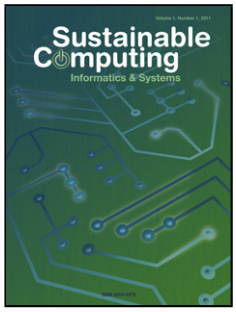

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Simulator for Modeling, Analysis, and Visualizations of Thermal status in Data Centers

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Highlights

- A simulator is developed allowing the user to physically model data center.
- Comparison of different physical configuration on hotspot is done.
- It also implements three basic job scheduling algorithms (FCFS, SJF, LJF) on same configuration.
- Visualizations allow the user to see and identify the source of hotspots.
- Prediction of future hotspots is done using moving average and exponential smoothing.

Abstract: Data centers (DC) are richly instrumented systems consists of highly coupled elements that store and process a large amount of data. To perform large computation and storage, a DC is equipped with more than thousands of servers or even more. Due to a large number of these computational devices put in use at DC, produces a large amount of heat. Therefore the cost to maintain the thermal balance in a DC has increased significantly and has become almost equal to the cost of operating these systems. The main problem in heat management is 'Hot spots creation' which can cause hardware inefficiencies, and operational disruptions and in turn have a negative impact on overall functionality.

To address these issues this paper aims at decreasing energy consumption of DC by allowing administrators, designers, and planners to model, visualize and analyze the thermal status of various configurations and solutions. A major difficulty in the thermal analysis of DC is the lack of simulation tool, where the impact of design (layout) and workload on thermal status can be tested. Therefore there is a need for a simulator that approaches the problem from an end-user perspective and takes into account all the factors that are critical to analyzing thermal balance in