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Cloud Computing: A New Horizon

Just

ScienceDaily (Apr. 21, 2009) — The outlook is bleak for laptops, hard drives and desktops – clouds are on the horizon and could change the way we use computers forever. For some, the 'cloud' is just the latest technological craze, but for others it is the future of computing, and it has already generated a large body of research literature. What seems certain is that cloud computing has the potential to bring about irreversible changes in the way computers are used around the world.

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Jordi Torres, coordinator of the Cloud Computing (CC) research team at the UPC, which works under the supervision of the High Performance Computing Group, is in New York to attend a conference. Before leaving his hotel, he opens his laptop, updates his Facebook status, checks his Gmail account to see if he has received an important message he has been expecting, and even has time to look over a spreadsheet used by his team at the UPC to manage one of the European research projects in which they are participating. Nothing out of the ordinary, you might think, but there is one important difference: the software and applications he uses are not installed on his computer, they are in a cloud.

In general terms, cloud computing can be described as a web architecture that allows users to work and save information online. David Carrera, one of the directors of the CC team, offers this explanation: "The aim is to move all of the applications installed on our computers to a remote location." In other words, to do away with a number of standard components, including operating systems and hard disks, and make them accessible through an online desktop accessed via a standard browser.

With the introduction of the cloud, traditional desktops will become obsolete, programs will no longer need to be installed, and Jordi Torres may never have to take his laptop to New York again: "He will be able to rent a computer on Fifth Avenue, just like renting a car, and use it to connect to all of the data he's working with in Barcelona", explains Ricard Gavalda, a lecturer in the Department of Software at the UPC.



Barcelona Supercomputing Center (BSC). (Credit: Image courtesy of Universitat Politècnica de Catalunya)

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Jordi Carrera, a director of researchers from the Barcelona (BSC-GNS), take part in European level, including directed by Rosa M. Baeza. Organizing ICT Resource create economic algorithm resources market the top decisions, and to give priority with the use of minimal resources that, "our current research saving and quality of virtual

'Virtualization', 'utility computing' and 'software as a service' (SaaS) are key concepts in understanding the potential of the cloud. Their basic function is to create multiple virtual machines within a single physical computer to make it more efficient. Carrera explains that, "It's like three passengers sharing a taxi, but each knowing the way by the cut-free email one another: you don't have to update the daily news service but only need the hardy update in your RSS reader."

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Utility computing is the provision of computational resources, such as processing or storage, as if they were traditional public utilities (electricity, water and gas). The advantage of [Feedback](#) its low cost, as hardware required is extremely cheap and the resources themselves are essentially rented. Carrera explains: "It is a system of selling software and negative comments that have any problems using the site? Questions? From Microsoft, pay the license and own the software. It's a user service".

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"The cloud computing phenomenon is more than just another technological fad – it combines the benefits of outsourcing and pay-per-use and provides companies with a springboard for further innovation", explains Jordi Torres. It will also have a significant impact on the business sector and the wider community, although its specific repercussions in Catalonia are yet to be seen. While some companies are already working in this field, such as eyeOS and Abiquo, many others in the ICT sector will clearly have to adjust their business strategies to

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accommodate such far-reaching changes. "The industrialization of ICTs is unstoppable, and a lot of companies will close their data processing centers and manage their ICT systems remotely via processing megacenters, which will compete only on the price of energy, as hardware is becoming cheaper all the time", says Torres.

These are some of the areas studied by the fifteen UPC researchers in the Cloud Computing team, who work closely with researchers at the BSC-CNS. The group is close to announcing the completion of its new cloud environment, Emotive Cloud-Barcelona, which has been designed specifically for the research sector.

A storm on the horizon

Despite its potential, cloud computing continues to raise doubts among personal and business users. To take a recent example, on 24 February of this year, the work of millions of people around the world was interrupted when they were unable to access any of the applications offered by GoogleApps, the most popular of which is its e-mail service Gmail.

Servers operated by the American firm, which are used to save important documents such as doctoral theses and business contracts, simply stopped working, and not for the first time, prompting debate on whether it is really worth storing sensitive material on a virtual support if we cannot be sure where our information is, who controls it, and who may be able to access it. Concerns over the privacy and confidentiality of information are potential hurdles to the widespread introduction of cloud computing networks.

In addition, for political reasons some countries will not allow certain information to be stored outside their borders. "Although a range of solutions already exists and wider use of cloud architecture appears to be inevitable, there are still several obstacles", says Torres, "but that gives us the opportunity to carry out cutting-edge research".

Green computing

'Green computing' is a discipline that looks at how to make efficient use of ICTs and minimize their environmental impact. Sustainability has become a major concern in recent years, as it is now calculated that CO2 emissions derived from these technologies account for 2% of the total pollution of this type, which is the same proportion produced by airplanes. However, as Jordi Torres explains, "The problem is that the increase in energy requirements is exponential, and there are no signs of a change in this trend". Computers already consume a huge amount of energy and the figure doubles every few years, which could ultimately strain the supply to breaking point.

The UPC "wants to contribute to reducing the number of computers individuals and companies need to do their work", explains Gavalda, adding that, "from a scientific perspective, this is an interesting development, but it will only be effective if companies realize that energy is expensive and needs to be used more sparingly".

Adapted from materials provided by [Universitat Politècnica de Catalunya](#), via [AlphaGalileo](#).

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