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Advanced Methods of Infrastructure Management

for Large Scale and Complex Data Centers

Yukinori Sakashita

School of Information Science,
Japan Advanced Institute of Science and Technology

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Abstract

The amount of digital data worldwide has recently been increasing and by 2020 will be 10 times what it was in 2013. Therefore, the data centers needed to store it will also become more large scale. We focus on the infrastructure constructions needed for large scale data centers, which are increasingly becoming more complicated because they are now using virtualization technologies. On the other hand, the number of administrators working in a large scale and complex data center is decreasing, and thus, the workload per administrator is increasing so they are unable to manage it all. Moreover, the administrator group is changing from a vertical management structure of the entire data center to a horizontal management one for separate infrastructure layers that comprise servers, networks, and storage, because this management structure increases the efficiency of the management infrastructures. As a result, consistent management of the entire data center falters. Furthermore, when a data center failure occurs, the recovery actions to system problems depend on the administrator's experience and sense. A novice administrator would not have enough knowledge to control it all.

In this research, I research methods for managing large scale and complex data centers that comprises three approaching steps. At first, I need to create a scale up of the foundation of the management software. Thus, the administrators will be able to manage the configuration of the entire data center using it. Second, we need to create the knowledge data from administrators for each layer using the foundation so that consistent management of the entire data center could be done by an administrator who does not have specialized knowledge. The last step includes creating a method for estimating the configurations of the infrastructures using the statistical inferences determined using machine learning, and propose a supporting method for knowledge learning for novice administrators. Therefore, even if the management software can't gather all the necessary information concerning the configuration of the infrastructures, the two learning methods ensure that novice administrators can manage the data center without needing skilled administrators. As a result of this research, the management software and administrators' knowledge will be more advanced, and thus, a smaller administrators' group would be able to manage a data center without needing skilled administrators.