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## **Modelling temperature distribution analysis in a data center using computational fluid dynamics**

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Data centers contain electronic equipment for telecommunications and storage purposes. So, temperature maintenance is an important thing to avoid unnecessary breakdowns. This paper introduces the computational fluid dynamics (CFD) analysis of the temperature distribution in the data center with 16 types of different layouts. "Future Facilities-6sigma Room 15 CFD" simulation software was used to design the graphical user interfaces and analyze the temperature dissipation effect.

The effects of different types of data center parameters on temperature distribution and flow field have been studied. Parameters and optimization techniques are used to find the best possible layout of the cooling method with single air-cooling unit and dual-air cooling unit conditions. The simulation results predict high temperature areas in the data center within the IT equipment racks and provide detailed 3D analysis of the movement of the temperature distribution. The results also provide a performance analysis of the computer room air conditioning, which includes detailed rack-to-rack inlet and outlet temperatures and 3D heat maps of the data center. The developed software can evaluate the airflow rate and heat load to optimize and design new or existing data centers to the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) standard. Finally, the lowest air-cooling unit (ACU) return temperature observed on double ACU is that the cold aisle intermediate data center is equipped with ACUs on the adjacent wall side is 21.67°C, and the lowest temperature observed on the single ACU condition is that the cold aisle intermediate data center is equipped with an ACU on the front wall side is 25.29°C.

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