Curriculum Vitae for Alexander Fleischer

Personal information

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Summary

I submitted my master thesis in computational physics in the beginning of 2018. The subject of the thesis was building a C++ application for simulating quantum dots. My goal was to develop code that was up to par with industry standards and I had focus on writing unit tests and readable code. For the thesis used open-source libraries such as Armadillo, UnitTest++, LAPACK and BLAS—where the last two are also C libraries. Using Git for version control was a given part of the thesis and I've used it almost entirely throughout my education.

Most of the programming in my master's thesis was done in C++, but I also have C programming experience from my education. While I did my master's degree I took an additional informatics course, INF3380—Parallel Programming for Natural Science Applications in C. The course consisted of two projects where I used the open-source parallel programming MPI and OpenMP libraries to parallelize the process of denoising an image and performing matrix multiplication. In practice, I learnt how to handle communication between processes, using data clusters, using the parallelization libraries and typical parallelization. While I haven't worked directly with distributed systems, parallel programming is in a sense a tighty distributed system and I have a superficial idea of the concepts of distributed programming and socket programming. Using MPI and OpenMP has also given me insight into message passing and communication between processes.

Furthermore, in one of my master courses, FYS4460–Unsorted Systems and Percolation, I developed code for simulating atomic interactions and visualize it using the open source software Visual Molecular Dynamics. The preferred language to use in the course was C++, but I chose to do the project in C. The reason for these choices was that I wanted to write and learn more C programming and eventually work with creating Linux applications.

Linux is my favored operating system and I like to spend my spare time tinkering with it. I personally use Arch Linux, which requires knowledge about the basic parts of the operating system and one must be their own system administrator. Luckily I got some experience working with Linux parallel to doing my master's thesis. I worked part-time (30 %) as IT support for employees and master students at the Department of Physics at the University of Oslo. This

included troubleshooting network errors and general office and lab computer problems (both Linux and Windows). Most of the IT resources revolved around Linux and the department servers were Linux-based and maintained by us. Therefore I got some experience working with Linux servers and handling and creating user directories. I got the opportunity to write small programs to ease and automate tasks. As an example I made my schedule as an interactive timetable written in Javascript and PHP for the convenience of the users as well as a script for easier printing from Linux machines at the department. Lastly I have basic knowledge of the meteor.js library as I've played around with it on my spare time for creating simple applications.

Technical skills

Frameworks	Numpy, Armadillo, MPI
Languages	C/C++, Python, Javascript, MATLAB, PHP, Bash
Tools	Git, Vim editor, Linux

Education

2018	M.Sc. Computational Physics from the Department of Physics, University of Oslo. Title of thesis: "Monte Carlo Studies of Quantum Dots". Supervisor: Professor Morten Hjorth-Jensen.
2017	B.Sc. in Physics, University of Oslo.

Professional experience

2018	Consultant at Expert Analytics
2015–2017	30 % IT Support at the Department of Physics, University of Oslo
2013–2017	Course Leader at Forskerfabrikken Summer School
2013–2014	Private Tutor at Studenthjelp privatundervisning

Languages

English	Fluent
Norwegian	Mother tongue

Personal skills

Problem solving	Both my previous work experience and my master thesis has taught me to work independently and assess the task at hand.
Programming	During my education, practically every subject involved some form of programming and I also enjoy recreational programming and scripting.
Quick learner	I like to learn, and do so quickly, in particular about programming and science.

Written communication	I like writing clear and concise texts. Everything from popular science to documenting code.

Extended descriptions of selected projects

Activity	Monte Carlo Studies of Quantum Dots
Staffing	2 researchers
Description	For my master thesis, I developed software for finding the ground state energies of quantum dots (fermions) using the variational Monte-Carlo method. The program handles different potential wells like the single and double harmonic oscillator and the finite square well. Furthermore I solved the Schrödinger equation of the potential systems to obtain one-particle wavefunctions of the energy states. The resulting wavefunction was then written as a linear combination of simple harmonic oscillator basisfunctions which were used in the Monte-Carlo solver and compared against the results of the original Monte-Carlo simulations. The code was primarily C++ with some data analysis in Python. I put effort and focus on unit testing and writing clean code.
Tools	C++, Python