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Abstract

Objectives/Scope:

Optimal reservoir management usually requires evaluation of a large number of various development scenarios. We propose a method that significantly improves multivariate calculations performance using available computational resources. The solution doesn't require additional capital investments and is easy to implement in the office.

Methods, Procedures, Process:

Proposed method is based on integration of several personal workstations into a grid cluster using local network. Client-side software includes customizable user timetable and/or smart load meter and allocates free resources for distributed computing. Host side identifies available PCs, dispatches predefined set of independent tasks (for example, field development scenarios) to free nodes and collects results. The system features parallel-compatible optimization algorithm, though external case generator may also be used.

Results, Observations, Conclusions:

Grid cluster consisting of fifty workstations with estimated peak performance of 60 TFLOPs was used to find optimal development plan for a field in Western Siberia, allowing to reduce computational time from several months to one weekend. The method proved linear speedup depending on the number of involved nodes along with stability under conditions when either client or host side may disconnect at any time. Grid cluster is also perfect for choosing optimal well placement, especially in case of geological uncertainty. Although initially designed for reservoir simulations, the system can be used for any time-consuming multivariate task, while flexible user timetable ensures that distributed calculations do not interfere with daily work.

Novel/Additive Information:

Generally, heavy computational tasks are accomplished with the use of a dedicated cluster while personal workstations stay idle most of the time. Grid cluster allows to efficiently utilize available resources and save money on additional equipment. To encourage colleagues to provide their resources for distributed computing we introduced oilcoins - a special reward, which may be used as a virtual cash and allows users running their own cluster tasks.