Mark Jones
Computer and Data Science Graduate Student

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EDUCATION

Old Dominion University, Norfolk, VA
Masters of Science, Data Science, (expected) December 2023 — GPA: 3.9
Bachelor of Science, Computer Science, December 2022 — GPA: 3.5

Thomas Nelson Community College, Hampton, VA
Associates of Science, Computer Science, August 2019 — GPA: 3.03

PROJECTS

 PyPWA: an HPC Python partial wave analysis toolkit for which I have been the primary developer. PyPWA is a general statistical analysis and complex high-energy physics analysis toolkit. It is a pure Python implementation targeting Python 3.8 and 20-Series NVIDIA GPUs or newer, installed through Anaconda. I designed it to be extendable and computationally fast using a combination of NumPy and Multiprocessing. The package includes offloading likelihoods and amplitudes to the GPU to accelerate data analysis or every CPU thread using the included processing package that seamlessly parallelizes computation. The Git organization model, documentation styling, and code styling blend ideas from the Pro Git book, Python's PEPs, Clean Code, and other projects utilizing Sphinx for their documentation. This project uses Setuptools for deployment, PyTest for unit testing, and Sphinx for documentation.

 Updating PWA2000: PWA2000 is an older C++-based Partial Wave Analysis toolkit written for C++98. My job was to port the core utilities still used, such as GAMP, to build on more recent systems. The package was updated to use CMake to compile and produce the binaries, force C++98 as the standard, and build all binaries as static. I also packaged the program into Anaconda to distribute through Anaconda's cloud.

Deep Learning Timeseries Analysis of Home Markets: The home market effectively consists of three types of markets: buyers, sellers, and balanced markets—this time-series analysis aimed to predict how the market would change three months from a given date. The dataset from Zillow includes data points from the federal reserve for inflation rates and the department of energy for gas prices. Tensorflow was used to perform the regression analysis and prediction.

 LibTorus: is an experiment with C++ data types. LibTorus does not have any real-world applications but instead exists as an exploration into heap, memory management, and C++ best practices. Functionally, LibTorus is a multidimensional doubly-linked list. However, LibTorus does not have boundaries. Instead, the head and tail of the data type are connected in both dimensions, forming a data structure shaped like a Torus. This project is documented using Doxygen, tested using Catch2, and built using Meson.

Money Moves, Senior B.S. Project: Money Moves is a full-stack software application to provide a dynamic game-based learning environment that can be modified on the fly by teachers accessing the website. The software was developed in three parts: a web frontend in React, a backend in Django with GraphQL API, and Unity for the Game. I was the student in charge of the backend and frequently contributed to the Frontend.

Homelab: consists of seven servers running a mixture of BSD and Debian; of those seven servers, four are for virtualization, one is for Slurm, one is a network-attached storage (NAS), and finally, one is for the network's primary router. The network-attached storage and the router utilize software solutions based on BSD, and the Virtualization servers utilize a software solution based on Debian. Both the NAS and virtualization servers leverage ZFS for their local storage and NFS for the file-sharing protocol. The cluster is fault-tolerant and configured to be highly available for most services. InfluxDB stores metrics collected from the servers and the network equipment, and PostgreSQL serves as the primary database. Finally, the network backbone for network relies on Unifi's layer three (L3) 10Gbe switches, with internet networks routed by the primary switch and less secure networks routed by the BSD router.

SKILLS	**Programming Languages:**

Programming Languages:
Fluent: Python, C/C++, CUDA, JavaScript, Java.
Effecient: R, Rust, Go, Puppet, LaTeX.

Data Science:
Environments: Python through Jupyter and IPython.
Libraries: Numpy, Pandas, Scikit Learn, Tensorflow.
Familiar with classification and regression analysis using traditional linear methods, Trees, and Deep Learning.
Experience with TimeSeries and Partial Wave Analysis.

Programming Technologies:
Parallel Programming: Python Multithreading and Multiprocessing, C/C++ OpenMP, and CUDA.
Data Science: Scikit, Tensorflow, Numpy, Pandas, Jupyter, iPython.
Databases: MySQL, PostgreSQL, HDF5, and InfluxDB databases.
Software Distribution: Flatpak, Docker, and Anaconda.
Web: React, Nginx, Apache, Django, TailWindCSS and HTML5Bootstrap.
Applications: VSCode, PyCharm, Git

Administration:
Operating Systems: Ubuntu, Debian, RedHat, Gentoo.
Automation: Ansible and Puppet.
Network: Basic Cisco and Ubiquiti Unifi Networking.
Efficient with: FreeIPA, Bind9, LibVirt.

EXPERIENCE

Research Assistant — Norfolk State University
June 2015 - December 2023 — Jefferson Lab, Newport News VA
I spent my time here as a software developer to produce high-performance multithreaded software alongside physicists to achieve the needs of ongoing analysis. My task was to support physicists on multiple software projects, ensure the stability of software projects, and maintain software repositories while researching parallel computing and its applications. I would take algorithms and write them into toolkits or standalone software to execute on the GPU or CPU with minimal error. I also presented the core software project, PyPWA, to several groups inside Jefferson Lab.

Web Administrator — Oklahoma State University
June 2013 - June 2017 — NASA LaRC, Hampton VA
During my time at NASA, I maintained and supported the NASA HUNCH website. My job was to meet with the various users who generated content for the site and find or develop plugins to help them achieve their content goals. During my time in this position, I evaluated several CMS and produced a handful of WordPress themes and plugins.

Technology Intern   Newport News School District
August 2012 - June 2013   Aviation Academy, Newport News VA
During my senior year of high school, I was brought in as an intern to provide additional
aid for the computing resources of Aviation Academy. While I interned here, I offered
support to teachers and faculty. I updated the flight simulation system to expand the
field of view. I updated the student labs to the latest version of Windows, set up
Windows Server and Active Directory for Student computers, and configured Windows
Deployment Services to deploy new machines rapidly.

REFRENCES   **Carlos Salgado** @ salgado@jlab.org   Mentor at Jefferson Lab
Professor of Physics at Norfolk State University / Staff Scientist at Jefferson Lab.

Will Phelps @ wphelps@jlab.org   Mentor at Jefferson Lab
Assistant Professor of Computer Science at Christopher Newport University / Staff
Scientist at Jefferson Lab.