assistant Advisor: Christopher Daley; Full-time, 40 hours/week

Newark, DE

- Evaluated performance of numerous OpenMP compilers on the Summit and Cori platforms using GPU kernels extracted from real-world applications, including three Exascale Computing Project codes
- Used NVIDIA profiling tools to gain deeper insights into the causes of performance differences between compilers
- Made recommendations to compiler developers for areas of improvement in compilers, and to application developers for best practices and common pitfalls in OpenMP compiler performance
- Presented results in a poster form to the LBL summer students program, and presented and published results in the WACCPD 2020 workshop at SC20

Joshua Davis

Brendan Iribe Center | 8125 Paint Branch Drive | College Park, MD 20742

jhdavis@umd.edu | <https://jhdavis8.github.io/>

University of Delaware, Global Computing Lab

September 2017 - February 2019

Undergraduate Researcher Advisor: Prof. Michela Taufer; Part-time, 10 hours/week

Newark, DE

- Selected project goals and areas to investigate in weekly meetings with advisors for power performance analysis of data-intensive MapReduce applications
- Designed publication-quality visualizations and collected data as determined in team meetings
- Adjusted software library source code and built graphing scripts as needed to carry out investigation
- Carried out work for this project in an internship at the University of Tennessee-Knoxville in Summer 2018

Union Hospital, Health Information Services

May - August 2017

IT Volunteer Part-time, 24 hours/week

Elkton, MD

- Worked with Network Engineer and Help Desk Support Technicians to create an updated network diagram including new hardware and additional detail
- Prepared a disaster preparedness and network redundancy summary document and checklist detailing response procedures and essential network features

RESEARCH PROJECTS

- Verification and Validation Test Suite for OpenMP 4.5 Offloading Support in Compilers (ongoing)
- Automated Formal Verification of Concurrent Data Structures in C (ongoing)
- Performance Evaluation of OpenMP GPU Offloading Compilers
- Power-capping and Power Performance Evaluation of Data-Intensive Map-Reduce Applications

POSTERS AND PUBLICATIONS

- Joshua Davis, Christopher Daley, Swaroop Pophale, Thomas Huber, Sunita Chandrasekaran, Nicholas J. Wright. (November 2020) "Performance Assessment of OpenMP Compilers Targeting NVIDIA V100 GPUs", **paper presented at Seventh Workshop on Accelerator Programming Using Directives, SC20.**
- Joshua Davis, Christopher Daley. (August 2020) "Performance Assessment of OpenMP GPU Offloading Compilers", poster presented at the Lawrence Berkeley Lab Computing Sciences Summer Student Poster Session.
- Joshua Davis, Tao Gao, Sunita Chandrasekaran, Heike Jagode, Anthony Danalis, Pavan Balaji, Jack Dongarra, Michela Taufer. (2019) "Characterization of Power Usage and Performance in Data-Intensive Applications using MapReduce over MPI", **2019 International Conference on Parallel Computing**. Prague, Czech Republic. 10-13 September 2019.
- Joshua Davis. (November 2018) "Studying the Impact of Power Capping on MapReduce-based, Data-intensive Mini-applications on Intel KNL and KNM", **poster presented at: SC18 ACM Student Research Competition, Won 2nd Place.** Advised by Dr. Michela Taufer, Dr. Sunita Chandrasekaran, and Dr. Tao Gao.
- Joshua Davis, Devlan Horner, Aamir Majeed, Marina Smolens, Stephen Siegel. (December 2017) "Verification of Concurrent Hash Set Algorithms with CIVL", poster presented at the Fall 2017 EECIS Vertically Integrated Projects Poster Session.

AWARDS AND ACHIEVEMENTS

- 2021 NSF Graduate Research Fellowship Honorable Mention
- University of Delaware Goldwater Scholarship Candidate
- Department of Computer and Information Sciences, UD 2020 Outstanding Junior Award
- SC19 Student Volunteer
- Department of Computer and Information Sciences, UD 2019 Outstanding Sophomore Award
- Winter 2019 UD CIS New Zealand study abroad participant
- 2nd Place, SC18 Student Research Competition (Undergraduate)
- SC18 Experiencing HPC for Undergraduates Participant
- Department of Computer and Information Sciences, UD 2018 Hatem M. Khalil Award
- University of Delaware Eugene DuPont Memorial Scholar
- 2nd Degree Black Belt, World Tang Soo Do Association