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Desktop supercomputer: what can it do?

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To have computing power of large system in hand was a dream of computational scientists for a long time. There were a lot of very interesting proposals in that direction, but there always were bottlenecks, that managed to ruin the original idea. We review some of those problems and argue that new technologies can bring solutions at least to majority of them. The use of cloud technologies transfer those problems to purely on technical level and we describe solutions to most important ones –data transfer overheads, operational environment and load balancing. All solutions are illustrated on a very popular heterogeneous system CPU+GPGPU. Despite all favorable results such system still cannot substitute General Purpose systems. So we formulate a new approach for algorithms in heterogeneous systems. It consists in two steps –finding proper variables for optimal distribution of a problem over the computational system and building a virtual cluster for optimal mapping the algorithm on it. We give three examples of realization of such approach for popular physical problems.

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