
NVIDIA
NVIDIA GRID™
A True PC Experience for Everyone Anywhere

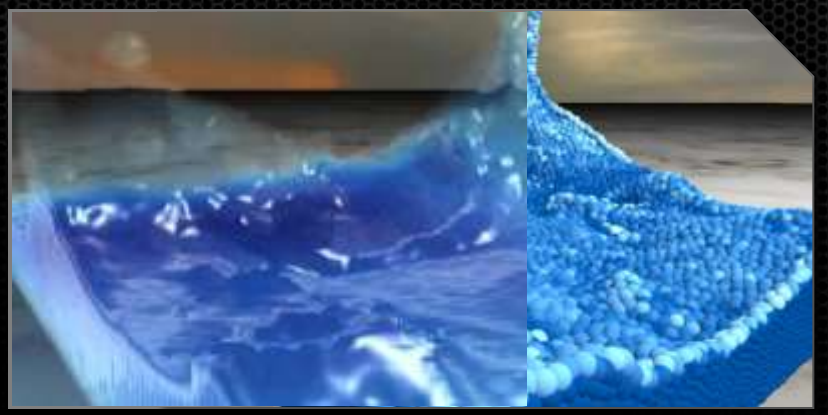
AGENDA

Why Every PC Has a GPU

NVIDIA GRID – GPUs for Virtual Computing

Solutions Roadmaps

Resources at NVIDIA



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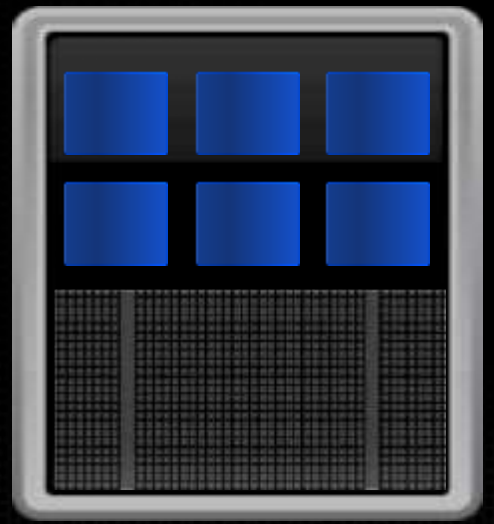
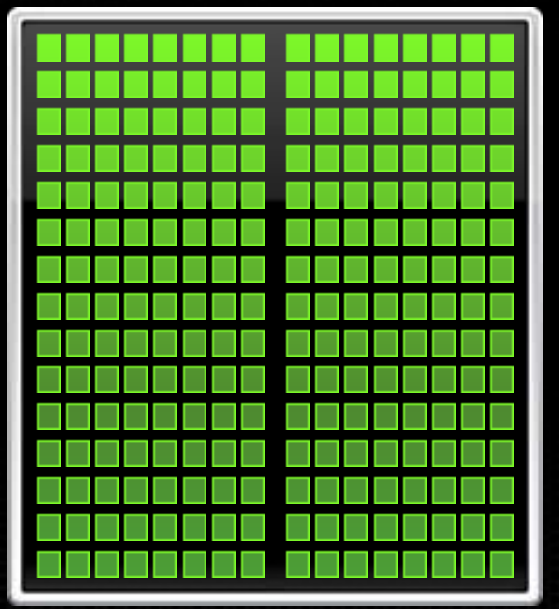
THE VISUAL COMPUTING COMPANY

What is a GPU?

CPU
Optimized for
Serial Tasks



GPU Accelerator
Optimized for Many
Parallel Tasks

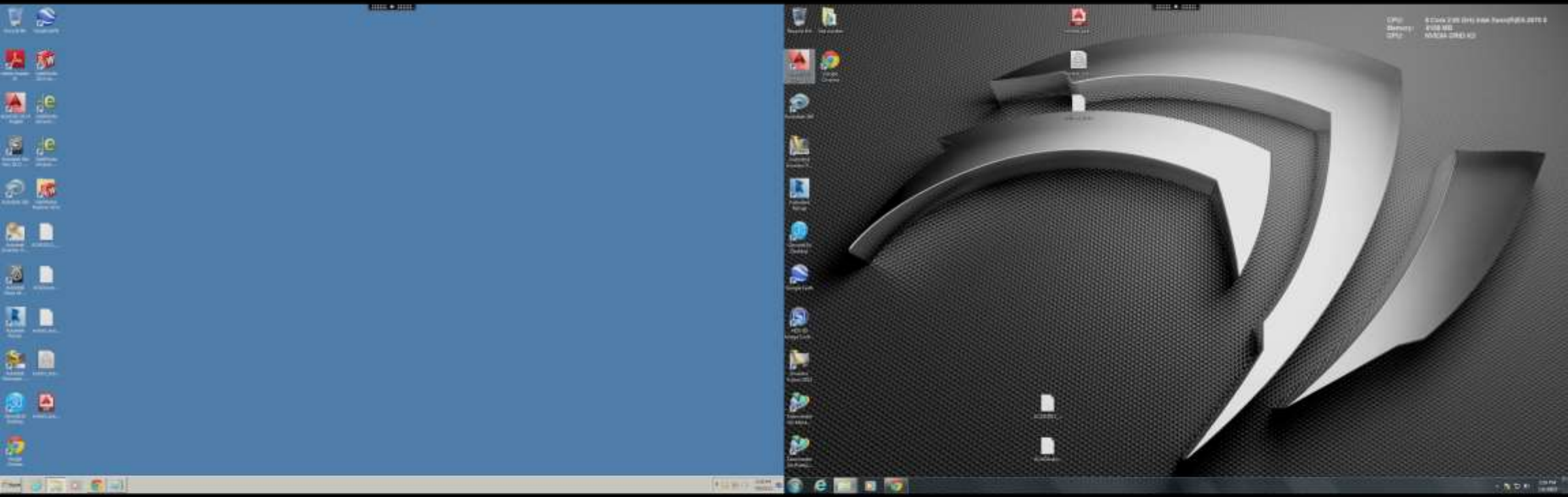


Every notebook, tablet and smartphone has a GPU

GPUs delivers a better visual experience by offloading work that the CPU is not efficient at processing (Direct X, OpenGL, Video)

Experience without a GPU
Citrix XenDesktop

Experience with a GPU
Citrix XenDesktop



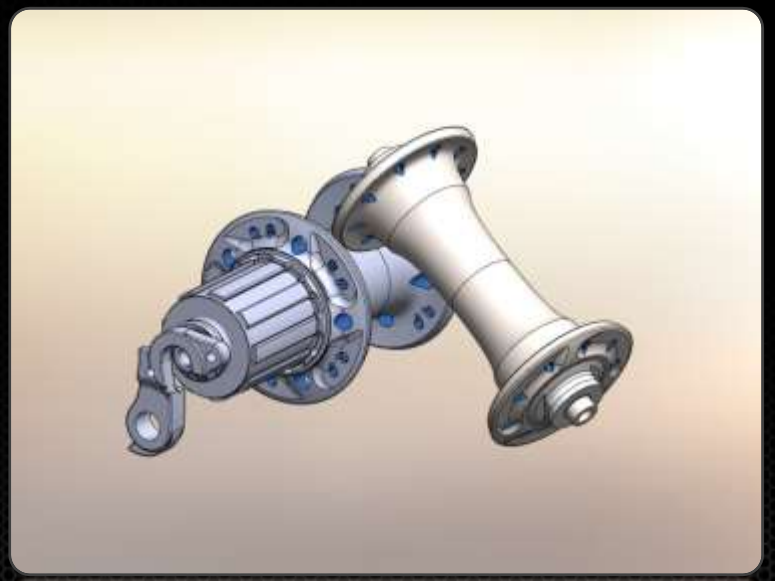
Autodesk AutoCAD - 3D Architectural Model

NVIDIA. GRID™

Visual Realism & Accuracy

- Complex materials surfaces, reflections and shadows
- Fast & Interactive Performance

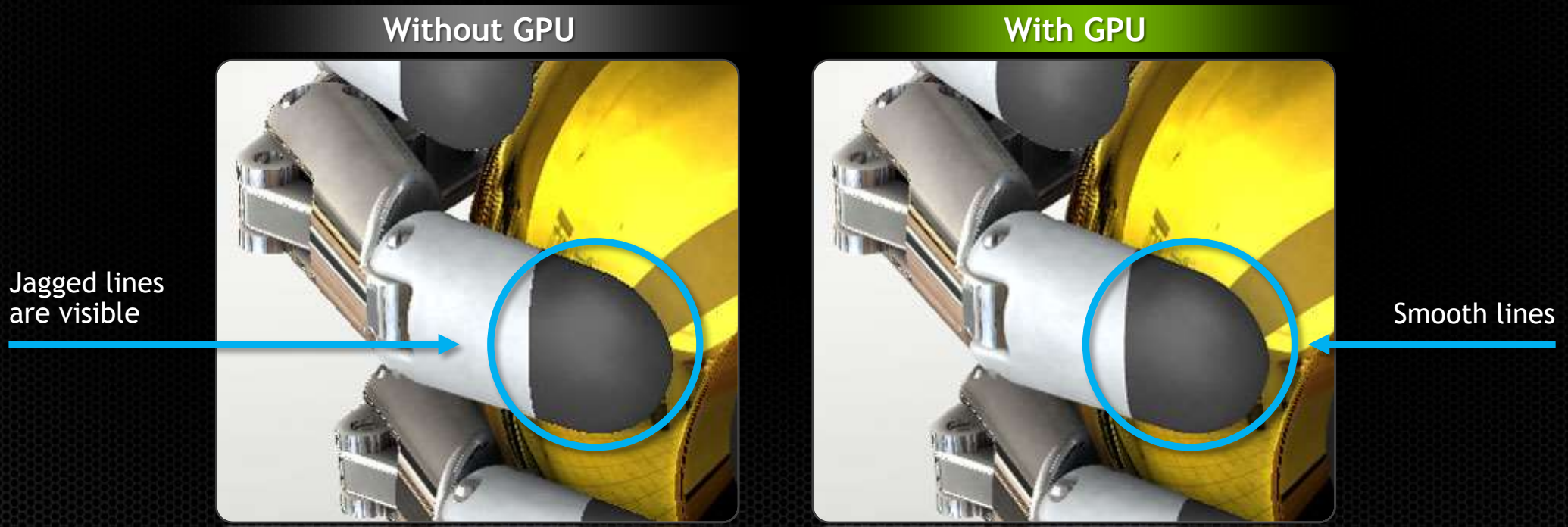
Without RealView



With RealView

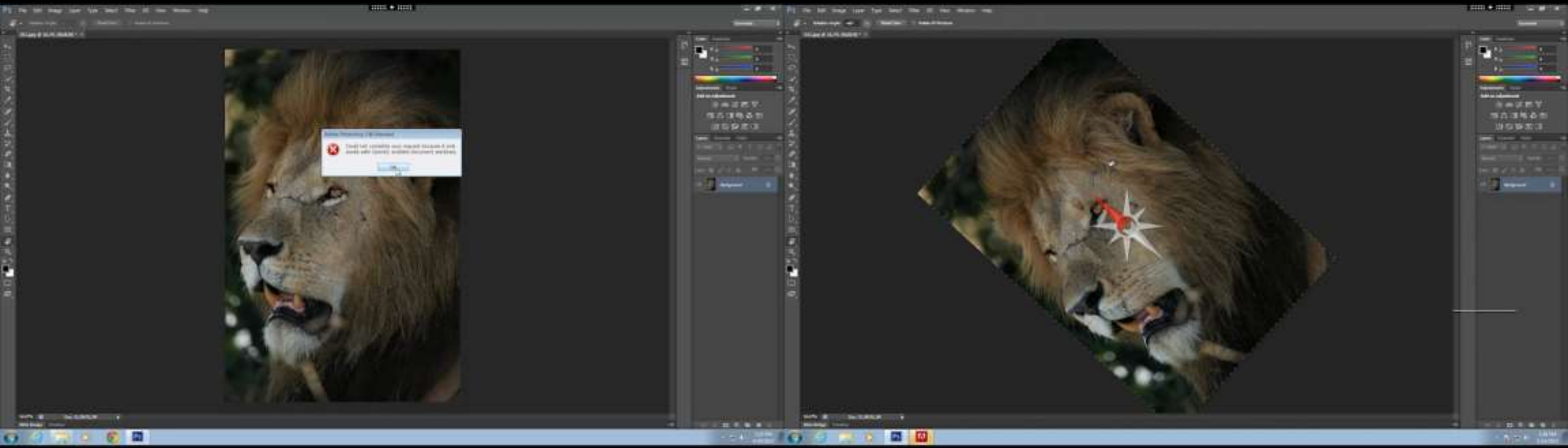
Visual Realism & Accuracy

- Full Scene Anti-Alliancing removes jagged edges
- Industry Standard for >12 Years
- Professional Modes - No compromise performance, models stay interactive



Citrix XenDesktop
with CPU emulated graphics

Citrix XenDesktop
with NVIDIA GRID™



Virtual desktops with full Adobe Photoshop features and performance

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NVIDIA GRID™

NVIDIA Quadro Professional Graphics

PRO APPLICATION PERFORMANCE

Industry's best performance on leading Design and Manufacturing applications

LEADER IN RELIABILITY AND STABILITY

Mission critical Drivers certified on 100+ applications and industry's best support

PREFERRED, TRUSTED BRAND

NVIDIA Quadro professional graphics have 90% share in Workstation Market

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NVIDIA GRID + Citrix (for Virtual Computing)

PRO APPLICATION PERFORMANCE

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PREFERRED, TRUSTED BRAND

NVIDIA Quadro professional graphics have 90% share in Workstation Market

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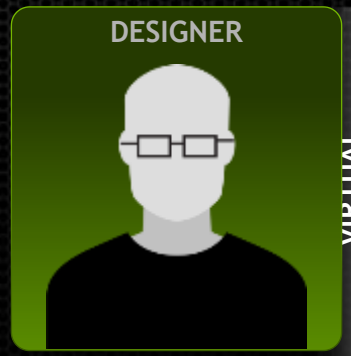
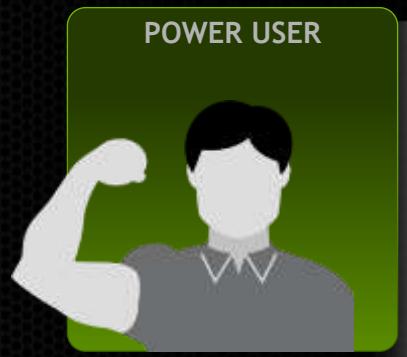
User Types for GRID



VIRTUAL WORKSTATION



VDI

IMPORTANCE OF GPU

Nice to Have	Must Have
Office Productivity	3D Engineering & Design Apps
Windows 7	PLM & Volume Design
	Web

AUTODESK. SOLIDWORKS PTC

TEAMCENTER

HTML

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DESIGNER

POWER USER

KNOWLEDGE WORKER

NVIDIA GRID K2

NVIDIA GRID K1

Performance

GPU	4 Kepler GPUs	2 High End Kepler GPUs
CUDA Cores	768 (192/GPU)	3072 (1536/GPU)
Memory Size	16GB DDR3 (4GB/GPU)	8GB GDDR5 (4GB/GPU)
Max Power	130 W	225 W
Cost	$2,000	$3,750
Number of Users	Up to 32	Up to 16

[1] Number of users depends on software solution, workload, and screen resolution

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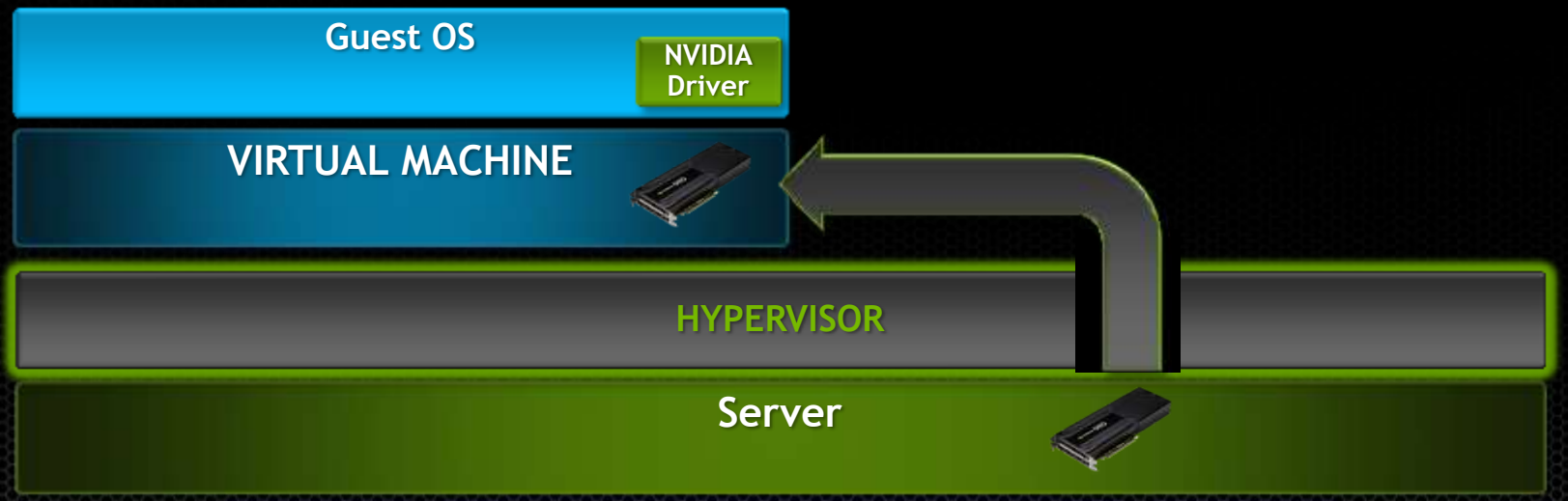
GPUs in a Virtual Desktop

- **GPU pass-through** — 1:1 dedicated GPU to user
- **Shared GPU** — *Software* virtualization of the GPU
- **Virtual User Sessions** — Multi-user single OS with GPU acceleration
- **Virtual GPU** — *Hardware* virtualization of the GPU through the NVIDIA GRID software

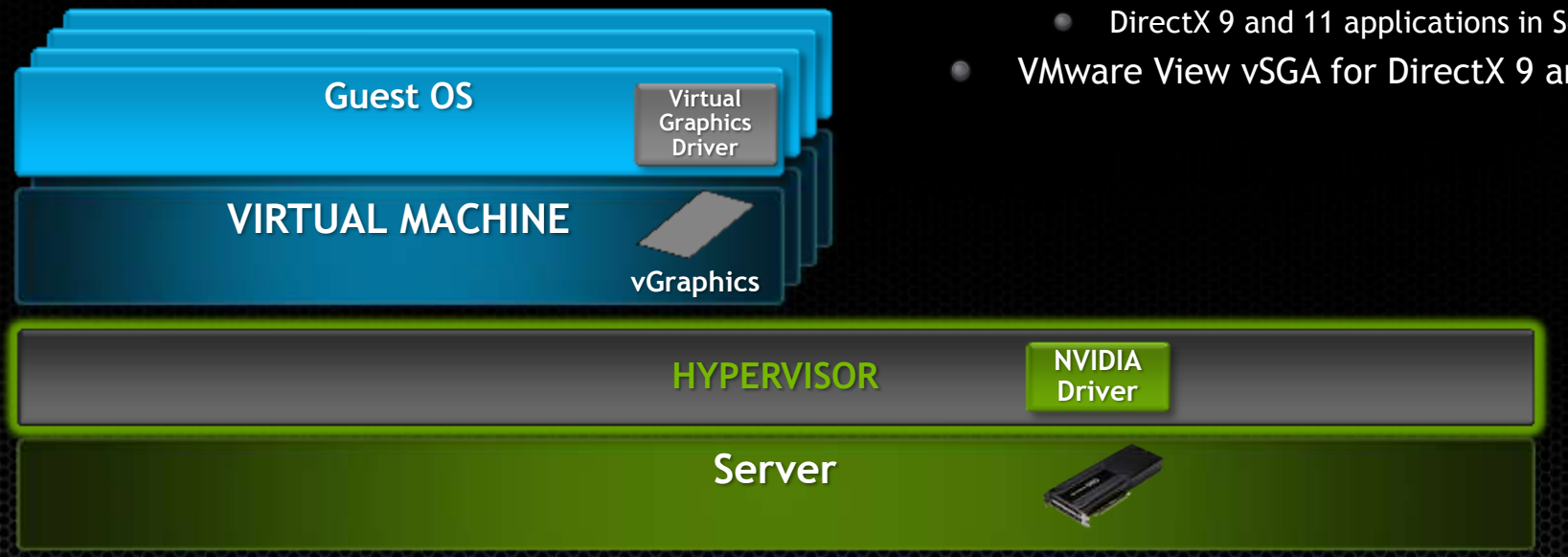
GPU Pass-through

- For highest performance, remote workstation
- Dedicated 1:1 GPU to user
- Citrix XenServer 6 and VMware ESX 5.1



GPU Software Virtualization

- Sharing of a GPU via an API-Intercept (or shim) driver
- Good for acceleration of knowledge worker desktops
- Application and API dependent



- Microsoft RemoteFX
  - DirectX 9 applications in Server 2008 R2
  - DirectX 9 and 11 applications in Server 2012
- VMware View vSGA for DirectX 9 and OpenGL 2.1 applicat

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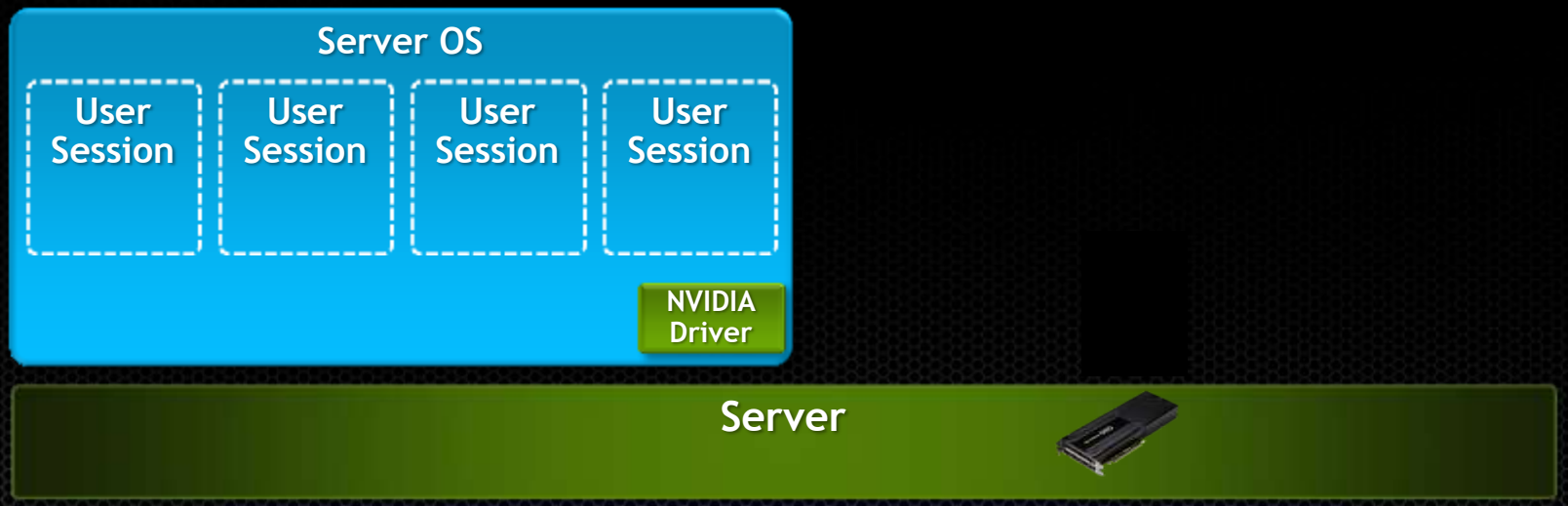
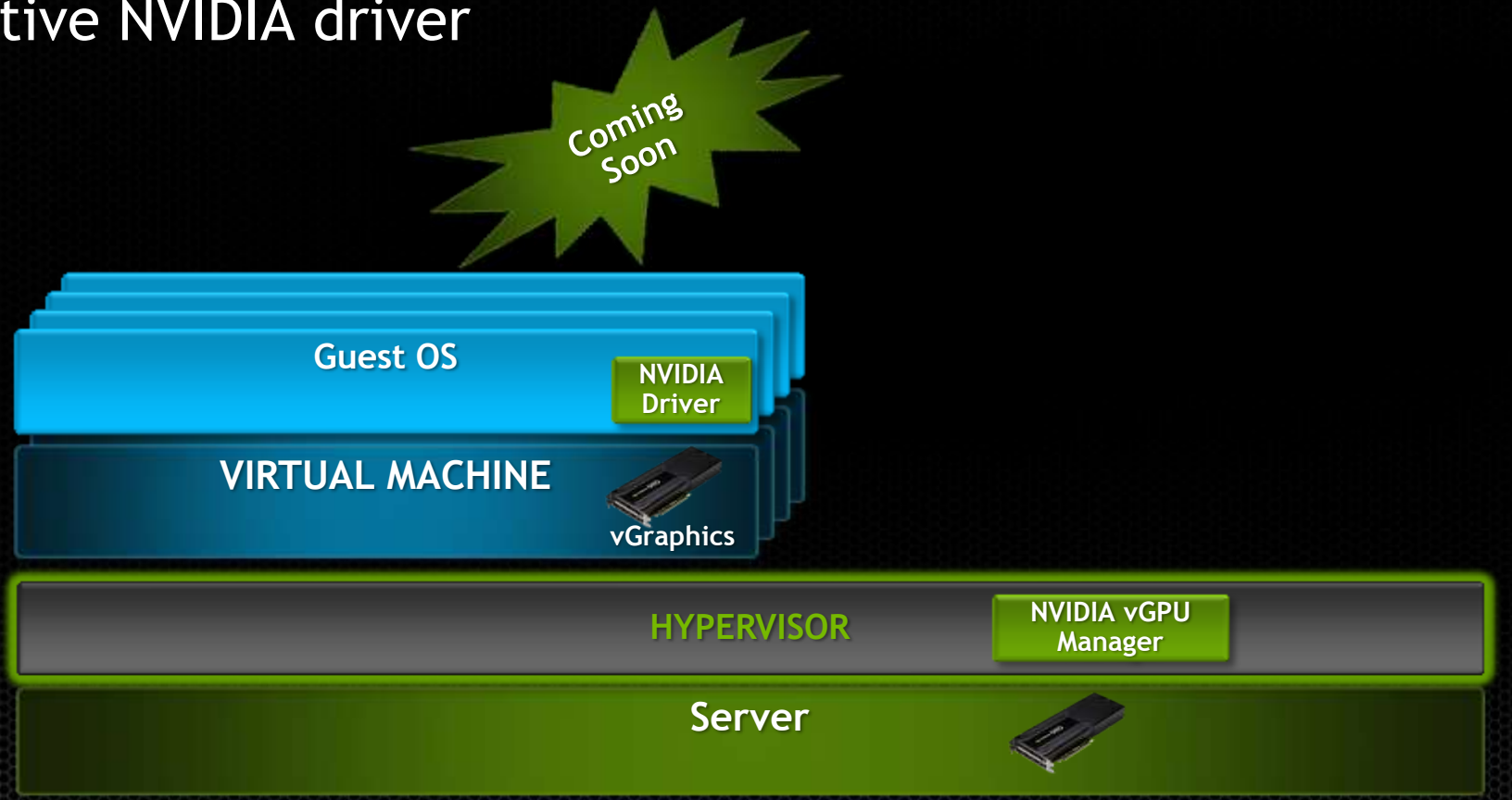
Virtual User Sessions

- Single OS (Server 2008 R2 or 2012) Multi-User
- GPU acceleration via XenApp 6.5 FP2 or XenDesktop 7 RDS Workloads
-



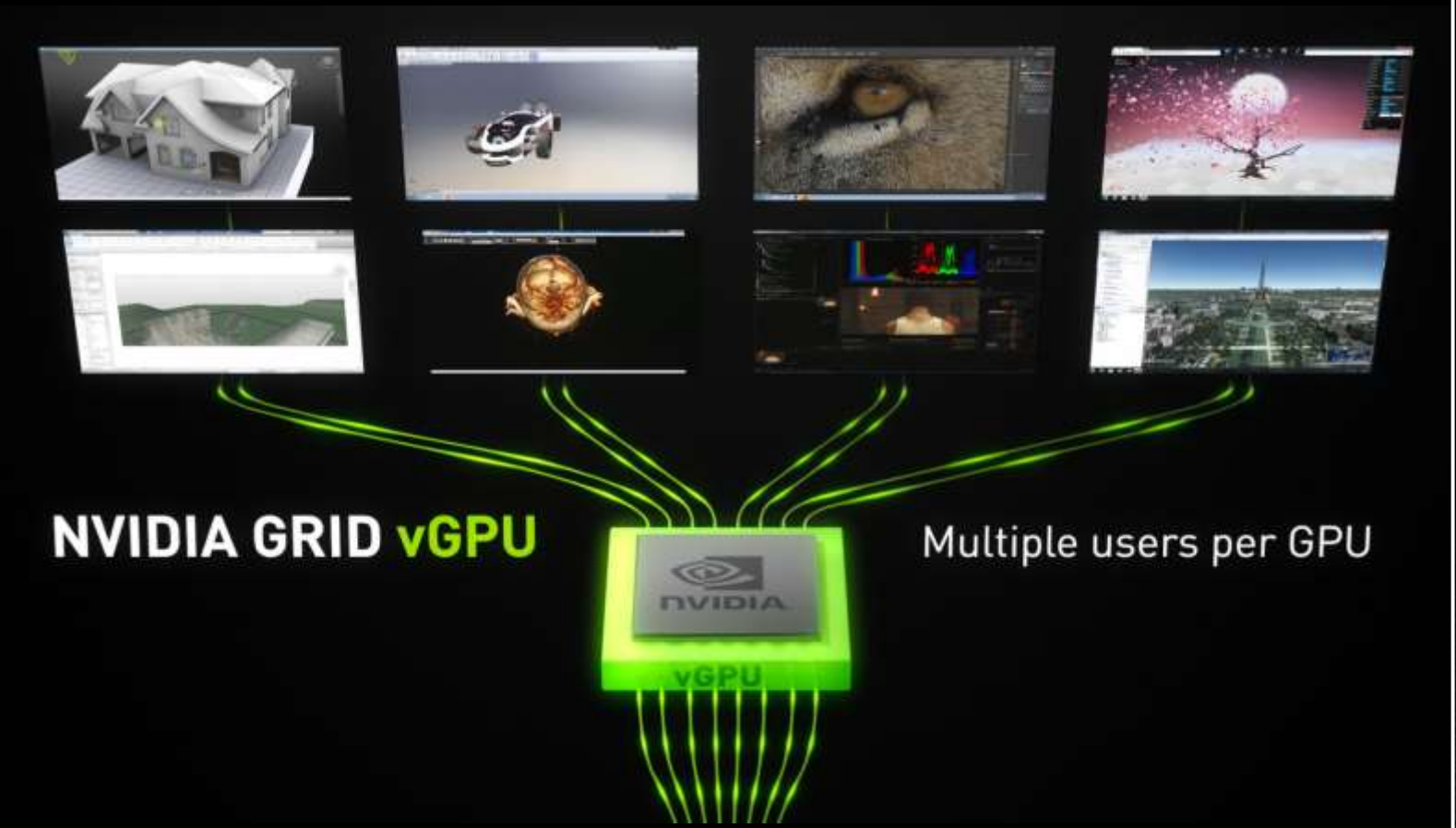
GRID Virtual GPU

- Hardware Virtualization of the GPU
- Native NVIDIA driver



Citrix Synergy 2013 Keynote

Jensen Huang, NVIDIA Co-Founder and CEO, was featured in Mark Templeton's Citrix Synergy Keynote



NVIDIA GRID™ vGPU™ is the hardware virtualization of the GPU which allows multiple virtual machines to interact directly with a GPU

GRID vGPU Profiles

Card	Physical GPUs	Virtual GPU	Use Case	Frame Buffer (MB)	Virtual Display Heads	Maximum Resolution	Maximum vGPUs		Cost per User
							per GPU	per Board	
GRID K2	2	GRID K280Q	High-end Designer	4096	4	2560x1600	1	2	$1875
GRID K2	2	GRID K260Q	Typical Designer	2048	4	2560x1600	2	4	$937
GRID K2	2	GRID K240Q	Entry-Level Designer	1024	2	2560x1600	4	8	$469
GRID K2	2	GRID K200	Power User / Knowledge Wkr	256	2	1920x1200	8	16	$235
GRID K1	4	GRID K140Q	Basic Designer	1024	2	2560x1600	4	16	$125
GRID K1	4	GRID K100	Power User / Knowledge Wkr	256	2	1920x1200	8	32	$63

DESIGNER

POWER USER

KNOWLEDGE WORKER

NVIDIA GRID K2

NVIDIA GRID K1

Pass-through

SW Virtualization

GRID Virtual GPU

NVIDIA

GRID Resources

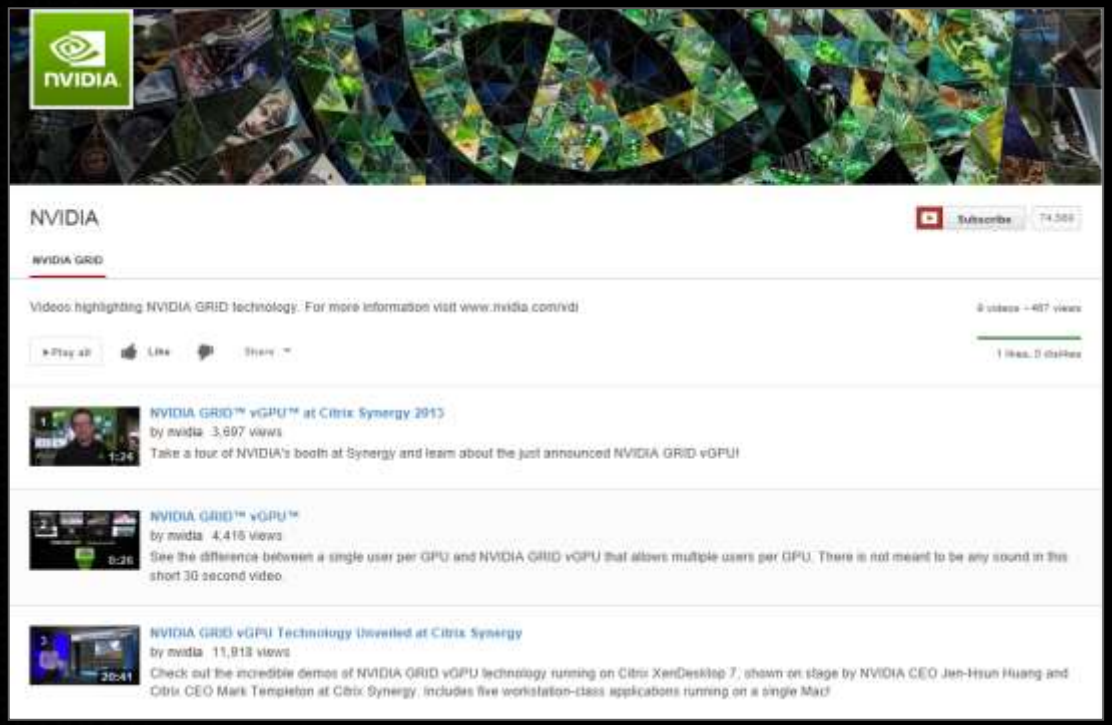
GRID Website
www.nvidia.com/vdi

Sign up for the monthly GRID VDI Newsletter
http://tinyurl.com/gridinfo

Questions? Email us
GRIDteam@nvidia.com

NVIDIA GRID YouTube Channel

http://tinyurl.com/gridvideos

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THANK YOU

	NVIDIA GRID K1	NVIDIA GRID K2
		
GPU	4 Kepler GPUs	2 High End Kepler GPUs
CUDA cores	768 (192/GPU)	3072 (1536/GPU)
Memory Size	16GB DDR3 (4GB/GPU)	8GB GDDR5 (4GB/GPU)
Max Power	130 W	225 W
Form Factor	Dual Slot ATX, 10.5”	Dual Slot ATX, 10.5”
Display IO	None	None
Aux power requirement	6-pin connector	8-pin connector
PCIe	x16	x16
PCIe Generation	Gen3 (Gen2 compatible)	Gen3 (Gen2 compatible)
Cooling solution	Passive	Passive
# users	4 - 100[1]	2 - 64[1]
Watts per user	~ 1.5 W	~ 3.5 W
OpenGL	4.3	4.3
Microsoft DirectX	11	11
VGX Hypervisor support	Yes	Yes

[1] Number of users depends on software solution, workload, and screen resolution

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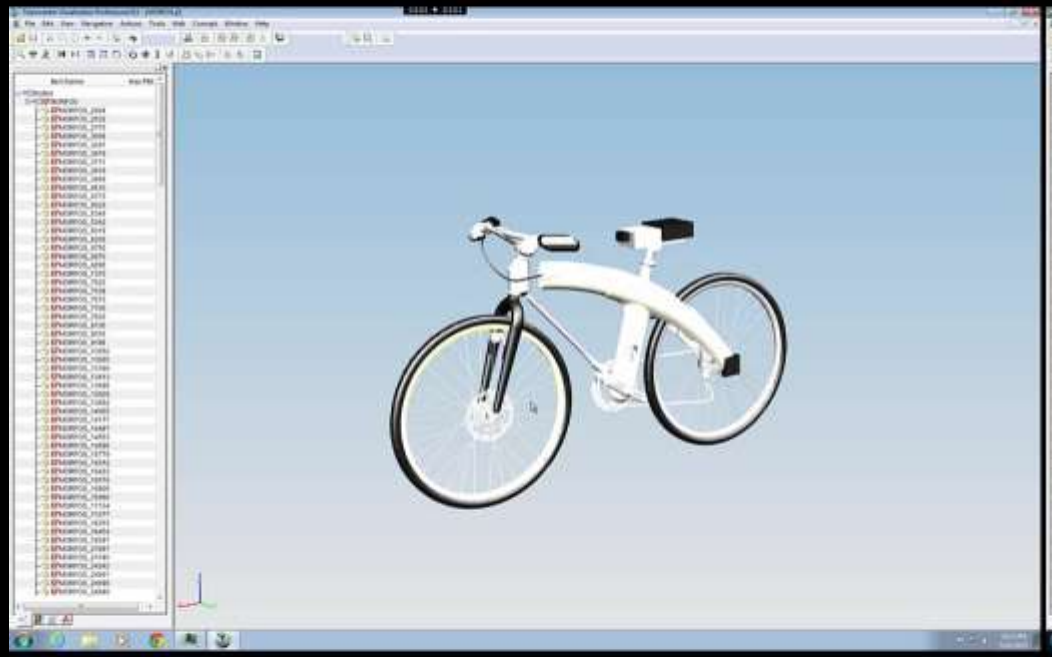
How does the GPU Improve the Experience?

More Examples

Citrix XenDesktop
with CPU emulated graphics

Citrix XenDesktop
with NVIDIA GRID™



Seimens Teamcenter PLM – 3D Viewer

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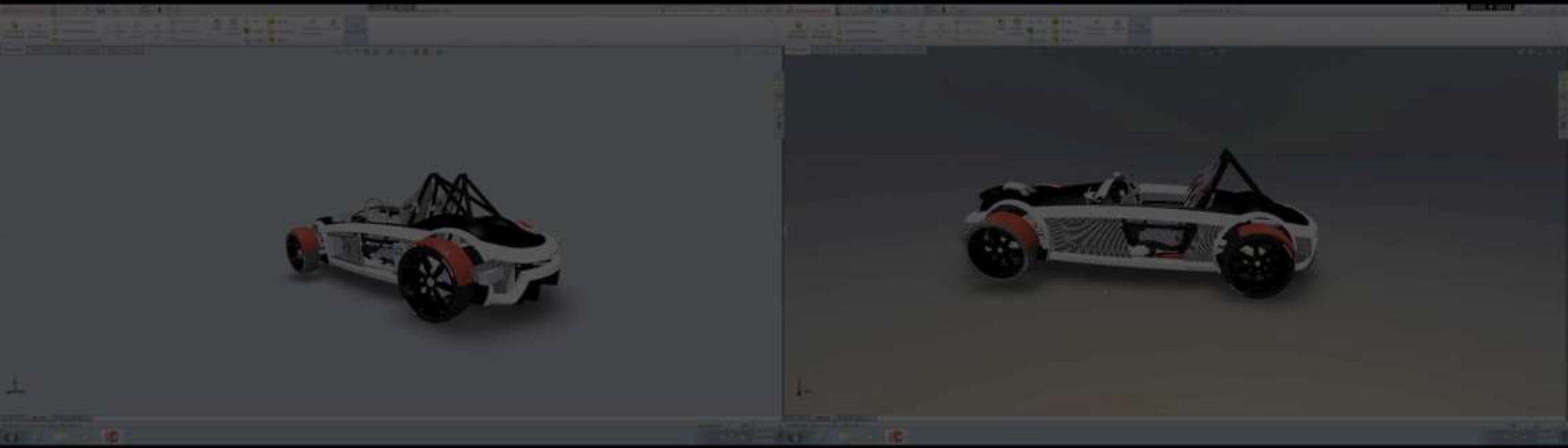
Interactive Performance

Citrix XenDesktop
with CPU rendered graphics

Citrix XenDesktop
with NVIDIA GRID™



Virtual desktops with full SolidWorks features and performance

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GRID Certifications

ISV	APPLICATION	CERTIFIED DRIVER
Autodesk Manufacturing	AutoCAD 2013	310.9
	Inventor 2013	310.9
	Revit 2013	310.9
	AutoCAD 2014	311.35
	Inventor 2014	311.35
	Revit 2014	In Progress
Bunkspeed	SHOT 2013	311.35
	PRO 2013	311.35
	DRIVE 2013	311.35
Ansys	Ansys	TBD
Autodesk M&E	3ds Max 2014	Deal Based
	Maya 2014	Deal Based
	Softimage 2014	Deal Based
TerraSpark	Insight Earth	311.35
Chaos	V-Ray	In Progress
Foundry		In Progress
PTC	PROe	320.00
ESRI	ArcGIS	TBD
Intergraph	Imagine	TBD
Synerscope	Synerscope	320.00
Graphisoft	ArchiCAD	In Progress
Bentley	Microstation	In Progress
Top Systems	T-Flex	In Progress
Ascon	Kompas 3D	In Progress
Adobe	Premier Pro	In Progress

Volume Creation and Design Applications

Photo Editing

Entry Design

Internet Video

Experience without a GPU
Citrix XenDesktop

Experience with a GPU
Citrix XenDesktop

Internet Browsing – Flash Video

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HTML5 — 3D/Web GL

Interactive Visual Content without Plug-ins

- Video
- Images and Animations
- Web GL

First Browsers Supporting Web GL

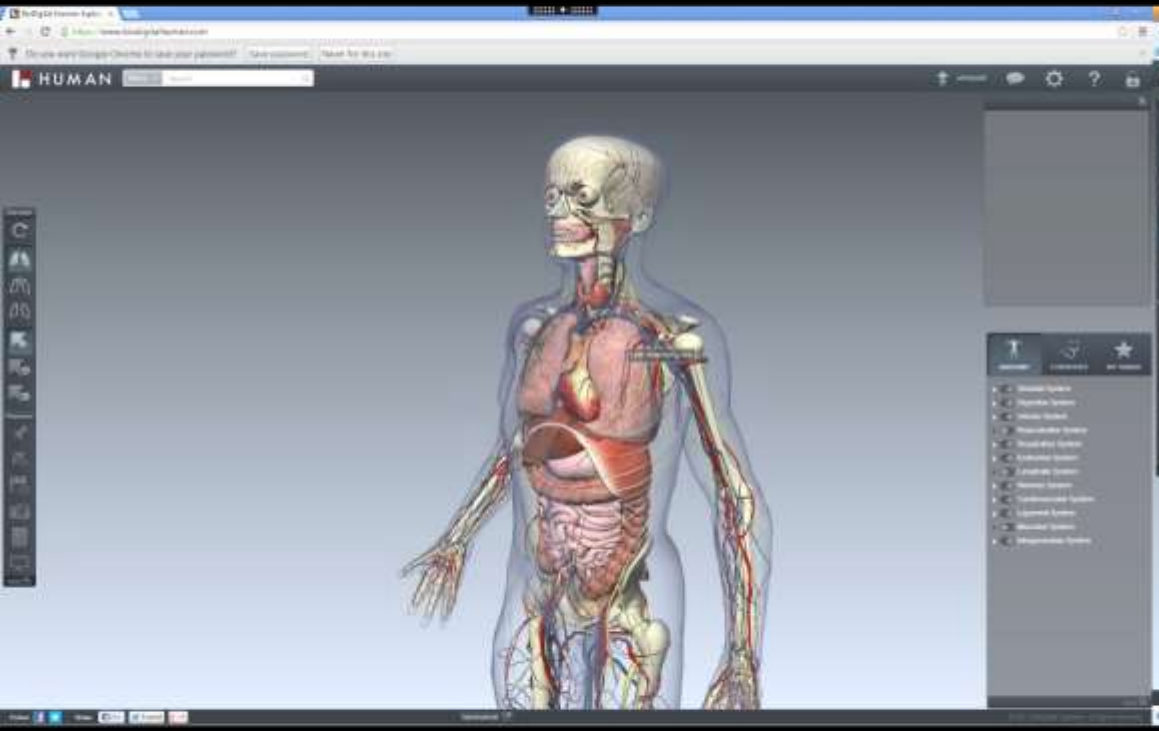

IE 11


Chrome 9

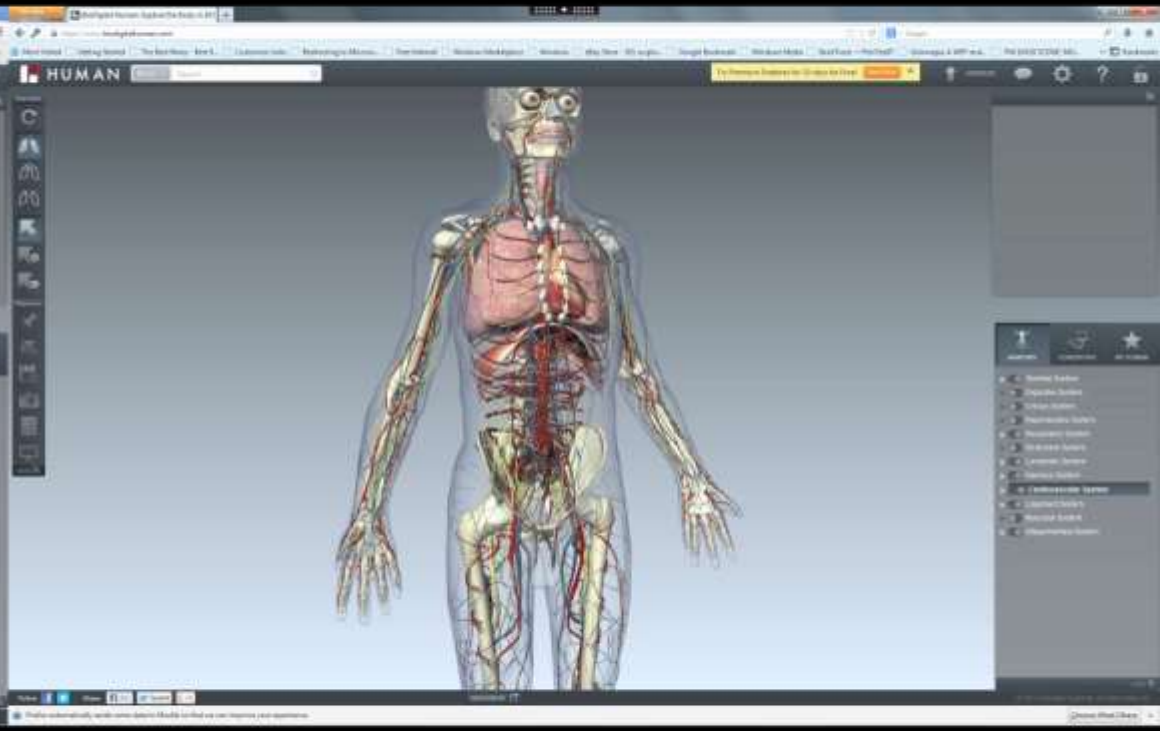

Mozilla 4


Safari 6.0

Experience without a GPU
Citrix XenDesktop



Experience with a GPU
Citrix XenDesktop



Chrome – HTML5 / WebGL

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HTML5 Sites and Application Examples

Google

YouTube

flickr

3DVIA

AutoDesk Applications

CAD Communities

GRABCAD

TINKERCAD

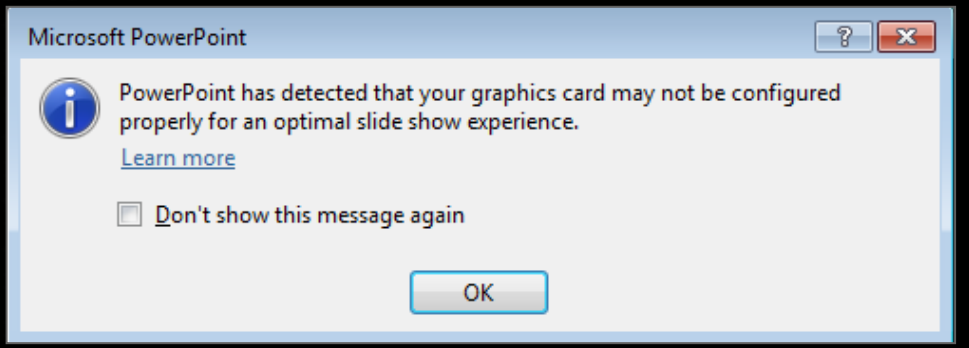
NVIDIA

Office Productivity Applications

Microsoft Office 2013

Adobe Acrobat

Microsoft Office 2013



Source http://technet.microsoft.com/en-us/library/ee624351.aspx#Overview1

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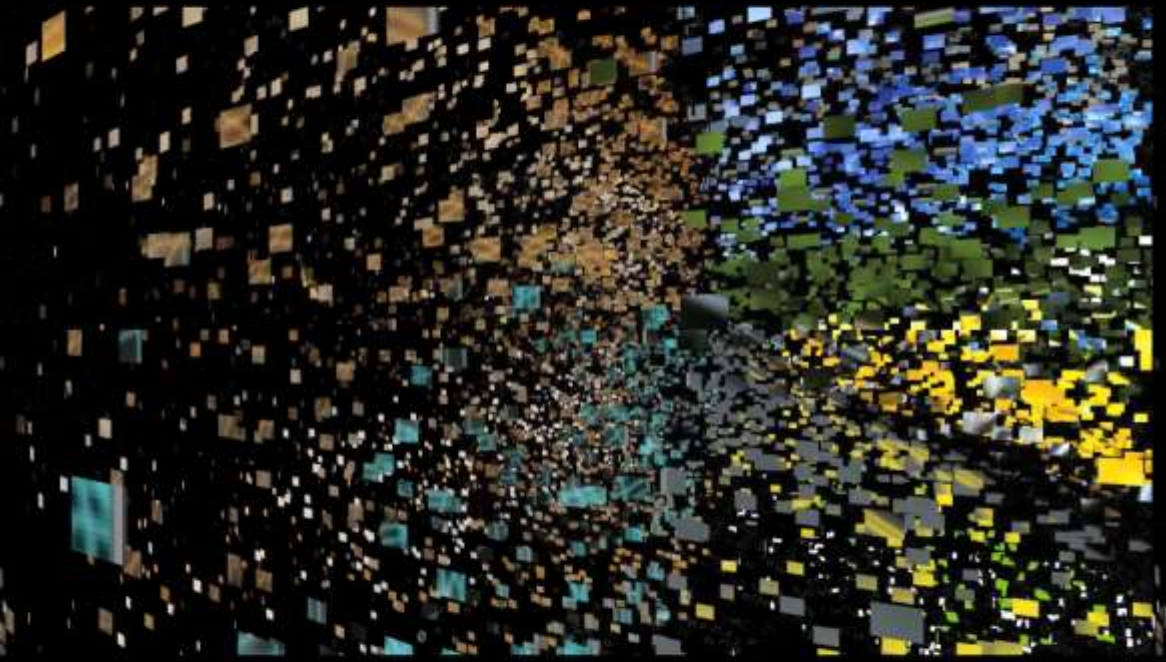
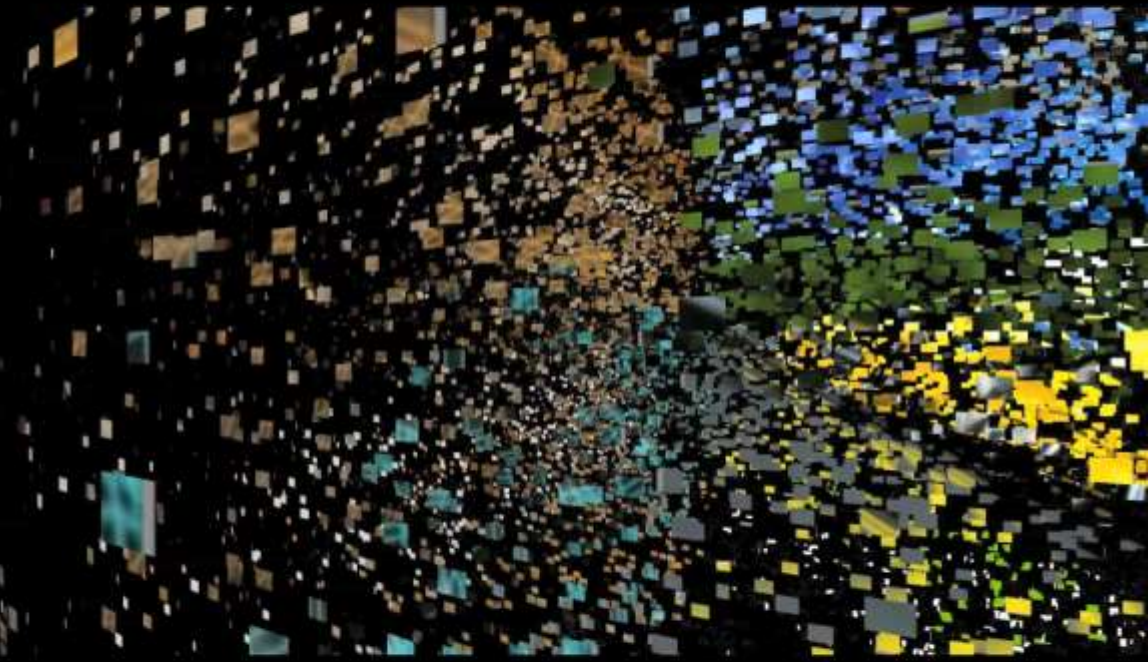
Experience without a GPU
Citrix XenDesktop



Experience with a GPU
Citrix XenDesktop



Microsoft Office 2013 - PowerPoint

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Windows Experience Index

Windows 7 4.0

A computer with a base score of 4.0 or 5.0 can run new features of Windows 7 like themes across multi display, and it can support running multiple programs at the same time.

Windows 7 Basic 3.0

A computer with a base score of 3.0 can run Aero and many features of Windows 7 at a basic level. Some of the Windows 7 advanced features might not have all of their functionality available.
For example, a computer with a base score of 3.0 can display the Windows 7 theme at a resolution of 1280 x 1024, but might struggle to run the theme on multiple monitors.

Windows for Business Apps 2.0

A computer with a base score of 2.0 usually has sufficient performance to do general computing tasks, such as run business programs and search the Internet. However, a computer with this base score is generally not powerful enough to run Aero, or the advanced multimedia experiences that are available with Windows 7

Substandard 1.0

Windows Experience (vGPU)

Windows 7 4.0

GRID K200 → 16 VMs

GRID K100 → 12 VMs

Windows 7 Basic 3.0

GRID K200 → 32 VMs

GRID K100 → 16 VMs

Windows for Business Apps 2.0

GRID K100 → 32 VMs

Citrix SW Graphics (XenDesktop 7) → 32 VMs

Substandard 1.0

VMs/GRID Card Tests Run on Cisco C240M Server – 2 CPU Intel Xeon E5-2620 GHz, 12 Physical Core, 24 Virtual CPU cores with HT, Memory 128 GB

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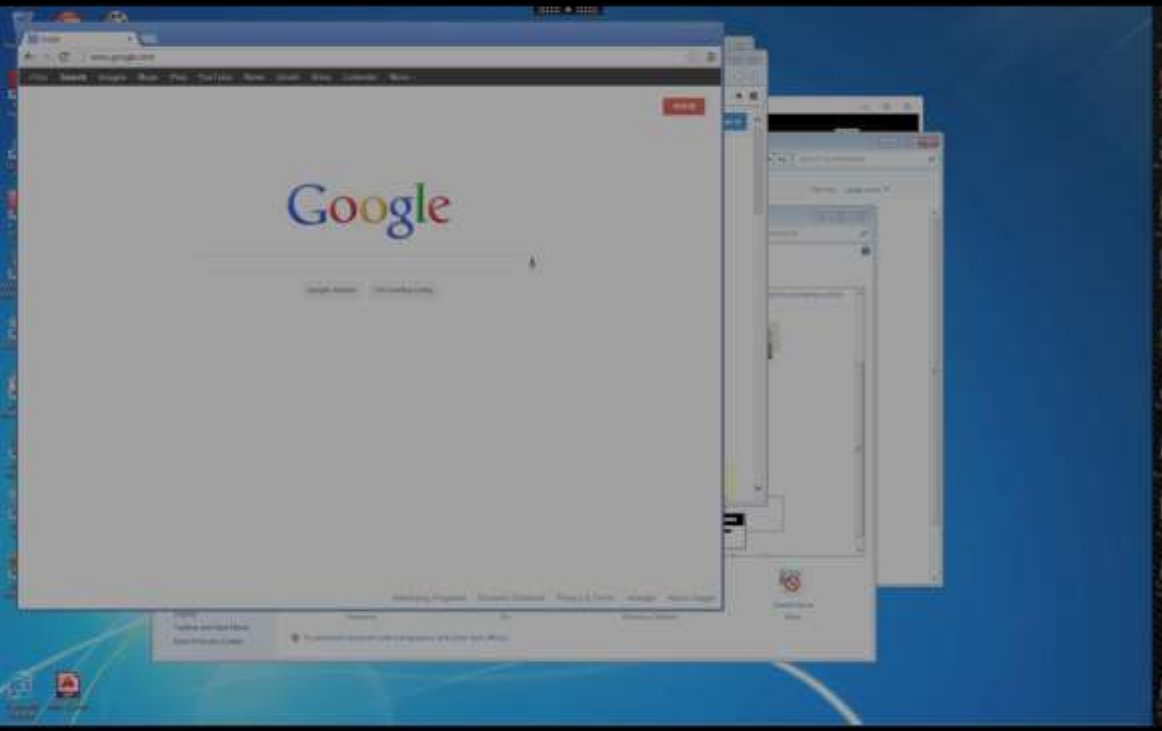
Experience without a GPU
Citrix XenDesktop



Experience with a GPU
Citrix XenDesktop

Microsoft Windows 7 - Desktop Experience

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