

# Faster searches key to a greener web

August 31 2009

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(PhysOrg.com) -- Faster internet search engine processors could be the key to reducing the environmental impact of the worldwide web, according to scientists at the University of Glasgow.

Using a system employing special low-powered microchips called Field Programmable Gate Arrays (FPGA), the team from the Department of Computing Science was able to search a document index 20 times quicker than a standard processor.

They hope to develop the system further and eventually see it used in

web servers to speed up internet searches, thereby reducing the energy and carbon cost of search engine requests.

Using search engines such as [Google](#) or Yahoo has an energy cost and produces carbon dioxide (CO<sub>2</sub>) emissions, not only as a result of the power required to run the user's computer, but also through the electricity consumed by banks of servers and cooling plants housed in giant, temperature-controlled data centres around the world.

Estimates for the amount of CO<sub>2</sub> generated by a single search request ranges from between 0.2g of CO<sub>2</sub> per search, according to Google, to 7g per search, according to US physicist Alex Wissner-Gross of Harvard University.

As the digital world expands, data centres are consuming increasing amounts of energy and the Information and Communications Technology sector is thought to contribute around two percent of global CO<sub>2</sub> emissions. As a result, IT companies are looking at different ways of reducing the environmental impact of computing.

Dr Wim Vanderbauwhede, a lecturer and research fellow in the Department of Computing Science who is working on the project with Dr Leif Azzopardi, said: "Few people stop to think about the carbon costs of their computing. They may be very well aware of the energy costs in terms of the electricity they are using in their house, but not of the energy they use online when conducting searches.

"There are a number of ways in which you can try to reduce the [energy consumption](#) of data centres, but we are particularly interested in cutting the time it takes for the servers to return search results.

"By making internet searches faster, servers will use less energy to produce results, even if the power consumption of the actual equipment

is the same because they will use that [energy](#) for a fraction of the time.”

As part of a project with a Vienna-based company called Matrixware, the team of researchers at Glasgow used two Xilinx FPGAs to perform the information retrieval and filtering algorithms for a document database. The FPGAs were programmed using tools developed by the Swedish company Mitrionics.

They found the FPGA system was up to 20 times quicker in returning results compared to a dual-core Intel Itanium-2 processor. Not only that, but the FPGA chips use just a fraction of the power, with the Itanium processor consuming 130 watts compared to the FPGA chips using just 1.25 watts each.

Dr Azzopardi added: “Our study demonstrates that FPGAs have excellent potential to deliver tremendous benefits by reducing power consumption and increasing the speed of operation. If you could link several FPGAs to a single processor you would have a huge improvement in speed for a much smaller carbon footprint.”

The researchers aim to improve the performance of their current prototype even further and test it in a data centre environment.

Their paper, 'FGPA-accelerated information retrieval: high-efficiency document filtering' will be presented at the leading FPGA conference in Prague this week.

Provided by University of Glasgow

Citation: Faster searches key to a greener web (2009, August 31) retrieved 20 March 2024 from <https://phys.org/news/2009-08-faster-key-greener-web.html>

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