WARNING

Benny and Ruben aren’t responsible for the effects of the information overload during their presentation such as sleeplessness, increased energy level, trouble falling asleep. It may change your point of view and will wake you up frequently during the night (or day). The information is based on personal and business experiences, copyright BlaBla here, if you have feedback or suggestions to make it better please let us know.

If it is great already let Jensen Huang know 😊
Hard Facts - Benchmarking NVIDIA Virtual GPU Accelerated Remote Desktop User Experience

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Benchmarking

REX Analytics

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TeamRGE Remoting Graphics Experts
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2008-2017

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Technologist
Workspace, Cloud
Community
Dad, Christian, kids 17,15,11 😊
“Sharing your knowledge doesn't put your job at risk. It empowers you to perform at a higher level”
SESSION TOPICS
Session topics

1. Windows, session remoting and GPUs
2. Preview: EUC state of the union 2018
3. Benchmarking: tooling and lab setup
4. Benchmarking results
Is Windows remoting still relevant?
NOOOBODY CARES
Cloud Adoption Rate and the “Long Tail”

Acceptance of Web / mobile Platforms

“Long Tail”

4 – 8 MILLION WINDOWS APPS!
### What operating systems are used for desktop VMs?

<table>
<thead>
<tr>
<th>OS</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 10 x64</td>
<td>44.00%</td>
</tr>
<tr>
<td>Windows 10 x86</td>
<td>2.00%</td>
</tr>
<tr>
<td>Windows 7 x64</td>
<td>30.00%</td>
</tr>
<tr>
<td>Windows 7 x86</td>
<td>9.00%</td>
</tr>
<tr>
<td>Windows Server 2008(R2)</td>
<td>3.00%</td>
</tr>
<tr>
<td>Windows Server 2012(R2)</td>
<td>2.00%</td>
</tr>
<tr>
<td>Windows Server 2016</td>
<td>3.00%</td>
</tr>
<tr>
<td>Windows XP</td>
<td>2.00%</td>
</tr>
<tr>
<td>Windows 8.x (x86 and x64)</td>
<td>3.00%</td>
</tr>
<tr>
<td>Linux</td>
<td>1.00%</td>
</tr>
<tr>
<td>Not sure</td>
<td>1.00%</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
Virtual Client Computing upstart in Cloud and Mobile 1st world
Popular (Graphics) Applications

Microsoft Office
Windows 7
Windows 10
Adobe Creative Cloud
Ai, Pr, Lr, Ps, Ae

Bohemia Interactive Simulations
Bentley MicroStation
GeoMedia
Wolfram Mathematica
ANSYS

creo
MATLAB Simulink
Schlumberger
CATIA
SOLIDWORKS

Paradigm
flame
HEXAGON Geospatial
Lightworks

Siemens NX
PLM Software

Autodesk
Product Design Suite
Inventor
Revit
3ds Max

Autodesk MUDBOX
Navisworks
InfraWorks
Fabrication
Showcase
Alias
Revit
Autodesk CIVIL 3D
Simulation
How much video frame buffer (memory) is required for OS and applications? Why is this important?
GPU usage for normal user

Drinking from the firehose: graphics for Virtual Desktops and Apps
## GPU-Accelerated Remoting – Options

<table>
<thead>
<tr>
<th>Direct Map</th>
<th>Software Graphics</th>
<th>Shared GPU (API Intercept)</th>
<th>GPU Pass-thru</th>
<th>GPU Virtualization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bare Metal</td>
<td>Virtual Desktops</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**User Session**

- **Windows OS**
  - Hypervisor
  - **GPU**
    - **CPU** (Emulating GPU)
  - **VM**
  - **GM**

**Software Graphics**

- **VM**
  - **GPU**
  - **CPU**
  - **GM**

**Shared GPU (API Intercept)**

- **VM**
  - **GPU**
  - **CPU**
  - **GM**

**GPU Pass-thru**

- **VM**
  - **GPU**
  - **CPU**
  - **GM**

**GPU Virtualization**

- **VM**
  - **GPU**
  - **CPU**
  - **GM**

**Legend:**
- Orange: GPU graphics driver
- Black: VDI vendor’s shared graphics framework
- Yellow: GPU virtualization component
Which GPUs do you use for your on-premises VDI/SBC solution

- NVIDIA TESLA - KEPLAR: 12%
- NVIDIA TESLA - MAXWELL: 16%
- NVIDIA TESLA - PASCAL: 6%
- NVIDIA QUADRO: 3%
- Teradici PCoIP Server offload card: 1%
- None, No GPUs or offloading technology is being used: 47%
- Not sure: 13%
- AMD Firepro: 1%
- AMD MxGPU: 1%
“Iron sharpens Iron, more competition between AMD, Intel and NVIDIA is a very good thing!”

Ruben Spruijt, Frame CTO
EUC - State of the Union survey

Which Office version is current standard in the VDI/SBC (on-premises and cloud) environment?

- Microsoft Office 2016 (Via Enterprise Agreement) : 22.18%
- Microsoft Office 2016 (Via Office 365) : 29.35%
- Microsoft Office 2013 : 24.57%
- Microsoft Office 2010 : 17.06%
- Microsoft Office 2007 or older : 0.68%
- LibreOffice / OpenOffice : 1.02%
- Not sure : 1.02%
- No Office is used : 1.02%
- Other (please specify) : 1.71%

N= 520

VDILIKEAPRO
PREVIEW
MARCH 2018
What is the ratio of devices being used to access SBC/VDI desktops and/or applications? Please add to 100%
EUC - State of the Union survey

What is the most common display configuration in your company? (approximately)

1 display, Full HD (1,920 x 1,080 pixels): 28.32%
1 display, HD (1,280 x 720 pixels): 10.49%
1 display, 4k or more (3840 pixels x 2160): 0.35%
2 displays, Full HD: 26.22%
2 displays, HD: 24.13%
More than 2 displays: 2.10%
Not sure: 1.75%
Other: 0.35%
1 display less than HD: 4.90%

N= 520

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PREVIEW
MARCH 2018
EUC - State of the Union survey

Will you use, introduce or change to public cloud VDI/SBC (Remote Apps/Deskop as a service)?

- Yes, we are already using on a small scale: 7.77%
- Yes, we are already using on a large scale: 3.18%
- Yes, but To Be Determined (TBD): 16.25%
- TBD, currently investigating out of curiosity: 19.43%
- TBD, currently investigating because of business requests: 12.37%
- No, not interested at all: 22.26%
- Not sure yet: 18.73%

N= 520

VDI LIKE A PRO
PREVIEW
MARCH 2018
PLEASE SUPPORT
VDILIKEAPRO.COM/SURVEY
Benchmarking:
tooling and lab setup
Our mission is to "de-suckify" remote end-user experience...

...or at least to know when and why it sucks so you can make better choices! ;-)

info@rexanalytics.com
Typical Customer Questions (in GPU context)

- Perceived performance of a **specific application** with GPU and without?
- Performance impact of the **cloud and varying network conditions**?
- Performance impact of a predefined number of **noisy neighbors**?
- Perceived end-user experience when **migrating** an existing remoting product?
- How do existing and **future remoting solutions and protocols** compare when looking at different use cases and personas?
Benchmarking Workflow

**Build**

**REX Workloads**
- Creates set of scripted user actions within an application
- Simulates individual users and noisy neighbors (personas)

**Track**

**REX Tracker**
- Triggers/syncs test runs
- Triggers primary user screen recording
- Collects telemetry data

**Analyze**

**REX Analyzer**
- Combines and displays visual and metric test results
- Compares load sequences
- Analyzes user experience
REX Analytics

Primary User

Endpoit Device

Network

Host + Guest VMs

Build Track Analyze

REX Workloads + Tools

Secondary Users

REX Tracker

REX Analyser
Comparison – REX Analyzer
Benchmarking Results
Notes from the field: observations & findings

- NVIDIA GPU solution = Hardware + Software.
- Make sure QvDWS is licensed correctly, to have maximum performance.
- Bug(s) in Azure NV6. GPU connect, GPU performance counters, GPU licensing.
- Bug(s) in NVIDIA on-premises licensing platform.
- Using WMI – NVIDIA component heavily, CPU impact is high (15-20%)
Test Scenarios “On-Premises”

1. HyperV2016-DDA-vs-XD7.15-LAN-DX9-Rollercoaster
2. HyperV2016-DDA-vs-XD7.15-2mb-200ms-1%-DX9-Rollercoaster
3. XD7.15-LAN-IE-vs-Chrome-PhotoGallery (Ken Burns Effect)
5. HyperV2016-DDA-vs-XD7.15-2mb-200ms-1%-OpenGL-Cinebench
Test Scenarios “Public Cloud”

1. NV6-FrameHTML5-vs-RDP10-“LAN”-IE-CarVisualizer
2. NV6-FrameHTML5-vs-RDP10-8mb-200ms-1%-IE-CarVisualizer
3. NV6-FrameMac-vs-RDP10-LAN-Superposition-FullHD
4. NV6-Frame-vs-XD7.15-LAN-Superposition_FullHD
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Thanks!

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