Newsletter

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The advance of cloud computing

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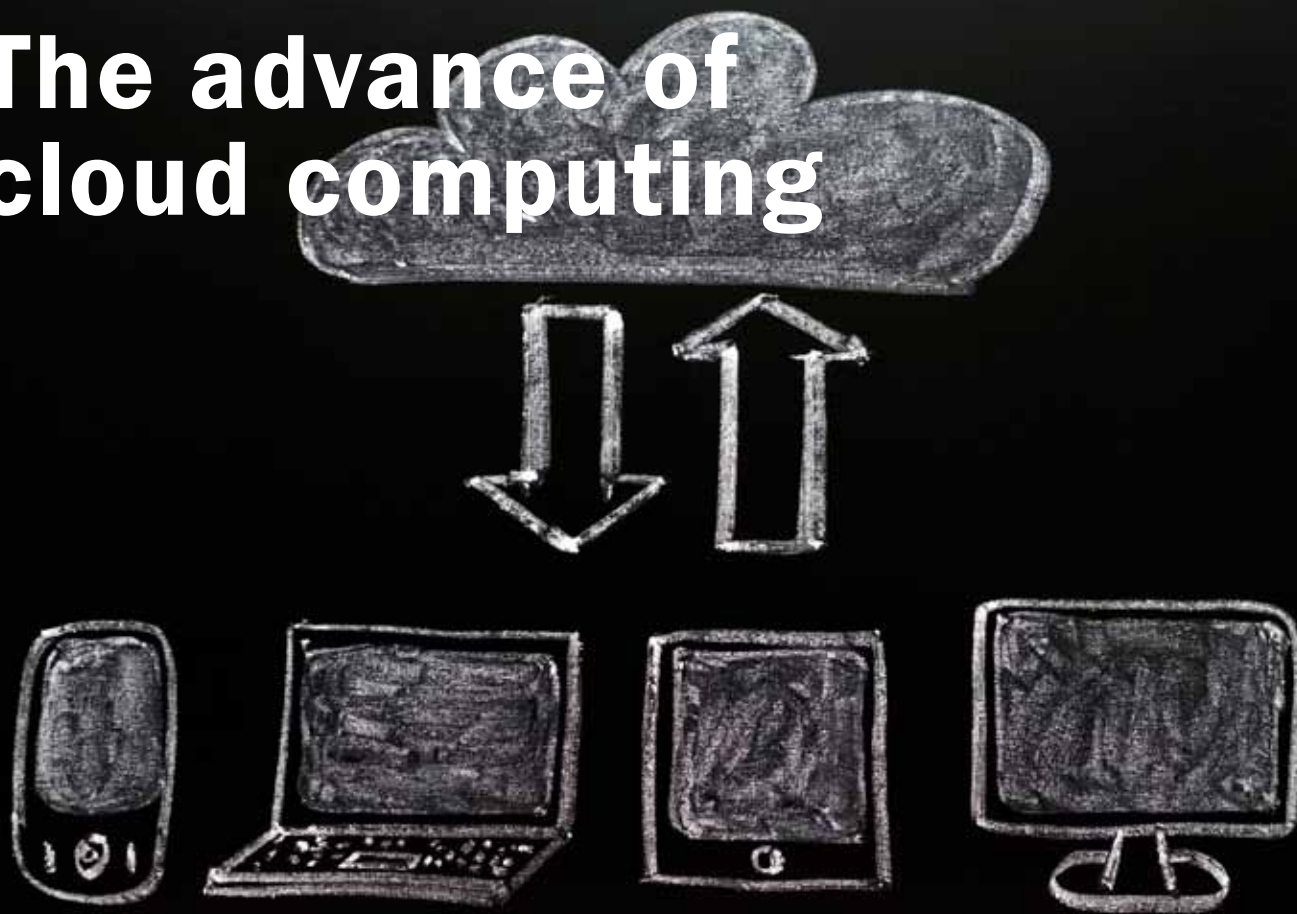
Augusto Espín,
**Deputy Minister of Telecommunications
and Information Society, Ecuador**

The "Implementation of the National Data Centre" project

According to the Networked Readiness Index (NRI) of the World Economic Forum, which measures the propensity for countries to exploit the opportunities offered by information and communication technology (ICT), in 2012 Ecuador ranked 96 of 142 nations considered, with an index score of 3.46 out of a maximum 7. This shows that, despite the progress made under this Government, much remains to be done. When we analyse the indicator, we see that there is a need for initiatives to enhance and improve online services so that they become more effective and efficient for citizens. This realization has inspired the initiative of implementing the Ecuador National Data Centre, in view of the transversality and impact of a project of this kind in the development of citizen-centred government services.

The "Implementation of the National Data Centre" project has been included in the Digital Ecuador Strategy as one of the components of the National Plan for Online Government. This strategy was presented in November last year by the Ministry of Telecommunications and Information Society of Ecuador (MINTEL). With this project, whose main focus is the provision of shared technology services using a cloud computing system, the Government means to address two aspects of fundamental importance for the country's development: enhancement of its relationship with citizens by developing online government services, and standardization of the technological capabilities of the different government institutions. This initiative will also optimize State resources by removing the need for one-off investments and enabling shared, standardized, timely and efficient services to be provided so that institutions can concentrate on their functions using a standard platform.

The National Data Centre has been planned to operate on a build, operate and transfer (BOT) basis, i.e., the supplier will be responsible for building the technology platform and providing services to the different institutions in accordance with different plans and profiles, complying with pre-established service level agreements and with industry best practice. MINTEL will be responsible for managing this relationship.

The project provides for public works construction to be carried out by the State as part of the Yachay City of Knowledge project, which will be a standard-setter for research and development. It has also been decided that the data centre should attain Tier III level (concurrently maintainable infrastructure), as defined by the Uptime Institute, with a view to ensuring proper provision of information technology services, which will translate into a better service for citizens.

The project is currently at the stage of drawing up the terms of reference for selecting and engaging the shared technology services provider. For this initial stage in the operation of the National Data Centre, five initial services have been identified (e-mail, corporate instant messaging, cloud data storage, web hosting and hosting), and these will be provided to 30 central government institutions. A further 30 or so possible services have been identified and will be made available in accordance with a growth plan, which also provides for the incorporation of further institutions.

Cloud computing is a new approach that has only recently taken off, so nothing else of the kind has been implemented in the country as yet. Projects along these lines do exist elsewhere in the region, examples being those of the National Fund for the Financing of State Enterprise (FONAFE) in Peru and Online Government in Colombia, and views and know-how have been shared with their representatives. Developed from an idea first put forward in 2011, this project has become a major venture entailing a constant learning experience for all those involved. Our hope is that what has been done so far and will be done in future will yield benefits for all Ecuadorian citizens.

Rafael Henrique Rodrigues Moreira,
General Coordinator of Software and IT Services,
Ministry of Science, Technology and Innovation, Brazil

Cloud computing and public policy in Brazil

Cloud computing is a model that provides convenient access on demand from anywhere, through a computer network, to a set of shared resources that can be quickly supplied and made available with a minimum of administration or interaction with those providing them.

The cloud computing paradigm is suitable for the provision of a great variety of services, ranging from those traditionally offered in the client-server model to new computer infrastructure services such as networks, storage and processing, in line with the "everything as a service" (EaaS) concept. To use this terminology, the three main cloud computing service models are: infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS).

The cloud computing market in Brazil and the world

Forrester, a United States firm that researches the technology market, expects the cloud computing market to be worth US$ 241 billion by 2020, as against US$ 40.7 billion in 2010. This is still only a fraction of the total information technology (IT) market which, according to IDC, a consultant, was worth about US$ 3 trillion in 2010. Research suggests that the SaaS market has the best growth outlook of any segment, the expectation being that it will be worth US$ 92.8 billion by 2016.

The IaaS market is going to start migrating from public clouds to private virtual clouds, but that market could decline, as dynamic infrastructure services tend to combine pure infrastructure with high-level services and rapid integration into in-house environments. Simplified and integrated platforms show the way forward for the PaaS segment, which will turn into an integration platform option.

According to IDC, the Brazilian cloud computing market is going to grow from US$ 64 million in 2010 to US$ 491 million in 2014. The sector with the greatest growth potential is SaaS, which is expected to increase from 32% (2010) to 39% (2014) of the total.

Public policies for cloud computing in Brazil

Brazil has taken an enormous interest in the development of cloud computing around the world; indeed, this is a strategic area in the National Programme for Software and IT Services that will be launched by the Ministry of Science, Technology and Innovation in 2012. A number of countries, and Brazil is one of them, have created structured public policies and programmes to support and absorb this technology. Some points of consensus that Brazil intends to implement are:

a) Establishment of a range of incentives to attract large regional data centres.

b) Support for the creation and modernization of personal data protection or privacy laws.

c) Creation of standardization and interoperability processes for cloud solutions for government use, concentrating on technological neutrality and supplier independence.

d) Major investments in research, development and innovation for the different layers (IaaS, SaaS) to generate hardware and software technologies that optimize processes, guarantee security and are environmentally sustainable.

e) A wide-ranging programme of training for professionals in sub-areas required for cloud computing, such as virtualization, storage, analytic applications, security and new architectures.

f) Evaluation of regulatory harmonization for international data transfer to allow the personal data of different countries' citizens to move securely through networks.

Breakdown of the Brazilian market and its evolution up to 2014. Source: IDC, December 2011
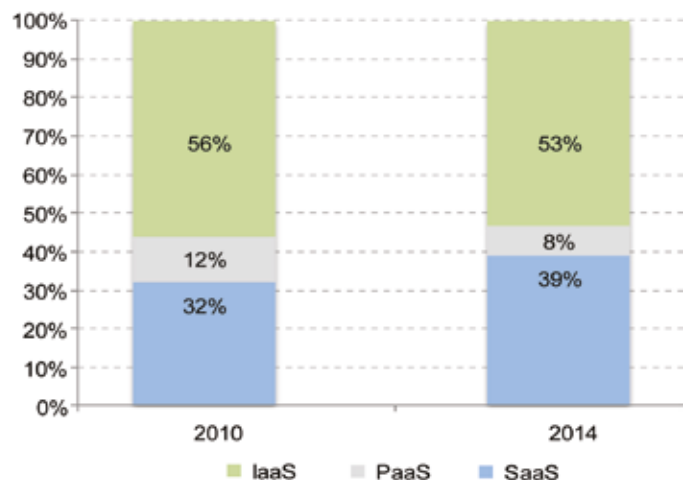
Lalo Steinmann,
strategist for cloud computing in the
Latin American public sector, Microsoft:

"The cloud is being taken up more quickly in Latin America than in the rest of the world"

This specialist offers a vision for the development of cloud technology in Latin America from the perspective of private enterprise and work with government institutions.

How would you rate the degree of development of cloud computing in Latin America?

The development of the cloud in Latin America broadly reflects what is happening in the rest of the world, with some factors that are unique to the region. There are two positive factors. The first is that take-up of the cloud has been faster in Latin America than in the rest of the world, and that is because our culture is a fairly entrepreneurial one. We have a lot of cases of new business models being launched in Latin America for the world. The second is that, because of the size of our countries and the way automation came to most of them, we do not have a great many old or legacy systems to hold us back. This lack of attachment to the past is a positive factor in a way because it makes us open to new ideas in the cloud.

On the negative side, I think there is still a lot of work to do on the infrastructure, especially when it comes to mass provision for all citizens. This is a subject that is continually coming up when we talk to governments, how are we doing with the infrastructure, what kind of international links are there… We have prepared a paper with other members of the industry on this very subject, the idea that creating broadband infrastructure today is like creating the highways of the 1950s.

Generally speaking, which firms or institutions can benefit most from cloud technology?

On my analysis, private firms are more dynamic and are less tied down because they do not have to comply with the same laws and mandates towards citizens, they are more flexible. So take-up has been fastest among SMEs and start-ups. From what I have seen in Latin America, though, once the first users start taking it up in the public administration, usage there accelerates more quickly than in private industry.

What do you think of the study by KPMG, *Exploring the Cloud: a Global Study of Governments*, which claims that governments are still very reluctant to embrace the cloud?

There is something very interesting in the report, the subject of the government cloud, which is basically the construction or use of this computing model, but which also means working with services generated outside the country and services the government constructs for its citizenry or its

constituent organizations. It is definitely a subject the public sector needs to pay attention to, because by looking after data, looking after the integrity of information, planning for the country's future in this way, it is carrying out its responsibilities towards citizens. There I agree with the findings. I think, and this is something else the study brings up, that the cloud computing model is not only about cost savings. To me, the most emblematic cases we have in the region concern things which could not be done before with traditional computing. The cloud makes it easier to do things that used to be very difficult or impracticable, but that can be done in the light of this new computing model. And, I repeat, it is not about cost savings, but about new approaches. The analysis speaks of barriers to take-up too, the way take-up in the public sector lags behind the commercial sector. And I think that the public sector probably is behind to start with, but once it gets started, take-up will accelerate more quickly there.

What are these things that can only be done with the cloud?

Dealing with the issue of scalability, which typically comes up in emergencies. For example, we created scalability for a Mexican government agency in an event where thousands of orders had to be received in a short time without losing the invoices, and here it is hard to bring more capacity on stream in a few hours. The typical average time to make a new server available for public administration services is around three months. With the cloud computing agreement that was in place, we had a server that made user applications available in a matter of hours. That is a significant time saving and this ability to scale up limitlessly when you need to and reduce capacity when you no longer need it, without overpaying, is a unique characteristic of the cloud. And when you think that the mandate of the public sector is to serve all citizens, this is where the cloud administers things that cannot be done in any other way.

Don't you see a danger or risk in large institutions, especially governments, having their information stored in the cloud, which is a virtual system? I mean, do you think there is wisdom in the feeling that it is better to have everything on your own servers than on an outside server that depends on a good Internet connection?

There are several aspects to the answer. The first is that there is a very close analogy here with travelling by plane as opposed to travelling by bus. If you look at the statistics, you are better off going by plane because there are far fewer accidents than with bus travel. This is a statistical answer, the kind of thing I consider as an engineer. But the reality of what happens when you go by plane is that any "incident" has catastrophic consequences. And the second thing is that there are our emotional responses to consider: there are people who are afraid of flying because of the loss of control, whatever numbers I might be able to show them.

Regarding virtualization, when we created the computer industry we transferred things that were on paper, we virtualized them on magnetic media, electronic media. This gradually became accepted in our society and culture and now it's hardly an issue. On the contrary, we say "why don't we go faster?" This is a question that has ceased to be relevant when it comes to incorporation into new systems. I think the same is going to happen with the cloud.

There is a third issue, however, particularly in the public sector, and that is the issue of laws. As this model has emerged, some paradoxical situations have arisen. Certain organizations that provide services worldwide have been faced with the dilemma that if they comply with laws passed by country A then they are breaking laws passed by country B, and vice versa. And this is an issue we need to deal with at the level of society and federations of countries.

Is cloud computing still a promise for the future or is it actually happening now?

Like everything else, it depends where you're standing. From the standpoint of things that actually exist, it is a proven model and has been adopted in many cases in the region. From the standpoint of large-scale take-up, it is a promise because this has not happened yet. In these terms, cloud computing is a new computing model and needs to be absorbed. In the history of computing models, we have learned that the appearance of a new model does not displace or kill off the previous model once and for all, and I think that where we are now is at the dawn of this new model.

The impact of education and research networks on the development of cloud computing

Eduardo Vera,
Innovation and Development Manager at the Centre for
Mathematical Modelling (CMM) of the University of Chile

Before analysing the possible evolution of cloud computing, it is important to examine the substantial impact that research and development (R&D) networks have had on the global economy. The Internet was born in the scientific community, with the development of NSFnet in the United States, followed by the rapid worldwide growth of networks such as Internet2 and REUNA, Chile's national university network. The web and its different knowledge management tools, such as browsers, were developed by the scientific community. Indeed, practically all the most popular Internet applications, such as Yahoo!, Google, Facebook, Twitter and Skype, were created in laboratories and universities by students who had access to these high-speed R&D networks. Environments with unrestricted access to unlimited bandwidth allowed them to create attractive applications and commercial services that would otherwise be unavailable. This has underlain the increasing momentum of emerging concepts such as user-owned "dark fibre" and "photonic networks". The societies that adopt these concepts most quickly will reap enormous comparative advantages in their economies. Self-evident though these observations are, governments and development agencies need to be continuously educated about the subject to inform their decision-making about what innovation initiatives to support in order to stimulate wealth creation.

Although R&D networks have already had a huge economic and social impact, their influence is only just beginning. Networks will enable us to face the major challenges of humanity, such as environmental destruction and continuous monitoring of our bodies for preventive health-care purposes. This will happen as progress is made with

mass data handling: accessing, transmitting, storing, processing and filing a gigantic universe of data (which will soon be counted in exabytes, 10^{18} bytes), together with the application of knowledge management to these large quantities of information. Worldwide scientific collaboration and the integration of commercial services into the cloud thanks to the convergence of ubiquitous wireless networks (for mass data access) and powerful photonic networks (for data trunking) will undoubtedly be an essential part of the architecture needed to achieve this.

The exponential growth of the data universe is bringing significant practical challenges in its wake, not only from the perspective of information and communication technology (ICT) but also from the ecological point of view, since handling exabytes of data will require an amount of electrical energy that will be unsustainable without a technological paradigm shift of the kind that only optical or quantum computing can bring. Places like Iceland (rich in geothermal energy) or the north of Chile (rich in solar energy) could position themselves as strategic locations for the siting of the data centres of the future, accessible through ultra-high-speed photonic networks. This infrastructure will need to be built very quickly, as there is clear evidence that researchers and students are rapidly moving towards the large-scale use of cloud computing capabilities (the R&D sector is currently the largest generator of CO_2 emissions in society from ICT use). Connecting researchers and students directly to the cloud will give them unrestricted, low-cost access to enormous calculating capabilities, currently only available in clusters of high-performance computers (HPCs) at major R&D centres, almost always with limited access. Thus, except in

specific cases, building private clouds will not make much sense, as the necessary physical infrastructure and data processing and storage can be provided competitively by the ICT industry. Accordingly, the efforts of R&D networks will be concentrated increasingly on providing researchers and students with direct support so that they can make proper use of the cybernetic infrastructure available on the market.

"Cloud computing is a paradigm shift"

How important do you think cloud computing is?

Cloud computing services are going to be hugely important eventually because this is a paradigm shift. People are not going to need to have large computing capabilities locally. Instead, they will buy them in as a service, like drinking water or electricity. This shift is not going to be immediate, it is something that will take time because there are problems with security. I also emphasize data transmission so strongly because people are not going to want to use cloud computing services until there are networks that guarantee high speeds and service quality. Few firms would risk using them as things stand, knowing how overloaded networks can get.

What cloud computing project is CMM embarking upon?

We are creating the National Laboratory for High Performance Computing (NLHPC): cloud computing services for the academic community, with large calculation capabilities that are going to be accessible over high-speed networks, which we call research and education networks. This will be a kind of laboratory for what are probably going to be the commercial services available in the cloud of the future.

What technological progress is needed for the cloud to come into wider use?

For really widespread use, there needs to be much greater capacity in communication networks, and greater storage capacity. Certain technological paradigms will also have to change, because mass take-up of network computing would generate a level of demand for electricity that today's systems would be unable to meet. This is where we are probably going to have to rely on new advances in optical or quantum computing. This is why I say that the concept of full cloud computing is not just around the corner. We are talking about a decade or two.

Luis Urzúa,
Information and Communication
Technologies Manager, Movistar Chile:

"The cloud helps to narrow divides by providing access to technology resources that used to be unaffordable"

This executive gives his view, as an operator, of the state of the cloud in Latin America, explains the need for the public sector to be an active user of it, and indicates the kind of things customers should consider when contracting for virtual services.

How do you think the cloud has been developing in Latin America?

It's coming on, but it also depends a lot on what market segment you look at. Progress has been fastest in markets that need access to technology but have a more limited financial capacity, such as SMEs, because they can get access to latest-generation technology much more cheaply than if they bought

the asset themselves. And large firms are also moving in that direction, we're seeing the fastest progress in areas such as office automation, e-mail, resource availability for development areas, while in production areas it is still at an early stage. In more developed countries such as the United States, where the cloud is used a lot more, when you see and talk to firms you find that their model for progress is similar to where we are.

So will the cloud help to narrow divides between developed and developing countries?

Certainly it will, since you can access technological resources at prices that used to be unaffordable.

As an operator, what challenges do you see in the development of cloud computing?

In my opinion, it is telecommunications operators that ought to be the great clouders, that is, providers of cloud services. There are three participants in a cloud model: the technology provider (the manufacturers, such as IBM, HP, etc.), the clouder, and the final customer, who is the consumer of the services. Cloud computing does not mean that it happens in some kind of esoteric place, up in the air. It is somewhere, in some data centre which you access through communication services. This is why telecommunications providers are best placed to offer these services.

To get the greatest benefit from the cloud, what needs investing in most: fixed Internet, mobile Internet, or both?

It depends who the final consumer is going to be. For example, if the consumers of the cloud are individuals, there are a lot of cloud services for them these days; Gmail, to name just one. In this case the cloud can be mobile, or use fixed Internet, etc. However, it is going to depend on the amount of information being transmitted whether mobile technology can handle it or whether the fixed Internet or some kind of private link will be needed. There is no one-size-fits-all definition. Greater and greater volumes of information are being moved all the time, we have gone from texts to photos and now to video, so when you are talking about uploading videos to the cloud then there is greater consumption of bandwidth.

That being the case, would you say that the great task is being able to transmit that volume of data?

Exactly. There needs to be more and more demand for infrastructure, and by infrastructure we mean bandwidth, whether it is fixed, mobile, or whatever. There needs to be more investment.

Do you think private enterprise can carry on being relied upon for smooth provision of the Internet services the cloud requires, or are there cases where the public sector is needed?

Partnership with the public sector is always a good idea. Now, for cloud computing to expand a lot more, it would be good for the public sector to lead by example and make use of it itself. If there are partnerships with the public sector, if the private sector is pushing the cloud but the public sector is not using it, that is also a confidence signal, it is a sign that makes you ask why the public sector is not moving towards the cloud model. Now, that is when we speak of a private cloud or a public cloud, that is why the distinction has to be made. The public sector, the Government or different ministries, may be using private clouds. It is in the public cloud that costs really come down, because they are absorbed by the great mass of people sharing it. Cloud computing is cheap because it is shared. It is the same as a holiday timeshare: it is cheaper because it is shared between a number of people, but the apartment is the same. The same principle applies here. I share a resource with a number of others, and so it works out cheaper for me.

What do you say to those who mistrust the cloud because it hosts critical resources in a system that is dependent on an Internet connection which could "go down" at any time?

I need to take a lot of precautions with the Internet connection, I can't have the kind of Internet connection I have at home. If the service to my house goes down, quite, I can't work. When I go to the cloud I need to be aware of who is providing me with that service. I need to make sure I have more than one way of reaching the cloud service, either by having two Internet providers, or with a private connection. I need to be sure that my information, data that are held in shared facilities, are protected and cannot be seen by anyone else. Now, it's not just the Internet, that's the part you see, but I would take these same fears about connectivity a little bit further. Who is providing the cloud services? How long have they been in the market? Where are they located? Countries have their own regulations about where information has to be kept, so is this provider complying with them or not? Rather than a critique of the Internet, what is needed is a bit more information about who the cloud provider is. Just as a lot of manufacturing companies are criticized when whoever is behind them is using child labour, it would be worth asking how energy-efficient my cloud provider is, what kind of carbon footprint it has and how this is affecting the global environment, whether or not it owns its services and communications infrastructure, if it is subletting, etc. Customers need to take precautions and ask these questions.

Jean-Bernard Gramunt, representative of France's digital strategy:

"Cloud computing will be a strategic sector of the economy in the coming years"

This French information and communication technology (ICT) expert gives some details of his Government's vision for cloud computing, such as the relationship with private firms, with which infrastructure projects are jointly financed.

How important do you think cloud computing is?

Cloud computing represents a major development in the usage and organization of information systems. Firms using it can increase their competitiveness, thanks to lower ICT costs and a better quality of service. Furthermore, this sector is going to generate new services, available on demand and at a distance. This market is growing by 25% a year in Europe.

What cloud computing initiatives are there in France?

The Government has called for tenders for cloud computing research and development to support the technologies that will be needed to create tomorrow's infrastructure. Of 18 projects presented, five were selected to receive State backing in the form of a € 19 million investment. These represent a total investment of € 50 million in research and development.

Looking at Europe, do you think there ought to be common regulation of this technology in the European Union? Or should each country have its own regulatory framework?

In 2020, the Digital Agenda approved by the European States is going to create a common regulatory framework (in accordance with the final objective of the European Union, which is a single market) and facilitate research and development for the European countries. Latin American bodies may be associated with this, for example the Chile-based Communications and Information Research and Innovation Centre (CIRIC), which is supported by that country's Production Development Corporation (CORFO) and by France's National Institute for Research in Computer Science and Control (INRIA).

What challenges does cloud computing now pose for digital development in France?

The challenge is mainly economic and strategic: using this technique to provide our businesses and industries with processing in France and retain control over data and information, and to create jobs. In the coming years, the cloud computing industry, associated with high-powered calculation (expressed in petaflops, that is, 10^{15} operations per second), will occupy the position that coal and steel production did 60 years ago: that of a strategic sector which nourishes the whole of our economy.

What kind of relationship should there be with private-sector operatives to promote this technology on the digital agenda?

There is a close relationship, with the State helping to launch projects. In France, private-sector investment accounts for 60% of the cost of research and development projects. As for infrastructure, the Andromède project, which is a national cloud computing infrastructure, represents an investment of € 225 million, € 75 million of it provided by the State and the rest by private investors (Orange, Thales and others). It will also provide "à la carte" processing, storage and bandwidth capacity for use by all firms and by governments.

What sector is taking best (or has taken best) to this technology (citizens, public administration, private firms, educational institutions, etc.)?

All sectors at once. Electronic government is one of the biggest uses, since cloud computing reduces costs for the State, but firms, including SMEs, are showing a growing interest in this technology, as it means they do not have to invest in products that rapidly become obsolete. The availability of a high-quality broadband network is the key to success for users.

Flavio Junqueira,
senior research scientist
with Yahoo! Labs, on
cloud computing:

"If usage in Latin America takes off as much as expected, it will be a good opportunity to generate and export technology"

This researcher details the challenges cloud computing poses to the Internet system, especially for users. He also gives his views on its growth potential, particularly in Latin America.

What challenges does cloud computing now present for the Internet system?

When we are speaking of the cloud, a lot of concepts can be involved. What we usually mean by it is online service implementation and data storage on third party infrastructure and platforms, with payment by actual demand and the ability to scale up and down in accordance with demand too, which is known as elasticity.

Using this informal definition, we can say that some of the problems of greatest concern to those thinking of using the cloud are security, privacy and durability. Even if they are told that cloud service providers' infrastructure is generally more secure, it is not under the control of its users, who know little or nothing about their provider's security measures. Security failures can result in attacks from outside or even from within the cloud, with major consequences for services. To sum up, it is not clear whether or not you are really safer in the cloud.

Privacy is another major concern. Attacks on infrastructure can result in unauthorized access to information, possibly including personal information such as bank and medical records, etc., so that putting measures in place to prevent unauthorized access to data is generally a priority for cloud providers.

Lastly, durability means the continuing availability of data. If I am a user and I store vital data with a cloud provider, can I be sure my data will still be available in 10 years? What happens if the provider goes bankrupt? One way of solving this problem is to diversify by storing data with multiple providers. Diversifying has a great drawback, which is that it increases the cost of the service, but it may serve to reduce the impact of a temporary suspension of a provider's service. There are known cases where a provider has gone down and this has resulted in interruption to a large number of services. Consequently, the Internet becomes somewhat more vulnerable if there is not a sufficient diversity of providers. An important question is how to add diversity whilst keeping cloud use profitable.

How do you see the state of this technology in Latin America?

A recent article in *Forbes* says that corporate cloud use in Latin America will reach 54% in 2014, considerably more than in Europe and the United States. However, the major cloud companies are still located in the United States, with some presence in Europe, such as Telefónica's Virtual Hosting 2.0 service, EMC and Cisco. In the case of Virtual Hosting, the data centres are in South American countries. If usage in Latin America takes off as much as expected, it will be a good opportunity to generate and export technology instead of importing it, as currently happens.

Will the development of the cloud call for new professional capabilities? For example, it might be necessary to train specialized programmers.

If we are talking about fundamental IT knowledge of algorithms or data structures, I don't see many fundamental changes, so the skills needed at this level are the same. Knowledge of virtual machines (or virtualization generally) and multi-core parallelism are topics that could be further explored in certain types of operating systems. From a more practical point of view, knowledge of what infrastructure and platforms are out there can be quite helpful for rolling out and managing a cloud service.

Which of the uses of the cloud has the most development and growth potential? Storage, programming, data processing, something else?

These are different uses for the cloud and I see them all as having growth potential. Data storage and processing are quite important with the big data movement. More and more firms will want to process their data to get a better understanding of their users, customers and systems. Space is also needed to store all these data and process them using batch or event processing systems.

Databases and platform as a service (PaaS) offerings generally have a great deal of potential. There are services such as Microsoft Azure and research projects we are involved in such as CumuloNimbo; with this project, we focus on the problem of transaction system scalability, something that is necessary for major applications to be able to derive the maximum benefit from other important properties of the cloud, such as elasticity.

How can cloud computing help scientific development?

For this question, I interpret science as meaning areas of study such as biology, physics and chemistry. A lot of problems that are dealt with in biocomputing, for example, require large amounts of resources, and many of them concern the development of medicines and efforts to understand the human genome. With the cloud, scientific research centres will often be spared the need for major investment in computer infrastructure: where these resources are needed, there would be the option of simply paying for the service for as long as required. Few groups can really afford large-scale investment, partly because of the way public financing mechanisms are set up.

What is the M45 initiative?

M45 is a Yahoo! initiative to provide access to a cluster of more than 4,000 processors for research purposes. One of the main objectives in starting M45 has been to stimulate research into software systems for large-scale applications. Few research groups have access to clusters of this size outside the industry. More information can be found at http://research.yahoo.com/node/1884.

How do you see this technology developing in future?

Yahoo! has concentrated on its own private internal cloud. When people talk about the cloud within the company, there are a number of concepts involved, but by and large two important points come up: the roll-out of applications and access to applications and platforms as a service. Before the cloud, it could take several weeks to roll out an application, what with buying the servers, setting them up, installing them, etc. With the cloud, roll-out time has been reduced a lot. Offering an application or platform as a service results in a large reduction in operating costs, as it means the resources used by the service can be consolidated and there can be a specialist group of people operating it.

The experience so far has been good. The basic concepts of the cloud make implementing and managing new applications nimbler. Elasticity is a particularly important concept and taking it into account at the design stage immediately facilitates the management of web-scale applications, something that is important for firms like Yahoo!.

How do you see this technology developing in future?

The cloud is more a concept than a technology. On the whole it makes sense. Building and managing data centres is expensive and a lot of one-off needs arise that do not justify the investment. There is the option of renting space, but even this does not do away with the need for investment in machines and staff.

For the future, I see the services available becoming more and more specialized, with the objective being to provide a simple interface for service users. An important issue for the near future is network virtualization. There are some start-ups working on this, such as Nicira and Midokura.

News in brief

Public television stations in Europe share content in the cloud

The public television stations of Sweden, Norway, Denmark, Finland and Iceland, grouped into the NORDIF3 consortium, will have access to a digital repository of audiovisual content, employing cloud computing technology. The goal is to create a fast and effective method of sharing pictures, audio material and other files, thus reducing distribution costs and time.

Using a web application, each channel will be able not only to upload audiovisual material to the repository but access, review and edit content. They will all take advantage of the cloud from their own premises, with the benefits including major savings in content storage space and greater ease of content management thanks to the centralization of images, sound and information files.

The platform will be complete by August 2012 and will be housed on the premises of NRK, the Norwegian public broadcaster, in Oslo.

The Panamanian government cloud and its influence in the region

Latin America has been identified by a number of studies as an area of rapid take-up for cloud computing. According to a report from Tata Consultancy Services, use of this technology in the region will reach 56% in 2014, as opposed to 34% in the United States and 24% in Europe. Another study, carried out by IT Consulting Service, states that 22% of large firms in Central America are using this technology, while figures from Trend Micro indicate that the cloud will generate about 14 million new jobs between 2011 and 2014, 700,000 of them in countries such as Brazil, Mexico, Argentina and Colombia, which are expected to be the quickest to take up this technology and generate applications.

Trend Micro highlights the example of the Government of Panama as one of the drivers of rapid adoption, at least in Central America, since it has been using cloud computing in government departments since October 2011 thanks to an initiative by the Authority for Government Innovation (AIG). Panama invested US$ 200,000 in a platform that is being used mainly to bring public accounting services and other critical applications together in one place. By doing this, government institutions in Panama have been saving on operating costs and hardware maintenance. The Panamanian initiative is so far the only one of its kind in Latin America.

2012 projected as a year of strong growth for the cloud

According to projections by International Data Corporation (IDC), a consultancy, worldwide information technology spending in 2012 will be US$ 1.8 trillion, with 20% going on cloud computing, smartphones, tablets, mobile networks and social networks. Spending in this particular segment is growing by 18% a year and is expected to represent 80% of total technology spending by 2020.

In the case of the cloud, IDC estimates that by late 2012 some 80% of new commercial Internet applications will be deployed on cloud platforms and that the focus will shift from building infrastructure to creating applications and ecosystems, so that firms such as Oracle, IBM and Microsoft will be "threatened" by services firms such as Google and Amazon. IDC expects Amazon to do a billion dollars' worth of business in its cloud division, Amazon Web Services, this year.