Hot Topics – Cloud Computing

By:

Larry Port
Rocket Matter, LLC

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Larry Port
Rocket Matter, LLC
Boca Raton, FL

Larry Port is the Founding Partner & Chief Software Architect, Rocket Matter, LLC. One of the leading experts on cloud computing for the legal profession, Larry speaks to an international audience on technology, productivity, and the business of law. Thousands of legal professionals have tuned in to his monthly webinars on emerging topics for the legal profession. Larry creates original educational programs and speaks at CLE events and conferences around the country. He is the author of Legal Productivity: How Project Management, GTD, and Tomatoes Can Transform the Way You Practice Law and also writes extensively for legal publications, including Legal Management, Law Technology News, Law Practice Today, ILTA’s Peer to Peer, Lawyerist, FindLaw, Chicago Lawyer, and Rocket Matter’s widely read Legal Productivity blog.
Hot Topics – Cloud Computing

by Larry Port

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.

**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 gets killed, 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."
Popular and Useful Cloud-based Software

**Dropbox** is a service which allows you to synch your files across multiple machines, including laptops, desktops, and mobile devices. Getting started with Dropbox is very simple: once you download and install their free application, you designate a special Dropbox folder on your primary work machine. Next you drag all of the files and folders you want to synchronize across multiple machines into your Dropbox folder. Now, any device you permission can access and modify those files.

**Evernote** is a comprehensive note taking and digital organization system. Like Dropbox, Evernote works on laptops, desktops, and mobile devices. Plugins for browsers allow you to clip and archive entire websites easily. The mobile app is a must for busy lawyers on the go, allowing lawyers to capture audio files and take pictures (very useful for receipts and expenses). When you get back to the office, notes recorded with your smartphone will appear on your primary work machine.

**MyFax** and **Efax** are online fax services which send and receive faxes, eliminating the need for a dedicated machine. Combined with a Fujitsu Scansnap scanner, lawyers can do away with their old fax machines and streamline their workflow with their PDF-based, paperless office.

**Skype** is a swiss army knife for inexpensive communication. If you haven’t used it in a while, try it again: you’ll be blown away by the call quality. For no cost, you can call, instant message, videoconference, and share your computer desktop with other Skype users. For additional fees, you call non-Skype phones and add a Skype Online Number which allows you to receive calls.

**Rocket Matter** allows attorneys to track cases, bill time, and invoice clients through a browser. In full disclosure, I am a founding partner of Rocket Matter, but because it offers client & case management, task management, calendaring, phone messaging, and other critical law office operational needs, I feel compelled to include it in a discussion of critical cloud legal software. Practice management software used to be too expensive for many small firms due to the licensing and IT costs, but cloud-based products spread these fees into monthly, budgetable chunks.

**Square** allows users to easily collect credit card payments with a mobile device. A small credit card reader plugs into the headphone jack of your iPhone or Android device. The 2.75% rate on each transaction is extremely reasonable, especially considering you don’t need a merchant account and the corresponding fees. The setup process is instant, and you can start accepting payments via credit card instantly. Just know your trust account obligations before you start accepting credit card payments.

Experiencing a Data Center
If you have the opportunity to see a data center first hand, it’s a great opportunity. I toured one for the first time recently, namely the NAP of the Americas (the NAP for short), one of the largest and most connected data centers in the world. The majority of all Internet traffic going to and from South America, Central America, and the Caribbean passes through this building.

Seeing a data center firsthand, whether you’re a technologist or not, is an overwhelming experience. The size and scale of the operation can boggle your mind. My reaction to the enormity of the NAP reminded me of similar moments from cinema where characters behold wonder, like when Luke and Han first encounter the Death Star in *Star Wars* or when Maximus enters Rome and initially sees the Coliseum in *Gladiator*.

From the outside, the NAP of the Americas is large, windowless, and ugly, and in a random area of downtown Miami. Architecturally, the primary purpose of the structure is to survive disasters. In fact, the NAP is designed to survive Category 5 hurricane winds, in excess of 155 MPH. The panels on the exterior walls are seven inches thick and made of steel-reinforced concrete. The floor of the data center is built 32 feet above sea level, in a FEMA-designated low risk flood area. Its fire protection system is specifically designed with the health of electronic equipment in mind.

Touring the data center, I was freezing. I was told to wear long sleeves to the facility but would have been better served by a jacket. Server computers generate heat as they process information, and with thousands of such machines mounted in close proximity, data centers must take measures against overheating and consequently, machine failure. At the NAP, we saw what’s required to cool the data center: a hallway the length of a city block lined with 15 foot-tall air conditioning units.

**Security Concerns**

One thing I did not anticipate prior to my tour of the NAP was the paramilitary-style operations of the security team. In order for us to tour the facility, we had to clear two checkpoints. The first was a standard, airport-style metal-detector walkthrough at the front entrance. On an upper floor, to enter the actual computer area, our guide gained access via a biometric hand scan. Further permission to the enter locked rooms, elevators, and hallways required key card access. Cameras and guards continuously monitor the entire facility.

Physical security is extremely important when dealing with data, and the NAP’s measures are typical for large data centers. Most theft is not caused by high-tech hacking, but via low-tech means. Just as identify theft is five times more likely to be caused by stolen wallets than Internet crime, the removal of actual computers and components from an office are more probable security risks than an online attack.
For this reason, any company or individual with sensitive data needs to ask themselves the following questions: Who has access to my equipment, including employees, cleaning staff, and landlords? And where are my machines better protected - in a server closet or in a fortified data center?

**Redundant Power and Connectivity Sources**

So what happens if you run a data center containing thousands of computers and the power goes out?

The answer is the power doesn’t go out. A facility as large as the NAP of the Americas is fed by two independent electricity substations. If one of them suffers an outage, then the NAP can draw from the other. If both power sources are knocked out, then the NAP powers itself with an uninterrupted supply of electricity. Row after row of rooms house backup generators, providing sustained emergency power for the center’s operations.

What happens if the internet connectivity itself is interrupted? Major data centers have multiple sources of Internet connectivity, often entering the facility at different locations to protect against failure and physical damage. The NAP maintains redundant connections to the Internet by its nature, as it serves as an exchange point for multiple communication providers. A surplus of Internet connectivity is common for data centers. For example, Rackspace, a leading player in server hosting, partners with no less than nine different Internet providers for redundancy.

**Data Centers Evolved For The Cloud**

As more and more computing takes place in the cloud, the need for more powerful and efficient data centers has increased. Google, Microsoft, Yahoo, and Amazon have all invested in the next-generation data facilities in the Columbia River Valley. In their effort to bring their cloud offerings to market, these companies designed facilities to house tens of thousands of computers operating at a higher degree of efficiency than most of today’s existing data centers.

The scale of these new data centers is colossal. The Microsoft building in Quincy, WA measures over 469,000 square feet, large enough to house approximately seven Boeing 747 airliners. In order to reduce electricity needs, alternatives to air-conditioning cooling schemes are needed. The chilly waters from the Columbia river, piped through these facilities, prevents overheating. The river is also a source of hydroelectric power. And the ready availability of high-bandwidth fiber-optic cable makes this geographic location a particularly rich one to drive the increasingly larger and more powerful cloud.
The Future of The Cloud

Even though we’ve come far with Internet-based computing, we’re only in the beginning phases of a massive movement towards increased usage. Economics already drives this adoption, as more businesses, especially smaller ones, recognize that their bulky client-server networks, security and backup practices, and software licenses are better handled via Software as a Service companies or other Internet computing providers. As familiarity and confidence increases with the emergent cloud, so too will adoption. And data centers - those gigantic, windowless, modern fortresses - will power it all.
THE CLOUD ALLOWS USERS TO CONSUME COMPUTING RESOURCES THAT THEY DON'T HAVE LOCALLY IN THEIR OFFICE.

ACT I
What is Cloud Computing?

“...I start where the last man left off.”
- Thomas A. Edison

Enter Stage Left: Invention
POWER AS A UTILITY

ELECTRICITY

1991

Tim Berners-Lee
Invention of the World Wide Web

CLOUD
COMPUTING AS A UTILITY
The cloud allows users to consume computing resources that they don’t have locally in their office.

With the cloud, individuals and small businesses can snap their fingers and instantly set up enterprise-class services.

- Roy Stephan, Director of IT architecture and engineering - Intelligent Decisions

Act II
What legal professionals can do with cloud computing?
Enter Stage Right: Functionality

Calendaring  Note Taking  Document Storage

LEGAL PRODUCTIVITY
& DOCUMENT MANAGEMENT

Cue: Communication

mindmeister

MINUTES & BRAINSTORMING
& COLLABORATION
SOCIAL NETWORKING

ACT III
IS IT SAFE & CONFIDENTIAL?
ETHICAL CONSIDERATIONS

MOBILITY
PERCEIVED RISKED VS ACTUAL RISK

WHO’S IN THE OFFICE AFTER HOURS?
Disgruntled, underpaid, paralegal?

Landlord
Cleaning Lady

WHO HAS ACCESS TO YOUR DATA NOW?

PHYSICAL SECURITY

PHYSICAL THEFT > ELECTRONIC THEFT

BIOMETRIC HAND-SCAN ACCESS

24-HOUR SURVEILLANCE

128-BIT ENCRYPTION

BACKUPS

HOW FREQUENT?
IN DIFFERENT GEOGRAPHIC LOCATIONS?
THREAT MODELING

SOFTWARE PRACTICE OF IDENTIFYING ATTACKS AND CODING DEFENSES

SQL INJECTION

XSS

DATA ISOLATION

DOES THE TECHNOLOGY PROTECT MY DATA FROM THE EYES OF OTHERS?

SLA

SERVICE LEVEL AGREEMENTS

HOW MANY 9'S?

99.99%

HOW MUCH TIME

is the service guaranteed to be up for?

How reliable is your CURRENT NETWORK
- with file servers, email, etc.

TERMS OF SERVICES SHOULD ADDRESS:

DO I OWN MY DATA?

CAN I GET MY DATA OUT ON-DEMAND?

SECURITY POLICY

BACKUP POLICY
This opinion places all such software and services under the “cloud computing” label, as each raises essentially the same ethical issues. In particular, the central question posed by “cloud computing” may be summarized as follows:

May an attorney ethically store confidential client material in “the cloud”?

In response to this question, this Committee concludes:

Yes. An attorney may ethically allow client confidential material to be stored in “the cloud” provided the attorney takes reasonable care to assure that (1) all such materials remain confidential, and (2) reasonable safeguards are employed to ensure that the data is protected from breaches, data loss and other risks.

The New York State Bar Association Committee on Professional Ethics concluded in Opinion 842 (Sept. 10, 2010) that the reasonable care standard for confidentiality should be maintained for online data storage and a lawyer is required to stay abreast of technology advances to ensure protection. Reasonable care may include: (1) obligating the provider to preserve confidentiality and security and to notify the attorney if served with process to produce client information, (2) making sure the provider has adequate security measures, policies, and recoverability methods.

The Alabama State Bar Office of General Council Disciplinary Commission issued Ethics Opinion 2010-02, concluding that an attorney must exercise reasonable care in storing client files, which includes becoming knowledgeable about a provider’s storage and security and ensuring that the provider will abide by a confidentiality agreement. Lawyers should stay on top of emerging technology to ensure security is safeguarded. Attorneys may also need to back up electronic data to protect against technical or physical impairment, and install firewalls and intrusion detection software.

State Bar of Arizona Ethics Opinion 09-04 (Dec. 2009) stated that an attorney should take reasonable precautions to protect the security and confidentiality of data, precautions which are satisfied when data is accessible exclusively through a Secure Sockets Layer (“SSL”) encrypted connection and at least one other password was used to protect each document on the system. The Opinion further stated, “It is important that lawyers recognize their own competence limitations regarding computer security measures and take the necessary time and energy to become competent or alternatively consult experts in the field.” Id. Also, lawyers should ensure reasonable protection through a periodic review of security as new technologies emerge.
Massachusetts Bar Association Ethics Opinion 05-04 (March 3, 2005) addressed ethical concerns surrounding a computer support vendor’s access to a firm’s computers containing confidential client information. The committee concluded that a lawyer may provide a third-party vendor with access to confidential client information to support and maintain a firm’s software. Clients have “impliedly authorized” lawyers to make confidential information accessible to vendors “pursuant to Rule 1.6(a) in order to permit the firm to provide representation to its clients.” Id. Lawyers must “make reasonable efforts to ensure” a vendor’s conduct comports with professional obligations. Id.

PENNSYLVANIA BAR ASSOCIATION COMMITTEE ON LEGAL ETHICS AND PROFESSIONAL RESPONSIBILITY

ETHICAL OBLIGATIONS FOR ATTORNEYS USING CLOUD COMPUTING/ SOFTWARE AS A SERVICE WHILE FULFILLING THE DUTIES OF CONFIDENTIALITY AND PRESERVATION OF CLIENT PROPERTY

FORMAL OPINION 2011-200

1. Introduction and Summary

If an attorney uses a Smartphone or an iPhone, or uses web-based electronic mail (e-mail) such as Gmail, Yahoo!, Hotmail or AOL Mail, or uses products such as Google Docs, Microsoft Office 365 or Dropbox, the attorney is using “cloud computing.” While there are many technical ways to describe cloud computing, perhaps the best description is that cloud computing is merely “a fancy way of saying stuff’s not on your computer.”

THANK YOU!
info.rocketmatter.com/cloud-computing/