DYNAMIC RESOURCE ALLOCATION FOR EFFICIENT LARGE SCALE CFD APPLICATIONS

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Abstract. CFD users of supercomputers usually resort to rule-of-thumb methods to select the number of subdomains to be used in MPI applications. One common approach is to set a minimum number of elements nodes or cells per subdomain, under which the parallel efficiency of the code is known to fall below a subjective level, say 80%. The situation is even worse when the user is not aware of the "good" practice for the given code and huge amount of resources can thus be wasted. This work presents a methodology to automatically adapt at runtime the resources allocated to a simulation. The criterion to control the required resources is based on runtime measures of the parallel efficiency of the execution. Resources are then expanded or reduced to fulfil this criterion and eventually execute an efficient simulation.