

Hierarchical Approach for Efficient Workload Management in Geo-Distributed Data Centers

Publisher: IEEE [Cite This](#)  PDF

Agostino Forestiero ; Carlo Mastroianni ; Michela Meo ; Giuseppe Papuzzo ; Mehdi Sheikhalishahi **All Authors** ...

38
Cites in
Papers

1092
Full
Text Views



Alerts

[Manage Content Alerts](#)
[Add to Citation Alerts](#)

Abstract
Document Sections
I. Introduction
II. Related Work
III. Architecture for Inter-DC Workload Distribution
IV. EcoMultiCloud Algorithms for Workload Assignment and Migration
V. Performance Evaluation
Show Full Outline ▼
Authors
Figures
References



Abstract:
Geographically distributed data centers (DCs) offer promising business opportunities to both big companies that own several sites and multi-owner inter-cloud infrastru... **View more**

▼ **Metadata**
Abstract:
Geographically distributed data centers (DCs) offer promising business opportunities to both big companies that own several sites and multi-owner inter-cloud infrastructures. In these scenarios, workload management is a particularly challenging task, since the autonomy of single DCs should be preserved while global objectives, such as cost reduction and load balance, should be achieved. In this paper, a hierarchical approach for workload management in geographically distributed DCs is presented. The proposed solution is composed of two algorithms devoted to workload assignment and migration. Both algorithms are based on the computation of a simple function that represents the cost of running some workload in the different sites of the distributed DC. The framework requires a very limited exchange of state information among the sites and preserves the autonomy of single DCs and, at the same time, allows for an integrated management of heterogeneous platforms. Performance is analyzed for a specific infrastructure composed of four DCs, with two goals: 1) load balance and 2) energy cost reduction. Results show that the proposed approach smoothly adapts the workload distribution to variations of energy cost and load, while achieving the desired combination of management objectives.

- Citations
- Keywords
- Metrics
- More Like This
- Footnotes

Published in: IEEE Transactions on Green Communications and Networking (Volume: 1 , Issue: 1, March 2017)

Page(s): 97 - 111

DOI: 10.1109/TGCN.2016.2603586

Date of Publication: 31 August 2016 ?

Publisher: IEEE

Electronic ISSN: 2473-2400

Contents

I. Introduction

The ever increasing demand for computing resources has led companies and resource providers to build private data centers (DCs), or to offload applications and services to the DCs owned by a Cloud company. Due to this process, the number and scale of data centers are rapidly increasing. It is estimated that data center electricity consumption is projected to increase to roughly 140 billion kilowatt-hours annually by 2020, corresponding to about 50 large power plants, with annual carbon emissions of nearly 150 million metric tons. The financial burden for the DC management is also huge, since a DC spends between 30% to 50% of its operational expenditure in electricity: the expected figure for the sector in 2020 is \$13 billion per year of electricity bills.¹

Updated information can be found on the Web portal of the U.S. National Resources Defense Council, <http://www.nrdc.org/energy/data-center-efficiency-assessment.asp>.

Authors	▼
Figures	▼
References	▼
Citations	▼
Keywords	▼
Metrics	▼
Footnotes	▼

Evaluating the impact of energy consumption on routing performance in delay tolerant networks
2012 8th International Wireless Communications and Mobile Computing Conference (IWCMC)
Published: 2012

Improving Energy Consumption of Epidemic Routing in Delay Tolerant Networks
2016 10th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS)
Published: 2016

Show More

IEEE Personal Account	Purchase Details	Profile Information	Need Help?	Follow
CHANGE USERNAME/PASSWORD	PAYMENT OPTIONS VIEW PURCHASED DOCUMENTS	COMMUNICATIONS PREFERENCES PROFESSION AND EDUCATION TECHNICAL INTERESTS	US & CANADA: +1 800 678 4333 WORLDWIDE: +1 732 981 0060 CONTACT & SUPPORT	   

About IEEE *Xplore* | Contact Us | Help | Accessibility | Terms of Use | Nondiscrimination Policy | IEEE Ethics Reporting  | Sitemap | IEEE Privacy Policy

A not-for-profit organization, IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

© Copyright 2024 IEEE - All rights reserved, including rights for text and data mining and training of artificial intelligence and similar technologies.

[» Change Username/Password](#)[» Update Address](#)**Purchase Details**[» Payment Options](#)[» Order History](#)[» View Purchased Documents](#)**Profile Information**[» Communications Preferences](#)[» Profession and Education](#)[» Technical Interests](#)**Need Help?**[» US & Canada: +1 800 678 4333](#)[» Worldwide: +1 732 981 0060](#)[» Contact & Support](#)[About IEEE Xplore](#) | [Contact Us](#) | [Help](#) | [Accessibility](#) | [Terms of Use](#) | [Nondiscrimination Policy](#) | [Sitemap](#) | [Privacy & Opting Out of Cookies](#)

A not-for-profit organization, IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

© Copyright 2024 IEEE - All rights reserved. Use of this web site signifies your agreement to the terms and conditions.