

"The Cloud" Explained, Part 1 of 2

By Larry Port, Rocket Matter

In the technology world, "the cloud" is an apt name for a murky topic with a hazy definition. Originally a computer science term, technologists and non-technologists alike have used "cloud computing" loosely, casually, and confusingly. Even among software experts, the exact definition of the cloud varies considerably.

Despite this confusion, cloud computing ultimately has a simple purpose: it allows people to leverage the Internet for application use, data storage, and other tools. This capability is what most consumers think of when they use the word "cloud" and it permits us to come up with a reasonable definition: A collection of utilities built on Internet technologies for on-demand services.

In his book *The Big Switch*, technology writer Nicholas Carr views the cloud transformation similar to our embrace of electricity. He explains that the cloud is much like the power grid: Your computer is plugged into a socket by way of its Internet connection, and you can consume services as you need them. The effect of what the Internet has become (so much more than email and web surfing) is akin to when home and businesses were being wired for electricity in the early 1900's: All manner of distractions and additional labor is removed, and new possibilities are developing at a lightning rate.

From the perspective of the small law firm, the cloud eliminates typical IT expenses, management, and headaches. "If I go to a cloud provider that has a Tier 1 data center, I get physical security, redundancy, and backup far better than I could do on my own," said Dennis Kennedy, legal technology expert and author of *The Lawyer's Guide to Collaboration Tools and Technologies*.

Cloud options are often cost-effective since they forego high up-front costs with predictable monthly fees, much like a utility bill. There's no more need for backup devices and software installations, and the firm frees itself of additional consulting costs and the hassle of managing IT infrastructure. The data and software simply goes somewhere else.

But what a lot of people want to understand is, "Where is somewhere else?"

Somewhere Else

When your data leaves your office and goes off into the Internet, it lives on a computer or group of computers. Your actual bits and bytes may be in Texas, along the Columbia River valley, or in some other location.

Your information lives on specialized servers typically stacked one on top of another in configurations called "racks." Racks are housed in buildings called "data centers" - remarkable feats of modern engineering with redundant power sources, backup generators, massive Internet connectivity pipes from multiple providers, and tight security surveillance (we'll explore data centers in depth in part 2 of this article).

Many Computers Working Together

The manner in which servers are arranged to work with one another is referred to as "server architecture". Server architectures can range from a single dedicated computer to massive amounts of machines working together on shared tasks.

For example, an Internet application (i.e. an HR/Payroll system) dedicated to a single company may run by itself on its own server. On the other hand, companies like Google and Amazon need tremendous computing power to render their services to hundreds of thousands of simultaneous users. To achieve such scale, computer scientists and server architects engineered solutions involving entire data centers of machines working together.

The Evolution of Cloud Computing

One of the toughest Internet engineering challenges is handling bursts of intense Internet activity. When many people come to a website or service at once, servers may not have the ability to keep up with the demand and respond to all of the incoming requests. Servers are like any other computer: When they get taxed too heavily, they can slow down or worse, crash.

Another problem involves data storage. Servers contain hard drives just like any home or business computer does. Though hard drive space is relatively cheap, Internet users from all over the world, working with mountains of data, can easily exceed server storage. Hard drives can also fail, causing data loss.

To solve these problems, companies developed an intermediate control layer on top of battalions of connected servers. They created tools to increase computational and storage capacity on demand. Sharing the storage across multiple computers has the added benefit of protecting against hard drive failures and data loss. They named this configuration "cloud computing," and thus the term was born that wormed its way into our vocabulary.

To understand how cloud computers are organized, imagine you're a general trying to direct an army. Instead of individually ordering each of the infantrymen to follow an order, you direct an officer. The officer disseminates the information to the troops and makes adjustments based on their performance and environment. If an individual infantryman falls, another one can compensate.

It's the same with the new server architectures. Instead of communicating with individual machines, commands are issued to the intermediate layer.

Clouds For Sale

Amazon and Google, having assembled massive cloud computing environments, are equipped to handle periods of high usage. However, they realized that for periods of low usage, they had a lot of valuable additional capacity on their hands. It's similar to companies discovering they could sublease extra office space.

The leading providers quickly understood the value of their cloud configurations to the growing legions of Web 2.0 companies, Software as a Service (known as SaaS) developers, and providers of any connected services. So they went beyond selling extra capacity, and set up dedicated resources, namely new product divisions and entire data centers outfitted specifically for their clouds. Amazon introduced Amazon Web Services and Google released Google Apps. Salesforce.com, a leading Software as a Service company, introduced Force.com, and Microsoft launched Windows Azure.

The Law Office and the Cloud

These are the early days of cloud adoption in typical law offices, though momentum is clearly heading in this direction. Online backup services offer cost advantages over local storage and are already in use. Software as a Service providers have tackled the problems of legal practice management, time and billing, and knowledge management, delivering zero-install applications over a web browser. The ABA Legal Technology Resource Center and some state bar associations have advice for lawyers with questions about online services.

"It does seem that there's a steady evolution toward a cloud approach, even if it's been slower in the legal profession," said Kennedy. "If I go to the cloud, or SaaS, as a lawyer who leaves a big firm to start a solo practice, I can get close to the technology I had in my big firm, or even better, with a small capital cost. My technology becomes a utility cost that I can budget for on a monthly basis, much like my electric bill. I can plan for those expenses, and I can also deliver the level of service I could in the big firm. To me, that's world-changing."

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