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10 Ways
Cloud is Changing
the World

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Introduction

When people talk about “the cloud” they may think it is just stuff for business, or those less educated in computer terminology may even think of the fluffy white things in the sky. In reality, the cloud is just a fancy way of accessing things stored somewhere on the Internet. It may involve interacting with others or just accessing data out there, by you or others. The cloud revolution is truly a revolution—the way we work, learn and even play is very different now than it was just 10 or 15 years ago and, as the Internet becomes more pervasive and connections get faster and faster, will probably be a lot more different in 10 or 15 years. There are several companies, such as Google and Facebook, that are looking to expand Internet access to the most remote parts of the world. Mobile phone-based Internet is available in almost every country—even very poor ones.

With this in mind, let’s look at 10 ways the cloud will (and to a large degree already has) changed the world.

Systems Entertainment: Streaming Audio and Video and Storing Video Purchases in the Cloud

One of the most common and visible ways that the Internet affects us is in entertainment, so let’s start with how we play.

We’ll begin with audio. Almost 100 years ago, you got whatever a handful of broadcasters chose to put on the radio, and if you weren’t listening when it was broadcast, you missed it. You might have had a few records to listen to for music, but that was about it. Records got scratched, skipped and weren’t very portable. Not much changed until the 1960s with eight-track tapes, which were more portable, but by today’s standards pretty large. In the ’70s and ’80s cassette tapes became much more popular, but you couldn’t skip between songs easily and the tape would occasionally come out of the case and get wrapped around the internals of the player. Not fun! Cassettes were smaller and lighter and much more portable, but they still required a (relatively) large player, at least by today’s standards.

The next big revolution was the CD—much smaller and lighter than records, though a little larger than tapes. CDs could skip between tracks instantly and play in high definition. Things changed again in 2001 with the introduction of the iPod. It could hold thousands of songs and fit in the palm of your hand, and the battery would last for many hours. This was a huge improvement! Nevertheless, who has an iPod today? We stream music over the Internet from a variety of sources like iTunes Radio, AccuRadio, Rhapsody, Spotify or Google Music, to name just a few. CD collections have become a rarity as we can store all the music in the cloud. It’s possible to maintain an active music library of millions of songs for less than \$10 a month.

Video was much the same, starting with broadcast TV in the 1930s. Reception often wasn’t good, necessitating either rabbit ears on top of the TV or an unsightly antenna on the roof. You still had to be home and watching when your TV show came on. In the 1940s, those who lived where TV reception was poor began to put big antennas on a hill and then run cable to a bunch of homes—the start of the cable TV industry. In the 1980s and ’90s, cable TV channels multiplied rapidly, providing ever more variety of programming to watch. Still you had to be watching when your show was on, unless you had a VCR, but even then you had to know how to program the thing as well as when and what channel a show was on. That changed in the 2000s with the advent of the DVR, enabling you to record the shows you wanted to watch, and with its integration with the Internet, the DVR would know what shows were playing when and on which channel. This was much simpler and a big game changer.

Today, we watch “TV” on many devices that aren’t televisions, such as tablets, phones and computers. DVDs are now stored in the cloud and can be watched from any device. Even more disruptive to the old cable TV industry is streaming movies and TV shows over the Internet using services such as Netflix, Amazon Prime Video and Hulu, to name just a few. Video can now be watched on demand, not only when broadcast. This has led to a whole new term, “cord cutters”, for those who have gotten rid of cable to watch online only and save the monthly cost of cable (now around \$125 a month on average).

Education

Another big change is to the way we learn. In years gone by, students would go to schools—from elementary all the way through college—and sit and listen to a teacher, who had been educated in the very same way. The problem is that teachers can only effectively teach so many people in a classroom and getting to that classroom can be expensive and is out of reach for the vast majority of people on the planet.

Solution? Well there are several. First is online, or distance, learning. This method is often used even by young students who are home-schooled. Many schools now require students to take at least one class online, and many get degrees entirely online, whether in college or high school. Many, many more people can be trained in this way. Khan Academy, for example, grew out of the need that a relative had for tutoring and assistance from another relative not living nearby. Today this free site provides Web-based learning on a broad range of subjects in a multitude of languages.

Similarly, meetings between groups of people are held online using WebEx, GoToMeeting and other similar products, allowing project collaboration by people around the world. People can view and share documents, see each other and work from almost anywhere.

Another even more common way the Internet has changed our education is e-books. From the young who like to carry around a library on their e-reader or tablet, to the old who like to change the font size as their vision declines, many people love the idea of having a range of books to read. Frequent travelers love how they can always have a book to read without the weight of lugging books around.

For those who prefer to learn by watching instead of reading, TED Talks are freely available on a wide variety of topics by a diverse group of speakers and are a great way to be exposed to a broad range of ideas from the world’s greatest minds. YouTube is a great way to learn how to do almost anything, from computer-related tasks to construction to car maintenance.

Healthcare

Medical imaging is an up and coming change to the way we receive and manage healthcare. At the moment it is having the biggest effect on doctors, hospitals and other healthcare professionals and institutions, but it will soon be affecting all of us in our everyday lives.

Today, the biggest impact is electronic medical records, meaning that all of your healthcare data lives online so that other professionals who need access to it can do so without sending paper forms all over the place. You have a legal right (in the U.S. at least) to view your own medical records any time.

In the early stages now but becoming more popular is the idea of telemedicine or the ability of a doctor with a webcam to diagnose your problems without an office visit. This is especially useful when it comes to those who live in remote areas and those needing specialized care that is not available locally. At the cutting edge of this technology is the ability of a doctor to remotely manage a robot performing surgeries.

File Storage and Sharing

Next up is online file storage and sharing. In the early days of computers, file sharing took place by sharing floppy disks, but they could only store a couple of megabytes of data at most. To solve that problem, along came Iomega Zip drives that could store 100MB. In following years other competitors would increase the size to a gigabyte or more, but still you had to carry cartridges around with you and connect a device to read the data on

the cartridges. Writeable CDs and DVDs were more ubiquitous but not the most convenient, especially for synchronizing data easily. Companies had servers that could be accessed by groups of people, which made document sharing easy, but only if you were at work.

Sharing files via the cloud, on the other hand, lets you access your pictures, data or whatever you wanted from anywhere on any device at any time. The idea has been around for more than half a dozen years, but it has become mainstream and widely accepted as iPhone and iPad users store their documents and photos in iCloud, Android users store photos and documents in Google's cloud, and Microsoft email and Office users use OneDrive. All of these solutions let users take their data and store it in the cloud, potentially sharing it with family, friends and coworkers.

There are many services that specialize in just storing your files online and sharing them with others. Probably the most well-known is Dropbox. Files can be uploaded to the cloud, synchronized automatically across all of a user's devices and accessed from devices the user doesn't own through a Web browser.

Businesses wanted and needed more control over what was in the cloud, who had access to it, and with whom the files were shared. Most of the services previously mentioned have a product that offers those capabilities. In addition, some companies specialize in business-level controls of data stored in the cloud. Examples include Syncplicity and VMware's Horizon Suite.

Backup and Disaster Recovery

One of the things that most people tend to neglect is creating backups, but they complain bitterly about lost files, photos, etc., when a hard drive crashes. Part of that can be solved by storing your data in the cloud, but deleting a file locally usually also deletes it in the cloud. If a virus strike occurs or files are deleted to save space on a device, it may have unintended consequences for the files stored on other devices.

For those few who do backup (and the number today is less than 25 percent who back up at least monthly and only 7 percent for those who do it daily), backups were often created on other floppies, Zip drives, etc., depending on when the backups were being created. It got easier with the invention of USB hard drives that were a terabyte or larger in size, but the user still had to remember to back up files, and if a fire happened, for example, both the backup and the original data were usually in the same place and thus both lost.

Companies often had similar problems, as many weren't as conscientious as they should have been in creating and maintaining backups. Many didn't back up often, and even when they did, it was often to tape, which had failures at a relatively high rate. The advantage of tape is that at least it could be stored off-site easily, though many companies didn't follow this cardinal rule.

The solution to both business and personal backup is to back up to the cloud. There are many companies that offer this service, including Carbonite, CrashPlan and Norton Security with Backup to name a few. All are simple to set up: Just install an app and the computer will back up to servers hosted by the provider automatically and either continuously or on a schedule you define, such as every night or every 15 minutes when the computer is idle. These services differ in the space offered, the number of devices protected and the cost, and they offer additional options for businesses over the less expensive home user plans.

Backup is good for individuals who lose a phone or even experience a catastrophe like having their home destroyed by flood or fire, but for businesses, the time it takes to restore all the data stored in the cloud may be prohibitively long; they may be out of business before everything gets restored. For them, there are options to have equipment in the cloud they can use to quickly get back online again. Companies and products that offer this kind of service include VMware's vCloud Air, HotLink DR Express, Zerto and Sungard Availability Services.

Mobile Apps

Mobile apps on tablets and smartphones are another good example of leveraging the cloud. Data is often stored on servers and used locally or compiled from individual devices, aggregated, and sent back out to users, such as the way Waze provides traffic information or Google Transit tells you the bus schedule and the process to get from where you are to where you want to go. Many games store information on your score, level, etc., in the cloud, and even productivity apps like Microsoft Office use the local device for the processing but store documents in the cloud. E-readers work the same way. Read on a Kindle or Kindle app and you will automatically be synchronized to the last page read on any device, making it easy to switch from device to device as you read. Any notes, highlights, etc., are automatically stored in the cloud and synchronized between devices. Many of the education apps described previously do the same thing.

Social Media

In the past, if you wanted to keep track of friends and their life events, you had to call them or write them. While many people still keep up with an annual Christmas card or something similar, social media changed all that for most people.

Today, there are over a billion Facebook users, not to mention those who use Instagram, Snapchat, Twitter and other ways to keep friends and family informed of what is happening in their lives, to share interests, etc. This category is already so ubiquitous that little more needs to be said.

Recovery Internet of Things (IoT)

In years gone by, when the stuff we own—cars, dryers, light bulbs and such—had a problem, we'd replace the item or take it to a specialist to diagnose and repair. That person would have expertise, much like a doctor, and would use it to try to figure out what was wrong and how to fix it. Like a doctor, there was trial and error involved and sometimes it took multiple attempts to guess what the actual problem was and address it.

That situation improved when computers were embedded in many of those devices, giving the repairman an error code to know what the problem was and increasing the odds of fixing it right the first time. This has greatly reduced the down time when a failure does occur, although it is still an inconvenience.

Today the situation is much improved and over the next five years or so, experts estimate that many billions of devices will be connected to the Internet. This is called the Internet of Things (IoT). It is different from today where most of the things on the Internet are devices with people behind them. Moving forward, many of those devices will be things that aren't directly interfacing with people.

Today, if your car breaks down and you have the appropriate service from the manufacturer, your car's computer can automatically connect with the manufacturer, have them call you and explain the issue and direct you to the nearest repair shop, or even send help to you. On some high-end appliances today and on most of them within a few years, the onboard computer is connected to the Internet and alerts the repairman to call you and schedule a visit before it even breaks. It could even use Radio Frequency ID (RFID) technology to monitor what is in the refrigerator and alert you when you are out of milk or to sense an imbalance in the washer and text you.

What about more mundane devices that are not as large and expensive as appliances? Today you can buy Phillips hue light bulbs that are connected to your Wi-Fi network and allow you to change the color or brightness on demand, have timers that automatically adjust the colors or shut them off, or even use events like the phone ringing or an email arriving to change the color of the light and alert you. You could get a Nest thermostat and change the temperature in your home to a more cost-saving level while you're away, and then connect on your drive home or while at the airport to return to the temperature you like. You can buy door locks that open when they have your phone placed near them using near field communication (NFC)—the technology that Apple Pay and Google Wallet use—so you don't need to carry keys. Some hotels even use this technology today instead of giving you a room key.

On a much larger, more expensive scale, the engines in modern airplanes gather thousands of statistics every minute and can relay to the ground when an issue is beginning to occur so a maintenance crew can meet the plane at the airport with the right parts, reducing the odds of a mechanical delay. Other parts of the aircraft can do the same thing and report data via satellite to ground crews.

The IoT is in its infancy, but the use cases will grow exponentially over the next few years. What an exciting time!

Home Security

In decades gone by, if you weren't home, you didn't know what was going on there.

One of the early uses of wireless communications at home was for baby monitors. With them, you no longer had to keep checking on the baby or wait until he or she cried loud enough for you to hear. Today, some of these monitors can be accessed over the Internet so you can check on your child while he or she is being cared for by an older sibling, babysitter or nanny.

As the Internet became more pervasive, alarm companies were created to monitor your home for break-ins, fires, etc., and to alert you. These companies still exist, but in many cases you can augment them or bypass them entirely with access to webcams, microphones, etc., to see what is going on inside or even outside your home. You can alert the police or fire department, check to see how a caregiver is interacting with your children, etc. You can even have evidence that can be used in a lawsuit if needed, and all of this can be accessed wherever you are in the world. It is also possible to interact with your family while away on a trip to read a story with your child or to go over homework together.

E-Commerce

We'll end as we began with another ubiquitous use of the Internet: e-commerce. In decades gone by, retailers would send catalogs through the mail to entice you to buy things. You could then get those things delivered to your home or go to the store and pick them up. In fact, an early use of this was in the early 1900s, when all the parts for a home would be delivered by Sears. Unfortunately, companies spent a lot of money and time mailing these catalogs to many people and caused untold numbers of trees to be converted into catalogs. It was even more difficult (and expensive) if you wanted to buy and mail a gift to someone overseas.

Amazon.com was an early entrant into the field known today as e-commerce. The company would buy an inventory of books and, when an order was placed, ship books to readers anywhere in the world. Over time they have grown to sell many other types of items, including digital ones. In the early days of e-commerce, the user experience was very basic and poor because the Internet connection speeds were so slow. As connection speeds improved, so did the buying experience. In the mid-2000s, as connection speeds rose to a level that allowed much greater collaboration online, Amazon even began to rent time on servers, storage space, etc., to customers, naming the service Amazon Web Services (AWS).

Other physical stores—now often called brick and mortar stores—got into the act, selling their goods online as well. Companies include virtually every major retailer today, including Sears, Wal-Mart and Best Buy, not to mention many niche players and sellers of boutique items. Now it is possible to purchase virtually anything from a local provider and have it shipped anywhere. Should I have a desire to send a gift to family or friends in Australia, I can go online to an Australian retailer and have anything I want delivered and pay inexpensive domestic shipping instead of the very expensive international shipping that was previously required.

Not only has retailing gone online, but companies have been created to put digital coupons online (RetailMeNot for example) as well as to advertise and offer sale prices on local goods and services (Groupon for example). Other services let you view and rate companies online (such as Angie's List) and then sell specials from some of the companies being rated to their subscribers as a form of advertising.

Conclusion

While many of these things are common in first-world countries, they are spreading to more and more places and providing a greater level of opportunity so that even those in remote places can understand our world, access medical and educational resources, and so on. As the Internet reaches more places at higher speeds, this transformation in the way we live, work and play will only accelerate. For example, the U.S. Federal Communications Commission (FCC) has recently defined broadband access as having a connection of at least 25 megabits per second (Mbps) downstream, up from just four in 2010. As we have higher and higher speed connections to our homes and jobs, providers are getting more and more advanced in what they can do.

This journey will be an exciting one. Enjoy the ride!

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John Hales, VCP, VCP-DT, VCAP-DCA, VCI, is a VMware, SDN and SoftLayer instructor at Global Knowledge and a lead instructor for SoftLayer training worldwide. Hales is also the author of many books, from involved technical books from Sybex to exam preparation books, to many quick reference guides from BarCharts, in addition to custom courseware for individual customers. He has various certifications, including VMware VCA-DCV, VCA-DT, VCA-Cloud, VCP, VCP-DT, VCAP-DCA, VCI and VCI Level 2; Microsoft MCSE, MCDBA and MOUS; EMC Storage Administrator (EMCSA); and CompTIA A+, Network+ and CTT+. Hales lives with his wife and children in Sunrise, Florida.