Accelerating Scientific Applications - Exercise Instructions for Students

Write a simple matrix multiplication serial code in C and Fortran:

- Add directive to the code that defines the variable for size of the matrices
- Define arrays for each matrix and allocate required memory
- Write for loop(s) to initialize the matrix arrays with some numbers. You could use random number generators.
- Write **do/for** loops to carry out the matrix multiplication

Parallelize the ***for*** loops with OpenACC:

- Find the compute intensive loops to parallelize.
- Use the Linux time command to document entire job runtime.
- Use OpenACC directives to copy data from CPU host to GPU
- Use timers' routines available either in OpenACC, C, OpenMP libraries to measure performance.
- Be careful in using reduction operators like: min and max.
- Compare performance of your program with using PARALLEL LOOP vs. KERNELS.
- Using the matrix multiply triple loops – test all possible combinations of the **do/for** loops and compare run times.
- Do a scaling and algorithmic complexity analysis of these programs.