

Computational Infrastructure for Parallel Processing Spatially Distributed Data

I.V.Bychkov

Institute for System Dynamics and Control Theories SB RAS,

Irkutsk, Russia

bychkov@icc.ru

The fundamental problem of infrastructure construction for sequential and parallel execution of computational modules results from improved computer networks, huge amounts of aggregated data (including cartographic data), and requirement of integration and intelligence level increase of spatially distributed data processing. The infrastructure is supported by corresponding information stored in shared warehouses of data and knowledge.

One of the possible ways of distributed data processing problem solution, which is popular today, is a virtual environment construction for interdisciplinary cooperation in the field of high performance information and computation systems and networks devoted to solution of scientific, industrial and educational tasks. The term "GRID" is introduced by the collaborative society of researchers. The GRID-technologies are considered as methods and means, which supply the user with computation hardware and software, distributed in a corporate information network framework (e.g., Intranet). The framework supplies also various program modules and databases for a defined class of tasks. One of the main tasks of the GRID-technologies is to supply the computing collaboration with new means of cooperation and construction of virtual alliances aimed at desired results. This is achieved by distributed resource integration and administration, resulting in metacomputing environment of temporarily free resources of networked personal computers, supercomputers and servers. Such consolidation allows to increase the degree of processing component load from 20% to 90%. In addition to the networked computational resources new effective parallel programming methodologies accounting distribution of the information resources play the great role.

The set of means allow us to solve applied problems, most of which connected with spatial and temporal relations of Earth's phenomena and also minimize the expenses on high performance computation environment construction by means of aggregation computer software (realizing alternative and supplemental methods of the tasks) within a corporate network. The GRID-technology of intellectualization of the enduser applications allows us to solve the fundamental problem of the distributed programming systems accessibility to user.