In the Year 2020, Part I: Cloud Computing

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In part one of our series on the year 2020, we explore the future possibilities of cloud computing.

It's Friday afternoon. Andy's had a long, tiring week, and he's thinking this would be a great time to shed the shackles of his job and kick back with a good friend over a couple of beers and a juicy steak. One problem: Andy's best buddy is off in Europe and he's stuck in downtown Cleveland.

Somewhere in New England, meanwhile, Jody and her young daughter take a leisurely drive through the countryside. It's a gorgeous fall afternoon. The weather is crisp but sunny, and the trees are ablaze with colors. Jody's daughter looks up at her from the passenger seat and says she thinks daddy would love it. Sadly, daddy's working all afternoon.

The colors aren't quite so dazzling in the hot Nevada desert, where Aaron comes to an epiphany of sorts. The ongoing saga of his divorce has taken its toll, and he's come to the realization that he needs to put his life back in order. If only there was more time in each day. If only Aaron had someone or *something* that could help him with the paperwork, the bills, the emotions, and all the excruciating minutiae he must conquer before he can soldier into the future.

If only it *were* the future.

Welcome to Part I of a three-part series here at Digital Trends on life and technology in the year 2020. We've enlisted the help of a few experts who make it their business to know where technology is moving and how it will impact us, in order to peek into the future. We'll look at the ups and the downs of the digital world a decade hence as it applies to real people, and perhaps even bewilder you occasionally with a forecast or two of what we may see.

In Part II of our series, we'll deal with biotechnology, genetics and engineering. In our final installment, we'll tackle urban planning, transportation, and the probable immediate future of our congested cities. But here in Part I, we'll get our collective heads in the clouds. Or, more appropriately, the *cloud*.

If you haven't heard about cloud computing, you will. Because cloud computing is, in admittedly simplistic terms, a far better, far more evolved information highway. With it, there will be a quantum shift in what we currently know as the Internet, and, ultimately, an equally massive shift in the way we interact with it, with each other, and with just about everything else too. We'll also look at the cloud-based devices we'll likely use – or not use – to get online and get connected to what will be, in a decade, the super-duper-ultra-information highway.

Dan Burrus

Extraordinary Solutions to Ordinary Problems

And that brings us back around to our introduction, where we met three normal, everyday people in three normal, everyday predicaments that, in 2020, may not be predicaments at all. That is, if Dan Burrus can be believed. And he usually can.

Burrus, noted futurist, keynote speaker, and founder of tech-oriented research and consulting firm Burrus Research envisions that a decade or so from now, all three of our test subjects will have options they simply do not have today.

Andy and his buddy, for example, will likely get together virtually – he in Cleveland and his good friend somewhere in Europe. They'll each walk into a video restaurant, where massive high-definition screens await at one end. They'll take seats at what for all intents

and purposes is the same table, converse and interact with one another as if they were physically side-by-side, and order those yummy steaks from the same waiter.

Our man in the desert, meanwhile, will find a little help through his tough times. And although that help won't actually be human, it'll be the next best thing – and in some ways better. Burrus calls it an "ultra-intelligent agent," an Internet-enabled, artificially intelligent entity that Aaron will customize to his own needs. He may even fashion it to take the appearance of something or someone he finds particularly pleasing. Say, the 2020 facsimile of Jessica Alba, for instance.

Aaron will wake up, saunter over to his TV or display, and come face to face with his own personal Alba. In fact, Aaron may not even need a traditional display in order to see and interact with her. She may well appear in front of him holographically, in full three-dimensional glory.

In any case, she'll offer an appropriate greeting before alerting him to all that's occurred since their last meeting. About midnight, Aaron's flight to Boston had been canceled. A few hours later, the stock he'd been eyeballing for the past few months finally hit his buy-in price. And while Aaron slumbered, she'd taken care of everything for him, booking him a bargain seat with a competing airline and purchasing several hundred shares of that elusive stock. And now, his "agent" will entice Aaron downstairs to his gym, where she'll meet him once again to coach him through a variety of custom-designed exercises.

As for Jody and her daughter, they'll have little trouble getting daddy in on the family's fun day in the country. Like we use a telephone to experience another person's voice even though we're physically disconnected, Jody will utilize a technology such as "telepresence" to both see and sense those beautiful autumn trees. In essence, he'll *be* there.

Dr. James Canton

And there's more. According to Dr. James Canton, futurist, business advisor, and author of *The Extreme Future: The Top Trends that will Reshape the World for the Next 5, 10, and 20 Years*, we'll see by 2020 or thereabouts the emergence of super-intelligence – computers and digital devices that equal or surpass the level of human intelligence. We'll have wearable digital devices of profound power, or even devices implanted in our skin. In fact,

say both Burrus and Canton, some of us may be completely device-free – relying instead on cloud access points and self-replicating nodes that will exist virtually everywhere within our ecosystem.

Defining the Cloud

So, just what is the cloud? Is it merely a faster, better Internet? In a way, yes. Burrus explains it as a bubble of information that, unlike the files on your home PC or work computer, don't live in just one place anymore. "Video, audio, graphs, e-mail, it's as if it's in a cloud all around you," he says. "It's a global cloud, and you can't escape it – unless you can't get reception."

Zubin Wadia

But there's much more to it. Zubin Wadia, CTO of ImageWork Technologies, a leading provider of technology solutions to the City of New York and Fortune 500, and a strong believer in the cloud, points out that many of the most revolutionary aspects of cloud computing will be in the amazing ways we discover to leverage it.

"The technologies that actually alter our lives will happen at the periphery of the cloud. Technologies such as flexible and extensible displays, 4G and 5G wireless communications, wireless HD streaming, more computing capability on smartphones, better mobile operating systems and nano- and micro-scale sensors."

Cloud computing disciples believe the inescapability Burrus speaks of and the complementary technologies Wadia speaks of will only increase, exponentially, in the coming years. They believe the trends we're already seeing – wherein we're all becoming accustomed to a connected world and are being catered to accordingly – will explode as those connections and the associated connectivity devices become easier to acquire and easier to use. And they believe services such as Google Apps are just the beginnings of a full-on revolution in the way we compute.

Software as a Service

Google Apps – an online suite of communication, Web, and standard office applications that has thus far proven extremely popular – is as important as it is because it breaks free

from the traditional notion of “on-premise” applications. It is, in effect, “software as a service,” a concept that offers many advantages.

For starters, users access it only when they want it, and therefore have no need to install an app on their own computers. Nor must they store the files they create. Instead, the entire thing – both app and user-created files – exists online, in the cloud. And that lessens the need for massive hard or flash drives and high-end processing power, which in turn lessens the need for monster PCs and bulky laptops, which in turn lessens the need for us to remain in a fixed location to do our computing.

Cloud Hardware

Granted, many of us enjoy a big rig PC for our endeavors (gaming, anyone?), and certainly our experts believe desktops will be with us for some time yet. However, if cloud-ensconced apps catch on in a serious fashion and potentially free us from the necessity of PCs and laptops and fixed locations – and most cloud proponents believe they will – what will tomorrow’s cloud-based devices look like?

On the personal hardware front, Burrus points to Moore’s Law, a shockingly accurate prophecy of computing power and miniaturization delivered by Intel co-founder Gordon Moore way back in 1965 that simply states, “The number of transistors on a chip will double every twenty-four months.” Burrus, fresh off a meeting with Intel executives, is convinced that “there’s no end in sight” to either the power or the miniaturization.

Pen computer projecting display and keyboard

Future portable devices will be smaller, faster, quite possibly wearable, and conceivably embeddable. Some will likely project virtual displays and even keyboards, though voice recognition may well become the input tool of choice. “We’ve achieved 98.5-percent accuracy with software such as Dragon [NaturallySpeaking], and it won’t be long until we hit 99.9-percent accuracy,” says Burrus, a proponent of voice recognition technology and what it can do for our digital future.

Wadia gives us a glimpse into his own vision of personal hardware advancement. “By 2020, the laptop will have gone the way of the desktop. Computing capabilities on smart

phones will exceed that of the laptop I am currently using. The biggest inhibitor to smart phones being laptop replacements will also be overcome with the advent of flexible, foldable displays. People will invest in larger, more flexible screens versus a faster processor or a slightly more efficient GPS chipset. One can also expect some of the first affordable compact augmented reality displays to enter the market."

And what will they look like? "In the future, it is conceivable that the smart phone is no longer a single physical unit. The memory, storage, (and) communications components would be a very small unit one could hang off a key-chain holder. The screens would just be battery plus GPU for rendering and a Bluetooth 4.0 receiver would exchange data between the core and itself."

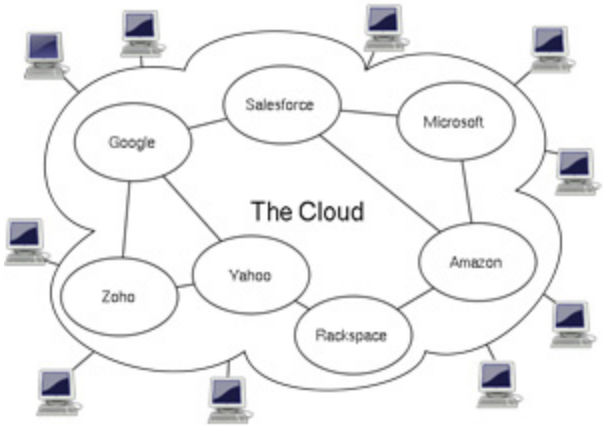
Burrus emphasizes just how critical the need for cloud connectivity will be in our digital and computing devices. "From the minute you buy [a digital device], it's connected. It will be instant on. This will happen well before 2020." Adds Canton, "In the future, power will come from speed, depth, and intelligence. The new power will be the depth of your connections."

Business as Unusual

Don't think for a minute that any of this is lost on the corporate world. In the words of Burrus, "There's a million people (globally) not currently in the middle class who will be in a decade." One would think marketing departments around the world are salivating over reaching them in an even more effective manner than today's Internet will allow. Do a search for "cloud computing," and you'll find more references to big business' involvement with it and adaptation to it than virtually anything else.

Indeed, business is in many ways leading the charge to ensure the cloud will be all that it can purportedly be. In a June 2009 survey conducted by Microsoft, fully one-third of 1,200 organizations polled said they planned to convert their application environments away from traditional client-server models during the next two years to one based on virtualization and cloud computing.

And certainly, the big tech firms such as IBM, Google, and a host of others are pouring untold gobs of money into massive server farms in which, if all goes according to plan, so much of our information will soon be stored. The latest example? A 500,000 square foot monster of a building located on a massive 180-plus acre parcel of land in the wilds of



North Carolina. It is here, experts speculate, that Apple will house much of the data for its future cloud computing services.

"By 2020, cloud computing will become the default platform for providing big data services to the consumer and the enterprise," Wadia says. "One could also anticipate separate 'climates' sprouting up to cater specific needs. High performance computing clouds like the Ekta supercomputer from Tata Communications in India. Government computing clouds like the Nebula project from NASA Ames. DNA Sequencing and Synthesis clouds could also be feasible beyond 2015."

Technological Truce

If the cloud is ever going to be as all-encompassing as its proponents believe, if it will eventually be a place where Canton says "information will find you," and if the technology behind it will, again according to Canton, spur an "intelligently tagged environment" that's independent of user devices, server upgrades are far from the only infrastructure changes we'll require. Attitudes will need to change, too.

The companies behind the cloud – Google, Amazon, Microsoft, et al – will have to play nice with each other and replace, at least in part, competition with collaboration and cooperation. The same goes for smart phone manufacturers, online providers, and any other business closely associated with the concept. Canton points to today's portable digital devices as an example, saying the primary reason we've yet to see a fully converged device that brings together TV, radio, Internet, phone, music, and entertainment has more to do with a lack of standards than anything else. For his part, Burrus claims the biggest holdup right now isn't technology, but humans and freedoms.

Escaping the Cloud

That brings us to one of the biggest fears for both businesses *and* individuals – privacy. If by 2020 or thereabouts, we find ourselves in a society where cloud access is omnipresent, where information will find you as easily as you can find it, where the cloud becomes so vital that even your most personal medical records are stored within it, how can we be sure we won't see even more serious transgressions and malicious attacks and more serious consequences than we do today?

We can't – at least not yet. "There *will* be attempted intrusions into our lives," says Canton. "There's definitely room for abuse and attacks on privacy and civil liberties." And what of the potential for an Orwellian state wherein Big Brother sees all and knows

all? There appears to be no guarantees, especially for those who already live with regimes that operate this way. “If you live in North Korea, you have an issue with Big Brother.”

The Money Question

How will we pay for all of this?

Surely a “software as a service” model will demand some sort of subscription fee, though beyond that, it’s unclear. If the cloud becomes as essential as many prognosticate and ultimately blankets our society, might we pay for it through our tax dollars?

“Taxes are a possibility,” says Burrus. “But I’ve been an accurate forecaster for a very long time, and I do that by concentrating on things I know. It *will* be paid for, but these things evolve and change in time, and I don’t know yet how it will work.”

Wadia hastens to remind us that since Joe Q Public isn’t the only one benefitting from the cloud and all the changes it will bring, so he certainly won’t be the only one paying for it. “In exchange for a large piece of content equity, corporations are willing to invest in elastic infrastructure that results in more uptime, ubiquity, and lower costs for the consumer,” In other words, they’ll foot the bill as long as there’s something in it for them. “Google gains a lot by owning search and being one of the leaders in video and e-mail. They understand consumer web behavior better than most. Facebook and Twitter are other niche examples of corporations building out clouds because they feel the social network, and the content exchanged within it, is valuable.”

Imagining the Possibilities

The potential power of cloud computing goes well beyond consumer convenience and business profits. It could even have humanitarian applications.

“Beyond sensors for motion, direction, and location, smart phones (of the future) will have the capability to measure altitude, pressure, luminosity, humidity, gravity, sound, temperature and infra-red emissions,” says Wadia. “Imagine a world where people with these smart phones could be emitting real-time vibration telemetry to the cloud. Whenever a cumulative spike in vibration occurs, one would know some unusual geological activity was occurring, potentially an earthquake or if the perimeter was small, a terrorist event.”

“This requires some pretty complex and expensive remote sensing infrastructure today, but sensor ubiquity and cloud computing can make a number of such use-cases reality without too much effort or cost.”

And that’s just the beginning. What else will evolve? You’ll have to stick around for the next decade to find out.