Enterprise 3-D Graphics Everywhere

How Intel, SAP, and Citrix provide cost-effective 3-D visualization across the enterprise

It's 4:00 a.m. and your phone rings. Calls this early are never good news. The caller is your frantic plant-operations manager telling you that your production line is shut down. A custom-built manufacturing system has failed, and your technicians can't find where the fault is. Their paper-based computer-aided design (CAD) drawings and manuals are several years old, and a recent equipment upgrade isn't reflected on the drawings. To make matters worse, the engineer who coordinated the upgrade is on vacation—and out of cell-phone range.

You dread calling your CEO to let him know why the company's multimillion-dollar production line is idle. You sigh, put on your slippers, and head to the kitchen for a cup of coffee. It's going to be a long day.

Outdated information is never a laughing matter, especially when your company's reputation is on the line. Immediate access to critical information can mean the difference between healthy profit margins with happy customers and a difficult call to your CEO. But how do you deliver rich, three-dimensional (3-D) information— such as manufacturing equipment's up-to-date CAD data—in real time? A combined solution from Intel, SAP, and Citrix can provide real-time, secure, and detailed 3-D information to virtually any device, which can help you avoid frantic morning phone calls.

Why 3-D Data?

From paper-based CAD drawings to bar charts in spreadsheets, two-dimensional (2-D) visualization has been a staple of businesses for decades. In addition, businesses often rely on written documents and simple images to describe complex concepts and processes. But while 2-D and the written word have their place, technical information and processes are becoming increasingly complex. 3-D visualization can provide a richer, more detailed view of complex data, technical drawings, and processes than its 2-D counterpart.

3-D content can provide a number of benefits throughout the enterprise:

- **Intuitive process learning:** If a picture is worth a thousand words, how many words is an interactive 3-D process animation worth? Enterprises who rely on complex processes can reduce learning curves by making training materials more intuitive and interactive. Instead of *describing* how to perform a task with words and static images, training materials can *demonstrate* how to perform a task using 3-D animation and high-definition video. This approach can help accelerate learning, increase understanding and retention, and reduce mistakes, which can improve the overall quality and efficiency of the training materials.

- **Improved search capabilities:** Complex structures can contain a massive number of objects, from the plumbing of an offshore oil rig to the microscopic design of an advanced microprocessor. Enterprises can build visual indexes with 3-D structures to help make information buried in large engineering drawings accessible to anyone in an organization. 3-D visualization of complex structures lets individuals visually drill down to information on specific components or parts. This data can be combined with product, vendor, and supply-chain information specific to a part to help you make more-informed business or operational decisions.

- **Better spatial analysis:** Oftentimes words and static 2-D images can't fully convey spatial relationships. How far is a wall from a desk? Is a temperature-sensitive component too close to a boiler? 3-D representations of spatial data can help inform decision making in areas as varied as office layout and automotive design. With interactive 3-D visualizations, spatial context can be added to what would otherwise be 2-D representations to help increase understanding of spatial relationships.
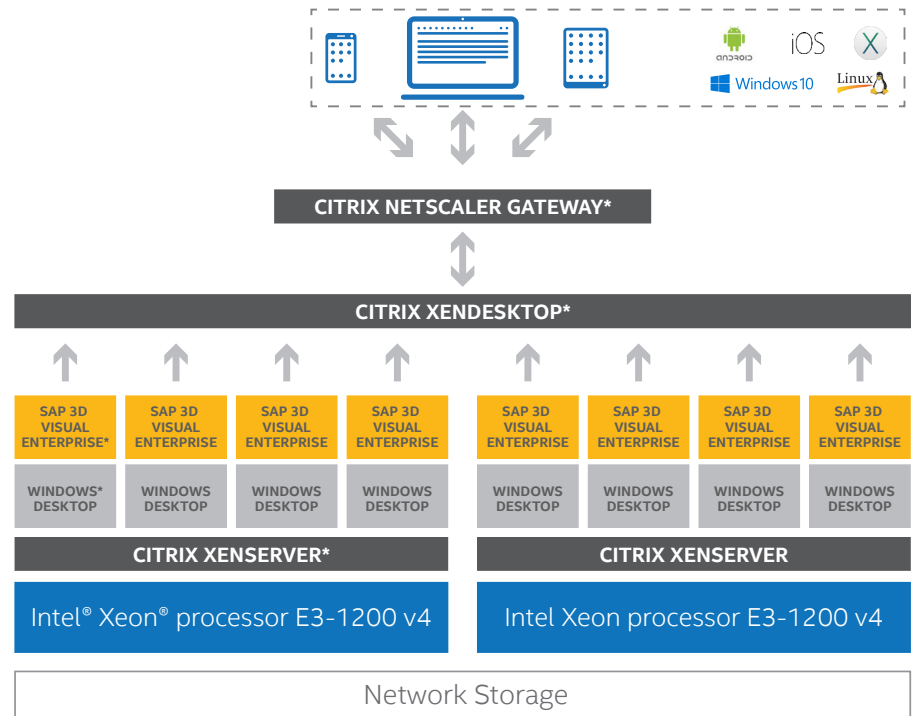

Figure 1. A 3-D–enabled solution from Intel, SAP, and Citrix delivers 3-D content to remote users on a multitude of devices

Deploying 3-D data throughout an enterprise can help improve operational efficiency and lead to better decision making when concepts or objects that are difficult to visualize in a 2-D world are at play.

3-D Anywhere: Intel, SAP, and Citrix Deliver Centralized 3-D Visualization to Virtually Any Device

A common problem with making 3-D data universally accessible is moving that data outside of engineering departments and the tools that those departments use. Engineering departments typically have the knowledge, expertise, and access to complex CAD tools to create and manipulate 3-D content. Yet CAD software licenses can be costly, the tools can be complex for non-engineering users, and the files generated by these tools can be extremely large.

Intel, SAP, and Citrix can help enterprises realize the benefits of moving 3-D data out of engineering by giving non-technical users access to complex, interactive animations and models. This combined solution provides a number of key benefits, such as:

- **Data mobility:** 3-D data can display on any number of supported devices, including desktop and laptop PCs, smart phones, and tablets. This mobility makes 3-D visualization easily accessible to field engineers and technicians who might normally not have interactive access to complex information.

- **Security:** Sensitive data is held in the data center, not on a user's device. Only encrypted display information is sent to the device, which improves the security of the confidential information.

- **Consolidation:** Multiple desktops and applications can run on a single, energy-efficient server and can be served to a larger pool of users, which can help lower capital and operational costs.

This solution combines hardware powered by the Intel® Xeon® processor E3 v4 family with powerful 3-D visualization solutions from SAP, served up to devices using 3-D–enabled virtual-desktop-infrastructure (VDI) solutions from Citrix.

Intel® Xeon® Processor E3-1200 v4 Product Family: the Foundation of Virtualized 3-D Visualization

The Intel Xeon processor E3-1200 v4 product family is the first Intel Xeon processor family with integrated Intel® Iris™ Pro graphics P6300. Intel combines both graphics and compute capabilities onto the processor, which increases performance and reduces the need for additional graphics processing components. By removing the need for additional graphics hardware, this combination of compute and graphics

also reduces power consumption and data movement between the processing cores and the integrated graphics processing unit (GPU). As a result, the Intel Xeon processor E3-1200 v4 product family outperforms the previous generation Intel Xeon processor E3-1200 v3 product family with an increase of up to 1.8x the overall graphics performance.[1]

For centralized 3-D visualization needs, Intel® Graphics Virtualization Technology™ (Intel® GVT)—featured on the Intel Xeon processor E3-1200 v4 product family—provides built-in hardware support for graphics virtualization. This technology lets enterprises share hardware-accelerated access to the Intel Iris Pro graphics P6300 GPU for remote users, and it provides the flexibility to dedicate graphics processing resources based on user need. A single remote designer or engineer might need the dedicated resources of an entire GPU, while larger pools of users with lower processing and graphics-resource requirements can share GPU resources.

In addition to its 3-D rendering capabilities, the Intel Xeon processor E3-1200 v4 product family improves video transcoding and streaming capabilities. These video capabilities provide cost-efficient performance to support multi-stream delivery of high-definition video. With up to 1.4x more transcodes per processor than the previous-generation Intel Xeon processor E3-1200 v3 product family, you can deliver high-quality content to more users while using a smaller data-center footprint.[2]

With improved 3-D rendering and video transcoding capabilities, the Intel Xeon processor E3-1200 v4 product family provides an ideal foundation for enabling 3-D data use across the enterprise.

Figure 2. Intel® Graphics Virtualization Technology™ (Intel® GVT) gives native graphics-processing-unit (GPU) capabilities to remote users

At-a-Glance: Intel® GVT

As employees become more mobile, they want the flexibility to access their work from any location on any device. Yet IT has the mandate to protect enterprise data and intellectual property while giving users the best visual experience possible. These two conflicting needs can be effectively managed with technologies from Intel, including Intel® Graphics Virtualization Technology™ (Intel® GVT).

Like other Intel® virtualization technologies, Intel GVT lets hypervisors directly use native GPUs, such as Intel® Iris™ Pro graphics P6300, to power graphics-intensive applications within virtual machines. Intel GVT passes the native graphics-driver capabilities within a virtual machine directly to the hypervisor.

With Intel GVT and enabled hypervisors and drivers, users can enjoy a rich, 3-D–enabled experience, while IT can retain centralized control over sensitive information.

SAP 3D Visual Enterprise* Enables 3-D Visualization across the Enterprise

Organizations in industries such as manufacturing and engineering often have vast repositories of content created with tools such as Dassault Systèmes CATIA*, Siemens PLM Software NX*, PTC Creo*, and Autodesk Inventor*. This content can range in simplicity from CAD drawings of office layouts to complete designs for engines and process animations.

The challenge to making rich, interactive 3-D content available to a wider audience is two-fold: file size and delivery. 3-D files can range in size from a few megabytes to dozens of gigabytes or more. Engineering teams can share large files among team members using shared storage, but downloading a multi-gigabyte file to display on a smart phone is far more difficult. SAP addresses these challenges

Figure 3. SAP Visual Enterprise Viewer* lets everyday users view and interact with complex 3-D content. Citrix Receiver* further enables users to view SAP Visual Enterprise Viewer 3-D content on a variety of devices.

with SAP 3D Visual Enterprise*. By removing the file size and viewing barriers of traditional CAD files, SAP 3D Visual Enterprise takes 3-D visualization beyond engineering and puts the power of 3-D data into the hands of everyday users.

The SAP 3D Visual Enterprise suite of applications lets enterprises convert complex 3-D content into a portable, lightweight format that makes it available to a wider audience and, more importantly, to those without CAD-application knowledge or tools. In addition, SAP 3D Visual Enterprise can combine business metadata to provide interactive access to visual applications in domains such as analytics, product compliance, manufacturing, test and repair, and maintenance.

The SAP 3D Visual Enterprise suite includes:

- **SAP 3D Visual Enterprise Generator*:** Processes CAD and other 2-D and 3-D data into files that can be easily accessed, viewed, and searched by non-technical users.

- **SAP 3D Visual Enterprise Author*:** Provides content creators with an environment in which they can create 3-D animations and render visual content into common desktop documents, file formats, and business applications.

- **SAP Visual Enterprise Viewer*:** Lets non-technical users view and interact with 3-D content.

With SAP 3D Visual Enterprise, content creators and engineers can now provide everyday users with access to 3-D data, such as rich, interactive 3-D models and process animations.

Consolidate and Deliver High-performance Graphics Capabilities with Citrix

Citrix builds upon the foundation of the Intel Xeon processor E3-1200 v4 processor family with Citrix XenServer*, Citrix XenDesktop*, Citrix HDX 3D Pro*, and Citrix Receiver* to deliver 3-D content to a variety of devices. As a leader in high-performance desktop and application virtualization, Citrix has worked closely with Intel to take

advantage of the graphics processing capabilities of the Intel Xeon processor E3-1200 v4 product family to deliver rich 3-D content to virtually any device, including Apple Mac*, Windows*, and Linux* PCs and laptops; Google Chromebook* devices; Windows Phone* devices; Android* smart phones and tablets; Apple iPhone* devices; and Apple iPad* devices. Enterprises can deliver content over high-speed internal networks or low-bandwidth, high-latency wide-area networks (WANs), which gives users access to the content whenever and wherever they need it.

Citrix XenDesktop running on Citrix XenServer is a leading VDI solution that provides virtualized applications and desktops capable of displaying 3-D content. A common deployment scenario includes hosted-shared delivery, which shares the Intel Iris Pro graphics P6300 capabilities among multiple users with smaller 3-D workloads.

Users with more demanding 3-D needs can use Citrix HDX 3D Pro technology, which enhances the delivery and performance of graphics-intensive applications to remote users. The combination of Citrix XenDesktop and Citrix HDX 3D Pro can provide a number of performance enhancing capabilities:

- **Hardware-accelerated GPU support:** Citrix solutions enable fully virtualized, hardware-accelerated GPU support. Each user's applications or desktop can access the full capabilities of the host server's Intel Iris Pro graphics P6300 to increase 3-D and high-definition video performance.

- **OpenGL* and DirectX* support:** Applications written using these two common graphics-acceleration technologies do not need any modifications to display in a XenDesktop environment.

- **WAN-optimization technologies:** These technologies help lower bandwidth requirements for graphics-intensive applications while increasing user density per server. Compression technologies and quality-of-service (QoS) controls help optimize and prioritize 3-D visual performance over any broadband network connection.

Citrix Receiver rounds out the Citrix VDI solution by giving access to 3-D–enabled applications and desktops to virtually any device running a modern operating system, including Windows, Mac, Linux, iOS, and Android. Mobile-device policies can touch-enable Windows desktop applications so that they are easily accessible on mobile touch displays.

Open the Door to 3-D Visualization across Your Enterprise

Intel, SAP, and Citrix can provide your enterprise with the critical information that your users need, when they need it, and on devices that they commonly use. Easy access to 3-D data from today's commonly used handheld devices can provide your users with a number of benefits, including faster learning, easy access to complex 3-D information, and access from anywhere with a broadband connection.

Don't get caught without up-to-date, real-time information, and avoid those frantic early morning calls. For more information on how your enterprise can benefit from 3-D visualization, contact your Intel, Citrix, or SAP sales consultant.

Find Out More

Intel Xeon processor E3-1200 v4 product family:

http://www.intel.com/content/www/us/en/processors/xeon/xeon-processor-e3-family.html

SAP 3D Visual Enterprise:

http://www.sap.com/solution/lob/r-and-d/software/product-visualization/index.html

Citrix 3-D Solutions:

https://www.citrix.com/products/xendesktop/features/high-def-experience/hdx-3d-pro.html