

GRIFFIN DUBE

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Chicago, Illinois, USA

EDUCATION

Northwestern University - <i>Evanston, Illinois</i> – PhD Student in Computer Science	GPA: 4.00	September 2021 - Present
Clemson University - <i>Clemson, South Carolina</i> – Bachelor of Science in Computer Engineering – Minor in Spanish Language	GPA: 3.79	August 2016 - May 2021

RESEARCH/WORK EXPERIENCE

Northwestern University - <i>Evanston, Illinois</i> <i>Research Assistant, Systems (Prescience Lab)</i>	September 2021 - Present
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- Research co-design opportunities between architecture, compiler, and runtime systems to improve programmability of highly-heterogeneous parallel systems through the use of high-level parallel languages.
- Designed and developed an LLVM front-end to NESL, a high-level parallel language for nested data parallelism, enabling research on code-generation for diverse hardware and custom FPGA accelerators.
- Study and modify the front-end of a production compiler for C/C++ (clang/LLVM) to investigate lowering of abstractions such as memory layout for unmanaged languages and their effect on performance.

Sandia National Laboratory - <i>Albuquerque, New Mexico</i> <i>R&D Grad - Scalable Algorithms Group</i>	June 2022 - September 2022
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- Evaluate NextSilicon novel hardware architecture and compiler toolchain for it's viability in future extreme-scale computing systems and parallel applications.
- Collaborate with the Kokkos performance portability team to assess current Kokkos abstractions and their usefulness when working with future highly-heterogeneous hardware.

Clemson University - <i>Clemson, South Carolina</i> <i>Research Assistant, Lossy Compression for Scientific Computing</i>	May 2020 - October 2021
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- Researched the benefit of SIMD parallelism (through vectorization) on lossy compression for CPU architectures using leading lossy compressor for scientific data, SZ.
- Investigated Intel vector instruction sets and their effectiveness for boosting performance of lossy compression algorithms.
- Contributed to larger collaborative projects involving groups from Clemson University, Washington State University and Argonne National Laboratory, winning an R&D 100 award.
- Studied a suite of common HPC workloads under a variety of domains (HACC, CESM, QMCPack, etc) to use in testing compression performance.

Creative Inquiry	January 2019 - May 2021
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- Designed, built and configured an HPC cluster to compete in the Supercomputing '20 Student Cluster Competition.
- Investigated structure and performance characteristics of extreme scale systems by designing a system modeled after a Top500 supercomputing cluster.
- Studied performance modeling of large scale systems using MPI, OpenMP and common HPC benchmarks like HPL and HPCG.

Oak Ridge National Laboratory - <i>Oak Ridge, Tennessee</i> <i>Science Undergraduate Laboratory Internship (SULI) Intern</i>	June 2020 - August 2020
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- Researched optimization of lattice Boltzmann computational fluid dynamics proxy applications for the Summit supercomputer using CUDA C++ (improving time to solution by 49x).

- Reduced unnecessary data transfers and the amount of runtime spent performing communication by 90%.
- Communicated with other groups at ORNL to apply similar optimizations into their own application in different domain (Computational Biology, Nuclear Reactor Simulations)

Delta Air Lines - Atlanta, Georgia

August 2018 - May 2020

Simulator Engineer Co-op

- Performed in depth research and modification of simulated aircraft systems and aerodynamics flight models in both Linux and Windows environments.
- Investigated and debugged complex hardware and software issues in simulator systems and aerodynamics simulation software (written in C and FORTRAN) in order to correct discrepancies.
- Worked according to FAA National Simulator Program regulations and requirements regarding regulations and procedures for documenting software issues.

PUBLICATIONS

1. **Griffin Dube**, Jiannan Tian, Sheng Di, Dingwen Tao, Jon C. Calhoun, and Franck Cappello. "Efficient Error-Bounded Lossy Compression on CPU Architectures," 2022 30th International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS).
2. **Griffin Dube**, Cavender Holt, John Hollowell, Sarah Placke, Sansriti Ranjan, Nikolas Heitzig, and Jon Calhoun, "Critique of "MemXCT: Memory-Centric X-Ray CT Reconstruction With Massive Parallelization" by SCC Team From Clemson University," in IEEE Transactions on Parallel and Distributed Systems, vol. 33, no. 9, pp. 2054-2057, 1 Sept. 2022, doi: 10.1109/TPDS.2021.3108961.

PRESENTATIONS/POSTERS

SC '20: ACM Student Research Competition

Reducing Data Motion of Lattice Boltzmann Simulations through Application of Boundary Conditions on GPUs

Virtual/Online

November 17, 2020

Summer Undergraduate Laboratory Internship

Reducing Data Motion of Lattice Boltzmann Simulations through Application of Boundary Conditions on GPUs

Oak Ridge, Tennessee

August 5, 2020

Ignite-Off 2020

Optimizing Computational Fluid Dynamics Simulations

Oak Ridge, Tennessee

July 28, 2020

Focus on Creative Inquiry Forum

High-Performance Cluster Computing: Engaging Young Scientists and Engineering in the 21st Century Laboratory

Clemson, South Carolina

April 2019

AWARDS

Northwestern University Walter P. Murphy and Royal E. Cabell Fellowship

1-year tuition and stipend offered to top first-year PhD students

2021-2022

R&D 100 Award — Developer

SZ: A Lossy Compression Framework For Scientific Data

Project url: <https://szcompressor.org>

2021

SKILLS

Programming

C/C++, FORTRAN, MPI, OpenMP, LLVM, CUDA, VHDL, Parallel ML, Matlab, Python, Bash

Languages

English, Spanish, Portuguese