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

**Unit 7: CUDA**

**Lesson 5: Adding 2 vectors in CUDA**

**Instructor Guide**

*Developed by Sanish Rai for the Shodor Education Foundation, Inc.*



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Note: Make sure that CUDA is installed and working. For more information check: Lesson 7.10 Installing and running CUDA

•You are given the code for vector addition program in CUDA

Code is given

•Write a similar program for multiplying three vectors.

Solution is given

Some points to consider:

* Change the SIZE to different values and observe the results
  + If you make SIZE too big, make sure to change data types in the code appropriately
  + If not done, then integer variables used in loops or other parts will cause error
* Why do we need to do (int)ceil((float)SIZE / threads) and not just SIZE/threads ?
  + If SIZE/threads is done then there might be loss in integer conversion during division, this might result in lower number of threads than expected
  + So we convert to float and take the ceiling to get higher value for threads and cast to int
* Why do we need to do *if (thread\_id < n)* in the kernel?
  + If we have higher number of threads than vector size, it might try to access vector index greater than the size of the vector
* Why do we need to do

*thread\_id = blockIdx.x \* blockDim.x + threadIdx.x* and not *thread\_id = threadIdx.x;*

*Since we are using block size greater than one, we need to get the correct global id using blockIdx and blockDim. If there was only one block, then thread\_id=threadIdx.x will work.*

**Common Pitfalls for Students and Instructors**

* Mistakes in proper allocation of memory in CPU and GPU
* Mistakes in writing kernel
* Students might be confused with using proper number of threads and blocks
* Students might make mistake in copying data from CPU to GPU or vice versa