EPI: HiePACS – INRIA Bordeaux – Sud Ouest

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Title: Design and integration of non regression test suite for High Performance Computing (HPC) simulations

Keywords: High performance computing (HPC), parallel platforms, continuous integration, numerical simulation

Scientific context:

Numerical simulations arising in High Performance Computing (HPC) are more and more complex both in terms of software building blocks and hardware platforms on which they are executed. For ensuring the robustness of the whole software stack over the life span of the libraries, advanced continuous integration tools need to be designed. Such tools are run automatically to check that the accuracy, the performance and the memory consumption are maintained between successive builds of the code. In an HPC context, the deployment of the code on large-scale parallel platforms is furthermore required to assess the behaviour in a realistic environment. If many generic continuous integration suites are available (such as Kitware CTest) for general usage, much fewer match HPC constraints.

EADS Innovation Works (IW) has developed an automatic testing system, named “Autotest”, which handles these specific requirements. This suite has been used in production for acoustics and electromagnetism applications.

The Inria HiePACS team aims at assessing and enlarging the usability of this testing suite for ensuring the continuous quality of the solvers they develop.

Goal:

The final objective of this internship is to provide a testing suite for the solvers developed in the HiePACS team. It will be achieved through the following steps.

- The usability of the EADS IW Autotest testing suite for HiePACS solvers (linear solvers and FMM) will be evaluated and compared with other publicly available testing suites.
- The selected tool will be used as a basis for the conception of a non-regression and validation tests for HiePACS solvers, by checking

identified metrics such as numerical accuracy, execution time, memory consumption, weak and strong scalability, I/O bandwidth.
- With the feedback of these preliminary experiments, the tool will be improved for ensuring a better match to HiePACS specific needs.

Expected skills: HPC, parallel platforms, MPI, notions of numerical linear algebra, scripting (python is a plus).
Master or engineer school in compuational science