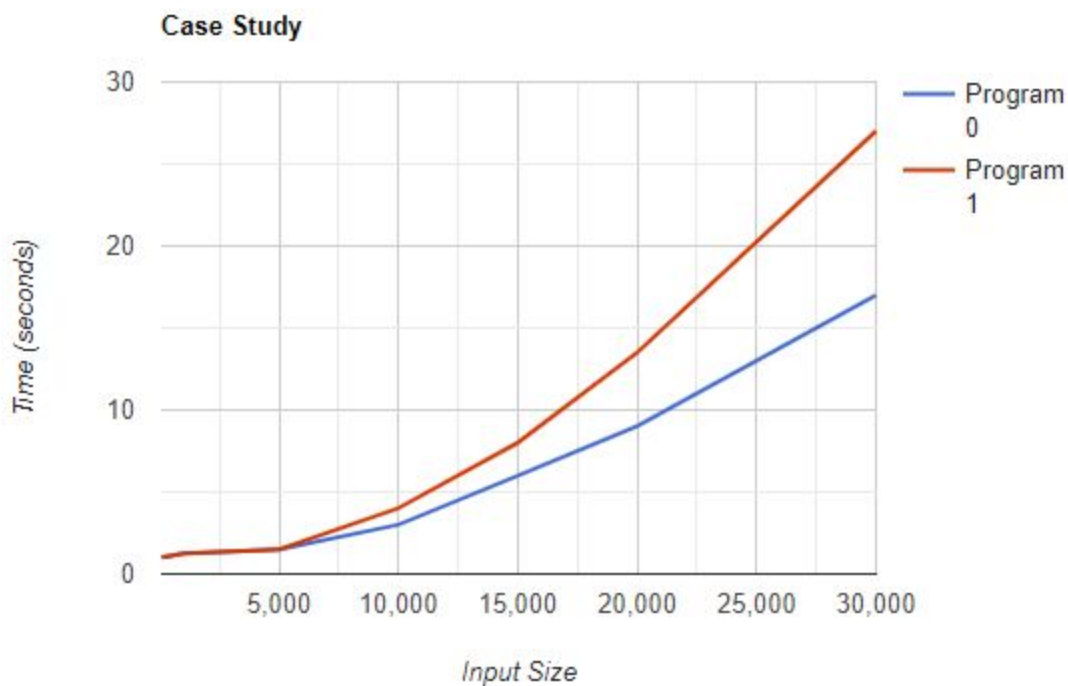


Lab 3 Case Study Report

For this case study, we aimed to report about the differences between the runtimes of the two given C programs (program0.c and program1.c) in an effort to gain a more concrete understanding of how a computer's architecture can sometimes be important to keep in mind when developing programs. For the two given files, all we did was add a timer in the code to track the runtime, and we varied the input size from 100 up to 30,000. In our case, we tested input sizes of 100, 1000, 5000, and intervals of 5,000 from there up to 30,000. Attached below is the resulting graph of input size vs. runtime in seconds.



For smaller input sizes, the runtimes were very close to each other. However, as the input sizes kept getting bigger, the runtime gap between the two grew as well, with Program 0 being the faster program. They appear to have similar runtime complexities, but Program 0 takes advantage of the computer architecture since it iterates through each matrix row by row (which is also how matrices are linearized). Program 1 iterates through each matrix column by column, which doesn't take advantage of the linearized locality of iterating row by row, thereby causing many tiny delays that snowball into the large time gap between the two programs.