TYLER N. ALLEN
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EDUCATION

Clemson University	Clemson, SC
Ph.D. Computer Science	**Defending Spring 2022**
M.S. Computer Science	Dec. 2018
Western Carolina University	Cullowhee, NC
B.S. in Computer Science	May 2015
B.S. in Applied Mathematics	May 2015

- Honors College at Western Carolina University

RESEARCH INTERESTS

- HPC and Systems Performance
- Accelerated Computing
- Virtual Memory Systems

RESEARCH EXPERIENCE

Clemson University	Clemson, SC
Research Assistant	Summer 2016-Present

- *Holistic Performance Analysis and Optimization of Unified Virtual Memory* (dissertation) - analyzing and improving performance for demand-paged memory for heterogeneous systems with unified address spaces such as NVIDIA unified virtual memory and Linux heterogeneous memory management.
- Studied GPU performance of Word2Vec implementations and provided architecture-specific optimizations to enable 5.72x speedup over prior state-of-the-art.
- Studied energy-efficient and power bounded high performance computing with NVIDIA GPUs. Characterized memory accesses for power and performance using empirical research methods. Designed and implemented framework for dynamic co-scheduling for improved resource utilization and throughput on GPUs. Also studied task-based parallel application performance on manycore architectures and improving utilization and usability of heterogeneous memory systems.
- Mentored several undergraduate/junior graduate students on multiple projects: Learning Application Access Patterns on GPUs, Energy and Performance Efficiency in Air and Immersion-Cooled Environments.
- System administrator for lab-scale air-cooled and immersion-cooled clusters sponsored by Submer and NSF.

Oak Ridge National Laboratory	Oak Ridge, TN
Short-term Research Appointee, Future Technology Group	Summer 2019

- Studied performance and use-cases for Intel Apache Pass NVDIMM hardware.

Lawrence Berkeley National Lab	Berkeley, CA
NERSC Advanced Technology Group Research Intern	Summer 2017, 2018

- Studied performance and energy usage of DoE HPC applications on Intel Knight's Landing Manycore CPUs used in Cori Supercomputer. Added energy monitoring for Cray systems to IPM open-source utility.
- Modeling of unified memory performance for NVIDIA GPUs and underlying hardware impacts.

Clemson University	Clemson, SC
Research Assistant	Summer 2015-Spring 2016

- Studied synthesizing realistic eye motion and studying the resultant perceptual realism. Developed synthetic eye model based on pink noise from biology research. Developed a 9-point eye test and reading model.

Clemson University	Clemson, SC
Data-Intensive Computing REU	Summer 2014

- Developed a proof of concept web application to be used as a tool in the classroom to teach heterogeneous network concepts. Tool treats network as linear program and optimizes based on economic and performance conditions.

TEACHING EXPERIENCE

Clemson University   Clemson, SC
Instructor of Record - Computer Organization and Design   Fall 2019
- Roster: 57 Students

- Taught bottom-up approach to computer organization, instructing students on the design and organization of modern computers starting at basic wires and circuits and working their way up to the 5-stage pipeline MIPS processor as designed by Patterson & Hennesey. Performance analysis and design for performance are given heavy emphasis.

Clemson University   Clemson, SC
Graduate Teaching Assistant   Spring 2018, 2019, 2020
- Course: Undergraduate/Graduate Advanced Operating Systems

- Create and grade student implemenatation projects focused on extending the XV6 kernel.

- Assist students during office hours and appointment with OS concepts and C programming.

Western Carolina University   Cullowhee, NC
Computer Science Lab Assistant/Tutor   Fall 2012-Spring 2015
- Assisted students during lab sessions alongside the instructor.

- Provided students with assistance as necessary with their lab programming projects.

- Tutored students in Java and Computer Science concepts during non-lab hours.

MENTORING EXPERIENCE

Mentor for Thomas Randall - Undergraduate and Graduate Student   2018-2021
Current Status: Graduate Student at Clemson University

Mentor for Bennet Cooper - Undergraduate and Graduate Student   2019-2021
Current Status: Graduate Student at Clemson University

Mentor for Derek Rodriguez - Undergraduate   2018-2019
Current Status: Graduate Student at Northeastern University

WORK EXPERIENCE

IT Services, Harris Regional Hospital   Sylva, NC
IT Associate   Summer 2010-Fall 2011
- Repaired malfunctioning equipment.

- Deployed hardware, installed software and operating system, and performed on-site and in-office repairs.

- Took repair and service calls and provided over-the-phone support.

AWARDS AND SCHOLARSHIPS

- *Best Paper Award, International Conference on Supercomputing (ICS), 2021*
- *Special Recognition for Research Achievements and Service, School of Computing, Clemson University*
- *Outstanding Graduate Teaching Assistant, School of Computing, Clemson University, 2019-2020*
- *Student Volunteer Travel Grant, Supercomputing, 2017-2021*
- *Student Author Travel Grant, International Parallel & Distributed Processing Symposium (IPDPS), 2019*
- *Graduate Travel Grant, Clemson University, Summer 2019*
- *Upsilon Pi Epsilon Member, 2016-Present*
- *Upsilon Pi Epsilon ACM Student Chapter Scholarship Award (Merit Based Scholarship), 2013-2014*
- *Dean's Outstanding Scholar Award (College of Arts and Sciences), Western Carolina University, 2013-2014*

- *Proffitt's Pecuniary Propitiousness Protocol (Computer Science Academic Scholarship), 2013-2014*
- *Senior Computer Science Award, Western Carolina University, 2013-2014*
- *Sophomore Computer Science Award, Western Carolina University, 2012-2013*
- *Dean's List of Distinguished Students, Western Carolina University, Fall 2011-Spring 2015*

LEADERSHIP & SERVICE TO THE COMMUNITY
- *Technical Paper Session Chair*, Supercomputing Conference, 2021
- *Students@SC Guided Interest Group Coordinator*, Supercomputing Conference Planning Committee, 2021
- *Students@SC Student Representative*, Supercomputing Conference Planning Committee, 2021
- *Student Volunteer Application Reviewer*, Supercomputing Conference Planning Committee, 2019-2021
- *Lead Student Volunteer*, Supercomputing 2019, 2020, 2021
- *Student Volunteer*, Supercomputing 2017, 2018
- *Computer Science Representative*, Clemson College of Engineering, Computing and Applied Sciences Dean's Graduate Student Advisory Board, 2019-2022
- *CUHackit Hackathon Judge*, Clemson University, 2020
- *President*, School of Computing Graduate Student Association, Clemson, 2017-2019
- *Bebras Computing Challenge Volunteer*, Clemson, SC, Spring 2017, 2018
- *President*, WCU Association of Computing Machinery (ACM) Chapter, 2013-2015
- *Volunteer*, Lego Summit, Western Carolina University, Spring 2013
- *Clinic & IT Volunteer*, Harris Regional Hospital, 2008 & 2009

PUBLICATIONS
Peer-Reviewed Publications
- **Tyler Allen**, Rong Ge, "In-Depth Analyses of Unified Virtual Memory System for GPU Accelerated Computing", Supercomputing 2021
- **Tyler Allen**, Rong Ge, "Demystifying GPU UVM Cost with Deep Runtime and Workload Analysis", In Proceedings of the International Parallel & Distributed Processing Symposium (IPDPS 2021)
- Thomas Randall, **Tyler Allen**, Rong Ge, "FULL-W2V: Fully Exploiting Data Reuse for W2V on GPU-Accelerated Systems", International Conference on Supercomputing 2021 (ICS 2021), **Best Paper Award**
- Rong Ge, Xizhou Feng, **Tyler Allen**, Pengfei Zou, "The Case for Cross-Component Power Coordination on Power Bounded Systems", IEEE Transactions on Parallel and Distributed System (TPDS 2021)
- **Tyler Allen**, Xizhou Feng, Rong Ge, "Slate: Enabling Workload-Aware Efficient Multiprocessing", In Proceedings of the International Parallel & Distributed Processing Symposium (IPDPS 2019)
- **Tyler Allen**, Christopher Daley, Doug Doerfler, Brian Austin, Nicholas Wright, "Performance and Energy Usage of Workloads on KNL and Haswell Architectures", In Proceedings of the International Workshop on Performance Modeling, Benchmarking and Simulation of High Performance Computing Systems (PMBS 2017).
- Pengfei Zou, **Tyler Allen**, Claude H. Davis IV, Xizhou Feng Rong Ge, "CLIP: Cluster-Level Intelligent Power Coordination for Power-Bounded Systems", In Proceedings of the International Conference on Cluster Computing (CLUSTER 2017).
- **Tyler Allen**, Rong Ge, "Characterizing Power and Performance of GPU Memory Access", In Proceedings of the 4th International Workshop on Energy Efficient Supercomputing (E2SC 2016).
- Andrew T. Duchowski, Sophie Jörg, **Tyler N. Allen**, Ioannis Giannopoulos, Krzysztof Krejtz. "Eye movement synthesis", In Proceedings of the Ninth Biennial ACM Symposium on Eye Tracking Research & Applications (ETRA 2016).

In Preparation
- **Tyler Allen**, Rong Ge, "Asyncronous Page Unmapping for Efficient Unified Memory"
- **Tyler Allen**, Bennett Cooper, Rong Ge, "In-Depth Analyses of Unified Virtual Memory System for GPU Accelerated Systems and GPU P2P", Journal Extension for GPU P2P
- **Tyler Allen**, Rong Ge, "Eviction Methodologies for Oversubscribed Unified Memory Systems"
- Rong Ge, **Tyler Allen**, "Power-Bounded Speedup for Heterogeneous Systems"

Accepted Posters
- **Tyler Allen**, Rong Ge, "Holistic Performance Analysis and Optimization of Unified Virtual Memory", Doctoral Showcase Poster, Supercomputing 2021
- **Tyler Allen**, Xizhou Feng, Rong Ge, "Optimizing Performance in Power Bounded GPU Computing", ACM Graduate Student Research Poster Competition, Supercomputing 2020
- Bennett Cooper, Derek Rodriguez, **Tyler Allen**, Thomas Randall, Rong Ge, "Learning Page Access Patterns for Algorithms Programmed with GPU UVM", ACM Undergraduate Research Poster Competition, Supercomputing 2019

INVITED TALKS
- "In-Depth Analyses of Unified Virtual Memory System for GPU Accelerated Computing", Supercomputing, November 2021
- "Holistic Performance Analysis and Optimization of Unified Virtual Memory", Doctoral Showcase, Supercomputing 2021
- "Demystifying GPU UVM Cost with Deep Runtime and Workload Analysis", The 36th IEEE International Parallel and Distributed Processing Symposium (IPDPS), May 2021
- "Slate: Enabling Workload-Aware Efficient Multiprocessing", The 34th IEEE International Parallel and Distributed Processing Symposium (IPDPS), May 2019
- "Beyond Moore's Law with Heterogeneous Computing", Western Carolina University, August 2018
- "Performance and Energy Usage of Workloads on KNL and Haswell Architectures", The International Workshop on Performance Modeling, Benchmarking and Simulation of High Performance Computing Systems, November 2017
- "Characterizing Power and Performance of GPU Memory Access", 4th International Workshop on Energy Efficient Supercomputing, November 2016