

# Daniel Nichols

*PhD Candidate*

*Department of Computer Science  
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## Education

2020–present **Ph.D., Computer Science**, *University of Maryland*, College Park, USA  
Advisor: Abhinav Bhatele

2017–2020 **B.S., Computer Science**, *University of Tennessee*, Knoxville, USA

## Research and Professional Experience

2020–present **Graduate Research Assistant**, *University of Maryland*, College Park

Summers **Research Assistant**, *Lawrence Livermore National Laboratory*

2022–2024

2018–2020 **Undergraduate Research Assistant**, *Innovative Computing Laboratory and Joint Institute for Computer Science*, Knoxville

Summer 2019 **Research Assistant**, *Joint Institute for Computer Science REU*, Knoxville

## Awards and Honors

2024 ACM-IEEE CS George Michael Memorial HPC Fellowship

2024 HPDC '24 Student Travel Grant

2024 ICPP IPDPS '24 Student Travel Grant

2023 Outstanding Graduate Assistant; *top 2% of graduate assistants university wide*

2021 GRFP Honorable Mention

2020 Dean's Fellowship, *University of Maryland*

2020 Summa Cum Laude, *University of Tennessee*

2017–2020 Dean's List, *University of Tennessee*

2017–2020 UT Volunteer Scholarship

2019 Herbert & Lillian Duggan Scholarship

2019 Harlan D. Mills Scholarship

2018 Edgar Wyman McCall Scholarship

2017 Frederick T. Bonham Scholarship

2017 Henry, Robert, & Velma Scholarship

## Professional Service

IEEE Cluster Conference 2022, Web Co-Chair  
IEEE TPDS Reviewer (x3)  
Reviews for HPDC, SC, IPDPS

## Software Projects

### Personal Projects

Slurm Dashboard VSCode extension for interacting with the slurm workload manager  
Performance Profile Viewer VSCode extension for viewing and analyzing performance profiles  
CSScholar Computer science publication data dashboard

### Research Projects

ParEval Parallel code generation benchmark for LLMs  
MagmaDNN High performance deep learning framework

## Teaching Experience

2021–2024 CUDA Lectures for UMD Intro to Parallel Computing  
2019 Teaching Assistant for UTK Data Structures and Algorithms

## Publications, Talks, & Reports

### Publications

- [1] **Daniel Nichols**, Harshitha Menon, Todd Gamblin, and Abhinav Bhatele. A probabilistic approach to selecting build configurations in package managers. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis, SC '24*, New York, NY, USA, November 2024. Association for Computing Machinery. **22.7% Acceptance Rate.**
- [2] **Daniel Nichols**, Joshua H. Davis, Zhaojun Xie, Arjun Rajaram, and Abhinav Bhatele. Can large language models write parallel code? In *Proceedings of the 33rd International Symposium on High-Performance Parallel and Distributed Computing, HPDC '24*, New York, NY, USA, June 2024. Association for Computing Machinery. **17% Acceptance Rate.**
- [3] **Daniel Nichols**, Alexander Movsesyan, Jae-Seung Yeom, Abhik Sarkar, Daniel Milroy, Tapasya Patki, and Abhinav Bhatele. Predicting cross-architecture performance of parallel programs. In *Proceedings of the IEEE International Parallel & Distributed Processing Symposium, IPDPS '24*. IEEE Computer Society, May 2024. **16.6% First-Round Acceptance Rate, 26.1% Overall Acceptance Rate.**
- [4] Harshitha Menon\*, **Daniel Nichols\*** (\* contributed equally), Abhinav Bhatele, and Todd Gamblin. Learning to predict and improve build successes in package ecosystems. In *International Conference on Mining Software Repositories, MSR '24*, April 2024. **26.3% Acceptance Rate.**

- [5] [Daniel Nichols](#), Aniruddha Marathe, Harshitha Menon, Todd Gamblin, and Abhinav Bhatele. Hpc-coder: Modeling parallel programs using large language models. In *ISC High Performance 2024 Research Paper Proceedings (39th International Conference)*, pages 1–12, 2024. **30% Acceptance Rate**.
- [6] Joshua H. Davis, Justin Shafner, [Daniel Nichols](#), Nathan Grube, Pino Martin, and Abhinav Bhatele. Porting a computational fluid dynamics code with amr to large-scale gpu platforms. In *Proceedings of the IEEE International Parallel & Distributed Processing Symposium, IPDPS '23*, pages 602–612. IEEE Computer Society, May 2023. **25.7% Acceptance Rate**.
- [7] [Daniel Nichols](#), Aniruddha Marathe, Kathleen Shoga, Todd Gamblin, and Abhinav Bhatele. Resource utilization aware job scheduling to mitigate performance variability. In *Proceedings of the IEEE International Parallel & Distributed Processing Symposium, IPDPS '22*, pages 335–345. IEEE Computer Society, May 2022. **9.7% First-Round Acceptance Rate, 25.9% Overall Acceptance Rate**.
- [8] Rick Archibald, Edmond Chow, Eduardo F. D’Azevedo, Jack J. Dongarra, Markus Eisenbach, Rocco Febbo, Florent Lopez, [Daniel Nichols](#), Stanimire Tomov, Kwai Wong, and Junqi Yin (Authors Alphabetical). Integrating deep learning in domain sciences at exascale. In *SMC 2020*, volume 1315 of *Communications in Computer and Information Science*. Springer, 2020.
- [9] [Daniel Nichols](#), Nathalie-Sofia Tomov, Frank Betancourt, Stanimire Tomov, Kwai Wong, and Jack Dongarra. Magmadnn: Towards high-performance data analytics and machine learning for data-driven scientific computing. In *High Performance Computing*, pages 490–503, Cham, 2019. Springer International Publishing.
- [10] [Daniel Nichols](#), Kwai Wong, Stan Tomov, Lucien Ng, Sihan Chen, and Alex Gessinger. Magmadnn: Accelerated deep learning using magma. PEARC '19, New York, NY, USA, 2019. ACM.
- [11] Frank Betancourt, Kwai Wong, Efosa Asemota, Quindell Marshall, [Daniel Nichols](#), and Stanimire Tomov. opendiel: A parallel workflow engine and data analytics framework. In *Proceedings of the Practice and Experience in Advanced Research Computing on Rise of the Machines (Learning)*, PEARC '19, New York, NY, USA, 2019. ACM.

### Pre-Prints

- [12] [Daniel Nichols](#), Pranav Polasam, Harshitha Menon, Aniruddha Marathe, Todd Gamblin, and Abhinav Bhatele. Performance-aligned llms for generating fast code, 2024. arXiv. cs.DC. 2404.18864.
- [13] Onur Cankur, Aditya Tomar, [Daniel Nichols](#), Connor Scully-Allison, Katherine E. Isaacs, and Abhinav Bhatele. Automated programmatic performance analysis of parallel programs, 2024. arXiv. cs.DC. 2401.13150.
- [14] [Daniel Nichols\\*](#), Siddharth Singh\* (\* contributed equally), Shu-Huai Lin, and Abhinav Bhatele. A survey and empirical evaluation of parallel deep learning frameworks, 2022. arXiv. cs.LG. 2111.04949.

## Talks & Tutorials

- [15] **Daniel Nichols**. Towards integrating llms in hpc software development. SC24 BoF, Session Leader, November 2024.
- [16] **Daniel Nichols**. Large language models for parallel and hpc code. Talk at PASC 2024 in *Machine Learning Support for the Lifetime of Software* Minisymposia, June 2024.
- [17] Abhinav Bhatele, Siddharth Singh, and **Daniel Nichols**. Distributed training of deep neural networks. ISC High Performance 2024 Tutorials (39th International Conference), May 2024.
- [18] **Daniel Nichols**. Evaluating the capability of large language models for parallel and high performance code generation. The 21st Annual Workshop on Charm++ and Its Applications, 2024.
- [19] **Daniel Nichols**. Probabilistic package builds: Guiding spack's concretizer with predicted build outcomes. PackagingCon, 2023.
- [20] Kwai Wong, Stanimire Tomov, **Daniel Nichols**, Rocco Febbo, and Xianfeng Ma. How to build your own deep neural network framework. Tutorial at PEARC, 2020.

## Posters

- [21] **Daniel Nichols**, Aniruddha Marathe, Harshitha Menon, Todd Gamblin, and Abhinav Bhatele. Modeling parallel programs using large language models. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis*, SC '23, Nov 2023.
- [22] **Daniel Nichols**, Dilan Gunawardana, Aniruddha Marathe, Todd Gamblin, and Abhinav Bhatele. Noncommittal commits: Predicting performance slowdowns in version control history. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis*, SC '22, November 2022.
- [23] **Daniel Nichols**, Jae-Seung Yeom, and Abhinav Bhatele. Predicting cross-platform relative performance with deep generative models. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis*, SC '22, November 2022.
- [24] Joshua Hoke Davis, Justin Shafner, **Daniel Nichols**, Nathan Grube, Pino Martin, and Abhinav Bhatele. Extreme-scale computational fluid dynamics with amr on gpus. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis*, SC '22, November 2022.