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

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ABSTRACT

In this report we review our current achievements and propose our future plan for carrying out the project. For paper survey, we have enlarged our research scope to study the technologies related to nano data center approach, aiming to identify potential technical challenges that nano data centers may face. Besides, we have drafted an interview plan to gather information from monolithic data

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center providers. Our next steps include concluding an initial list of the key challenges focusing on one or two specific areas and making the interview. The only deviation from our previous proposal is the new interview plan.
Authors: Team effort

KEYWORDS

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

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Progress Report I

ACHIEVEMENTS

We have continued our research into nano data centers according to our project plan. So far our research enabled us to derive some problematic aspects that could prevent a widespread usage of nano data centers. While some of those were explicitly stated, others can be implicitly found through the points the papers lack. The latter bring the risk of making false assumptions, so some statements are yet to be proven by further research.
Based on some of the suggestions after our initial project presentation we also decided to broaden our research scope to include not only nano data centers themselves, but also related technologies. In doing so we intend to balance the fact that there is very little research available for nano data centers specifically. By identifying potential problems in more thoroughly researched technologies which are in turn intended to be used in nano data centers we are able to determine whether these problems would still persist in the context of nano data centers. Aside from broadening our research scope we also drafted a questionnaire aimed at providers of current monolithic data centers (see Appendices on page 4). The questionnaire is aimed at identifying areas which are working well in monolithic data centers, but which might pose a problem in the context of nano data centers.
Authors: Team effort

NEXT STEPS

From a research perspective our next tasks involves narrowing down the scope of the challenges we want to take a closer look at. At the moment our research question is too widely scoped and we will not be able to identify all challenges from all areas relevant to nano data centers (political,

environmental, technical, economical, etc.). Our intention is to pick one or two areas and to identify some key challenges within these areas. This has then also to be reflected in our research question and the topic of our paper. It will be challenging to find the right balance between the amount of challenges and the detail in which to analyse them.
Regarding the questionnaire we hope to interview someone from the Leibniz Supercomputing Centre(LRZ) in Munich to get some qualitative insights from a professional in the field. Ideally we would like to find some other experts, too. However we expect it will be difficult to achieve this within the tight time-limit, especially considering the holidays coming up.
One other idea we had was to develop a second questionnaire to interview ISPs with. As ISPs are the proposed providers and maintainers of a future nano data center architecture, their input would be valuable to explore whether nano data centers are already a topic they are concerned with. However, as with the original questionnaire we are unsure whether we will be able to make according appointments in time.
Authors: Team effort

DEVIATION FROM PLAN

As our original research plan was based solely on paper research, we deviated from it in so far as we are now also trying to gather qualitative information through interviews. Besides that we did not deviate from our research plan, yet. Considering our proposed next steps however we do acknowledge that further deviations might follow. We consider these deviations necessary to help narrowing down our research question and providing a more focused paper.
Authors: Team effort

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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?