Reducing Energy Consumption with Cost Budget using Available Budget Preassignment in Heterogeneous Cloud Computing Systems

Abstract

- Energy consumption and cost are important factors in executing applications in grid or cloud computing systems because they directly affect resource consumption and economic benefits. This study solves the problem of reducing energy consumption of a cost budgeted directed acyclic graph (DAG) application in heterogeneous computing systems.
- The state-of-the-art work has studied the cost budgeted scheduling for a DAG application in heterogeneous computing systems by proposing the budget level-based preassignment method;
- however this work is merely to reduce the schedule length without involving energy consumption, and its preassignment method is still pessimistic although it improves the existing method.
- In this study, we first propose an available budget preassignment method to further improve it. We then introduce the available budget preassignment method to reduce the energy consumption.
- We propose minimiz-ing energy consumption using available budget preassignment (MECABP) algorithm based on the two steps.

Existing

- Cloud computing is a promising, effective computing model for supporting scientific applications, which are frequently used in modeling scientific applications in the fields of bioinformatics, astronomy, and physics.
- Heterogeneous cloud computing systems are special systems in which different virtual machines (VMs) have varying computation capacities because old and slow machines are continuously being replaced by new and fast machines

Proposed

- we first propose an available budget pre assignment method to further improve it.
- We then introduce the available budget pre assignment method to reduce the energy consumption.
- We propose minimizing energy consumption using available budget pre assignment (MECABP) algorithm based on the two steps.
- Experiments on three types of DAG applications with different parallelism degrees confirm the effectiveness of the proposed MECABP algorithm compared with existing algorithms.

HARDWARE REQUIREMENTS

- Processor – Pentium –III
- Speed – 1.1 Ghz
- RAM – 256 MB(min)
- Hard Disk – 20 GB
- Floppy Drive – 1.44 MB
- Key Board – Standard Windows Keyboard
- Mouse – Two or Three Button Mouse
- Monitor – SVGA

SOFTWARE REQUIREMENTS

- Operating System : Windows 8
- Front End : Java /DOTNET
- Database : Mysql/HEIDISQL

Conclusion

- This study proposed an algorithm called MECABP to reduce the energy consumption of a cost budgeted DAG appli-cation in heterogeneous cloud computing systems.
- MECABP attempts to minimize energy consumption while satisfying the cost budget of the DAG application by proposing the available budget preassignment method. MECABP decomposes the problem into two sub-problems to implement the heuristic algorithm with low time complexity.
- MECABP demonstrates its effectiveness compared with existing algorithms through experiments based on three types of DAG applications with different parallelism degrees.

Reference

[1] K. Keahey, I. Raicu, K. Chard, and B. Nicolae, “Guest editors introduc-tion: Special issue on scientific cloud computing,” IEEE Transactions on Cloud Computing, vol. 4, no. 1, pp. 4–5, Jan. 2016.

[2] H. Li, K. Ota, M. Dong, A. Vasilakos, and K. Nagano, “Multimedia processing pricing strategy in gpu-accelerated cloud computing,” IEEE Transactions on Cloud Computing, vol. PP, no. 99, pp. 1–1, Feb. 2017.

[3] T. Kumrai, K. Ota, M. Dong, J. Kishigami, and D. K. Sung, “Multiob-jective optimization in cloud brokering systems for connected internet of things,” IEEE Internet of Things Journal, vol. 4, no. 2, pp. 404–413, Apr. 2017.

[4] K. Xie, X. Wang, G. Xie, D. Xie, J. Cao, Y. Ji, and J. Wen, “Distributed multi-dimensional pricing for efficient application offloading in mobile cloud computing,” IEEE Transactions on Services Computing, vol. PP, no. 99, pp. 1–1, Dec. 2016.

[5] M. A. Rodriguez and R. Buyya, “Deadline based resource provi-sioningand scheduling algorithm for scientific workflows on clouds,” IEEE Transactions on Cloud Computing, vol. 2, no. 2, pp. 222–235, 2014