HARS: Heterogeneity-aware resource scheduling in grid environment using K-Centroids clustering and PSO techniques

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Abstract

Grid computing system have become one of the major computing platforms for large computational tasks. Many existing systems have been addressing the issues of scheduling in traditional grids. There are only few system functioning to improve the scheduling in the utility grid. The multi-objective accomplishment of scheduling in utility grids was difficult to solve the problem of heterogeneity of jobs and resources. To overcome these issues, Heterogeneity-Aware Resource Scheduling (HARS) is proposed in the grid environment. This approach is mainly focused on the energy consumption in grids, which helps to increase the system reliability. The gridlets and grid resources are categorized for minimizing the scheduling delay using the K-Centroids clustering algorithm. A novel provisioning mechanism is introduced along with the consideration of load, energy, and network time. By integrating these three parameters, the optimized fitness function is employed for Particle Swarm Optimization (PSO) to select the computing node. Failure may occur after completion of the successful execution in the network. To improve the fault tolerance service, the migration of the gridlet is focused on the particular failure node. This can recomputed the node by PSO and the corresponding optimal node is predicted. The experimental results exhibit better scheduling length, scheduling delay, speed up, failure ratio, energy consumption than the existing systems.