DIGITAL TRANSFORMATION IN THE FINANCIAL SERVICES INDUSTRY

Increase Mobility, Deliver Great User Experiences, and Reduce Downtime with NVIDIA Virtual GPU Solutions

The financial services industry is comprised of several sectors, from investment banking and trading to retail and insurance. Today, they're all facing challenges in improving scalability and mobility while meeting stringent security and regulatory compliance requirements. To stay ahead of the market and competitors, professionals in the financial services industry need to access their workspace from any device, anywhere, with a great experience. This becomes even more challenging with the advent of Windows 10, which impacts every sector in the financial industry. For example, financial analysts and advisors routinely scroll through screens upon screens of data. Without graphics acceleration, functionality in common business applications, such as being able to scroll through a 300-page PDF, is plagued with significant lag time and results in reduced productivity.

The trading floors, in particular, have unique challenges that are generating the need for virtualized solutions. Traders need mobility and are often moved around, along with their systems, to work closely with different groups like equity, commodities, or risk income. They also need to be constantly up and running, and have physically small desk areas. Multi-monitor support is the desired approach, as some may have as many as 15 applications open at a time. In addition to safeguarding data from information breaches and insider trading, data must also be preserved in the event of natural and man-made disasters to ensure that the trading floor can be up and running in no time.

Because every second of downtime translates to lost revenue, the financial services industry is very conservative and requires stable systems. It's not uncommon that some organizations are still on Windows XP because they haven't had time to upgrade their systems and cannot afford downtime.

> Brokerage firms and stock exchanges stand to lose millions of dollars if transactions or trading were interrupted for just minutes during normal business hours.[1]

> The financial services sector was the most attacked in 2016, with 65 percent more attacks than other sectors, resulting in 200 million records being breached in one year.[2]

> The financial services sector, including banking and insurance, is the largest contributor to the desktop virtualization revenue forecast through 2020 - security being one of the major driving factors.[3]

[1] ITIC Blog (2013, July 24). One hour of downtime costs > $100K for 95% of enterprises. Retrieved from http://itic-corp.com/blog/2013/07/one-hour-of-downtime-costs-100k-for-95-of-enterprises/

[2] Olenick, Doug (2017, April 28). Financial services sector most attacked in 2016: IBM. Retrieved from https://www.scmagazine.com/financial-services-sector-most-attacked-in-2016-ibm/article/653706/

[3] BusinessWire. Research and Markets: Desktop Virtualization Market - Forecast and Trends (2015 - 2020). Retrieved from https://www.businesswire.com/news/home/20160105005829/en/Research-Markets-Desktop-Virtualization-Market---Forecast

NVIDIA VIRTUALIZATION TECHNOLOGY DELIVERS A MOBILE DIGITAL WORKPLACE THAT REDUCES DOWNTIME AND BOOSTS SECURITY

Financial services organizations are looking to virtualization solutions to increase mobility, ensuring anytime access to data while also enabling improved security. In addition, they need to increase the quality of performance and user experiences in modern office applications that are substantially more graphics intensive. By adding NVIDIA virtual GPU solutions to their VDI environments, these organizations can centralize apps and data, delivering cost-effective VDI performance that scales. Plus, they can provide virtual workspaces for knowledge workers, power users, and mobile professionals that offer improved management, security, and productivity. The benefits of virtual GPU are significant:

> **Enhance Productivity and User Experience.** Financial services professionals can now access their workspace from anywhere, on any device with a native PC-like experience. With graphics acceleration, financial services organizations can take full advantage of Windows 10 and modern business apps—including key apps such as Bloomberg and homegrown, customized apps—with significantly lower latency. In addition, NVIDIA virtualization solutions can satisfy unique financial services productivity needs such as multi-monitor support for brokerage systems and larger frame buffers for better data visualization and pattern recognition.

> **Increase Manageability and Scalability.** In all sectors, financial services organizations often have hundreds and thousands of users to support, from rolling out systems to quickly resolving issues. Moreover, on trading floors, every second of downtime equates to thousands of dollars lost. Now, financial services organizations can centralize data and applications in the data center, delivering virtual workspaces with improved manageability, security, and performance while reducing downtime and support costs. IT can also easily manage large-scale virtualization deployments with end-to-end visibility of the organization's infrastructure and proactive monitoring.

> **Bolster Security and Regulatory Compliance.** As a heavily regulated industry, financial services organizations must safeguard data against information breaches and insider trading or face serious consequences. By securely hosting sensitive financial information within the data center, organizations can improve their overall security while simultaneously protecting data in the event of disaster. Not only does virtualization allow more users to securely access more applications, it also enables secure work-from-anywhere workstyles.

NVIDIA VIRTUAL GPU SOLUTIONS
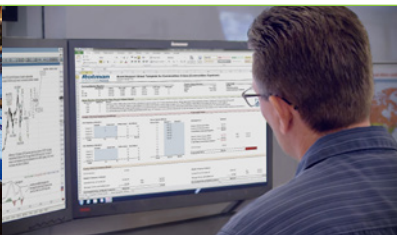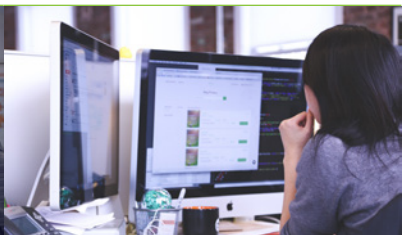
Virtualization with NVIDIA GRID® and NVIDIA® Tesla® GPUs	Virtualization with NVIDIA Quadro® vDWS and NVIDIA® Tesla® GPUs
The **NVIDIA GRID Virtual PC/Virtual Apps** (GRID vPC/vApps) is positioned for general-purpose VDI across all sectors of the financial services industry.	The **NVIDIA Quadro® Virtual Data Center Workstation** (Quadro vDWS) is positioned for high-frequency, super traders.
BENEFITS	**BENEFITS**
Support for the increasing graphical requirements of Windows 10 and modern productivity applications	Support for up to four 4K resolution monitors and large frame buffer sizes for increased productivity
Support up to two 4K or four HD resolution monitors for increased productivity	Security enforced in the data center
Cost-effective solution to scale VDI across your organization for as little as $2 per user per month[4]	Lower IT management costs
Lower IT management costs	Increased trader mobility
Security enforced in the data center	Central management of business continuity and disaster recovery
Increased employee mobility	Guaranteed zero downtime, even during maintenance with Live Migration
Central management of business continuity and disaster recovery	
COMMON APPLICATIONS	**COMMON APPLICATIONS**
Windows 10, Microsoft Office 365, modern browsers, advisory and analysis software, proprietary and custom applications	Bloomberg, Thomson Reuters Eikon, other electronic trading platforms

CUSTOMER EXAMPLES

| Unleashing Productivity	Mobility That Knows No Limits	Continuous Uptime for All
Cornerstone Home Lending, Inc. based in Houston, Texas, USA, realized that even its core desktop applications were becoming more graphics-intensive and its previous virtualization solution left employees with poor user experiences. With NVIDIA GRID, Cornerstone was able to deliver a low-latency, high-quality user experience – especially for modern business applications like streaming video and social media, which are key to Cornerstone's marketing campaigns. "Most people don't know it is virtualization, but they know they have access to the applications they need anywhere.	A multinational financial services corporation based in the Northeast, USA, was experiencing performance issues and lack of mobility on their trading floor, with 300 traders using thin clients with multi-monitor support. With NVIDIA GRID, productivity improved as a result of lower latency and fast access to the latest data and market trends. IT was able to meet their internal cost model with improved density and lower infrastructure costs.	An American hedge fund based in New York, USA, needed to ensure remote access for traders. After the experience of "Superstorm Sandy," they wanted to ensure high availability in the event of other natural or man-made disasters. Before GPUs, they were not able to implement VDI properly and get the right level of performance and monitor resolution they needed. They migrated from NVIDIA GRID K1 to NVIDIA Tesla GPUs with Quadro vDWS and saw significant improvements in performance and manageability for more than 50 traders.

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[4] Assumes cost of subscription, NVIDIA GRID software, and hardware, with three-year amortization of hardware of two Tesla M10 cards supporting 87 vApps users.

KEY FINANCIAL SERVICES USER GROUPS

	Power Traders & Financial Analysts	Traders, Financial Analysts, Super-Users from other Departments	Retail Bankers, Investment Managers, Financial Advisors, Insurance Agents, and Others
USE CASES	For running network-heavy apps (Bloomberg, Reuters, Eikon) on multi-monitors, with security, redundancy, and continuity	For simultaneously running productivity and financial apps, and general-purpose VDI with multi-monitor support on Windows 10	For general-purpose VDI using custom finance apps and common office productivity apps
RECOMMEND	Quadro vDWS on Tesla P4 for rack servers, P40, P100, V100 or M60 for high-end and P6 for blades (supports up to four 4K displays)	GRID vPC on Tesla M10 and P6 (supports up to two 4K or four HD displays); GRID vApps on Tesla P4, M60, and P6 for blades	GRID vPC/vApps on Tesla M10 and P6 (supports up to two 4K or four HD displays)

HOW NVIDIA VIRTUAL GPU WORKS

In a VDI environment powered by NVIDIA virtual GPUs, the NVIDIA virtual GPU software is installed at the virtualization layer along with the hypervisor. This software creates virtual GPUs that let every virtual machine (VM) share the physical GPU installed on the server. The NVIDIA virtualization software includes a graphics driver for every VM. Quadro vDWS includes, for example, the powerful Quadro driver. Because work that was typically done by the CPU is offloaded to the GPU, the user has a much better experience, and demanding engineering and creative applications can now be supported in a virtualized and cloud environment.

Apps and VMs

NVIDIA Graphics Driver or NVIDIA Quadro Driver

vGPUs

NVIDIA Virtualization Software

Hypervisor

NVIDIA Tesla GPU

Server
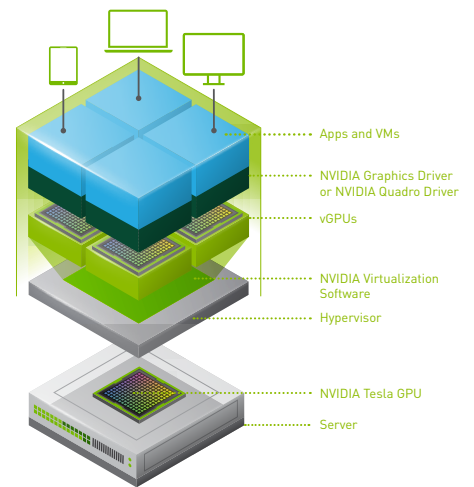
WHAT MAKES NVIDIA VIRTUAL GPU POWERFUL

EXCEPTIONAL USER EXPERIENCE

The ability to support both compute and graphics workloads for every vGPU

PREDICTABLE PERFORMANCE

Consistent performance with guaranteed quality of service, whether on-premises or in the cloud

BEST USER DENSITY

Support for up to 24 virtual desktops per physical GPU, or lower TCO with up to 8 vGPU profiles for the most flexibility to provision resources to match users' needs
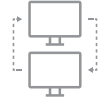
OPTIMAL MANAGEMENT AND MONITORING

End-to-end management and monitoring to deliver real-time insight into GPU performance, plus broad partner integrations so you can use the tools you know and love

CONTINUOUS INNOVATION

Regular cadence of new software releases that ensures you stay on top of the latest features and enhancements

BROADEST ECOSYSTEM SUPPORT

Support for all major hypervisors and the most extensive portfolio of professional apps certifications with Quadro drivers

For more information, visit **www.nvidia.com/virtualgpu**