# MOW

# BETTER VDI UX MAKES GOOD BUSINESS SENSE

Three Ways GPUs Add Value to Your Virtualized Environment

# **EXCELLENT VDI UX**

# Until recently, the enterprise optimized virtual desktop infrastructure (VDI) deployments to reduce costs and centralize IT, often at the cost of user experience (UX).

However attitudes about the benefits of VDI are shifting, and the importance of prioritizing users is coming into focus. To find evidence of this changing attitude, just look at one of industry's biggest annual surveys.<sup>1</sup>

When asked about their top VDI challenges, IT experts ranked user experience issues as three out of their top six concerns.

Notably, the survey demonstrated the growing influence of remote work—the top ranked user experience issue for IT in 2020 is user experience of voice, webcam, VoIP and conferencing solutions, followed by high latency (#2), and performance of rich media and 2D/3D graphics (#3).

As organizations adjust to the new normal of remote work, user experience will grow in importance. In this environment, the number-one factor in determining a VDI project's ultimate success or failure will be nailing the user experience.

Today only 49% of VDI deployments deliver a good user experience. Poorly performing VDI limits mobility and remote worker collaboration, stifles productivity, and increases help desk tickets, which reduces the ROI gained from VDI. That's why it just makes good business sense to design a remote desktop experience that's on par with, or even better than, a local desktop. Well designed, high performing VDI environments mean happier, more productive end-users.

# IMPROVING UX IS MORE CHALLENGING THAN EVER

#### MODERN APPS ARE SLOWING DOWN LEGACY VDI

In the modern digital workplace, one of the biggest challenges to a good VDI user experience is the evolution of everyday business applications. While once offering relatively basic functionality, modern productivity apps have evolved to provide rich, graphically intense interfaces and high levels of user interactivity.

Today remote work is expanding at a rapid pace, and video conferencing applications and collaboration tools are becoming the new normal. We expect that demands on computer graphics resources will continue to increase as video and audio quality of conferencing tools get better. To help remote knowledge workers stay productive, it's imperative your infrastructure can effectively support these growth trends.

#### **OUR WORKPLACE IS CHANGING**

30%



increase in demand for remote work by 2030 from Gen Z<sup>2</sup>

82%



of organizations will have the option of working remotely



of enterprise meetings will take place via video or phone by 2024<sup>3</sup>



<sup>2</sup> Gartner. March 3, 2020. "With Coronavirus in Mind, Is Your Organization Ready for Remote Work?"
<sup>3</sup> Gartner. June 2, 2020. "Gartner Says Worldwide End-User Spending on Cloud-Based
Web Conferencing Solutions Will Grow Nearly 25% in 2020." [Press Release]

#### TRENDS ARE CHANGING THE WAY WE WORK

At the same time, the enterprise is rapidly embracing video and multimedia to improve productivity and remove geographical barriers. Live-streaming meetings is now commonplace. With the rise in geographically dispersed teams, web and video conferencing software like Zoom, Skype, and Webex are becoming a simple and cost-effective way to collaborate online with colleagues and customers in real-time.

Training sales teams and onboarding new employees is frequently done with video tutorials hosted on websites like YouTube, which is now no longer just a consumer site. Plus, Microsoft Teams is now heavily used in the enterprise as an important collaboration tool for employees working on projects across multiple sites. The distinction between these consumer, multimedia, and enterprise apps is fading as employees increasingly bring rich media types to their work environments.

# GPU = HAPPY USERS + HAPPY IT

- > BETTER EXPERIENCE
- > IMPROVED SERVER DENSITY
- > LESS HELP DESK TICKETS



# **GET MODERN VDI RIGHT WITH GPUS**

Rapidly growing use of a GPU by everyday business applications pose significant challenges to virtualized environments using shared resources. With CPU resources and RAM being consumed at unprecedented rates, traditional VDI environments without a GPU delivers even slower performance and reduced feature sets. This situation only promises to get worse. A fresh perspective is needed to make today's VDI deployments successful.

While building out data centers is one way to improve VDI user experience, a more savvy approach is to look to GPU acceleration to offset added workloads. GPUs offer a cost-effective way to alleviate pressure placed on CPUs in a virtual environment and speed up VDI performance. This design results in an upgraded user experience, while also enabling servers to accommodate more users without degrading performance.

If you've been wondering about the business value of adding GPUs to your VDI, consider what other enterprises have experienced firsthand. What follows are some benefits of improving user experience, as well as stories from our customers about how their businesses have benefited from GPUs.

#### WHAT IS GPU VIRTUALIZATION?

GPU virtualization enables every virtual machine to get the benefits of a GPU, just like a physical desktop. Because work that was typically done by the CPU has been offloaded to the GPU, the user has a much better experience and more users can be supported.



# 1: GOOD UX BOOSTS USER PRODUCTIVITY

While there are many drivers behind desktop and application virtualization, one of the biggest is the increasingly remote corporate environment. In fact, 41% of employees are likely to work from home.<sup>4</sup> Today's remote workforce often logs in from anywhere, be it from home or a customer site, with the expectation that they can be as productive as their physical PC. Adding to this complexity is the new normal of bring your own device (BYOD), which has now become a fundamental requirement for today's IT departments.

Adding to this situation is the rising trend of the consumerization of technology. Employees expect a rich, immersive experience anytime, anywhere, whether they're using a smartphone, PC, tablet, or high-end workstation. The outcome is that productivity is constantly impacted. Employees get frustrated and work grinds to a halt when multiple users share server resources. All it takes is a single user with high graphics demands on a virtual desktop to slow down performance for everyone in the system.

When workers are using BYOD to not only work but also collaborate, any virtualized system is bound to struggle with increased CPU demands the minute anyone jumps on a live-streamed meeting or video. In a recent Gartner survey, 54% of employees indicated that poor infrastructure is the biggest barrier to working remotely,<sup>5</sup> so it's essential to ensure they are properly equipped to be productive.

<sup>4</sup> Gartner. April 14,2020. "Gartner HR Survey Reveals 41% of Employees Likely to Work Remotely at Least Some of the Time Post Coronavirus Pandemic." [Press Release]

<sup>5</sup> Gartner. March 3, 2020. "With Coronavirus in Mind, Is Your Organization Ready for Remote Work?"

# **BETTER UX: MEASURE PRODUCTIVITY BY THE NUMBERS**

When you improve the basic performance of virtualized environments on a daily basis, there's a measurable business impact. Take the example of a typical knowledge worker. They access multiple applications at once - scrolling through PowerPoint slides or Excel spreadsheets, streaming video, and viewing multimedia rich websites in quick succession.

A traditional VDI environment based on CPU adds 15% end user latency<sup>6</sup> over a GPU-accelerated VDI environment, resulting in aggravated users and wasted time. Imagine giving that time back and improving productivity instead.

It costs organizations so much to hire and retain employees. In a study by Gallup, it costs employers between 50% and 200%<sup>8</sup> of a worker's annual salary to hire a replacement if that worker leaves. With thousands of dollars already invested into your employees, why wouldn't you go that extra mile to make sure they have the tools to be happy and productive, and better contribute to your overall bottom line.

#### FANTASTIC USER EXPERIENCE, COST EFFECTIVE SOLUTION

Beyond productivity savings from a GPU-enabled VDI environment, you also reap the benefits of increased employee satisfaction leading to better focus and improved quality of work. That is well worth the cost of NVIDIA Virtual PC (vPC), which costs an average of \$6 per user per month, and Virtual Apps (vApps), which costs \$2 per user per month.<sup>7</sup>



Assumes cost of subscription, NVIDIA software, and hardware, with three-year amortization of hardware of 2 M10 cards supporting 64 vPC users and 87 vApps users

<sup>6</sup> NVIDIA Professional Design and Visualization. "Quantifying the Impact of Virtual GPUs. Benchmarking the User Experience in VMware Virtualized Environments with Dell EMC and NVIDIA nVector"

<sup>7</sup> Assumes cost of subscription, NVIDIA software, and hardware, with three-year amortization of hardware of two M10 cards supporting 87 vApps users and 64 vPC users.

<sup>8</sup> Gallup. March 13, 2019. "This Fixable Problem Costs Businesses \$1 Trillion."

# TECHNOLOGY IMPROVES EMPLOYEE ENGAGEMENT

In today's workplace, innovation is key to keeping employees happy and productive, consequently allowing you to retain your best talent. A company that embraces innovation is perceived as a forward-thinking company. As more and more workers become mobile, giving your employees the right tools and resources to work virtually from anywhere is crucial. This fosters collaboration and teamwork and increases employee engagement. In fact, extensive research by Gallup has shown that...

#### BUSINESS UNITS IN THE TOP QUARTILE OF THEIR GLOBAL EMPLOYEE-ENGAGEMENT DATABASE ARE 17% MORE PRODUCTIVE AND 21% MORE PROFITABLE THAN THOSE IN THE BOTTOM QUARTILE.<sup>9</sup>

In addition, engaged employees drive better customer outcomes and customer retention, further increasing profitability. Developing and investing in employees through technology pays off in the long run.







 When we compared before and after introducing NVIDIA virtual GPUs, performance improvement was significant.
With NVIDIA, it was obvious that the display and rendering of content was a lot faster.

– Shoichi Koga, Information Systems Department, Häagen-Dazs Japan

# HÄAGEN-DAZS JAPAN IMPROVES USER PRODUCTIVITY WITH NVIDIA



#### CHALLENGE

Häagen-Dazs Japan produces premium ice cream as a business arm of the U.S. brand Häagen-Dazs. After deploying VDI five years ago, staff experienced difficulty accessing the company's website, as well as increasingly poor performance of Microsoft Office. To streamline access to internal websites and productivity tools, Haagen-Dazs turned to NVIDIA.

#### SOLUTION

Deployed a virtualized environment with NVIDIA Virtual PC software with NVIDIA M10 GPUs and VMware Horizon on VMware vSphere running on HPE DL380 Gen10 servers.

#### RESULT

Before	After
Unsatisfactory user experience viewing WebGL based website	Native desktop experience with any device
Poor VDI performance on web browsing streaming videos and productivity applications	Performance improved by 10x
Frequent user complaints and questions	Significantly less IT complaints
High CPU utilization on Windows 10 virtual desktops	Drop in CPU utilization with virtual GPUs

# 2: GOOD UX IMPROVES ADOPTION

#### NAIL THE FIRST IMPRESSION AND USERS WILL COME TO YOU

From the outset, a virtualized environment makes sense in terms of simplifying IT and improving security. Which means CIOs and the IT department usually like VDI. However, users often feel very differently. Replacing a physical desktop with a virtual one frequently means poor performance and applications running too slowly, particularly during peak hours.

Anyone who has been involved with a VDI deployment knows the impact of user experience on adoption. If a new or upgraded VDI deployment doesn't provide an experience that's as good as a physical workstation, users simply won't want to use it. Reviving an environment with a bad reputation is a bigger challenge than you might think. When trying to extend virtualization across an enterprise, IT has a tough sell if word spreads about all the issues users are facing.

#### **BETTER UX ENSURES USER BUY-IN**

When you're deploying VDI for the first time—or updating an aging environment—it's critical to deliver a high-quality user experience and validate that experience before rollout. Otherwise, your entire VDI project won't get off the ground.

Delivering a user experience that's as good as or better than an employee's current PC experience is the most important success factor when adopting VDI or desktop as a service.

Getting as many users as possible across departments to adopt VDI ensures the best ROI by helping to lower your infrastructure costs. And because GPUs take on the added workload of graphics-rich everyday applications, they aren't just for power users anymore. They're also important for today's knowledge workers and support staff.









Performance optimization from NVIDIA vPC in the user environment has improved user experiences in a wide range of operations... They did great for reducing the number of physical servers while optimizing the performance.

– Daisaku Handa, Project Manager, Hanasaku Life Insurance Co., Ltd.

### HANASAKU LIFE INSURANCE EMPOWERS ITS REMOTE WORKFORCE WITH NVIDIA



#### CHALLENGE

Hanasaku Life Insurance is in charge of strengthening sales to agency channels for its parent company Nippon Life Insurance Company. To enable employees to effectively work remotely, Hanasaku deployed NVIDIA GPU-accelerated VDI.

#### SOLUTION

Deployed a virtualized environment with NVIDIA Virtual PC software with NVIDIA M10 GPUs and VMware Horizon running on HPE ProLiant DL380 Gen10.

#### RESULT

Before	After
Employees tethered to the office and their desks	Employees can securely and effectively work remotely
High CPU utilization with Windows 10	30% drop in CPU utilization with GPUs
Poor user experience on video conferencing and productivity applications	Improved user experience for Skype and applications needed for day-to-day work
Physical desktops and workstations	Widespread VDI adoption

# **3: GOOD UX REDUCES TCO**

#### IT CAN FOCUS ON HIGHER-VALUE PROJECTS

IT teams often find themselves scrambling to keep up with the everyday challenges of managing legacy desktop and application virtualized environments, like resetting, stuck sessions, and rebooting hosting servers. Logins take forever and sometimes don't connect at all. Constant system resets and application hang translate into frustrated users and IT getting stuck in the "keeping the lights on" trap. The recent growth of graphics-intensive applications and the explosion of BYOD have only compounded these challenges.

Today's IT departments are spending a significant amount of energy servicing and maintaining hardware, troubleshooting aging VDI infrastructure, and responding to user problems instigated by increased CPU workloads. Without a GPU, the CPU has to work extremely hard just to keep up with basic workloads, which in turn means fewer users can be supported. As a result, the user experience can degrade so badly that calls to the help desk drastically increase. While most companies switch to VDI because they're looking to cut costs, they often find that VDI's total cost of ownership (TCO) is reduced by an increase in IT personnel hours directly related to user problems. This drives up IT costs, which is compounded by the required additional investment in server hardware.









GPU acceleration is critical to us. We could not deliver the kind of quality services that we need on campus without it.

- Steve Herzig, Director of Enterprise Systems, The University of Arkansas

### UNIVERSITY OF ARKANSAS UPGRADES STUDENT ACCESS TO DIGITAL RESOURCES

### UNIVERSITY OF ARKANSAS

#### CHALLENGE

The University of Arkansas operates 10 colleges and schools serving 27,000 students. With a bring-your-own-device policy, some students had difficulty accessing digital resources. The university wanted to provide access to graphics-intensive engineering and design applications, anywhere, anytime, on any device. It also wanted to streamline data center maintenance.

#### SOLUTION

Deployed a virtualized environment on NVIDIA Virtual PC and Virtual Apps software, NVIDIA M10, VMware vSphere, Dell R730 servers.

#### RESULT

Before	After
Design and engineering rendering took up to 30 hours	Rendering reduced to 3 hours
Poor experience on 3D applications for students without high end PCs	Identical experience for students on Chromebooks and high end PCs
Numerous IT calls for servicing and maintenance	Reduced IT support calls
Some students working off campus couldn't access digital resources	All students now have secure access on any device

# BETTER UX REDUCES HELP DESK TICKETS AND FREES UP IT

When enterprise IT budgets and staff numbers remain flat, CIOs have to get creative about how to keep VDI running while also pursuing important IT projects, like data security initiatives. In order to be successful, they need to do more than keep up—they need to innovate. They need their IT personnel working on higher-value projects, instead of troubleshooting minor issues.

Rather than building out data centers to handle growing CPU demands and improve the user experience, the enterprise is increasingly turning to GPU acceleration to offset the added workloads of graphics-intensive applications. NVIDIA optimizes data center architecture, taking on increased CPU workloads.

Transitioning to the high-performing platform ensures seamless performance on accelerated apps, protects your investment, and results in happier, more productive users. Additionally, getting end-to-end visibility into your virtualized infrastructure, down to the application level, will ensure you can right-size allocation of resources, eliminating waste while simultaneously ensuring users get the performance they need.

When that happens, users stop wondering why things aren't working well, and they stop logging unnecessary help desk tickets. That means IT personnel get to focus on more important projects.

#### **BONUS POINTS: GPUS INCREASE SERVER DENSITY.**

While the addition of graphics acceleration to a VDI environment may increase hardware and licensing costs upfront, GPUs significantly lower demand on the CPU. This results in an increased number of supported users who enjoy a better user experience. Ultimately, adding GPUs to a virtualized environment increases server density, which makes the overall cost of providing a great user experience very affordable.







We knew that it would be difficult and unsafe to update physical PCs across all 190 bases, so we decided to introduce VDI.

– Seiichi Shimamura, IT Promotion Manager, Business Management Division of TOKYU LIVABLE

# TOKYU LIVABLE BOOSTS IT EFFICIENCY WITH NVIDIA



#### CHALLENGE

TOKYU LIVABLE is a real estate industry pioneer. The company wanted to introduce a virtual desktop environment to provide employees with anytime, anywhere access to their desktops. It also wanted to upgrade its data center. To provide a great user experience and easier IT management, the company turned to NVIDIA.

#### SOLUTION

Deployed virtual environment with NVIDIA Virtual PC with NVIDIA M10 GPUs and VMware Horizon running on Supermicro SYS-2029U-TR4.

#### RESULT

Before	After
Lost productivity due to PC failures	Secure, mobile access to any application with support for BYOD
Risk of data leakage on physical devices	Secure, mobile access to data in the data center
Time-consuming maintenance for individual PCs	Streamlined VDI management and updates
Initial VDI adoption by only a small group of employees	Widespread adoption across all employee levels







The biggest value NVIDIA technology brings is the most native desktop experience possible... Whether our attorneys want to browse the web, scroll through large PDF files, or take advantage of video, NVIDIA aids it all seamlessly.

– James Nixon, Application Support Manager, Seyfarth Shaw

### SEYFARTH SHAW LEVERAGES NVIDIA TO BOOST USER PRODUCTIVITY AND WINDOWS 10 PERFORMANCE



#### CHALLENGE

Seyfarth Shaw is a global law firm with a team of 900 attorneys in 15 offices worldwide. Over the years, the firm's IT team relied on a Windows 7 VDI environment to deliver Office 10 and support lightweight document management. However, as its VDI environment aged, there were roadblocks to progress. In order to upgrade to Windows 10 and speed up web applications for users, the firm turned to NVIDIA.

#### SOLUTION

Deployed a virtualized environment with NVIDIA Virtual PC software with NVIDIA® M10 GPU cards and Citrix XenDesktop running on Cisco UCS C240 M4 servers.

#### RESULT

Before	After
Poor web browsing: slow load times, sluggish video, stilted scrolling	Native desktop experience, even on thin clients
8–10 seconds to open up the Intranet	2–3 seconds to open an Intranet with rich graphics
High CPU utilization on Windows 10 virtual desktops	~30% drop in CPU utilization with GPUs
Numerous complaints from frustrated VDI users	Hardly any complaints to IT







User adoption is key... With NVIDIA, we saw that we could deliver an unparalleled user experience that rivaled the physical desktop.

- Cory Smith, CIO, City of Davenport

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# CITY OF DAVENPORT SAFEGUARDS ADOPTION WITH NVIDIA



#### CHALLENGE

The City of Davenport is a mid-size municipality in Iowa with 1,000 employees at 34 facilities. During a cost-saving initiative, it deployed virtual desktops with field-programmable gate array (FPGA) cards. However, slow system performance led to poor widespread adoption. The city's IT team turned to NVIDIA for a solution.

#### SOLUTION

Deployed a virtual environment on NVIDIA Virtual PC software and NVIDIA M10 and M6 GPU cards with HP DL380p Gen8 and Gen9 servers.

#### RESULT

Before	After
Poor VDI performance on streaming videos and productivity applications	Lower latency on streaming videos for conferencing, training, and daily work
Costly infrastructure with complex IT management	2X increase in server density, with 75% leaner IT versus a comparable city
Inability to support remote work	Secure, mobile access to any application with support for BYOD
Resistance from many users	Widespread adoption, from police officers to city planners and engineers







Thanks to NVIDIA Virtual GPUs, we have a team of 3.5 people who easily manage 1,500 users daily... That's a 500-to-1 management philosophy. You don't get that anywhere.

- Mike Bantz, Engineer and Technical Lead for VDI Environments, DigitalGlobe

### DIGITALGLOBE IMPROVES IT EFFICIENCY WITH VIRTUALIZED DESKTOPS WITH NVIDIA



#### CHALLENGE

A leading provider of high-resolution satellite imagery, DigitalGlobe specializes in innovative applications to leverage its images. Recently, an aging virtual environment increasingly impacted the productivity of its developers and IT staff. It turned to NVIDIA for a solution.

#### SOLUTION

Deployed a virtual environment with NVIDIA Virtual PC and Virtual Apps software with NVIDIA M10 GPU cards on Nutanix 3350 and Dell PowerEdge R720 and R730 servers.

#### RESULT

Before	After
Slow VDI performance on web and graphics- intensive applications	Consistently great experience on any device
Constant troubleshooting and lack of visibility into users' resource requirements	3.5 IT people easily managing 1,500 users daily
Overprovisioned VDI environment	Optimized allocation of resources, along with 2X improvement in user density
Poor VDI adoption	Stellar adoption, with everyone wanting to be moved over to the new VDI environment and IT unable to keep up with the requests

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# WHAT DEFINES GOOD UX?

# IT ISN'T PERSONAL OPINIONS OR SIMPLE FORMULAS

It's broadly agreed that the success of a VDI deployment is measured by the degree to which VDI end users feel that they're working on a local desktop or PC. The problem with validating user experience has always been: How do you quantify something that's seems so subjective?

Until recently, the best you could do was approximate by using a legacy benchmarking tool. The idea was that you could measure the average application response time inside a guest operating system of a VDI instance to get a good understanding of what users were experiencing.

Recently, all that changed when NVIDIA developed a benchmarking tool. Based on a unique methodology, it models and automates the various behaviors in a typical knowledge worker's daily routine, including:

- End-user latency
- Image quality
- Consistency of end-user latency
- Remoted frames
- Server utilization

VDI deployments also aim to achieve the best possible user density on server hardware. However, as user density is scaled up after a certain point, the user experience is negatively impacted. NVIDIA's benchmarking tool measures these trade-offs by modeling how knowledge workers use applications and what happens to performance when workloads are run at scale.

# REALIZE THE DREAM OF VALIDATING GREAT UX

#### GPU IMPACT IS TOTALLY QUANTIFIABLE BEFORE ROLLOUT

Wouldn't it be great to understand the impact of GPUs on virtualized environments, so you can be confident you're building VDI that delivers the best possible user experience? NVIDIA's unique user-experience benchmarking tool can help.

Now you can achieve better user experience on your graphically intensive VDI environments.

# **READ THE WHITE PAPER**

for more information.