

Jesus Rafael Rijo

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Education

Macon, Georgia

Mercer University

August 2019 -- May 2023

- Computer Science (B.S.); Mathematics (B.A.)

Overall GPA: 3.88

Projects

Nuclear Magnetic Resonance (NMR) Analyzer:

- A Fortran 90 analyzer for the discrete data sets from a nuclear magnetic resonance (NMR) spectrometer.
- This analyzer provides three filtering options that can be adjusted for different dimensions and cycles: Boxcar filter, Savitsky-Golay filter, and Discrete-Fourier Transform (DFT) filter.
- The analyzer determines key information from the data by interpolating the data as a natural cubic-spline and using adjustable numerical integration techniques, such as adaptive quadrature, Gaussian quadrature, and Romberg integration.
- The formatted final report lists the peak positions, areas, and the relative number of hydrogens per peak.

The Dusty Decker: A Single-Threaded Optimization Project:

- Translated an archaic and unoptimized Fortran 77 program named `dusty.f` to C and modern Fortran, procuring the new programs matched the results of the old program to machine precision.
- Assessed the performance pitfalls of the original program by performing function- and line-based runtime profiling with various tools, such as `gprof` and `gcov`.
- The new programs were optimized using common single-processor optimization techniques, like loop unrolling, vector triad, and loop linearization.
- The performance of the programs and their optimized versions were gauged using both wall-clock time and CPU time over various problem sizes.

File Zip with Huffman Encoding Tree:

- A C++ project that performs file compression and decompression using the Huffman encoding algorithm.
- The Huffman encoding algorithm operates based on the frequency of each character in the original text file, where each type of character is represented as a struct stored in a vector.
- The compression portion of the projection reports the number of bits compressed and the compression rate.

Work and Research Experience

Undergraduate Research Assistant

Mercer University

May 2021 – July 2021

- Researched the fundamental concepts of set theory and the applications of set theory in computer science.
- Wrote a technical report outlining common uses of set theory in data structures and basic logic design.

Precalculus Preceptor

Mercer University

August 2020 – May 2021

- Taught students core concepts of undergraduate precalculus and helped senior lecturers prepare additional practice material for the course.

Technical Skills

- *Languages (Proficient):* C, C++, Fortran 90/95, Java.
- *Languages (Familiar):* Bash, Lisp, Python, Perl, Go, Julia, NASM, Ada, Rust, C#, Prolog.
- *Tools and Libraries:* Git, Gnuplot, GNU Make, BLAS, POSIX Threads, Linux, SageMath, Mathematica, Insight Maker.