

# Benjamin Michalowicz

PhD Student, The Ohio State University

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📍 Columbus, Ohio, USA

## Education

**PhD, Computer Science and Engineering**, The Ohio State University, Columbus, OH 08/21 - Present

**Advisor:** Dr. Dhabaleswar K. (DK) Panda

**Research Interests:** High Performance Computing, Parallel Programming Models, Computer Architecture, Parallel Architectures, Virtualization

**Relevant Coursework:** Advanced Operating Systems, Introduction to High-Performance Deep Learning, Network-based HPC, Algorithms, Computability and Complexity

**MS, Computer Science**, Stony Brook University, Stony Brook, NY 08/19 - 05/21

**Relevant Coursework:** Principles of Programming Languages, System Security, Data Science Fundamentals, Analysis of Algorithms, Quantum Computing and Applications, Fundamentals of Computer Networks, Computational Geometry

**Advisor:** Dr. Barbara Chapman

**Activities:** SBUHacks Organizing Committee, Marching Band, Research

**BS, Computer Science**, Stony Brook University, Stony Brook, NY 08/16 - 05/20

**Relevant Coursework:** Principles of Programming Languages, Systems Fundamentals I/II, Operating Systems, Principles of Database Systems, Advanced Systems Programming in Unix/C, Algorithms, Calculus I-III, Linear Algebra, Theory of Computation

**Activities:** Marching Band, Research, SBCS, SBLive, TKD @ SBU, heading a rock band

## Experience

**Research Assistant**, The Ohio State University, Columbus, OH 05/2021–Present

High-Performance Computing research in Dr. DK Panda's [NOWLAB](#), focusing on the MVAPICH project with some side-projects focusing on Deep Learning and how to improve data-loading in MVAPICH2 coupled with other industry software.

**Teaching Assistant**, The Ohio State University, Columbus, OH 08/2021–12/2021  
Grader for CSE 4471: Information Security.

**Percussion Teacher/Drumline Instructor** 05/2021–08/2021  
Park Ridge, NJ

Working with the Park Ridge Jr./Sr. High School Marching Band's drumline on their 2021-22 halftime show: wrote drumline parts, held weekly rehearsals, and taught marching fundamentals. Also taught drum lessons to beginner, intermediate, and advanced players, in rudiments and their applications to the drum set, drumming dexterity, and advanced techniques

**Social Media Manager**, SBUHacks Organizing Committee, Stony Brook, NY 03/2020–Present

Kept social media accounts up to date (Instagram, Twitter, Facebook, etc.) and otherwise helping organize the SBUHacks hackathon for the 2020 MLH season; helped successfully run Stony Brook's first-ever, student-run, virtual hackathon.

**Research Assistant**, Stony Brook University, Stony Brook, NY 08/2020–05/2021

High-Performance Computing research in Dr. Barbara Chapman's [Exascalelab](#), focusing on testing and benchmarking new HPC clusters and architecture. Ran acceptance tests and helped debug the configuration of the new Ookami cluster. Used code profilers to obtain exact behavior of performance across different HPC processor architectures. Studied/currently studying the effects of compiler toolchains and OpenMP on different applications on the A64FX processor

**Teaching Assistant**, Stony Brook University, Stony Brook, NY 08/2020–05/2021

**Fall 2020:** Held weekly office hours, led weekly recitations, and helped students understand material in Stony Brook University's **CSE 216** course (Programming Abstractions). Designed recitation questions and collaborated with the course lecturer. Helped grade exams homework assignments, and led exam reviews outside of class. Kept in contact with students to answer conceptual and assignment questions.

**Spring 2021:** Held weekly office hours, collaborated on designing homework test cases and exam questions with the professor and fellow TA's for CSE 320: Systems Fundamentals II.

**Software Technical Intern**, BAE Systems, 05/2019–  
Totowa, NJ 08/2019

Worked with full-time employees to re-design a code generation tool from interface definition files with a backing symbol table in C#. Allowed for optimization and easier redesign for larger files. Created a Common Language Runtime Environment for generated objects to communicate via C# and C++. Worked with fellow interns to redesign the mentor/mentee program for incoming interns and YearOne employees.

**Undergraduate Teaching Assistant**, Stony Brook University, 01/2019–  
Stony Brook, NY 12/2019

Held weekly office hours, led weekly recitations, and helped students understand material in Stony Brook University's **CSE 216** course (Programming Abstractions).

**Undergraduate Research Assistant**, Stony Brook University, 05/2018–  
Stony Brook, NY 05/2019

Worked with PhD students in the **COMPAS lab** on projects focusing on microarchitecture and cloud infrastructure. Specifically, I primarily used C and C++ for microarchitectural components (see **Projects** below), and JavaScript for verifying cloud benchmarks.

**Summer Recruitment Staff**, Stony Brook University, 04/2018–  
Stony Brook, NY 08/2018

Aided in recruitment for the 2018-2019 Season. Assisted in planning for band camp, football games, and half-time shows for fall 2018. Helped organize funds, set up equipment to be ordered, cleaned instruments, and encouraged incoming undergraduate students to join The Spirit Of Stony Brook.

**Master @ Master Yoo's Summit Martial Arts**, 06/2012–  
Park Ridge, NJ 08/2017

Led classes of all ranked levels, from beginner to 2nd degree black belt; taught sparring, blocking/striking techniques, self-defense, and weapon techniques while keeping a safe environment for students.

## Projects

**MVAPICH: NOWLAB Research** 05/2021–  
Stony Brook, NY Present

HPC research revolving around the MVAPICH2 library and improving its performance through tuning and novel designs for different forms of communication and message transport. Working on designs that closely interact with the Verbs API.

**Ookami/A64FX Research:** Studying the FLASH code 03/2021–  
Stony Brook, NY 07/2021

Collaborated with astrophysicists at the **Institute for Advanced Computational Science** studying **FLASH**: a multi-scale/multi-physics application written in Fortran. Analyzed memory constraints of FLASH through experiments revolving around 2D and 3D simulations.

**Ookami/A64FX Research:** Behavior analysis of Parallel Programming Libraries 08/2020–  
Stony Brook, NY 05/2021

Tasked with helping run acceptance tests on the **Ookami Cluster at Stony Brook University** just after it had finished being installed, and repeated similar experiments on the **Fugaku Supercomputer**, analyzing OpenMP and MPI libraries and their behavior as well as examine several compiler toolchains and their abilities to optimize runtime, performance, and general efficiency of applications.

**Chor-DNS:** Implementation for Chord-based DNS Resolution | Data Management, Integration 10/2020–  
Stony Brook, NY 12/2020

Implemented the Chord Ring structure with Python/DistAlgo for DNS resolution and compared runtimes to queries made through Linux's **dig** and homemade DNS resolvers. Github link: <https://github.com/BTMichalowicz/CSE534-ChorDNS>

**Topologic:** Library to Simulate DFAs | Co-Developer 06/2020–08/2020  
 Park Ridge, NJ  
 Simulates DFAs and Probabilistic NFA's using context switching. Programs can start at multiple vertices, which may be run in parallel using POSIX Threads and Mutexes in C. Github project: <https://github.com/mstern98/Topologic>

**Gerrymender:** Capstone Project | DB Designer, Data Management 08/2019–12/2019  
 Stony Brook, NY  
 Capstone Project for the Stony Brook CS major aimed to fix political Gerrymandering; designed databases using My/SQL; data pre-processing and maintenance was done through Python's Pandas library, with database entries made using PyMySQL. Github link: <https://github.com/BTMichalowicz/Gerry-mender>

**E-Commerce Pro:** Database Course Project | Primary Designer and Developer 01/2019–05/2019  
 Stony Brook, NY  
 Created a simple application using Node.js, MySQL, and standard JavaScript to demonstrate proficiency with relational databases. Github link: <https://github.com/BTMichalowicz/E-Commerce>

**FeS2/SIMICS simulation research:** COMPAS lab Research Project 05/2018–12/2019  
 Stony Brook, NY  
 Studied the FeS2 simulator platform and the SIMICS x86 processor simulator to model its configuration to real processors. Using C/C++, I debugged the cycle-accurate platform to enable checkpoints of benchmark applications to run for durations in excess of one billion clock cycles.

## Service to Computer Science

Assistant Contributor to SPEChpc 2021 2020–2021  
 Aided in testing and verification during the development of SPEChpc2021, under the direction of Anthony Curtis (Stony Brook University). Mr. Curtis later received a contributor award in January 2022 from SPEC as a result of our work.

**SC'2021:** Virtual Student Volunteer 2021  
 Helping the virtual aspect of SuperComputing 2021 run smoothly in its attempt at a hybrid conference. Checked in with session chairs, helped fellow volunteers, and otherwise ensured that online sessions would start, run, and end smoothly. Recognized as one of the top Student Volunteers.

## Technologies

Git, Slurm, Seaborn, MPI, OpenMP, Pandas, Sklearn, Spring Boot, My/SQL Workbench, Hibernate/JPA, Intel Pin, Linux CLI tools, IBM Qiskit, PennyLane, LLVM, Cray, GNU Compilers

## Programming Languages

C, C++, Java, Python, OCaml, C#, Fortran, HTML, CSS, MySQL, MIPS Assembly,  $\LaTeX$

## Personal Interests

Drumming, Computer Science, Martial Arts, Languages (Programming and Natural), music of all types/theory/history

## Non-technical skills

**Drums and assorted percussion** 2007–Present  
 - Formal training in jazz, rock, marching, and orchestral drumming. I am also a private teacher by request, and have experience teaching drums to all ages and any skill level in aforementioned styles.  
 - I was the snare-line section leader for the Spirit of Stony Brook Marching Band between 2017–2020, and played in several ensembles since 2011.

### 4th Degree Black Belt in TaeKwonDo

As of 2016, I hold a 4th degree black belt (and the rank of "Master") in Tae Kwon Do.

## Awards

### International Symposium on Computer Architecture

06/2019

Phoenix, AZ

A fully funded stipend to ISCA 2019 and its new undergraduate workshop in Computer Architecture (uArch).

### John J. Leddy Director's Award, SOSB Marching Band

05/2020

Given for displaying Academic Excellence, Musical Leadership, Creativity, and commanding exceptional attention in rehearsal and performance.

### Shirley Strum Kenney Founder's Award, SOSB Marching Band

05/2018

Given for displaying qualities and skills of some of the original founding members in SOSB #1 in 2006.

### Student Volunteer Recognition, SC '22 Conference

11/2021

Helping the virtual aspect of SuperComputing 2021 run smoothly in its attempt at a hybrid conference. Checked in with session chairs, helped fellow volunteers, and otherwise ensured that online sessions would start, run, and end smoothly. Recognized as one of the top Student Volunteers.

## Publications

### Conferences and Workshops

- [1] Ookami: Deployment and Initial Experiences  
Andrew Burford, Alan Calder, David Carlson, Barbara Chapman, Firat Coskun, Tony Curtis, Catherine Feldman, Robert Harrison, Yan Kang, Benjamin Michalowicz, Eric Raut, Eva Siegmann, Daniel Wood, Robert DeLeon, Mathew Jones, Nikolay Simakov, Joseph White, Dossay Oryspayev  
*Practice and Experience in Advanced Research Computing (PEARC)* (2021)
- [2] "Comparing the behavior of OpenMP Implementations with Various Applications on two Different Fujitsu A64FX Platforms"  
Benjamin Michalowicz, Eric Raut, Yan Kang, Tony Curtis, Dossay Oryspayev, Barbara Chapman  
*Practice and Experience in Advanced Research Computing (PEARC)* (2021)
- [3] "Comparing OpenMP Implementations with Applications across A64FX Processor Platforms"  
Benjamin Michalowicz, Eric Raut, Yan Kang, Tony Curtis, Dossay Oryspayev, Barbara Chapman  
*17th International Workshop on OpenMP*, 2021
- [4] "Experiences with Porting the FLASH Code to Ookami, an HPE Apollo 80 A64FX Platform"  
C Feldman, B Michalowicz, E Siegmann, A Curtis, A Calder, R Harrison  
*International Workshop on Arm-based HPC: Practice and Experience* (2022)
- [5] Designing Hierarchical Multi-HCA Aware Allgather in MPI  
Tu Tran, Benjamin Michalowicz, Bharath Ramesh, Aamir Shafi, Hari Subramoni, Dhabaleswar K. (DK) Panda  
*Fifteenth International Workshop on Parallel Programming Models and Systems Software for High-End Computing (P2S2)* (2022)

## Invited Talks

- [1] Benjamin Michalowicz, Yan Kang. *IACS Student Seminar*. "Studying OpenMP Behavior on the A64FX Processor"  
Apr. 1, 2021
- [2] Catherine Feldman, Benjamin Michalowicz, Alan Calder. *ACM Frontiers in Computing*. "Lessons Learned: An In-Depth Look at Running FLASH on Ookami"  
May 11-13, 2021