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

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ABSTRACT

In this report, we present our achievements since the last report and describe our plan for concluding the project. In section Achievements we describe what we have already done, e. g. started grouping the issues by categories, conducted the interview with an expert on data centers from the Leibniz

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Supercomputing Center and elaborated the issues themselves. In section Next Steps we give a description of our planned steps. We proceeded our work as planned. From now on, we finalize the ideas and issues.
Authors: Team effort

KEYWORDS

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

ACHIEVEMENTS

We stopped our research into new papers and started analyzing our available information. Hence, we divided the papers up and every team member had to read and summarize one or two papers. We used this method to produce an expert for every paper and also to inform the other team members about the important facts. The resulting summaries are the basis for some chapters in the final paper. This working part was mainly done in independent work by each team member. Since not all papers explicitly provide information about nano data centers but also about related issues, we started grouping the found issues and also began to merge the information. There is very little research available for nano data centers so that combining and drawing conclusions should be well thought out.

So far we have constructed an energy consumption model for nano data center based on the energy consumption model proposed in different papers. By analyzing the energy consumption model, we have concluded four technical challenges towards the nano data center development: the activation of nano servers; the selection of the access network that the nano servers are attached to; the location of nano servers; and the data replication strategy.

According to our modified project plan from the last report we conducted the interview with an expert on data centers from the Leibniz Supercomputing Center. We designed a questionnaire that was used for this task, but in the course of the interview we had to adjust the questions to the situation and answers of the expert. The interview was recorded, so there is an audio file available. A transcript is in production.

We also planned and organized our final paper. This included creating a table of contents and finding important chapters and topics for chapters. We also began to write the chapters including related

work and technical challenges.
Authors: Team effort

NEXT STEPS

Our next steps will be focused on finalization of our paper. This includes finalizing the description of the two chosen types of challenges relevant to nano data centers (see description in Achievements). In this section we will elaborate all challenges that we have found out. In addition, we have to draw up the transcript of the interview. Furthermore, we have to write down our introduction according to the CARS model and to complete our methodology.
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 thus we neglected them. Instead some new questions emerged from the answers and were hence included them.
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?