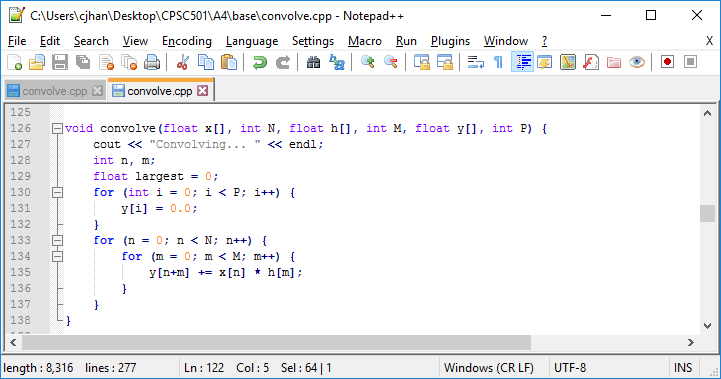
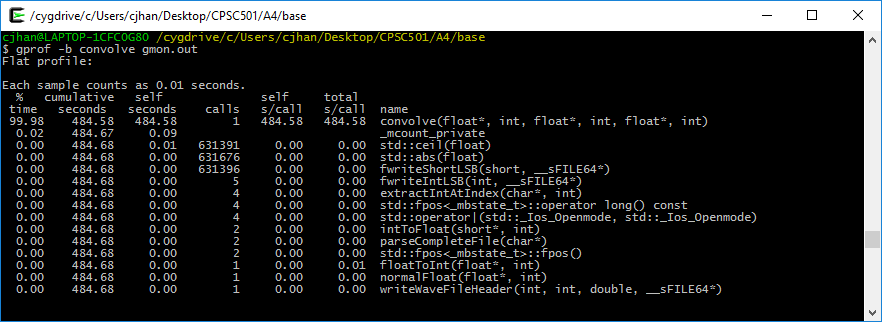
**CPSC 501 Assignment 4 Optimization Report**

Baseline Program: Our implementation begins with an input-side time-domain convolution algorithm. It operates by parsing both the input and impulse response .wav files for their respective signal data. Once the samples have been extracted, they convolved together using the following convolve function:



This convolution function, while accurate, is extremely slow. Timing data, collected at initial execution of the convolution of a two-second-long constant 440Hz sine tone with the provided five-second-long impulse response file l960auto\_park.wav resulted in a total profiled convolution time of 484.68 seconds as reported by gprof profiling software:



Algorithm-Based Optimization: The baseline program was optimized by changing the nature of the convolution from a time-domain input-side convolution to a frequency-domain convolution utilizing the provided Fast Fourier Transform function four1: