Realtime publishers

How the Software-Defined Data Center Is Transforming End User Computing

The Essentials Series

sponsored by vmware®

David Davis

Copyright Statement

SDDC–Powered Virtual Desktops and Applications

Virtual desktop infrastructure (VDI) offers many benefits, but the pain points of implementing VDI are also well-known:

- **Large upfront CAPEX cost and complexity.** Typically, to bring up a new VDI, companies must purchase new servers and new storage infrastructure capable of handling the massive I/O requirements of VDI. To bring up the new infrastructure for VDI, companies typically purchase new network switches, routers, and firewalls, and make many network, storage, server, and even power infrastructure configurations.
- **Infrastructure silos.** Many companies create silos of server and storage infrastructure just for VDI workload, away from the regular production infrastructure, to try to prevent security and performance issues; however, this setup is in itself a huge cost and management inefficiency.
- **Security concerns.** By moving potentially hundreds to thousands of end users to the data center (where security is typically more relaxed than at the edge), enterprises are concerned about increased security threats borne by virtualized desktops and applications that are still susceptible to email and web-borne security threats because desktop virtual machines still have access to the Internet but are now sitting on the trusted side of the data center firewall.
- **Over-provisioning.** To mitigate VDI boot storms, antivirus storms, and other IOPS-hungry VDI events, companies typically over-provision their infrastructure, multiplying the costs and infrastructure requirements.
- **Poor end user performance.** It's common for VDI to be implemented and have end user application performance fail to meet expectations. This outcome results in additional infrastructure or solution purchases (think caching or flash storage) and, in some cases, if the end user performance can't be resolved, abandonment of the VDI project.

So how can the software-defined data center (SDDC) help mitigate these VDI pain points?

Three Pillars of SDDC and Desktop/Application Virtualization

We've talked about how the SDDC abstracts, pools, and automates the data center, but the modern SDDC vision offers much more than that, providing functionality all of which benefits desktop and application virtualization.

Thanks to advancements in software technology, flash storage, and the massive compute power of x86 servers, today's vision of the SDDC extends beyond virtualized compute to also include virtual storage—that is, software-defined storage (SDS), virtual networking and security including software-defined networking (SDN), and hyperconverged infrastructure (HCI) as the SDDC-enabled infrastructure that brings it all together. Let's explore each before we talk about how they help desktop and application virtualization.

Virtualization

The first of the three pillars that make the SDDC possible is server virtualization. Thanks to the increasing performance of the x86 architecture, combined with x86 server OEM advancements, it's possible today to virtualize even the most critical production application. When it comes to VDI, server virtualization combined with new capabilities like graphics virtualization help to deliver better economics for VDI with more desktops per host, and those virtualized desktops will have better graphics performance and responsiveness than ever before. In addition, these advancements provide linear scalability for VDI.

Software-Defined Storage

SDS is part of the essential kernel of the SDDC and is an enabler for HCI. The second pillar is enabled through the separation of storage management software from actual storage capacity that resides in hardware. SDS virtualizes and pools server-embedded storage capacity (in the form of disk and flash) across a cluster of SDS-enabled hosts, into a distributed data store that any virtual machine (e.g., virtual desktop) in the cluster can access based on storage policy. SDS systems typically provide advanced, virtual machine-level storage functionality such as high availability, caching, buffering, and more. VMware's Virtual SAN is an example of an SDS solution.

SDS helps shrink storage TCO, providing desktop-worthy levels of IOPS and sub-millisecond latency from industry-standard x86 servers, solid state disks (SSDs), and hard-disk disks (HDD). When IT needs more desktop or application storage capacity, SDS enables rapid "scale up" by simply adding SSDs and/or HDDs to SDS hosts in the cluster, avoiding the expense of adding a complete storage system controller and the common (but expensive) practice of over-provisioning for IOPS. If storage needs grow quickly, IT can easily "scale-out" by adding more nodes to an SDS cluster, running on standard x86 servers, SSDs, and HDDs. Typical SDS configurations start with a minimum of three nodes, allowing for varying levels of resiliency against loss of a node through data-striping or other techniques.

Software-Defined Networking

Similar in concept to SDS, SDN is the separation of the network management and policy layer from the actual physical network (see Figure 3.1). With SDN, the network is defined fully in software as programmatic capabilities (e.g., switch, router, load-balancer, firewall) that can be virtually combined to deliver network services and administrator policy. The SDN elevates the network intelligence traditionally borne in custom hardware to software functionality embedded in each instance of the hypervisor, across the data center. In this approach, the actual physical network is treated as simple (i.e., dumb) IP transport that services the SDN layer's needs, with the SDN encrypting all traffic end to end. VMware's NSX is an example of an SDN solution.

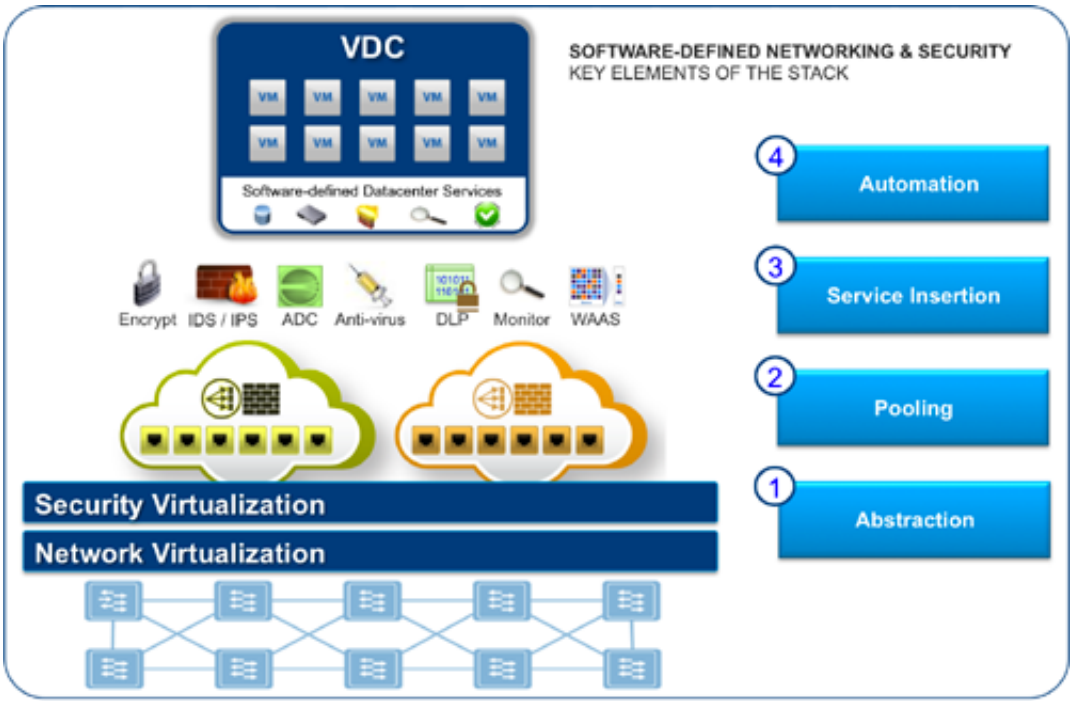

Figure 3.1: SDN

SDN helps desktop and application virtualization by allowing administrators to easily create more application-centric, role-based networks. SDN enables software implementation of policy that would be impossible to operationalize using physical networking hardware. Consider a technique called micro-segmentation, in which an SDN can place each virtual desktop inside its own virtual network container/firewall, through which only policy-permitted traffic may pass. This prevents unauthorized traffic/communication between not only virtual desktop neighbors but also between desktops and server workloads, preventing the cross-infection from one compromised desktop (say, due to a malware attack started via email or web browser within the desktop virtual machine) over to a database server.

Automation of policy is another benefit of SDN because centralized rulesets can be dynamically and automatically delivered to virtual desktops as soon as they are instantiated by the hypervisor. This attachment persists and follows the virtual desktop, even as it traverses the infrastructure, as in the case where a virtual machine moves from one host to another.

In the case of VMware NSX, SDN can also service-chain partner capabilities through APIs. For example, an antivirus partner can "tag" a virtual desktop after it fails a scan, based on which the SDN controller can quarantine that desktop and lock down all traffic to/from that virtual machine.

Management, Automation, and Orchestration

In addition to the three pillars of server virtualization, SDS, and SDN, a crucial piece of the SDDC that ensures it all works is centralized management, automation, and orchestration. Centralized management gives you a single point of control, monitoring, and troubleshooting for the SDDC. Automation allows you to perform common tasks, over and over again, faster and more reliably than ever before. Orchestration allows you to bring multiple pieces of the infrastructure together, to work as one and run complex tasks, quickly, and, typically, through a self-services portal designed for power users and application owners.

Bringing It All Together: HCI

HCI brings together x86 architecture, server virtualization, and SDS and SDN into an appliance or scale-out form factor that can be easily consumed and expanded. HCI appliances can include SDN, but it is typically not included when initially purchased and deployed except for large-scale platforms such as VMware's EVO SDDC, which include integrated NSX capability.

HCI is ideal for desktop and application virtualization because it includes the agility and low-cost, high-performance storage that VDI requires. HCI is also ideal for VDI because of its easy scale size/step size such that when you need more capacity, you can easily add another node without a forklift upgrade or large CapEx spend.

Selecting the Right Platform for Your VDI

From this series, you should have learned how the SDDC vision benefits desktop and application virtualization. With so many platforms available to address the challenges associated with implementing VDI, how do you select the right platform for your VDI implementation?

Consider the following five factors when selecting a platform for VDI:

- **SDDC.** Is the platform SDDC-capable? Can it provide not only virtualization of workloads but also automation, SDS, SDN, and advanced management?
- **SDS and HCI**. Can the platform offer SDS to allow you to eliminate traditional monolithic storage arrays or dedicated storage appliances (saving time and money), provide the storage I/O throughput that VDI requires, and manage storage on a per-virtual machine basis?
- **SDN**. Can the platform either integrate or expand to include SDN features for automation of networking and security policy for virtual desktops?
- **Cloud Integration.** Can the platform offer cloud integration such that you could easily move workloads to and from public clouds and manage both private and public clouds form a single interface?
- **Application-Centric.** Ensure that the platform you select is application-centric and allows you to manage and monitor the entire infrastructure with the applications (VDI, in this case) in mind.
- **Lower Costs.** Make sure that whatever platform you choose allows your company to lower costs when it comes to what is required to deploy and maintain VDI.

Summary

Companies of all sizes are implementing desktop and application virtualization. However, for VDI projects to be successful, companies must look at what the SDDC has to offer, including new and innovative features such as SDS, SDN, and HCI. Greater efficiency, flexibility, agility, cloud-like elasticity, and cost savings are all gained with a software-defined approach. It is imperative that you consider the SDDC before you implement desktop or application virtualization!