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| Modeling:  Mathematics:  Programming:  Science: |  |
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# Software Lab:

GPU offloading in MGLET base

##### Description

MGLET is a commercial CFD-CAA solver widely used in the automotive industry. Predicting aeroacoustics is computationally expensive and therefore MGLET is highly optimised for running efficiently on thousands of cores on modern HPC systems. GPU computing offers the potential for accelerating these computations, but despite being on the horizon for years, GPU computing is not yet employed widely in the CFD community. The acoustic perturbation equations solved in MGLET are explicit, linear and contribute significantly to the total computational cost and thus are a good candidate for GPU acceleration.

In this project, the offloading of the scalar transport equation to GPU accelerators is to be implemented in the open source flow solver MGLET-base1 (used by the chair of hydromechanics at the TUM). The implementation should work with the future HPC hardware at the LRZ or HLRS. Different implementation strategies should be analysed, benchmarked and compared and potential bottlenecks identified. A test case with flow and scalar transport should run successfully.

##### Task

* Analyse and benchmark different implementation strategies
* Identify possible bottlenecks
* Implement GPU acceleration for scalar transport in opensource MGLET-base
* Successfully run a benchmark test case

##### Supervisor

Florian Schwertfirm, KM-Turbulenz GmbH, f.schwertfirm@km-turbulenz.de

*Simon von Wenczowski, Professorship of Hydromechanics, simon.wenczowski@tum.de*

*[1] https://github.com/kmturbulenz/mglet-base*