



## CS 7345 ADVANCED APPLICATIONS: LAB 1

**Overview:** In this lab you will utilize Emscripten to convert a c++ library/application into a web application via WebAssembly (WASM). After conversion, evaluate the performance of native vs js based versions of the library.

**Due: September 14, 2021 @ 11:59pm.**

**Code Requirements:**

1. Setup the Emscripten pipeline
  - a. Install Emscripten compiler frontend (emcc)
  - b. Configure system variables to allow for compilation of code
  - c. Verify with hello world project.
2. Identify code base to transpile.
  - a. A code base that has a significant computational overhead should be chosen
    - i. This can be a publicly available code base, that doesn't currently have an emscripten port
    - ii. This can be a custom library/program you have previously created (algorithms, search, math lib, etc).
3. Test code base compiling with emcc to native executable code.
  - a. This verifies code base is functional and ensures compiling is possible.
4. Build code base to WebAssembly
  - a. Save out all file that are produced with this step
  - b. Use HTML output page to verify execution
    - i. You can modify this page to make it more user friendly, by improving the UX, but it is not required for this project.
5. Extra Credit: Attempt to improve performance of WASM code, if possible, by modifying native code

**Report Requirements:**

1. List process taken to setup the Emscripten development environment
  - a. This should be a tutorial style writeup, showing screenshots and outputs where applicable
  - b. Be complete with all steps you took to get environment working
    - i. What websites, what sys variables (if any) did you set and how, how did you compile, etc.
2. Compare and Contrast execution time between native and wasm based code bases
  - a. Perform a timing analysis for each code base
    - i. Your analysis should be performed over multiple executions of the code base

1. Do not compare off a single execution of each code base
- ii. Show confidence intervals for execution time at 95% confidence interval and discuss if the results are statistically significant
- b. Extra Credit: perform same analysis above on any optimizations performed on code base.

***All code should be in the “Code” folder, raw data files generated should be in “Data” and your final report should be in “Report” folder in the git repo.***