Energy-aware Resource Management for geo-distributed data centers

Código do projeto: DC01
Responsável: Prof. Daniel Cordeiro
Linha de pesquisa: Gestão e Desenvolvimento de Sistemas
Número de vagas: 2

Descrição geral

The dynamic nature of how Cloud Computing (CC) platforms manage their resources enables different strategies to reduce energy consumption. Previous works showed that less energy can be used when Dynamic Speed Scaling is used in some of the machines or if migrations of virtual machines are employed to execute tasks on data centers (DCs) with more renewable energy available.

Future energy-efficient, low-environmental impact DCs will need to decrease the usage of non-renewable energy. Particular focus will be needed on providing application developers the tools they need to maintain the scope of their development within their research subject and to help them minimize the effort required to execute their applications in the cloud in a performance- and energy-efficient way. Cloud platforms are investing in the use of renewable energy. They are a suitable target for energy-efficient applications. However, the programmer is still responsible for efficiently utilizing the resources available (including specialized hardware) and simultaneously keeping the load balanced and the data coherent between the nodes while minimizing data movements among them.

In this project, we will investigate techniques to decrease the carbon footprint of geo-distributed data centers using Scheduling Theory and Algorithm Design.

Perfil desejado

A solid undergraduate background in Information Systems / Computer Science, including Design and Analysis of Algorithms skills and C/C++ programming, is highly recommended for applicants.

Referências

COHEN, Johanne; CORDEIRO, Daniel; RAPHAEL, Pedro Luis F. Energy-aware multi-organization scheduling problem. In: Euro-Par 2014 Parallel Processing: 20th International Conference, Porto, Portugal, August 25-29, 2014. Springer International Publishing, 2014. p. 186-197, doi: 10.1007/978-3-319-09873-9_16

VASCONCELOS, Miguel Felipe Silva; CORDEIRO, Daniel; DUFOSSÉ, Fanny. Indirect network impact on the energy consumption in multi-clouds for follow-the-renewables approaches. In: 11th International Conference on Smart Cities and Green ICT Systems. SCITEPRESS-Science and Technology Publications, 2022. p. 44-55, doi: 10.5220/0011047000003203

M. Vasconcelos, D. Cordeiro, G. da Costa, F. Dufossé, J.-M. Nicod and V. Rehn-Sonigo, "Optimal sizing of a globally distributed low carbon cloud federation," 2023 IEEE/ACM 23rd International Symposium on Cluster, Cloud and Internet Computing (CCGrid), Bangalore, India, 2023, pp. 203-215, doi: 10.1109/CCGrid57682.2023.00028.