NVIDIA

THE TOP FOUR REASONS

WINDOWS 10 VDI NEEDS GPUs

Today's digital workplace is changing due to the increased graphics requirements of Windows 10 and the doubling of the number of enterprise applications requiring accelerated graphics over the past five years[1].

Modern workers expect a consumer-like experience with immersive visual quality and processing speed. To satisfy these expectations, software developers are creating rich, graphically intensive user experiences for physical desktops in the enterprise.

In a virtual desktop (VDI) environment without a GPU to offload these additional processing requirements, the end user sees slower performance, reduced feature sets, and applications that simply won't launch.

WINDOWS 10 IS HERE

As more and more businesses deploy Windows 10 - 85% of enterprises will have started deployments by the end of 2017, according to a recent **Gartner survey**[2]—many of them are re-evaluating their virtual desktop deployments. While improved security and cloud integration are often cited as reasons for making the move, accelerated performance is another strong factor in Windows 10's faster-than-normal adoption. To take full advantage of the platform's performance capabilities, enterprises need GPU accelerated graphics.

85%
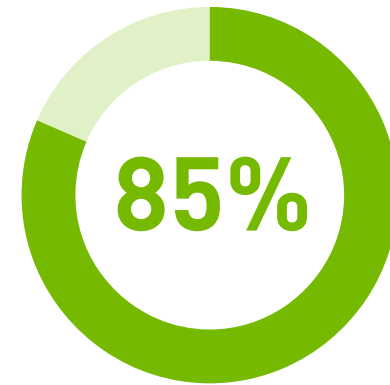
The percentage of companies that will have started Windows 10 deployment by the end of 2017[2].

HOW CAN GPUs HELP?

As someone considering the role of GPUs in your Windows 10 VDI environment, take a few minutes to read through what enterprises have experienced firsthand. According to Lakeside Software's SysTrack Community data from over 3 million desktops without a GPU, not only will Windows 10's full power not be realized, but key performance metrics, including scalability, are impacted negatively.
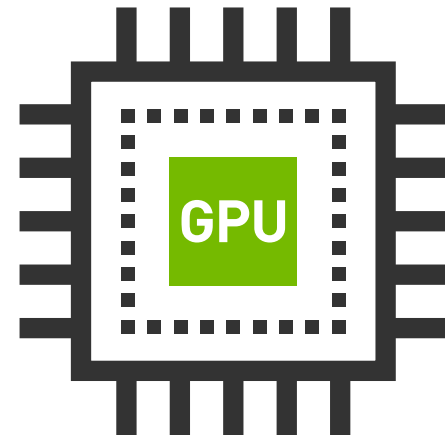
1

SATISFY THE
NEW NORMAL

Windows 10 has the highest graphics requirement of any operating system to date. In fact, when compared to Windows 7, the new Windows 10 results in a 32% increase in graphics consumption according to Lakeside SysTrack Community data, which determined the increase by measuring the percent of time the OS is making DirectX or OpenGL calls[3]. That number is only expected to increase as Windows 10 updates are delivered. Also, the updated versions of applications used in Windows 10 also drive higher graphical consumption than their counterparts in Windows 7.

Comparing office productivity applications in Windows 10 versus Windows 7, there is an increased need for accelerated graphics across the board: 53% in Excel, 64% in PowerPoint, and a whopping 409% in Skype[3]. While professional applications like Dassault Systèmes SOLIDWORKS, CATIA, and others logically require a GPU for graphics acceleration, it's clear that even common business applications now need GPU resources to run efficiently.

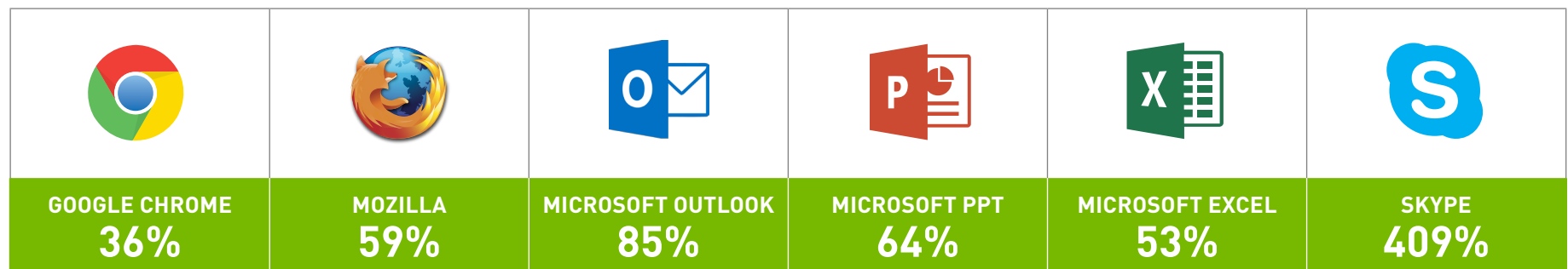# Applications that are accelerated by graphics have doubled over the past 5 years.

GOOGLE CHROME 36%	MOZILLA 59%	MICROSOFT OUTLOOK 85%	MICROSOFT PPT 64%	MICROSOFT EXCEL 53%	SKYPE 409%

Figure 1. Increase in GPU Demands comparing Windows 7 to Windows 10*
*As measured by DirectX or OpenGL calls by Lakeside Software

2

DELIVER
INVESTMENT
PROTECTION

While the number of applications that require accelerated graphics has doubled in recent years, the number of employees using these applications has increased by over 60%.[1]

As enterprises evaluate a Windows 10 upgrade, they are also trying to anticipate resource requirements for the next couple of years. While the number of applications that require accelerated graphics has doubled in recent years, the number of employees using these applications has increased by greater than 60%[1]. That's a large portion of their organization demanding accelerated performance and expecting a desktop experience in a virtual environment.

While some enterprises might get by with Windows 10's minimum specs today, Microsoft will be gradually upgrading

Windows 10, adding new features via regular updates, causing the minimum specs to grow over time. Windows 10 and Office 365 ProPlus will have semi-annual feature updates, with Office 365 ProPlus having additional security and quality updates monthly[7]. In fact, one of the builds that Microsoft dropped earlier this year, while not even the latest, is already being called a "monster update...so full of updates it's like a whole new OS"[4]. Moreover, Office 365 is designed to work with the latest browsers and versions of Office. If you use older browsers or versions of Office, Microsoft won't prevent you from connecting to the service, but you would experience

reduced functionality and diminished quality of experience over time[5].For increased collaboration, better security, and an immersive experience, it is advised to be on the latest Microsoft version. However, each update to the OS and the Office suite will only require more processing power, which highlights the pressing need for a GPU.

As enterprises plan future requirements, they must also account for trends that are changing the way we work. For example, organizations are rapidly embracing video and multimedia to remove barriers and improve productivity, whether to stream company meetings, train sales teams, onboard new employees, or collaborate on projects across multiple geographical sites. Consumers are creating videos, graphics, and other types of media in their personal lives. In the digital workplace, the distinction between these consumer, multimedia apps and enterprise apps is fading as organizations enable employees to bring rich media types that require significantly more processing power to their work environments[6]. YouTube has become the ubiquitous platform for employee training, customer support, and marketing. Also, Skype started as a consumer app, is now heavily used

in the enterprise. While technology evolution and adoption is difficult to predict, it's clear that applications are increasingly more graphics intensive, and this is something to consider as they evaluate their next VDI upgrade.

Figure 2. Multimedia is changing the way we work.

3

ENHANCE USER EXPERIENCE

Understanding enterprise employees' needs and expectations are critical for a Windows 10 upgrade.

Based on the consumerization of technology the new-normal is a rich, immersive experience anywhere, and on any device to be productive. Bring your own device (BYOD) is a fundamental requirement in today's corporate environment, and employees expect the same experience—whether on their four-inch smartphone or a high-end workstation. As multiple users share server resources, a single user with high graphics demands on a virtual desktop can impact performance for everyone in the system, resulting in a slow and frustrating user experience. GPUs, however, can alleviate pressure placed on CPUs in a virtual environment, enabling servers to accommodate more users, increasing density on a server.

Understanding enterprise employees' needs and expectations are critical for a Windows 10 upgrade. When Windows 10 virtual desktops are deployed without a GPU, users notice.

Lakeside Software, provider of workspace analytics, analyzed user data comparing Windows 10 with and without GPU acceleration.The GPU accelerated environments scored higher for a better user experience and were, on average, considered the same or nearly the same as a native PC experience.

Lakeside's health scoring system is a top-level key performance indicator (KPI) built out of lower-level KPIs like application performance, login time, CPU, and memory. To calculate the scores of a non-GPU vs. GPU environment, they divided the total time a user is impacted by the total time they

are active. By subtracting that number from 100, they were left with the percentage of time that a user was experiencing a non-impacted session. Scores are grouped into four categories: Excellent is 97% and above, Good is > 90% and < 97%, Fair is > 80% and < 90%, and Poor is everything below that. For VDI deployments, Lakeside does not recommend deploying to users with a score less than 80.

NVIDIA performed a user test, where they had employees across the organization perform basic tasks on two PCs, one with and one without GPU on a loaded environment with 60 concurrent users. For operations like mail search, GPU

USER EXPERIENCE SCORE
Lakeside user testing of Windows 10 VDI

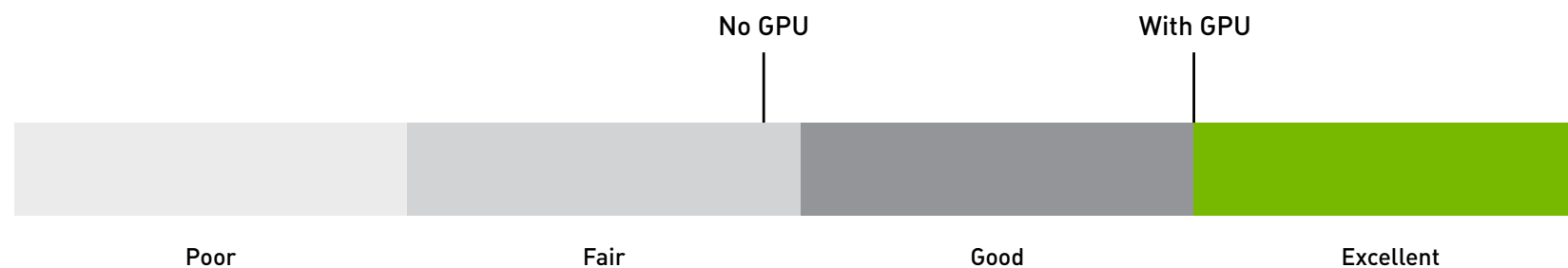No GPU   With GPU

| Poor | Fair | Good | Excellent |

Figure 3. Source: Elevating User Experience Through GPU Acceleration: A Windows 10 versus Windows 7 Analysis, Lakeside Software White Paper, 2017

WINDOWS 10 WITH CPU VS. NVIDIA GRID

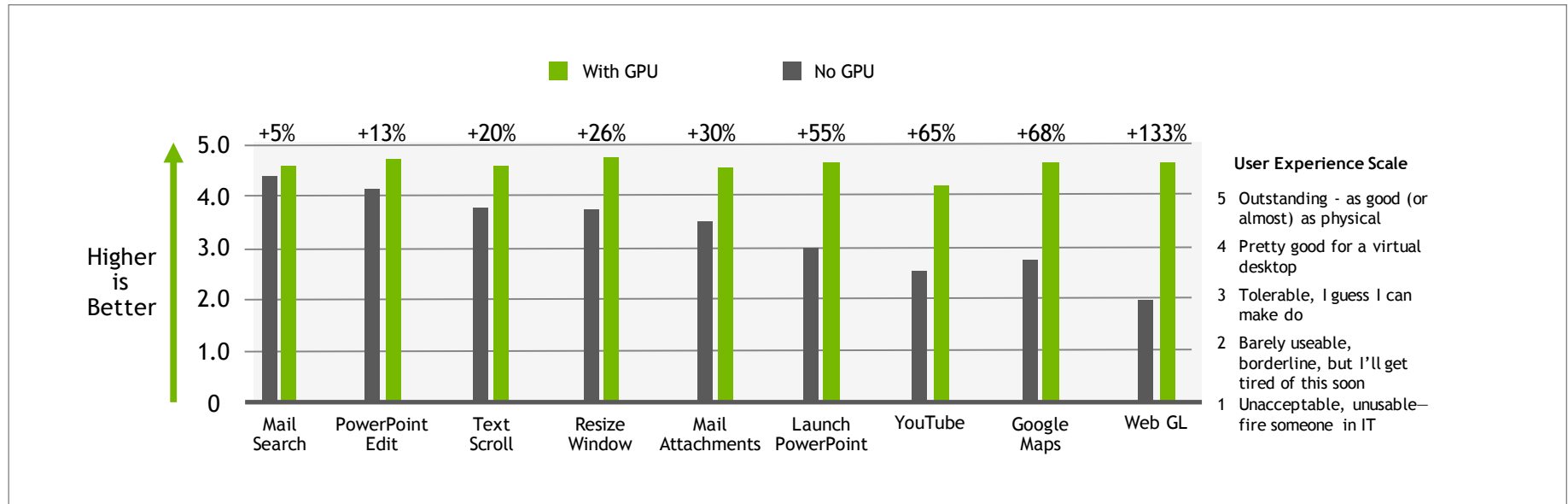**NVIDIA GRID provided an average 34% increase in Win10 UX quality**

Figure 4. Source: NVIDIA

didn't make a difference. But for tasks like Google Maps, YouTube, and WebGL, the difference was significant. NVIDIA GRID™ provided an average 34% increase in Win10 user experience (UX) quality. Even on the small VDI environment that was tested, without a GPU users struggled at best and, when using modern applications, found the experience barely tolerable.

Every enterprise runs uniquely, using different apps and varying workflows, so it would be beneficial for an organization to set up their own user evaluation. To see how NVIDIA setup their test environment, enterprises can refer to this whitepaper. Companies like Lakeside also have tools enterprises can leverage, and their methodology and findings can be found **here**.

4

IMPROVE DENSITY
WITH GPUs

Another key benefit of including GPU in your Windows 10 VDI upgrade is that it will increase server density, lowering the overall cost per user.

As we've mentioned before, without a GPU, the CPU has to work extremely hard, which in turn means fewer users can be supported. The user experience can degrade so badly that the employee makes calls to the help desk. This of course drives up costs, along with the additional investment in server hardware.

With a GPU accelerated VDI environment, the addition of compute and graphics resources offload the CPU so that more users can be supported on a server. Based on data from Lakeside and customer deployments, we've found that the addition of a GPU results in 30% less CPU consumption. Subsequently, Windows 10 VDI architects can increase server density (in CPU bound cases) by 30% through the inclusion of virtual GPU (vGPU)[3].
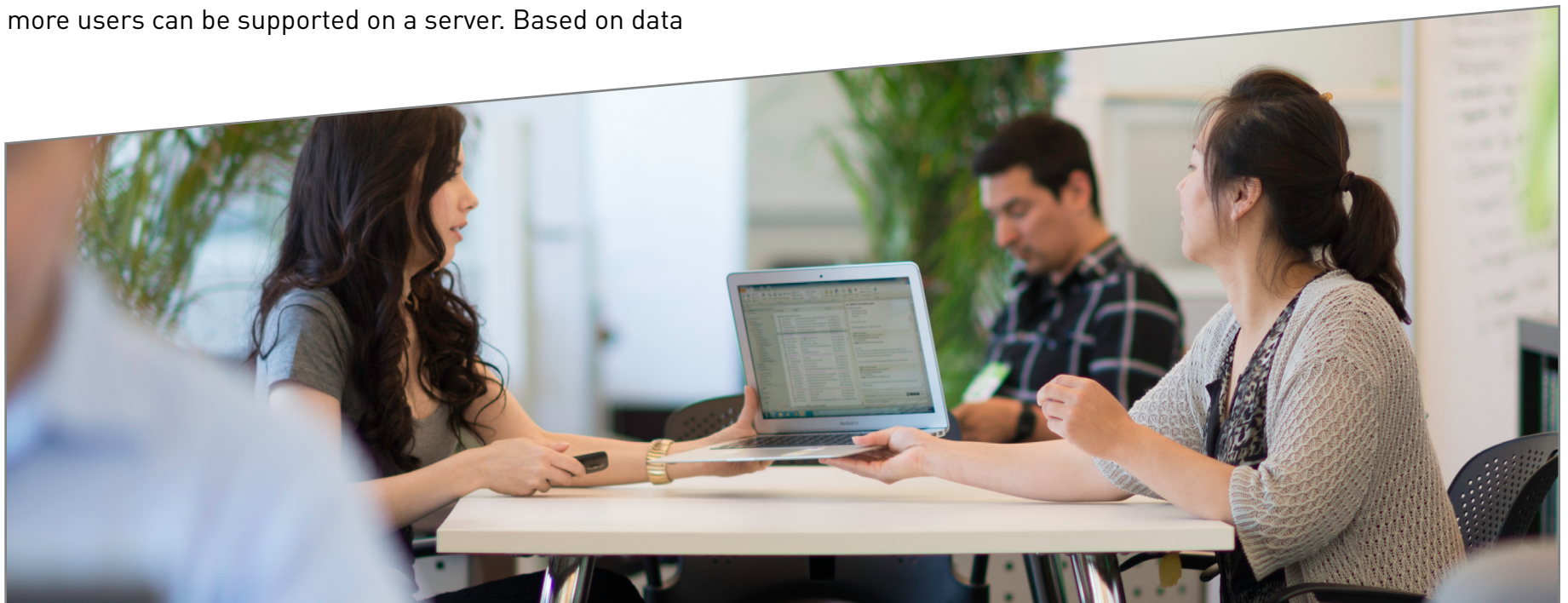
With the addition of accelerated graphics, modern applications like Google Maps and processor-hogging web browsers operate more as they do on a PC. As these graphics-accelerated apps continue to increase - and increase in sophistication – enterprises will have the capacity to support them. Overall, though the GPU is an incremental investment, it offers the benefits of increased user density on the server and improved user experience that results in future investment protection.
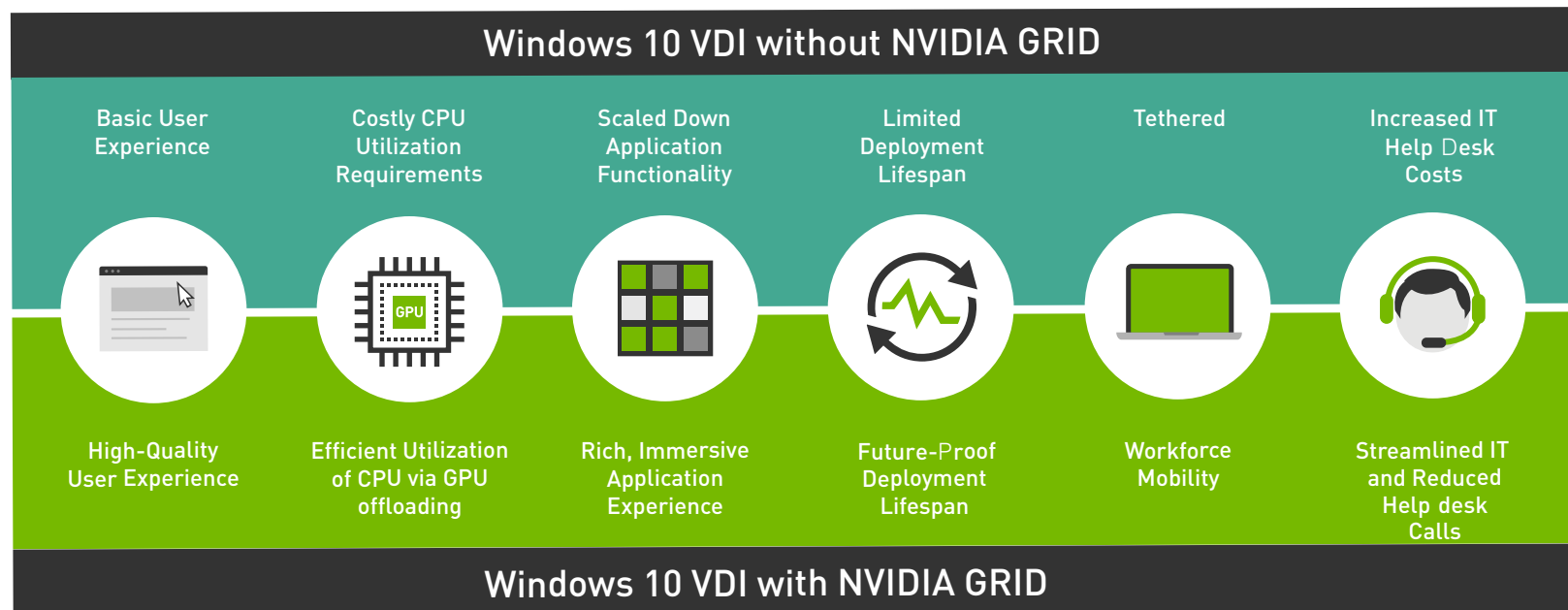

Figure 5. Benefits of including GPU with your Windows 10 virtual desktops

Think VDI with Graphics Acceleration is Too Expensive?
Think Again.

Although enterprises may be spending on additional hardware and licensing costs by implementing graphics acceleration on their VDI environment, they also lower demand on the CPU, resulting in an increase in the number of users supported. NVIDIA understands that the needs of knowledge workers are different from professional designers and engineers, so it offers two license models designed especially to meet those needs at an affordable cost – the virtual PC (GRID vPC) and virtual apps (GRID vApps) license.

Fantastic User Experience, Cost Effective Solution

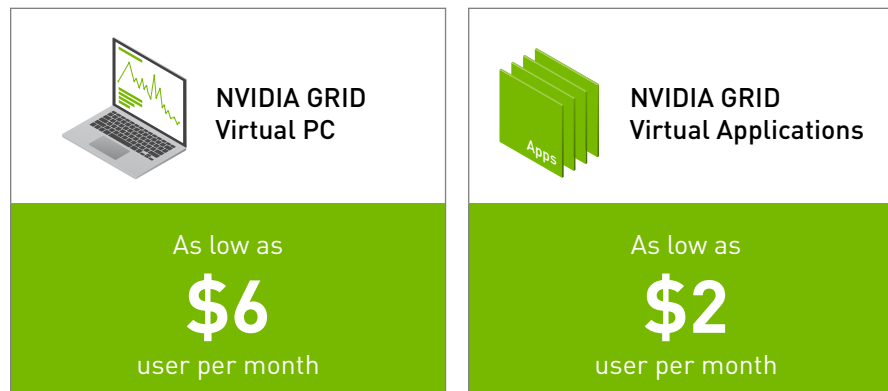| NVIDIA GRID Virtual PC	NVIDIA GRID Virtual Applications
As low as **$6** user per month	As low as **$2** user per month

Figure 6. Assumes cost of subscription, NVIDIA GRID software, and hardware, with three-year amortization of hardware of 2 Tesla M10 cards supporting supporting 64 vPC users and 87 vApps users

Upgrading your VDI environment to Windows 10 is inevitable for businesses to keep pace with modern demands. **Transitioning to the high-performing platform will ensure seamless performance on accelerated apps, improve server density, protect your investment, and result in happier, more productive users.** If an enterprise is considering the move, they should test in their environment with an understanding of the unique ways in which their users work.

Click here for information on setting up and running effective test environments.

1. Data from Lakeside Software's SysTrack Community, 2017
2. Gartner. April 25, 2017. "Gartner Survey Shows 85 Percent of Enterprises Will Have Started Windows 10 Deployments by End of 2017." [Press release]. Retrieved from http://www.gartner.com/newsroom/id/3690917
3. Lakeside Software, Inc. "Elevating User Experience Through GPU Acceleration: A Windows 10 versus Windows 7 Analysis." Lakeside Software White Paper. 2017
4. Patrizio, Andy. "New Windows 10 build is a monster update: First update of the year adds more new features than any previous build." http://www.computerworld.com/article/3157369/windows-pcs/new-windows-10-build-is-a-monster-update.html (retrieved July 2017)
5. Microsoft. "Overview of the upcoming changes to Office 365 ProPlus update management" https://support.office.com/en-us/article/Overview-of-the-upcoming-changes-to-Office-365-ProPlus-update-management-78b33779-9356-4cdf-9d2c-08350ef05cca (accessed July 2017)
6. Pemberton Levy, Heather. "Top 12 Emerging Digital Workplace Technologies: Give employees more agility by bringing these consumer technologies to work." http://www.gartner.com/smarterwithgartner/top-12-emerging-digital-workplace-technologies/ (accessed July 2017)

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