CTNDCI: Identifying the Challenges Towards a distributed Nano Data Center Infrastructure

Melanie Hauser
Ludwig Maximilian University of Munich
Munich, Germany
melanie.hauser@campus.lmu.de

Diana Irmscher
Ludwig Maximilian University of Munich
Germany
d.irmscher@campus.lmu.de

Mengchu Li
Ludwig Maximilian University of Munich
Munich, Germany
mengchu.li@yahoo.com

Katrin Kolb
Ludwig Maximilian University of Munich
Munich, Germany
Katrin.Kolb@campus.lmu.de

Katharina Rupp
Ludwig Maximilian University of Munich
Munich, Germany
katharina.rupp@web.de

Andreas Scholz
Ludwig Maximilian University of Munich
Germany, Germany
andreas.scholz@campus.lmu.de

Document Identifier: GI 201711

ABSTRACT

In this report, we present our achievements since the last report and describe our plan for concluding the project. We started grouping the issues by categories, conducted the interview with an expert on data centers from the Leibniz Supercomputing Centre and elaboratet the issues themselves. We proceeded our work as planned. From now on, we finalize the ideas and issues.

SPWAL LMU, November 2018, Munich, Germany

Authors: Team effort

KEYWORDS

Green IT; Nano data center; Energy consumption; Security; Availability; Scalability; Data distribution

ACM Reference Format:
Melanie Hauser, Diana Irmscher, Mengchu Li, Katrin Kolb, Katharina Rupp, Andreas Scholz, and Document Identifier: GI 201711. 2018. CTNDCI: Identifying the Challenges Towards a distributed Nano Data Center Infrastructure. In *Proceedings of Wissenschaftliches Arbeiten und Lehren, LMU (SPWAL LMU).* ACM, New York, NY, USA, 4 pages. https://doi.org/10.1145/nnnnnnn.nnnnnnn

SPWAL Research Project: Green Computing
Title: Identifying the Challenges Towards a distributed Nano Data Center Infrastructure
Progress Report II

ACHIEVEMENTS

Authors: Team effort

NEXT STEPS

Authors: Team effort

DEVIATION FROM PLAN

After the deviations presented in the last report, we proceeded our adjusted research plan. Solely, the interview plan changed somewhat, as we adapted the questionnaire to the course of the interview. Some questions didn't fit the course and we thus neglected them. Contrariwise, some questions emerged from the answers and were hence included.

Authors: Team effort

REFERENCES

[1] Inc. Cisco Systems. 2017. The Zettabyte Era: Trends and Analysis - Cisco. (07 2017). https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/vni-hyperconnectivity-wp.html#_Toc484556821 (Accessed on 11/05/2017).

[2] D. Dumitriu, E. Knightly, A. Kuzmanovic, I. Stoica, and W. Zwaenepoel. 2005. Denial-of-Service Resilience in Peer-to-Peer File Sharing Systems, Vol. 33. ACM. https://doi.org/10.1145/1071690.1064218

[3] S. Eum, Y. Shoji, M. Murata, and N. Nishinaga. 2015. Design and Implementation of ICN-enabled IEEE 802.11 Access Points As Nano Data Centers. *J. Netw. Comput. Appl.* 50, C (April 2015), 159–167. https://doi.org/10.1016/j.jnca.2014.07.031

[4] Jiayue He, Augustin Chaintreau, and Christophe Diot. 2009. A performance evaluation of scalable live video streaming with nano data centers. *Computer Networks* 53, 2 (2009), 153–167.

[5] Fatemeh Jalali, Robert Ayre, Arun Vishwanath, Kerry Hinton, Tansu Alpcan, and Rodney S. Tucker. 2014. Energy Consumption of Content Distribution from Nano Data Centers versus Centralized Data Centers. *SIGMETRICS Performance Evaluation Review* 42 (2014), 49–54.
[6] Nikolaos Laoutaris, Pablo Rodriguez, and Laurent Massoulie. 2008. ECHOS: Edge Capacity Hosting Overlays of Nano Data Centers. *SIGCOMM Comput. Commun. Rev.* 38 (Jan. 2008), 51–54. https://doi.org/10.1145/1341431.1341442
[7] Leibniz-Rechenzentrum. 2014. Green IT at Leibniz Supercomputing Centre. (02 2014). https://www.lrz.de/wir/green-it_en/ (Accessed on 11/19/2017).
[8] Darshan Mhapasekar. 2011. Accomplishing anonymity in peer to peer network. ACM. https://doi.org/10.1145/1947940.1948055
[9] Vytautas Valancius, Nikolaos Laoutaris, Laurent Massoulié, Christophe Diot, and Pablo Rodriguez. 2009. Greening the internet with nano data centers. In *CoNEXT*. ACM, 37–48.

Appendices

Questionnaire

(1) On the website of the LRZ it can be read that *Green IT* is important [7]. What has been achieved or improved so far?
(2) In 2012, the LRZ was awarded the German Data Center Award for *energy and resource efficient data centers* [7]. What makes the LRZ better on *Green IT* than other data centers?
(3) What does the LRZ offer its customers? Are there any special *Green IT* services available? Does the customer have an influence on more environmentally conscious use?
(4) Today's use of Internet services has changed massively [1]. How has the LRZ adapted accordingly?
(5) Why are the big data centers still so popular? What are the reasons/advantages? Are these political, economic or technical?
(6) Are there any disadvantages with monolithic data centers?
(7) Have you heard of an alternative solution to monolithic data centers? There are, among others, some research on nano data centers. Does the LRZ also work with these approaches? What is your opinion?
(8) In your opinion, what are the advantages and disadvantages of nano data centers?
(9) How does the LRZ see the data centers of the future? What could be possible? Is it realistic that monolithic data centers could be replaced by special peer-to-peer networks?
(10) Do you think there are any difficulties or special challenges that need to be solved in order to implement nano data centers suitable for the mass or as new state of the art? What are the difficulties oder challenges in your opinion?
(11) Do you have any idea or approach how to solve these difficulties or challenges?

(12) Would you have an idea for other alternative systems?