Lab 0: "Hello World"

Lab 0 is due Friday, September 11. Your lab report and source code must be submitted by **1:25 PM** before class. The late policy applies to this lab project.

This lab is to be done individually. Get started early! Also, remember to **put your name** on the lab report!

You can solve this problem on any machine with a C compiler. All EECIS machines (check www.eecis.udel.edu) satisfy the requirements. In particular, we have a computer cpeg655.ece.udel.edu set up for this class. If you decide to use another system, please describe the CPU configuration, the OS and the compiler on that system in your lab report.

Problem 1: "Hello World" of Program Optimization

    (a) Implement the following pseudo code in C:

<div align="center">

For i from 1 to 1 million-1
    For j from 0 to 3
        a[8*i+j] = a[8*(i-1)+j] * 2

</div>

    (b) Find ***three different ways*** that implement the same workload but show ***non-trivial*** and ***persistent*** speed difference. Importantly, the speed difference must be attributed to different mechanisms, not just because of the choice of different parameter values. For each version, you need to describe the mechanism that you hypothesize will lead to different speeds. You will be scored mainly based on whether your hypothesis is reasonable. Note that the speed difference should not be the result of artificially introduced overhead or underload, for example, adding more operations to or remove operations from the existing code, or using different but functionally equivalent operations, or simply wrapping some operations into a function. Also parallel implementations are allowed. Essentially, you can only change the order or concurrency of the existing operations to do the same job.
        – Find the right way to measure time. The time measurement APIs are different on Linux, Windows and MacOS. You need to do a little exploration to find the right API on your machine.
        – Find mechanisms that make similar code perform differently. The mechanisms can be architectural or operational.
    (c) Report the speed difference of the three versions, ***and*** explain whether the difference verifies your hypothesis about their performance.

How to Submit:

Copy your lab report, which is a .pdf, a .doc, or a .html file, and all your source code into an empty directory. Assuming the directory is "submission", make a tar ball of the directory using the following command:

tar czvf [your_first_name]_[your_last_name]_lab0.tar.gz submission.

Replace [your_first_name] and [your_last_name] with your first name and your last name.

Submit the tar ball with subject "cpeg455/655 lab0 [your_first_name] [your_last_name].

The receiving time will be used as the time-stamp of your submission.