

Wet computer server could cut internet waste

February 26 2013

A revolutionary liquid-cooled computer server that could slash the carbon footprint of the internet is being tested at the University of Leeds.

While most computers use air to cool their electronics, all of the components in the new server are completely immersed in liquid. The power-hungry fans of traditional computing are replaced by a silent next-generation [liquid cooling](#) process that relies on the natural convection of heat.

But the significance of the new Iceotope server lies less in the novelty of its design than in the bite it could take out of the huge [electricity demands](#) of the internet servers that form the fabric of our online lives.

Its designers calculate that the server cuts [energy consumption](#) for cooling by between 80 percent and 97 percent.

While the information industry enjoys an image of hyper efficiency and environmental friendliness, all internet use relies on remote servers, which are usually housed in large data centres that must be constantly cooled to remain operational. The reality is that the [mobile apps](#), networked devices and 24-hour internet access on which we have come to rely are very energy hungry.

A 2011 report by Datacenter Dynamics estimated that the world's data centres currently use 31 [gigawatts](#) of power, the equivalent of about half of the UK's total peak electricity demand. A 2008 report by McKinsey

and Company projected that data centre [carbon emissions](#) will quadruple by 2020 and a year-long investigation by the New York Times, published in September, criticized the industry for its energy waste.

UK company Iceotope designed and built its new server working with team of researchers led by Dr Jon Summers from the University of Leeds' School of Mechanical Engineering. The first production system has now been installed at the University after two years of testing prototypes.

Dr Summers, whose team used [computational fluid dynamics](#) to model how the coolant flows through the new server's components, said: "The liquid we are using is extraordinary stuff. You could throw your mobile phone in a tub of it and the phone would work perfectly. But the important thing for the future of computing and the internet is that it is more than 1,000 times more effective at carrying heat than air.

"The cooling of [servers](#) is traditionally done using fans and air conditioning units, but air is a great insulator. We use it in double glazing. Why would you use it to cool a server?" he added.

The non-flammable liquid coolant, called 3M Novec, can be in direct contact with electronics because it does not conduct electricity.

There is no equivalent of the noisy fans required by traditional computers and the server does not require an elaborate pump to move the coolant over its components.

Instead, a simple low energy pump, located at the bottom of the cabinet, pumps a secondary coolant (water) to the top where it cascades down throughout all 48 modules due to gravity.

The secondary coolant terminates at heat exchangers within the cabinet

for transfer of heat to a third and final coolant, on an external loop, taking the heat away for external cooling or reuse.

The third coolant can be drawn from "grey water" sources such as rainwater or river water, further reducing the environmental impact of the server. Because of the high cooling efficiency of the system, the output water can reach temperatures of up to 50 degrees Centigrade, which can be used for heating and other uses.

The Iceotope system uses just 80 watts of power to harvest the heat from up to 20 kilowatts of ICT use. The server also does away with the need for ancillary data centre facilities such as computer room air conditioning (CRAC) units, humidity control systems and air purification.

Dr Nikil Kapur, also from the University of Leeds' School of Mechanical Engineering, said: "The fact that this system is completely enclosed raises a host of possibilities. It does not interact with its environment in the way an air-cooled server does, so you could put it in an extreme environment like the desert. It is also completely silent. You could have it on a submarine or in a classroom."

Neil Bennett, CEO of Iceotope, said: "Information technology has been the poster child of the new economy but its environmental impact has frequently been unaddressed. Given the increasing scarcity of resources such as energy and clean water, Iceotope delivers computing with a conscience. We are proud to have the University of Leeds as partners on this disruptive and exciting journey."

Peter Hopton, Iceotope's Chief Technology Officer and originator of the Iceotope concept, said: "More than five years of research, innovation and collaboration have gone into Iceotope's technology. The basic principle of the design has many applications and, while a few years

away, there is no reason why every home shouldn't make better use of the surplus heat from consumer electronics, imagine having your PC or TV plumbed into the central heating system."

More information: Key facts about data centres:

- The world's data centres use 31 gigawatts of power, more than seven times the capacity of UK's largest coal-fired power station, Drax in North Yorkshire.
- Data centre carbon emissions are projected to quadruple between 2008 and 2020.
- The UK has 7.6 million square metres of data centre floor space.
- 1 in 3 of the world's population use data centres. The number is growing at around 15 per cent annually

Provided by University of Leeds

Citation: Wet computer server could cut internet waste (2013, February 26) retrieved 26 April 2024 from <https://phys.org/news/2013-02-server-internet.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.