

Hot Aisle and Cold Aisle in Computer Rooms

Article Overview

Hot and cold aisles are a data center design strategy that separates cold intake air from hot exhaust air to improve cooling efficiency, reduce energy use, and protect equipment.

Concept Overview

Hot and cold aisle configurations involve arranging server racks in alternating rows. The fronts of servers face each other to form a cold aisle, where cool air is supplied, typically through perforated floor tiles or vents. Servers draw in this cold air to maintain optimal operating temperatures. The backs of servers face each other to form a hot aisle, where heated exhaust air is expelled and returned to the cooling system .

Purpose and Benefits

- o Temperature Control: Separating hot and cold air prevents mixing, ensuring servers operate within safe temperature ranges and reducing the risk of overheating .
- o Energy Efficiency: Cooling is concentrated in the cold aisle, allowing fans and air conditioning systems to operate more efficiently, lowering energy consumption and operating costs .
- o Equipment Longevity: Maintaining consistent temperatures extends the life of servers and other IT equipment .
- o Airflow Management: Proper aisle design ensures smooth airflow, reducing hotspots and improving overall cooling performance .

Design Principles

- o Cabinet Placement: Servers are arranged in a face-to-face (cold aisle) and back-to-back (hot aisle) configuration .
- o Aisle Dimensions: Cold aisles typically require a minimum width of 1.2 meters to allow airflow and personnel access, while hot aisle widths are designed to accommodate exhaust air and ceiling ducting .
- o Containment Options: Hot or cold aisle containment can further improve efficiency by physically separating hot and cold air, reducing fan and chiller energy use by 20-25% .
- o Raised Floors and Ducting: Raised floors are often used to deliver cold air from CRAC units to the cold aisle, while hot air is returned via ceiling ducts .
- o Perforated Doors: Server racks should have perforated doors to allow proper airflow; solid doors can impede cooling .

Practical Considerations

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- o Retrofitting existing data centers may require downtime and HVAC adjustments .
- o Maximum aisle lengths should not exceed 16 meters for continuous rows, with shorter lengths if exits are restricted, to maintain safety and accessibility .
- o Proper cable management and overhead wiring help prevent obstruction of airflow in the cold aisle . By implementing hot and cold aisle layouts, computer rooms can achieve optimized cooling, reduced energy costs, and improved reliability for high-density server environments .

Assuming a computer room is configured in such a way that either is an option, hot aisle

Understand how UPS systems provide instant backup power and protect data centers from outages and power

best approach for aisle containment in data centers will be dictated conditions. At most sites, it is easier to implement containment

Data Center Hot Aisle/Cold Aisle Layout Design Looking for ways to keep your Data Center Server Room cool?

Hot aisle vs cold aisle containment -- compare both strategies, understand the pros and cons, and find the right

Cool Shield Aisle containment solutions reduces server row temperatures in active data centers. Learn more about the benefits of hot

Hot aisle containment systems isolate the hot aisle using a similar enclosure system to that of a cold aisle with a sealed

Hot aisle containment (HAC) and cold aisle containment (CAC) are the most efficient ways of preventing your servers

Another issue is the fact that in cold aisle containment the server room will be kept at a high temperature, as opposed

The concept of containment began with the introduction of hot-aisle, cold-aisle arrangements and the standardization

But there are some disadvantages to cold-aisle containment. Allowing the discharge air from the hot aisle to fill the

Hot aisle containment may be the best option in a hot climate, as it can help keep the servers cool, and cold

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aisle

A data center hot and cold aisle is a strategic layout for organizing server racks

A Time-tested Technique The hot aisle /cold aisle data center layout was originated by IBM in 1992 and it is one of the oldest ways to

Training and Awareness The hot and cold aisle strategy is a proven method for improving cooling efficiency and reducing energy

Cold Aisle: Rows of racks face each other, forming a corridor where cool air is directed. Hot Aisle: Exhaust air from

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