Becoming virtualized: the future of computation in the AEC industry

The advent of the personal computer (PC) in the 1980s carried with it the intrinsic message that every individual should possess their own "personal computer." This type of independent ownership made sense at a time when computers were used primarily by individuals working in isolation. But today, with people in the AEC industry working remotely and together, it seems like an anachronism to suggest that they need to be physically at their own PC in order to get their work done.

With the advent of low-latency, high-bandwidth network connections, and a range of new hardware and software designed for virtualization, a number of AEC firms are moving away from PCs to a virtualized computing environment. This makes virtualization a compelling solution for AEC firms that increasingly need to accommodate a highly mobile workforce. Instead of carrying a powerful laptop, employees can carry a lightweight Ultrabook (or even a tablet) while still having access to the performance of a high-end workstation.

Another advantage of virtualization is that computing resources can be consolidated. Rather than every employee having an individual workstation, there may be as many as 16 people working from a single server. These virtual computers can be tailored to each individual. Users doing basic tasks can be assigned fewer resources in order to free up even more computing power for other users. Some firms are also experimenting with a hybrid virtualization setup, whereby users have their own individual workstation for their most common tasks, but also have access to high-performance virtualized servers for when they need to do computationally intensive tasks such as rendering, clash detection, and point cloud processing.

Since the virtualized workstations can be hosted together in a datacenter, file transfer between workstations is extremely fast. Users don’t need to sync files to their local machines, but can instead work on files directly from the server. This can make a huge difference for firms that have multiple offices struggling to keep everyone in sync or for firms that have remote workers who are unable to sync large files. And since the files are stored on servers rather than laptops and memory sticks, there is less risk of project data being stolen, which is an important consideration for firms working on sensitive governmental projects.

Virtualization does have its drawbacks, particularly if you have a slow or intermittent connection back to the server. For virtualization to feel natural, the network latency needs to be below 150ms and ideally around 70ms. On a local network, this shouldn’t be a problem provided you have gigabit Ethernet. However, if the workstation is being operated outside the local network, you may require a MPLS connection to ensure the least latency.

Employees also need a period to adjust to virtualization. For those accustomed to PCs, the fact that their files and computing power don’t reside locally can be slightly difficult to grasp. In most circumstances this shouldn’t be a problem provided the change from PCs to virtualized infrastructure is managed and communicated well.

THE VIRTUALIZATION STACK

Virtualization requires a combination of software and hardware. There are four main components to the software powering virtualization:

1. The Hypervisor creates and runs the virtual machines.
2. The virtual desktop management software manages the deployment of the virtual machines to the users.
3. The sending agent creates and sends data from the server to the user.
4. The receiving agent renders the desktop on the users’ workstation.

The two main providers of virtualization software are Citrix® and VMware®.

On the hardware side, you need a server to run the virtual machine, and a client for the user to interact with. Since the client machine is only displaying the desktop and sending the user input, it can be relatively lightweight. It could even be a tablet if you are travelling. Although if you are working at your desk you probably want to go with either an HP ZBook 14 Mobile Workstation or an HP Z600 Flexible Thin Client.

The server should be highly specced. Remember that you are essentially splitting the cost of this server across the number of users accessing it. Therefore, the server should have a fast processor—like an Intel® Xeon® processor—because Revit loves GHz. It should also have plenty of CPU cores in order to maximize the number of users. Also, get as much RAM as possible, since you will be running multiple instances of the same program from one server. The number of GPUs and the way they are distributed to the virtual machines is another important consideration, particularly for 3D applications.

The HP DL380p server has been specifically optimized to support high-end 3D graphics software. These servers also feature a choice of the latest Intel Xeon E5-2600 v3 CPUs (up to 18 cores each), up to 1.5TB of 2,133 MHz DDR4 memory, and a choice of NVIDIA® GPUs, including up to two NVIDIA GRID™ K2s (@ 8 GB each). It can also support up to ten 2.5-inch drives internally and boosts 10 Gigabit Ethernet for a high-speed connection to shared data center storage. HP servers have been designed to support Citrix and VMware software with HP’s software for remotely administering virtualized workstations and monitoring performance.

ABOUT CASE

CASE exists where building and technology intersect. We combine our experience as architects, engineers, project managers, software developers, and educators with a passion for technology to improve the way buildings are designed, realized, and operated. CASE is a building information modeling (BIM) and integrated-practice consultancy. We provide strategic advising to building design professionals, contractors, and owners seeking to supplant traditional project delivery methods through technology-driven process innovation.

About CASE

CASE is a building information modeling (BIM) and integrated-practice consultancy. We provide strategic advising to building design professionals, contractors, and owners seeking to supplant traditional project delivery methods through technology-driven process innovation.

HP helps you get ahead of the curve with professional desktop and mobile workstations designed for large and complex datasets, dispersed teams, and tight deadlines. HP Z Workstations built for Pros with Intel Inside deliver the innovation, high performance, expandability, and extreme reliability you need to deliver your 3D CAD projects in less time. To learn how to configure a HP Z Workstation, visit the HP and Autodesk Page at [www.hp.com/go/autodeskmanufacturing]. Start saving now!

About HP

HP helps you get ahead of the curve with professional desktop and mobile workstations designed for large and complex datasets, dispersed teams, and tight deadlines. HP Z Workstations built for Pros with Intel Inside deliver the innovation, high performance, expandability, and extreme reliability you need to deliver your 3D CAD projects in less time. To learn how to configure a HP Z Workstation, visit the HP and Autodesk Page at [www.hp.com/go/autodeskmanufacturing]. Start saving now!