Cloud Computing in Plain English

By Ryan K. L. Ko

I am not an evangelist of cloud computing, and I must admit that, like many, I was once a skeptic. As a fledgling researcher, I was also quite appalled at how many seasoned researchers were able to recently claim that their research "has always been" cloud computing. I suppose many people believe cloud computing is just a buzzword and are also quite turned off by the ever-growing list of acronyms plaguing the computer science world. But is "cloud computing" really just another buzzword brought forward by the software giants, or is there something more?

Significance of the Cloud Computing Era

Fundamentally, cloud computing is a concept that aims to enable end-users to easily create and use software without a need to worry about the technical implementations and nitty-gritties such as the software's physical hosting location, hardware specifications, efficiency of data processing, and so forth.

This concept is already evident in many current technologies that are not explicitly labeled as cloud computing. For example, end-users no longer need to learn a new language or worry about the program's memory requirements to create a Facebook or MySpace application. A small- to medium-sized enterprise no longer needs to own and maintain actual physical servers to host Web applications but are instead able to lease virtual private servers (VPS) for a monthly subscription fee. With cloud computing, end-users and businesses can simply store and work on data in a "cloud," which is a virtual environment that embodies data centers, services, applications, and the hard-working folks at the IT companies.

The key difference between this and other similar-sounding approaches, such as grid computing or utility computing, is in the concept of abstracting services from products. This is done by virtualizing the products (for example, the complex network of computers, servers, and applications that are used in the back end) so that computing is now accessible to anyone with a computing need of any size. By accessible, we mean that it is easy for a non-technical person to use this software and even create his or her own.

This marks the change from the focus on full implementation of computing infrastructures before the year 2000 to the abstraction of the high-level, value-driven activities from the low-level, technical activities and details in the present and near future. In the words of those advocating cloud computing, it means that we are now moving toward services instead of focusing on selling products, and practically anyone can utilize computing to the max. (More technical information on these services can be found in "The Business of Clouds," page 26.)

So, what does all this mean for common folks like you and me? It means that we are freed from the need to upgrade hardware and the need to spend more than half of the time trying to make a product work, but are now able to focus on the real essence of our activities—the value-adding activities (*cf. Michael Porter's Competitive Advantage*).

With cloud computing, a startup company would no longer need to worry about the RAID configurations and the number of scheduled backup jobs, but instead could focus on more important details, such as the actual web content, the number of emails to set up for its employees, and the file structure and permissions to be granted for its content management structure.

Now, when we look beneath the sales talk and big promises of cloud computing and observe the shifts in trends in our computing approaches, we start to realize that cloud computing is not just another buzzword, but something that embodies this innate attempt by humans to make computing easier. The evolution of computing languages from the first generation (assembly languages) to the more human-readable fourth-generation languages (4GLs, SQL), and the evolution from structural/modular programming to object-oriented programming are both earlier evidences of this trend.

Cloud computing's focus is on empowering Internet users with the ability to focus on value-adding activities and services and outsource the worries of hardware upgrades and technical configurations to the "experts residing" in the virtual cloud.

In today's context, cloud computing loosely means that software you use does not reside on your own computer, but rather on a host computer, accessed via the Internet, run by someone else.

Given this fact, there are bound to be many problems and loopholes. Hence, it is not rare to find researchers claiming that they are working in a research area that contributes to cloud computing. With so much at stake, experts from computer security, service computing, computer networking, software engineering and many other related areas are crucial people in this turn of a new era.

Imminent Issues

If we are evolving into a cloud-oriented environment and way of doing business, we will need to urgently address both data privacy and data security concerns.

Researchers need to find the right balance between convenience and security. It's a balancing act: when convenience increases, security decreases, and *vice versa*. As cloud computing is a highly trust-based system, many researchers are now geared toward creating better trust evaluation mechanisms and authentication procedures, while the industry is busy figuring out scalability solutions, data integrity, and security issues.

Once a hacker or malicious attack successfully penetrates the security boundaries of the cloud, or an employee of a cloud vendor betrays the trust of the public, our data and critical information is at the complete mercy of these criminals. To further increase the security, we would need legislation and laws to catch up with the nature of cloud computing, as it will be a borderless and large-impact problem.

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How Can Graduates Approach Cloud Computing?

The best way to approach this field is to have a good balance between the quest of knowledge and discernment. Do not bounce on the latest buzzwords you hear. Take a step back and try to see how things fit together. A good way to do this is to organize and draw what you have learned into mind maps. *Crossroads* has prepared a starter kit (see sidebar), introducing some non-technical links to interesting articles and videos to kickstart your journey.

While it is my greatest wish for you have a better understanding of cloud computing through this article, I hope that I have also opened up your mind to witnessing the increasing influence of cloud computing in our daily lives.

Biography

Ryan K. L. Ko is a final year PhD candidate at Nanyang Technological University, Singapore, specializing in the semantic web and business process management. He is also an editor for Crossroads.

Cloud Computing Starter Kit

While there are plenty of sites and articles describing cloud computing, not many have an objective view of this high-potential but controversial topic. The following resources have been selected by Crossroads' editors in an attempt to help other students understand the meaning, concerns, and latest trends of cloud computing.

"**Like it or not, cloud computing is the wave of the future.**"
By Therese Poletti, MarketWatch.
www.marketwatch.com/story/like-not-cloud-computing-wave
A layman's summary of the recent cloud computing trend.

"**Microsoft to battle in the clouds.**"
By Rory Cellan-Jones, BBC News.
http://news.bbc.co.uk/2/hi/technology/7693993.stm
See in particular the short video clip on Microsoft Azure in this piece from the BBC.

"**Storm warning for cloud computing.**"
By Bill Thompson, BBC News.
http://news.bbc.co.uk/2/hi/technology/7421099.stm
Highlighting concerns surrounding cloud computing.

"**Cloud computing is a trap, warns GNU founder Richard Stallman.**"
By Bobbie Johnson, Guardian.co.uk
www.guardian.co.uk/technology/2008/sep/29/cloud.computing.richard.stallman
Richard Stallman on why he's against cloud computing.

"**Click's Favourite Cloud Links.**"
From Click's BBC News
http://news.bbc.co.uk/2/hi/programmes/click_online/7464153.stm
See in particular G.ho.st, a global virtual computer hosting site.

"**Dell attempts to copyright 'cloud computing.'**"
By Agam Shah, for IDG News Service,
published on TechWorld
www.techworld.com/opsys/news/index.cfm?newsid=102279
Just for fun, Dell tries to beat other computing companies to the punchline.