

MSc Project Proposal:

Resource Usage Prediction in Private Cloud Systems

Background and context

The amount of energy needed to run the data centers in the world was an astonishing 196 TWh during 2020. This figure is expected to grow to between 321 TWh and 2000 TWh by 2030. In 2030, data centers are expected to account for approximately 8% of the global use of electric energy. This means that the environmental and economical impact of the electricity consumption of data centers will be extremely significant in the future.

One approach to reduce the energy consumption is to adjust the number of running computers to the current load in the system. However, predicting the most suitable number of running computers as well as the memory and I/O requirements is a non-trivial task. In the Green Clouds project, we try to exploit knowledge about the application behavior in private cloud environments to do better predictions of the resource demands in the system.

Description

In this thesis work, we will develop machine learning models for predicting the resource usage in private cloud systems. Input to the models will typically be information about the running applications, the incoming network traffic (i.e., service requests), etc. The output from the models should be, e.g., predictions of CPU usage and memory requirements.

Examples of research questions that we would like to be addressed are:

- How can application load be measured for different types of applications?
- Which parameters can be considered as good load indicators?
- How can we exploit application knowledge?
- To what extent can we predict the resource usage of different applications in private clouds?

The work will be performed within the Green Clouds research project, “*Green Clouds - Load prediction and optimization in private cloud systems*,” and in collaboration with Ericsson AB.

Technical requirements / suitable background

We are looking for students with the following competences:

- Good knowledge about AI / Machine learning
- General knowledge about operating systems and cloud systems
- Excellent programming skills in Python, scikit learn, Pandas, PyTorch, etc.
- Good writing skills and fluency in English

Contact persons

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