**Blue Waters Petascale Semester Curriculum v1.0**

**Unit 8: OpenACC**

**Lesson 2: Intro to OpenACC**

**Exercise Instructions for Students**

*Developed by Mobeen Ludin for the Shodor Education Foundation, Inc.*



*Except where otherwise noted, this work by The Shodor Education Foundation, Inc. is licensed under CC BY-SA 4.0. To view a copy of this license, visit*[*https://creativecommons.org/licenses/by-sa/4.0*](https://creativecommons.org/licenses/by-sa/4.0)

*Browse and search the full curriculum at*[*http://shodor.org/petascale/materials/semester-curriculum*](http://shodor.org/petascale/materials/semester-curriculum)

*We welcome your improvements! You can submit your proposed changes to this material and the rest of the curriculum in our GitHub repository at*[*https://github.com/shodor-education/petascale-semester-curriculum*](https://github.com/shodor-education/petascale-semester-curriculum)

*We want to hear from you! Please let us know your experiences using this material by sending email to* [*petascale@shodor.org*](mailto:petascale@shodor.org)

Write a simple matrix multiplication serial code in C:

1. Add directive to the code that defines the variable for size of the matrices
2. Define arrays for each matrix and allocate required memory
3. Write for loop(s) to initialize the matrix arrays with some numbers. You could use random number generators.
4. Write for loop to carryout the matrix multiplication

Parallelize the for loops with OpenACC:

1. Find the compute intensive loops to parallelize.
2. Use OpenACC directives to copy data from CPU host to GPU
3. Use timers routines available either in OpenACC, C, OpenMP libraries to measure performance.
4. Compare performance of your program with using PARALLEL LOOP vs. KERNELS