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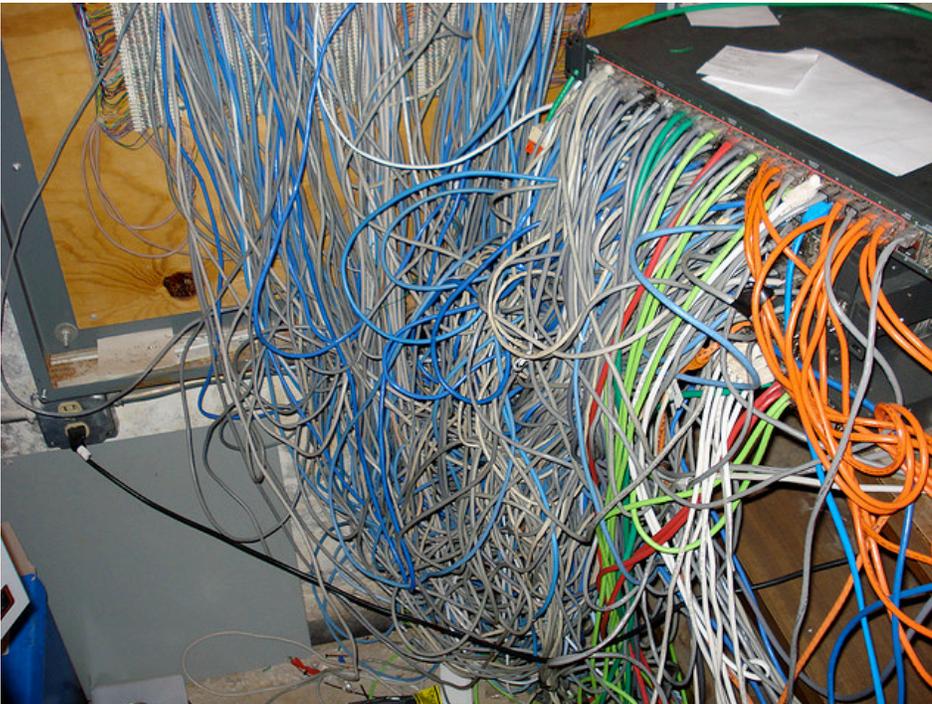
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Virtualization's Limits, and Optimal Use in the Cloud

[Eric Johnson](#) posted in [Blog](#), [Featured](#) · March 14, 2012 11:42 am



Knowing virtualization's limits and applying them to virtual machines -- as well as virtual networks -- can help optimize.

Virtualization has been increasingly used for leveraging underutilized compute resources, but there are questions about whether we are trying to use virtual machines (VMs) in situations for which they were not intended. Virtual computing has a much longer history than most imagine. Like many technological approaches that have been repurposed over time (Tag Switching/Multiprotocol Label Switching, or MPLS, comes to mind), virtual computing initially had a different value proposition, enabling legacy applications to execute on modern systems.

Today as we use VMs more extensively we tend to gloss over the fact that from a systems engineering perspective, regardless of how much we abstract the virtual from the physical we are still left with physical system constraints. In cloud computing architectures one of the key factors that will distinguish between successful — even viable — cloud computing architectures and those that are unsuccessful or unreliable, will be the degree to which these virtualization implementations map to the physical world.

For example, we can mount dozens of virtual machines on a system, but we will be gated by the physical channel within the physical host. These physical resources can starve long before some system resources such as CPU reach saturation. Even before that point, applications executing on the host may receive sub-optimal service. The same holds true for virtual switches. They are really just a logical forwarding element, essentially a shared adapter. That distinction segues to network virtualization.

In the case of network virtualization, many are using this term in a manner analogous to server virtualization, and in doing so they misuse the concept. Virtualization enables single resources to look and feel like many resources and conversely many resources to look and feel like a single resource; the network virtualization being discussed simply doesn't natively accomplish



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that, and to expect that behavior natively only invites disappointment. Compute virtualization natively leverages unused resources in a contained system, and is a significant tool when used properly, as in with regard to physical constraints.

Network virtualization occurs in a system of systems. It has been commonly codified as the re-location of control plane logic from that which has been implemented by the vendor of a switch, to a control plane managed remotely using a customer's implementation of control plane logic. Based upon this, most believe that the establishment of multiple control planes is adequate to "virtualize" the network.

Yet this methodology by itself is inadequate to utilize unused network resources. Greater global knowledge, higher layer knowledge, and more dynamic affirmative capabilities than exist by simply abstracting multiple control planes from the data plane are required for network virtualization to natively use underutilized network resources and to be more analogous to compute virtualization.

Positioned properly, both compute and network virtualizations are incredibly powerful tools to architect and build unified data centers and networks we all want and need. However, in current widely discussed network virtualization approaches, the inability to provide affirmative measures of service delivery simply means until we do so, these abstractions will be of greater academic value and less value add for production environments.

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Eric Johnson is Chairman and CEO of ADARA Networks. He is a subject matter expert, and speaker on advanced technology, networking, security, cloud computing and architecture, and he is an advisor to Congress and the Department of Defense.

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As Chairman and CEO of ADARA Networks, Eric Johnson is responsible for guiding the direction of the company and overseeing technology advancements. Johnson is a subject matter expert, and speaker on advanced technology, networking, security, cloud computing and architecture, and he is an advisor to Congress and the Department of Defense.

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