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Microsoft's Chiller-less Data Center

Rich Miller | Sep 24, 2009

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Microsoft (MSFT) today announced that its huge facility in Dublin, Ireland is running without any chillers and can operate its server room at temperatures as high as 95 degrees.

An aerial view showing rooftop air handlers at Microsoft's Dublin data center, which opens today. (Image: Microsoft Corp.)

Microsoft has joined Google on the new frontier of energy efficiency - the chiller-less data center. Microsoft today announced that its huge facility in Dublin, Ireland is running without any chillers. Outside air is drawn into the facility to cool the thousands of servers powering the company's "Live" suite of online services for users in Europe, the Middle East and Africa.

Microsoft also said it can run its server rooms at temperatures of up to 95 degrees F (35 degrees Celsius), much warmer than most data centers, which typically range between 68 and 72 degrees.

Free Cooling Drives Energy Savings

Using outside air in data center air conditioning - a practice known as "free cooling" or air-side economization - allows facility owners to dramatically reduce the amount of energy used in cooling. Chillers, which are used to refrigerate water, are widely used in data center cooling systems but require a large amount of electricity to operate.

With the growing focus on power costs, many data centers are reducing their reliance on chillers to improve the energy efficiency of their facilities. Running servers at higher temperatures greatly expands a company's ability to use free cooling instead of chillers.

In July we noted that Google has begun operating a chiller-less data center in Belgium. Microsoft says the cool climate in Ireland allowed it to also implement a design that eliminates chillers completely.

95 Degrees in the Server Room

"No chillers are used in the Dublin data center," writes Arne Josefsberg, General Manager of Infrastructure for Microsoft Global Foundation Services, in a blog post. "The outside air that cools the facility is usually lower than the 95 degree F limit for our server rooms. If it ever exceeds that temperature, or in the extremely rare event of external air quality issues such as a nearby fire, Direct eXpansion (DX) cooling will be used. DX is a simpler means of mechanical cooling that is normally used for residential, automotive, or light commercial applications."

The ability to run the data center as hot as 95 degrees expands the number of days that the facility can use free cooling. Microsoft's move reflects a broader move in the data center industry to save energy costs by raising the temperature in the data center. In January the American Society for Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) expanded its recommendations for ambient data center temperatures, raising its recommended upper limit from 77 degrees to 80.6 degrees.

80 Degrees and Beyond

Others have gone much farther. Google maintains its data centers at temperatures above 80 degrees, while HP says its POD containers can run at 90 degrees in the cold aisle and and SGI (Rackable) has introduced racks designed to support environments as hot as 104 degrees.

The Dublin data center went live on July 1, when more than 303,000 square feet of space was put into operations. The building totals 550,000 square feet, allowing for additonal expansion as Microsoft fills the facility with servers. By relying exclusively on free cooling, Microsoft doesn't require cooling towers, meaning the Dublin site will use "less than 1% of the water that traditional data center facilities typically use on an annual basis," Josefsberg said.

Huge Water Usage an Issue

In large data centers, heat from servers is often managed using cooling towers, where hot waste water from the data center is cooled, with the heat being removed through evaporation. When this process is played out at mega-data center scale, the amount of water required for cooling can be enormous.

Josefsberg said Microsoft was discussing details of its Dublin data

center operations to adance the continuing industry conversation on best practices and energy efficiency. "While our best practices are competitive advantages for Microsoft, we hope they will also help others in the industry make the cloud a safer and more reliable place that companies can trust for their operations," he wrote. "Very few companies can make the infrastructure investment that Microsoft has, so we think it is important to share our best practices with the industry."

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