Billy E. **Geerhart III**

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Personal Statement

My two passions are programming and physics. I used my two passions to work on computational projects to earn both a BS and MS degree in physics. My computational physics background has forced me to learn various programming languages and software to get work done. In other words, I am confident I could learn any programming languages or software required to become a quantitative analyst. For instance, I am currently taking a Coursera course in SQL and R programming since I am interested in learning how to deal with large amounts of data.

Education

MS in Physics - Expected September 2016 — **GPA: 3.6** — *Oregon State University*

BS in Physics - June 2012 — 3.48 — *Corvallis, OR*

Equivalent courses to a BS in Math — -

Experience

Oregon State University — *Corvallis, OR*

Graduate Research — *January 2011 - Present*

- Used Linux in combination with GIT and SLURM to work on a project requiring thousands of Markov Chain Monte Carlo simulations; the data from each work unit was stitched together to generate the thermodynamic observables of a square-well fluid.
- Programmed in CUDA to explore a non-linear wave using finite element analysis in combination with RK45.
- Used the mpi version of NAMD to explore the feasibility of a computational biophysics project.
- Worked as a team helping others debug and create code in both Python and C++.

Undergraduate Research

- Used LAMMPS to create hundreds of molecular dynamics simulations that contained both a liquid and a solid at the same time. The data was used to recreate the liquid-solid phase coexistence of the Lennard-Jones 12-6 potential.
- Created an algorithm that identified whether an atom was in a liquid or solid state. The algorithm determined the state by how the nearest neighbors fluctuated. Over time, an atom in a liquid state will generally swap nearest neighbors; on the other hand an atom in a solid state will usually keep the same nearest neighbors.
- Created an efficient density calculation algorithm. The initial algorithm took 60 seconds per computation while the optimized algorithm took only 2 seconds per computation. I optimized the algorithm by combining bisection and Monte Carlo integration; I also applied geometry to a special case in the bisection algorithm that reduced the unsorted boundary volume elements from a 2d surface down to a 1d wire frame. The reduced boundary naturally decreased the computation time. I recognized the opportunity to apply a second special case that could reduce the unsorted boundary volume elements from a 1d wire frame down to a handful of points. This second special case had the potential to decrease the computation time from $O(2^n)$ down to $O(n)$, but I decided the added time to build and test the new code would not be offset by the time saved from the computations.

Graduate Teaching Assistant

- Lead laboratory and recitation sections for introductory algebra and calculus based physics courses.
- Graded thousands of exam problems by finding each students mistake so that I could award maximum points.
- Motivated students to do well in class. I accomplished this by first gaining the students respect by telling them my perspective on the universe, then I used the physics to transition to philosophy in which I challenged the students to question their own place in the universe. I ultimately wanted the students to realize they weren't being forced to take physics as a requirement for their degree; rather I wanted the students to realize they were the ones that signed up in the hopes of doing what they wanted to do in life.

May Trucking Company — *Salem, OR*

Class A Truck Driver — *January 2004 - October 2010*

- Drove 60+ hours a week while away from home; I usually drove the night shift.
- Maintained a zero accident history despite driving thousands of miles per week all year long.

Skills

Programming Experience CUDA, C/C++, Python, Java

Software Experience SolidWorks, Maple