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1 *Presentation of a simple workflow with ALOMA: In-bound gatherers are corrected and then stacked. Input and results can be visualized interactively.*

ALOMA LETS GEOSCIENTISTS FOCUS ON THEIR FIELD OF EXPERTISE

ALOMA lifts the burden of dealing with parallelization, multi-threading, and other challenges in high-performance computing from its users. Instead, the experts for geophysical questions can focus on their area of expertise while ALOMA takes care of efficiently executing their algorithms even on large scale and heterogeneous systems.

The software is a specialized version of GPI-Space which is widely used in fields beyond geophysics such as big data and machine learning.

Complex computations on ever growing amounts of data are characteristic for the geosciences and thus geophysicists are forced to learn about HPC techniques in order to make their software run efficiently on large scale systems. We developed a system that sits in between the geophysicist and the HPC expert. Computer scientists and geophysicists together came up with ideal strategies for parallelization, data partition, and failure tolerance in the context of geophysical applications.

The heart of ALOMA, its failure tolerant runtime system to execute workflows on distributed systems, was then developed by the HPC experts of our group. For its users, the geophysicists and geologists, ALOMA is merely a black box in which they can integrate their latest developments via a well-defined interface. The learning curve for the new approach is easy to manage. Once ALOMA is installed, it takes users not more than a day to port their first module to the new system.

Quick prototype development and scaling

The main benefit of ALOMA is to quickly integrate and test newly developed algorithms and prototypes on production scale real-world problems in no time. Furthermore, existing codes and applications – even in different programming languages such as C/C++, Fortran, Matlab etc. – can be integrated as modules in ALOMA. With a graphical editor, users can combine these modules into workflows and let the software deal with the automatic parallelization and execution.

We were able to prove the feasibility of this concept in various projects with partners in the oil and gas industry, where we managed to make a customer software scale within a few days. The concept is so convincing that a Houston based company has commissioned us with switching over their existing processing software to ALOMA.