



WAKE FOREST  
UNIVERSITY



SC19  
Denver, CO | hpc is now.

# Daemon Deacons

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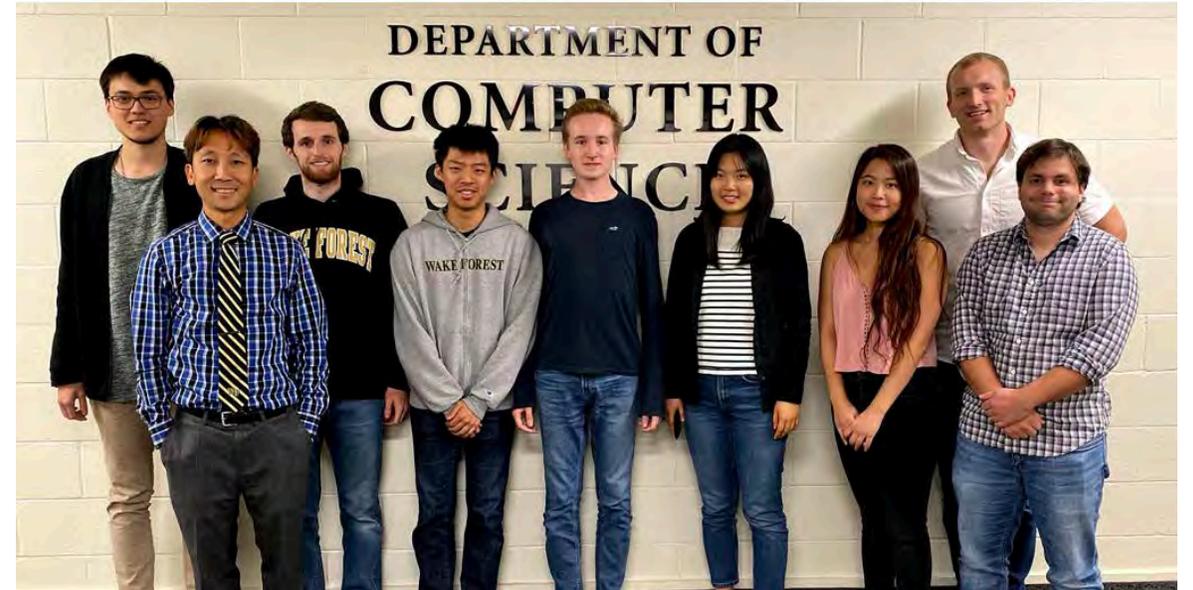


Primary Advisor: Samuel S. Cho (Depts. Computer Science and Physics)

Secondary Advisors: Adam Carlson (Information Systems) and Cody Stevens (Information Systems)

# About Our Team

- Our current undergraduate student team consists of:
  - 1 Sophomore
  - 2 Juniors (1 veteran)
  - 3 Senior students (2 veterans)
- Majors in (3 double majors):
  - Computer Science
  - Mathematics
  - Applied Mathematics
  - Engineering
  - Finance
- Diversity:
  - 1 American & 5 International students (Austria, China, and France)
  - 4 males, 2 females (one President of Women in Computer Science)
  - Fluently speaks: English, Mandarin, German, French, and Japanese.



(Left to right: Jacques Nanquette, Prof. Cho (Computer Science & Physics), Mitch Eisenstat, Hao Tong, Paul Kefer, Vera Zhang, Emma Zhang, Adam Carlson (Information Systems), Cody Stevens (Information Systems))

- Our advisors:
  - Primary Advisor: Comp. Sci. Faculty
  - Secondary Advisors: WFU HPC Team
  - Vendor Advisor (Cisco)

# About Our Hardware

- One (1) C480ML-M5 server with 750GB DDR4 RAM, 980GB SATA SSDs with 8 Nvidia V100 GPUs with 32G memory.
  - The C480 server should be capable of performing serial and parallel computations with the fastest communication possible. Mostly for HPL and HPCG benchmarking and possibly the Mystery App.
- Three (3) compute nodes are Cisco C240-M5's with 384GB of DDR4 memory, and two 18-core CPU's each.
  - The C240 servers are more general purpose; since none of the applications released so far are GPU-optimized, these servers will be utilized for the competition applications.



# Why We Will Win

- One of our secret sauces is **preparation**:
  - Last year, we finished 2<sup>nd</sup> out of the 6 first-time competitors.
  - After the SC18 SCC, the five undergraduate students who competed performed a SWOT (Strength, Weakness, Opportunity, Threats) analysis of their experience under the supervision of the primary advisor.
  - From their SWOT analysis results, they identified a set of “action items” to be better prepared for the next competition. We spent the last year implementing them.
- We are not only planning to win this year, we are also taking careful notes of the things that work and do not work so that we can learn to optimize ourselves too. We will overcome every failure and **persevere**. Why? We are already planning on winning next year too.



# How We Prepared

- Introduction of an HPC class
  - One-credit per semester, weekly meetings
    - Spring: New students learn basic linux administration, shell scripting, application installation and optimization; veteran students assist in teaching. A final team is selected.
    - Summer: Available students, either on campus or virtually through video conferencing, improve HPC skills and explore new directions (e.g., Docker containers, Miniconda). These students are team members or interested students.
    - Fall: Work on competition applications on Cisco Servers with NVIDIA GPUs, Slurm Schedulers, Power Monitoring, presentations skills. Go to SC19, win.
- To date, 24 unique undergraduate students have taken the High Performance Computing class across four (4) semesters, and many of them are repeat students.

