

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

MELANIE HAUSER, LMU Munich, Germany

DIANA IRMSCHER, LMU Munich, Germany

KATRIN KOLB, LMU Munich, Germany

MENGCHU LI, LMU Munich, Germany

KATHARINA RUPP, LMU Munich, Germany

ANDREAS SCHOLZ, LMU Munich, Germany

In this paper we identify the challenges currently preventing nano data centers from becoming the dominant form of content provision on the internet. With the global increase in IP traffic the question of how to provide and deliver data is becoming increasingly important. Monolithic data centers, as they are used today, pose several problems, such as high energy consumption and lack of scalability. An alternative solution mitigating the problems of monolithic data centers has been proposed in the form of a distributed nano data center infrastructure. Research has shown this to be a superior solution. However, no widespread solution based on a nano data center infrastructure has been implemented as of yet. By identifying the main challenges nano data centers are facing steps can be taken to overcome these challenges in a more focused way, leading to a more economic data distribution.

CCS Concepts: • **Computer systems organization** → **Embedded systems**; *Redundancy*; Robotics; • **Networks** → Network reliability;

Additional Key Words and Phrases: Green IT; Nano data center; Energy consumption; Security; Availability; Scalability; Data distribution

ACM Reference Format:

Melanie Hauser, Diana Irmischer, Katrin Kolb, Mengchu Li, Katharina Rupp, and Andreas Scholz. 2010. CTNDCl: Identifying the Challenges Towards a distributed Nano Data Center Infrastructure. *Proc. ACM Hum.-Comput. Interact.* 9, 4, Article 39 (March 2010), 2 pages. <https://doi.org/0000001.0000001>

1 INTRODUCTION

2 RELATED WORK

3 DESCRIPTION OF RESEARCH (INCLUDES METHODOLOGY TO ACHIEVE?)

includes Interview and confrontation of technical similar systems

Authors' addresses: Melanie Hauser, LMU Munich, Munich, Germany, melanie.hauser@campus.lmu.de; Diana Irmischer, LMU Munich, Munich, Germany, d.irmscher@campus.lmu.de; Katrin Kolb, LMU Munich, Munich, Germany, katrin.kolb@campus.lmu.de; Mengchu Li, LMU Munich, Munich, Germany, mengchu.li@yahoo.com; Katharina Rupp, LMU Munich, Munich, Germany, katharina.rupp@web.de; Andreas Scholz, LMU Munich, Munich, Germany, andreas.scholz@campus.lmu.de.

ACM acknowledges that this contribution was authored or co-authored by an employee, contractor, or affiliate of the United States government. As such, the United States government retains a nonexclusive, royalty-free right to publish or reproduce this article, or to allow others to do so, for government purposes only.

© 2010 Association for Computing Machinery.

2573-0142/2010/3-ART39 \$15.00

<https://doi.org/0000001.0000001>

3.1 Confrontation of technical similar systems

In this section, we want to introduce related works that we have also studied. Each paper is presented below, in particular with regard to the points of implementation and especially the description of the problems.

3.1.1 ECHOS. ECHOS introduces a concept for Nano Data Center that can or should completely replace monolithic data centers [1]. The authors call it a radical solution for data management and provision. According to this concept, so-called "boxes" are set up at the edges of the network, eg. in home gateways (see [2]). These boxes communicate with each other via a peer-to-peer system. The peer-to-peer system as well as the bandwidth is controlled by a central unit, such as the ISP. However, the approach of networking boxes via a peer-to-peer system, and thus providing or sharing content, requires some conditions. So it is first necessary to provide a distributed hosting edge infrastructure. Furthermore, there are still some problems added. In ECHOS these are listed as follows [1]:

- "Lack of service guarantees due to uncontrolled interface between different application [...]."
- "Inefficient use of network's and other peer's resources and consequently suboptimal performance [...]."
- "Even if sufficient status information is in place, still P2P is inherently unable to use it as it was designed around selfish user behavior and free-riding prevention mechanism [...]."
- "Absence of security and control make it impossible to guarantee the integrity and security of content."

4 EVALUATION/RESULTS

includes research results and interview results etc.

5 ACHIEVEMENTS (?)

6 FUTURE WORK

7 CONCLUSION

A QUESTIONNAIRE

ACKNOWLEDGMENTS

The authors would like to thank Dr. Schiffrers.

REFERENCES

- [1] P. Rodriguez N. Laoutaris and L. Massoulie. 2008. ECHOS: Edge Capacity Hosting Overlays of Nano Data Centers. *SIGCOMM Comput. Commun. Rev.* 38 (01 2008), 51–54. <https://doi.org/10.1145/1341431.1341442>
- [2] Technicolor. 2011. Technicolor Research & Innovation - Nano Data Center. Online video. (01 2011). <https://www.youtube.com/watch?v=uvkBUKqFbKI>

Received February 2007; revised March 2009; accepted June 2009