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GPUs in a Computational Physics course

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Abstract content \
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In an introductory Computational physics class of the type that many of us give, time constraints lead to hard choices on topics. Since everyone likes to include their own research in such a class I give fair time to visualiation, but try to also give an overview of many areas. Since about 2007 I have also included 2 lectures on parallel programming algorithms using MPI. Both the principle and the need to break the "fear barrier" of using a large machine with a queuing system via ssh have been sucessfully passed on.

Due to the plateau in chip development and to power
considerations future HPC hardware choices will include heavy use of GPUs. Thus the need to introduce these at the level of an introductory course has arisen. Just as for parallel coding explanation of the benefits and simple examples to guide the hesitant first time user have been selected.

I proposed several student projects using GPUs that include how-to pages, in the style described in [1], so that these examples would provide me with material. I will describe two of the more successful ones: a lattice Boltzman and a Finite Element code, two topics that I previously gave in short overviews, and link to new lecture pages that we developed.

[1] D. Mazvovsky, G. Halioua and Joan Adler, "The role of projects in
(Computational) Physics Education", Physics Procedia, 2012, Vol 34, p 1-5.

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