Graphics in the Cloud

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A Brand New Idea...
“BYOD” Movement

Windows PCs

Tablets and Smartphones

Mac PCs
IT Simplification

Work-PC as an App

CLIENT DEVICES

OS

APPs

Data
GPUs in the Cloud

GAMING GRAPHICS
GeForce™ GRID
Cloud Gaming

PROFESSIONAL GRAPHICS
VGX™
Remote PC and Workstation

PARALLEL COMPUTING
TESLA™
Cloud Computing

CLIENT DEVICES
TEGRA™
Enterprise Computer Users

DESIGNER
(CATIA, CS6, Inventor) 25M

POWER USER
(PLM, Med Img, Showcase) 200M

KNOWLEDGE WORKER
(MS Office, Photoshop) 400M

TASK WORKER
(Call Center Apps) 100M
DESIGNER
(CATIA, CS6, Inventor)

POWER USER
(PLM, Med Img, Showcase)

KNOWLEDGE WORKER
(MS Office, Photoshop)

TASK WORKER
(Call Center Apps)
DESIGNER
(CATIA, CS6, Inventor)

POWER USER
(PLM, Med Img, Showcase)

KNOWLEDGE WORKER
(MS Office, Photoshop)

TASK WORKER
(Call Center Apps)

PC

API Intercept
Software (CPU) Rendered Graphics

GPU Pass-through

NVIDIA VGX
GPU Pass-through

Hypervisor

Virtual Machine
- Guest OS
  - Apps
  - Virtual Desktop
  - Remote Protocol
- NVIDIA Driver

NVIDIA GPU
GPU Pass-through

- Citrix XenServer 6
- VMware ESX - Coming Soon
- Parallels Workstation 6 Extreme

Citrix XenDesktop 5.6
- VMware View - Coming Soon

Hypervisor

Virtual Machine

- Guest OS
- Apps
- Virtual Desktop
- Remote Protocol
- NVIDIA Driver

NVIDIA GPU

- NVIDIA GPU
- Microsoft Server 2008 HyperV
- VMware ESX - Coming Soon

- Microsoft RemoteFX
- VMware View - Coming Soon

Hypervisor

NVIDIA Driver

Translation, Execution, Readback

Virtual Machine

Guest OS

Apps

Virtual Desktop

Remote Protocol

API Capture Driver (DX9)

API Intercept

NVIDIA GPU
NVIDIA VGX

Hypervisor

- GPU Hypervisor
- Virtual GPU Manager
- Resource Manager

- Hypervisor Device Emulation Framework

State

NVIDIA VGX GPU

- GPU MMU
- Per-VM Dedicated Channels
- Remote Display

NEW!
NVIDIA VGX Remote Display

1. **FB**
2. **GFX API**
3. **DRIVER**
4. **SYSTEM MEMORY**

**FB** → **RGB → YUV** → **H.264 Encode** → **Network Protocol**
NVIDIA VGX Remote Display

SYSTEM MEMORY

1. FB
2. RGB → YUV
3. H.264 Encode
4. Network Protocol

GFX API

DRIVER

GPU

Network Protocol

SYSTEM MEMORY

1. FB
2. Network Protocol

GPU

FB

Network Protocol
NVIDIA® VGX™ Platform
Frees Users to Run A True PC as a Service From Any Connected Device

VGX Board
World’s First Virtualized GPU

VGX HyperVisor
True Virtual PC, Running Any App

User Selectable Machines
Enterprise Manageability
KEPLER
THE WORLD’S FIRST GPU for CLOUD COMPUTING

Virtualized GPU
Low Latency Remote Display
Super energy-efficiency
NVIDIA® VGX™ Board

Hardware Virtualization
Four GPUs, 16GB of Frame Buffer

Low Latency Remote Display
Dedicated h.264 Encoder

Datacenter Efficiency
New SMX Shader Design, Passively Cooled
DEMO: Fully-Accelerated PC as an App
GTC 2013 | March 18-21 | San Jose, CA
The Smartest People. The Best Ideas. The Biggest Opportunities.

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- Call for Posters: October 2012

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