



## Decoupling software components in the simulation code ComPASS 2 year position for a HPC software engineer

### **Context:**

The ANR project Charms (<http://www.anr-charms.org/>) develops high performance open source software for the simulation of geothermal energy systems. The Compass code is an open framework under development in the project (<http://www.anr-charms.org/page/compass-code>).

A common theme in modern high performance computing is to uncouple the generic parts of a code (solving systems of equations, performing input / output operations) from the more application specific parts. For example, the Parallel Data Interface (PDI) is a library that aims to decouple high-performance simulation codes from Input /Output (<https://gitlab.maisondelasimulation.fr/jbigot/pdi>). This frees the application developer from having to worry about these more specialized aspects, and also means that he or she can more easily switch between different libraries, according to various trade-offs between, say, ease of use or efficiency.

### **Job description:**

The hired candidate will interact with the main developers of Compass to make the code more flexible, along two main directions:

- The solution of linear systems, which is the most compute intensive part of the simulations, uses the well-known PETSc library. Other high quality libraries could be used, so as to evaluate other solution algorithms. A high-level interface is needed, so that switching between those libraries becomes easier;
- Replacing the current I/O system, based on a fixed format for both reading and writing by a plug-in linked to PDI.

The candidate hired for the position will be provided with use cases to validate the work from the software side. The numerical validation and comparison of the various solutions will be carried out elsewhere.

### **Skills:**

- PhD or master's degree in computer science with strong software engineering skills,
- Knowledge of several programming languages, familiarity with design patterns,
- Some knowledge of either numerical methods is not required but would be a plus

**Compensation:** Salary will be based on CNRS rules, and will depend on experience (a typical range is 25k€ - 35k€ yearly, including health benefits, but not income tax).

**Location:** Maison de la Simulation (<http://www.maisondelasimulation.fr/>) is a multidisciplinary laboratory in high performance simulation. It features scientists and engineers specialized in applications of HPC to various fields, or the development of HPC simulation tools. It is located on the fast growing Plateau de Saclay, south-west of Paris.

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