Designing a Parallel Fuzzy Expert System Programming Model with Adaptive Load Balancing Capability for Cloud Computing

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Abstract. MapReduce is a programming model for processing and generating large data sets. It is used widely in cloud computing frequently. Programs written based on the MapReduce model are automatically parallelized and executed on a large cluster of commodity machines. Data partitioning, task scheduling and inter-process communication are all handled by the run-time system. Programmers have no need to learn the complicated techniques for parallel computation for efficient resource utilization in a large distributed system. In this paper, we introduce how to design a parallel fuzzy expert system programming model with adaptive load balancing capability based on the philosophy of MapReduce. In particular, we investigate how to utilize the feature of the fuzzy expert system language to design a dynamic scheduling scheme to improve the system performance. At runtime, the scheme adjusts the next chunk size for a worker by comparing the expected execution time and the real execution time of the current task assigned to the worker. Experimental results show the proposed scheduling scheme can improve the system performance significantly.

Keywords: cloud computing, parallel processing, fuzzy expert system, load balancing, FuzzyCLIPS

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