Energy And Migration Cost-aware Dynamic Virtual Machine Consolidation In Heterogeneous Cloud Datacenters

ABSTRACT

- Energy efficiency has become one of the major concerns for today's cloud datacenters. Dynamic virtual machine (VM) consolidation is a promising approach for improving the resource utilization and energy efficiency of datacenters.
- However, the live migration technology that VM consolidation relies on is costly in itself, and this migration cost is usually heterogeneous as well as the datacenter.
- This paper investigates the following bi-objective optimization problem: how to pay limited migration costs to save as much energy as possible via dynamic VM consolidation in a heterogeneous cloud datacenter.

- To capture these two conflicting objectives, a consolidation score function is designed for an overall evaluation on the basis of a migration cost estimation method and an upper bound estimation method for maximal saved power.
- To optimize the consolidation score, a greedy heuristic and a swap operation are introduced, and an improved grouping genetic algorithm (IGGA) based on them is proposed. Lastly, empirical studies are performed, and the evaluation results showthat IGGA outperforms existing VM consolidation methods.

EXISTING SYSTEM

- The existing studies are mostly limited to homogeneous datacenters. However, the PMs in a datacenter, as well as the VM migration costs, may be heterogeneous . This is because, in reality, it is difficult to keep PMs in a datacenter homogeneous all the time. For example, when a large datacenter undergoes upgrades, it is practically impossi-ble to replace all the servers. The cluster trace published by Google also shows that PMs are heterogeneous . In such an environment, the various PMs provide different amounts of resources and consume different amounts of energy, and hence, minimizing the number of active PMs (i.e., PMs which are not sleeping) is not equivalent to minimizing the energy consumption.

DISADVANTAGES

- The large energy con-sumption also results in much more carbon emissions, making datacenters environmentally unfriendly.
- The poor power usage effectiveness

PROPOSED SYSTEM

- To solve the optimization problem, a greedy heuristic called MBFD for VM placement and a swap opera-tion to reduce migration costs are introduced, and based on them, an improved grouping genetic algorithm (IGGA) is devised. Simulation experiments based on the real-world Google cloud trace compared four approaches to consolidate the placement scheme. The results showed that IGGA always achieved the highest consolidation score. Specifically, in the experiment on varying the dispersion degree, compared with pMapper , the normalized saved power obtained by IGGA was 0.063 higher, and the normalized migration cost was 0.112 lower on average; compared with Sercon , IGGA incurred 0.011 more migration costs but had 0.119 additional power savings on average.

ADVANTAGES

- Reducing energy consumption has become one of the primary concerns for cloud providers

HARDWARE REQUIREMENTS

- System : Pentium IV 2.4 GHz.
- Hard Disk : 40 GB.
- Floppy Drive : 1.44 Mb.
- Monitor : 15 VGA Colour.
- Mouse : Logitech.
- Ram : 512 Mb.

SOFTWARE REQUIREMENTS

- Operating system : Windows XP/7.
- Coding Language : ASP.net, C#.net /java

CONCLUSION

- With increasing numbers of energy-hungry physical ma-chines in cloud datacenters, reducing energy consumption has become one of the primary concerns for cloud providers.
- En-ergy-aware dynamic VM consolidation has become a prom-ising approach for reducing the energy consumed in cloud datacenters. This study aims to advance the state of the art by taking into account migration costs and heterogeneity.
- The consolidation score is defined to enable an overall evaluation for the two conflicting objectives of migration costs and saved power.

- A specifically tailored grouping genetic algo-rithm called IGGA is developed in order to optimize the con-solidation score on the basis of a greedy heuristic and a swap operation. Simulation experiments show that in comparison with traditional consolidation methods, IGGA always achieves the highest consolidation score.

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