

Joseph Zimmerman Jr. passed away to little fanfare in Brookfield, Wisconsin at the age of 92. The man who invented one of the first telephone answering machines in 1948, credited his inspiration for the device to the fact that his air conditioning and heating company could not afford an assistant to take calls when he was away from the office.

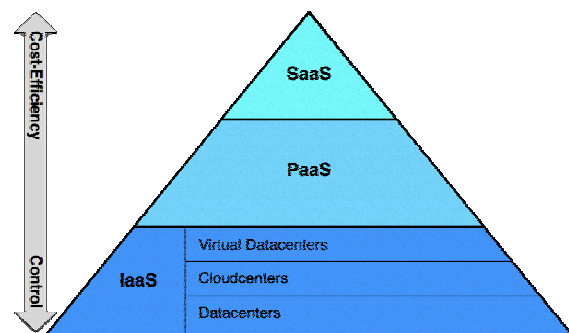
In 1971, PhoneMate capitalized on Zimmerman's idea when it introduced the Model 400, one of the first commercially viable versions capable of holding 20 messages on tiny reel-to-reel tapes. Before long, convenience quickly evolved into necessity. However, limited storage capacity meant those tiny tapes began to accumulate; the reels wore easily and tangled frequently and technological improvements required users to constantly upgrade from one machine to the next.

Fortunately, voice mail – the process by which seemingly infinite quantities of messages could be remotely stored and managed – eliminated these limits and headaches. Users no longer bore the responsibility for personally maintaining and replacing the technology while the amount of information at their disposal continued to increase.

The idea that vast stores of technology and services can be tapped from afar has only continued to grow. In the same way that a massive leap in voice recording power moved from the living room, we are now seeing massive amounts of computing power moved from the corporate server room. The concept is known as cloud computing. And it has been designed to remove the costs and complexities associated with the way we work and interact.

Cloud computing uses the scalability of the Internet and central remote servers to deliver IT capability to any device with Internet access. The services offered are typically broken down into three separate segments: infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS).

In theory, the design holds great promise. Many cloud-based services eliminate the need to internally build and maintain cumbersome data centers and up-to-date software applications, reducing costs by turning fixed capital expenditures into flexible operational expenditures. The scalability of these computing resources will benefit individuals as well, whereby the greater number of people that use this technology, the greater productivity, innovation and market opportunity that will follow.



Source: [cloudscaling.com](http://cloudscaling.com)

Remotely sourced computing capacity begins with infrastructure as a service. IaaS allows individuals and enterprises to more or less rent raw computing and storage services on demand through massive server farms housed in one centralized location. The concept conjures images of buildings similar to the Pentagon, filled floor to ceiling with the latest stacks of hardware, constantly blinking and humming as various customers adjust their computing resources with the simple click of a mouse.

Customers who utilize IaaS will typically rent these services on a pay-as-you-go basis. For many companies, this approach can eliminate a great deal of the cost associated with purchasing and maintaining excess computing capacity. Microsoft estimates that IT outsourcing can reduce operational costs by at least 20%.

For start-ups who lack the capital to build their own internal infrastructure platform, this option becomes especially useful.

Platform as a service (PaaS) moves the concept one more step up the value chain. Platforms owned and operated by third-party providers encapsulate a layer of software (e.g. operating systems) on top of the infrastructure. This layer provides a service that can be used as a building block over the internet without downloads or installation. In effect, platforms serve as an environment for developers to create new applications that can be deployed over the cloud.

Finally, software as a service (SaaS) applications rest atop the pyramid. Instead of buying a software package (Microsoft Office) to be run on your own on-premise computer, users will subscribe, typically on a per-user basis, to software applications hosted on remote servers over the internet. Conceptually speaking, a power generation network operates in a similar fashion. An electric grid essentially allows centralized energy sources (such as power plants, wind mills, solar farms, etc.) to deliver power to various consumers on a per-usage basis. And like your local energy supplier, SaaS vendors provide the necessary day-to-day support and technical updates, effectively eliminating the incremental costs and expenses that are currently relegated to the consumer. In today's economic environment, every nickel counts.

Merrill Lynch estimates software applications alone hold the potential for a \$100+ billion market opportunity. They calculate \$95 billion in business and productivity applications, and another \$65 billion in online advertising. For major players like Amazon, Google, IBM, Microsoft, and Salesforce.com, the economics are truly compelling. However, while the ease, efficiencies and inexpensive nature of cloud computing make supporters optimistic, concerns surrounding quality control, latency, reliability and security keep others mindful of its current limitations.

Ensuring privacy and confidentiality remains priority number one. For example, the recent disclosure by Twitter that a hacker had breached company data stored on Google Apps captured significant attention. On a larger scale, suspicion that North Korea initiated a cyber attack on government Web sites in both United States and South Korea elevates these concerns to the highest levels.

Despite these setbacks, the catalyzing effects of IT outsourcing seem overwhelming. The tipping point, in fact, may have already come and gone. As the expectations for online experiences continue to grow, more and more consumers and IT organizations insist on efficient, easy-to-use applications that deliver the desired result in a matter of seconds. That is, leveraging the cloud's potential becomes a matter of necessity, rather than choice.

In a sense, the combination of these applications effectively creates networks that allow people, companies and markets to interact in seemingly unlimited ways. Before firms like eBay and PayPal leveraged the Internet's potential, the odds of a collector in Colorado ever finding a rare coin in China were infinitesimal. And what eBay and PayPal accomplished from an economic standpoint, Facebook and Twitter are accomplishing from a social standpoint. The possibilities are literally endless.

So, what began as something Zimmerman liked to call the Electronic Secretary, a device, according to an obituary in the *Milwaukee Journal-Sentinel*, that weighed 80 pounds and operated by lifting the phone's receiver up off the cradle, has evolved into a vast network of information-processing entities that few, if any, could have ever imagined. The potential for cloud computing to unleash an avalanche of change certainly exists. The exact timing, however, is anyone's guess.

Brown Advisory  
September 2009

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