



(Photo by Sean Gallup/Getty Images)

#### CLOUD COMPUTING, DATA CENTER DESIGN

## How Cloud Has Changed the Data Center Architect

Cloud computing has fundamentally changed the way we deploy applications, control users, and deliver resources; and our ability to interconnect data centers today has allowed organizations of all sizes to be more agile and cost-effective.

As this cloud evolution continues, it's critical to understand that beyond all of these future technologies sits the data center. Your underlying hardware resource architecture is meant to support a truly expansive array of solutions that has allowed us to far surpass the point of one service per one server.

Today, physical buildings still stand, physical servers need to be managed, and resources must be controlled. However, sweeping changes have taken place. One of the most critical pieces of the modern data center is the data center architect. This is the individual who must clearly understand the requirements of your entire infrastructure. Considerations around power, cooling, location, available utilities, and even pricing all fall under the realm of the data center architect. Now, these professionals must take a new look at the architecture that they work so hard to support. Through disaster recovery, new kinds of applications, and constant demands from users, cloud is forcing data center architects to evolve and even change some older schools of thought.

When it comes to changes in cloud and data center evolution, the trends speak for themselves. The use of cloud computing is growing, and by 2016 it will become the bulk of new IT spend, according to [Gartner](#). This will be the year when the private cloud begins to give way to the hybrid cloud, and nearly half of large enterprises will have mixed deployments by the end of 2017. Furthermore, [Cisco](#) reports that by 2018, more than three quarters (78 percent) of workloads will be processed by cloud data centers. And, by 2018, 59 percent of the total cloud workloads will be Software-as-a-Service (SaaS) workloads.

With growth in cloud, it'll be very important for the data center architect to really think outside the box. Now, let's look at a few ways that cloud has changed the data center architect.

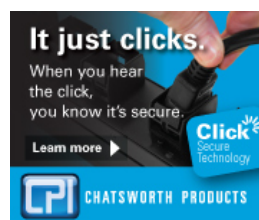
- **Data center design and convergence.** Simply put, there have been big changes in physical architecture design. New kinds of servers are being implemented in more efficient rack systems. Furthermore, considerations around new converged infrastructure have given data center architects new ways to create their underlying ecosystem. There are few more realities here to consider. There are more conversations today around commodity technologies and even more ways to effectively deploy a data center environment. Moving forward, data center architects will need to look at a variety of design options concerning their data center model. Furthermore, it's important to understand how those underlying resources work with and extend into the cloud.

- **Evolution in power and cooling.** Powerful *fanwall* technologies, new kinds of “free cooling” concepts, and evolved air flow management techniques have all impacted how the data center performs today. As a result, organizations are looking closer at hydro-electric power options as well as more effective ways to get their PUE down. For the data center architect it's critical to understand that cloud computing has placed even more reliance on modern data centers, making organizations are even more dependent on them. Furthermore, data center architects must understand how cloud technologies have changed densities, virtualization values, and the underlying hardware supporting all of it. Remember, as you're working with more “converged” systems and better multi-tenant platforms, power and cooling demands will very much need to evolve and remain agile.
- **New applications and workloads.** Data center architects must understand what they're actually hosting. They don't have to be experts in application delivery or hosted workloads, but they need to understand how hypervisors, applications, and virtual resources all interact with the underlying data center model. Why? This will help them make better decisions around future data center technologies that revolve around physical design, cooling, power, and even rack architecture. Furthermore, by understanding the tie between cloud, your applications, and the data center, data center architects can evolve into cloud architects and beyond. Having this additional skillset increases their value as an asset and can certainly help from a career perspective.
- **Uptime, disaster recovery, and business continuity.** This one is huge. The new level of demand surrounding data center resources and the level of reliance on data center technologies is forcing architects to ensure optimal uptime. Cloud computing has made a big impact on the resiliency of the modern data center by helping extend complex resources over vast distances. The data center architect must understand what happens during a disaster event. New kinds of DCIM tools create visibility spanning multiple data center points and allow you to see how resources are being utilized. New methodologies around global server load balancing allow users to be dynamically redirected to the data center with available resources. Bottom line: There is a lot more automation, orchestration, and intelligence built into the modern data center to help support the cloud. Today, data center architects must be aware of those kinds of tools and how they help extend their data center infrastructure.

I recall speaking at the 2012 Uptime Symposium in Santa Clara where I focused on how new technologies like cloud and virtualization are drawing new kinds of data center road maps. It was a room *full* of data center engineers and architects eager to hear how cloud computing was going to impact their data center. Over the course of just three years, we've seen global data center IP traffic double from 2.6 zettabytes/year to more than 5.2 ZB/year today. And trends indicate continued growth.



The message then was to be aware of what's happening in your market, the industry, and with end users. Today, the idea is much of the same. Data center architects must know that they are now the foundational pieces of cloud computing. Their roles within the modern enterprise help not only create data center efficiencies but also direct organizational competitive advantages.



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## About the Author



**Bill Kleyman** (437 Posts)

Bill Kleyman is a veteran, enthusiastic technologist with experience in data center design, management and deployment. His architecture work includes virtualization and cloud deployments as well as business network design and implementation. Currently, Bill works as the Vice President of Strategy and Innovation at MTM Technologies, a Stamford, CT based consulting firm.

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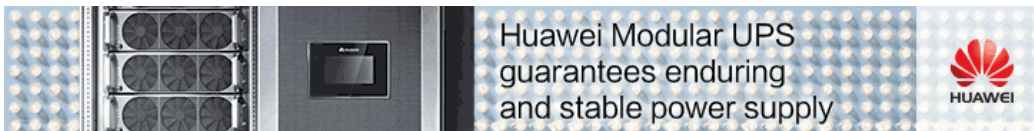


**ROBERT KEAHEY**

APRIL 21, 2015 AT 2:20 PM

An interesting offshoot of the private and hybrid cloud model is the question of "where is the data center edge?" in the future. Physically, it's pretty simple, but virtually, and especially in the area of networking, it's another question. Carriers are looking to extend services deeper into the data center. And some large enterprises are looking to push the edges farther out, taking over some of the traditional carrier-based services. Is the top of rack the new line of demarcation for networks? Or is actually outside the physical walls? Ultimately, application owners just want IT services that allow them to place applications (workloads) in the most appropriate place. They want the underlying infrastructure, whether physical or virtual to "flex" to their needs. What does this have to do with the data center architect that Bill describes? I believe he/she has to think not just in terms of physical design, but also in terms of "service" design. The data center architect of the future has to think about how the physical infrastructure can be effectively and efficiently allocated to rapidly changing business, application and technology demands. All this has to be enabled through software automation and orchestration. The data center architect is going to a multidimensional role. And it's going to be a very big and important job!

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