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

**Unit 7: CUDA**

**Lesson 1: Introduction to CUDA GPGPU**

**Instructor Guide**

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1. Read the exercise instructions for students first, which will help you also understand the material.
2. Then try executing the code. I recommend then writing the code from scratch so you can become familiar with the parameters of each function.

* CUDA commands and syntax used in this lesson that you should understand:
  + `\_\_global\_\_`
  + cudaMalloc
  + cudaMemcpy
  + The difference between cudaMemcpyHostToDevice, and cudaMemcpyDeviceToHost
  + cudaFree

1. It will then be useful to read chapters 1,2, and 3 of the current CUDA toolkit (https://docs.nvidia.com/cuda/cuda-c-programming-guide/index.html) as of this writing, which is version 11.
2. Teaching the first lesson may be the hardest, as students may have trouble getting CUDA configured on their machines--for this reason, I recommend getting students configured on the same environment (i.e. some cloud environment with GPUs that are known to work).

**Common Pitfalls for Students and Instructors**

* Mixing up order of device to host and host to device when transferring memory
* Students may have questions about which version of CUDA to use--I recommend using the latest.



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*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)