



ArcGIS Pro Virtualization: On-Premise and from the Cloud

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**GIS
INSPIRING
WHAT'S
NEXT**

Overview

- **ArcGIS Pro**

- Differences from ArcMap
- Performance Considerations

- **On Premises Virtualization**

- Products
- File Based VM vs Enterprise Virtualization
- Advantages & Disadvantages

- **Cloud Computing**

- Products
- Advantages & Disadvantages

- **Hardware**

- Server Equipment
- GPU & Profile Selection
- Nvidia vGPU GRID Manager

- **Lessons Learned**

What makes ArcGIS Pro different?

- **Differences Between ArcMap & ArcGIS Pro**

- **Non-GPU (ArcGIS Desktop)**

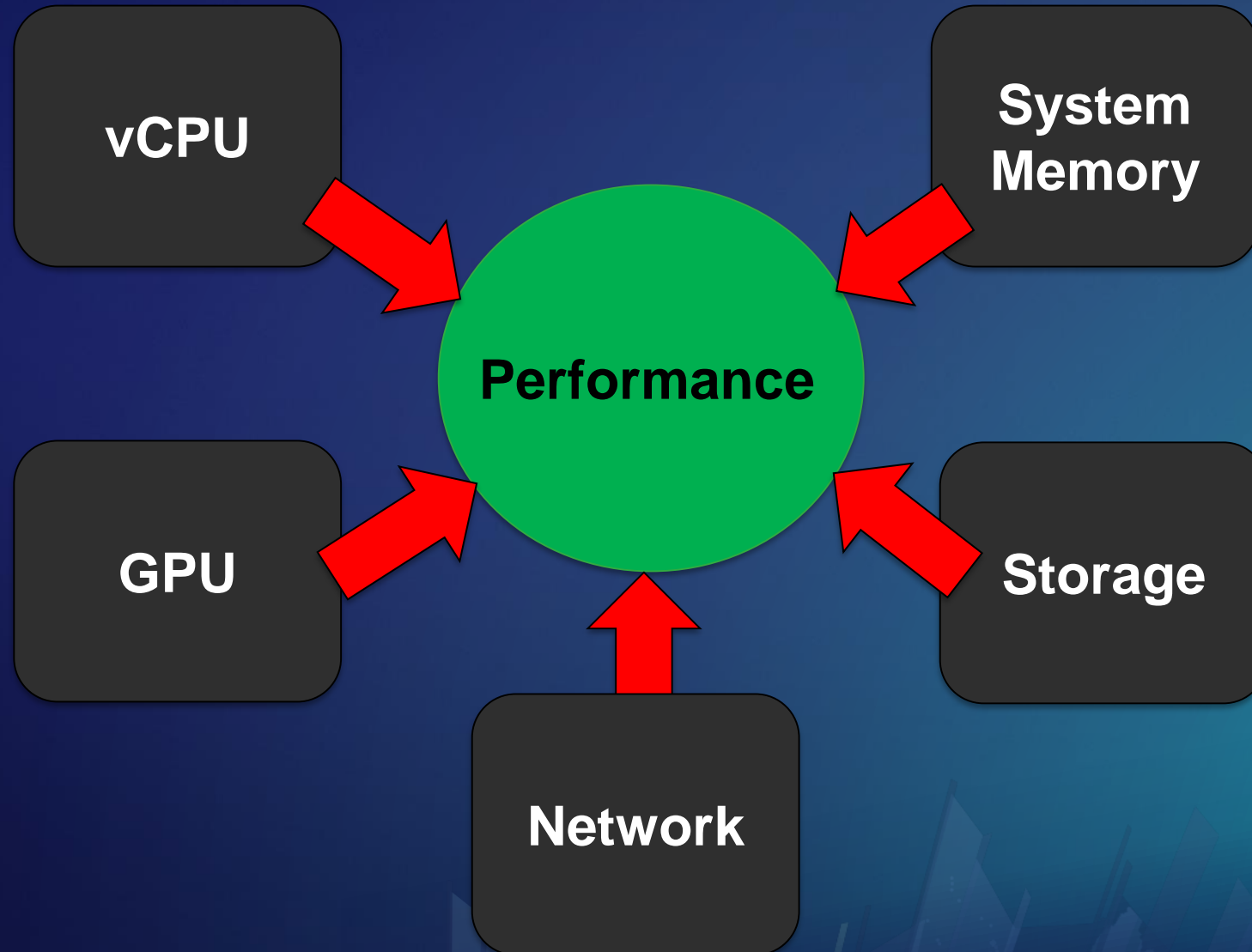
- 32 Bit Application
- Single-Threaded
- Windows GDI+
- 4GB memory limit on 64bit OS

- **GPU (ArcGIS Pro)**

- 64 Bit
- Multi-threaded
- DirectX / OpenGL
- 16TB memory limit

Requirements: <http://pro.arcgis.com/en/pro-app/get-started/arcgis-pro-system-requirements.htm>

ArcGIS Pro Performance Considerations



On Premises Virtualization

On-Premises Virtualization

Citrix

- XenApp / XenDesktop

VMware

- vSphere / Horizon 7

Microsoft

- Hyper-V

- Nutanix

-AHV and more



Citrix

- **Core Products**

- XenApp

- *Do not Use for Pro

- XenDesktop

- **Uses NVIDIA Grid Manager**

- **Hypervisor Options**

- ESXi

- XenServer

- **Remote Display Protocol**

- HDX 3D Pro

VMware

- **Core Products**

- Horizon

- **Uses NVIDIA Grid Manager**

- **Hypervisor Options**

- ESXi

- **Remote Display Protocol**

- PCoIP

- Blast Extreme

Hyper-V

- **Core Products**

- Hyper-V (Server 2012/2016)

- **Remote Display Protocol**

- RDP (Remote Display Protocol)

- **Graphics Option**

- DDA (Pass Through)
- RemoteFX (vGPU from MS)
 - SLAT enabled CPU
 - Up to 30FPS

Nutanix

- **Core Products**

- Prism

- **Graphics Option**

- Uses NVIDIA Grid Manager

- **Hypervisor Options**

- AHV

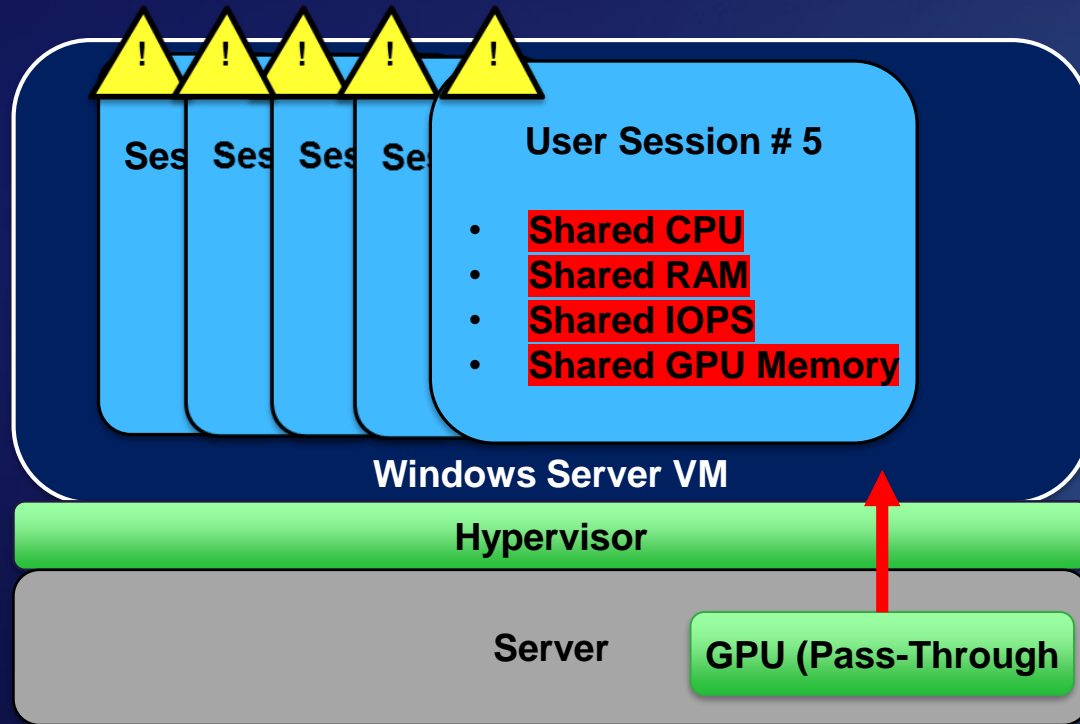
- ESXi

- XenServer

- Hyper-V

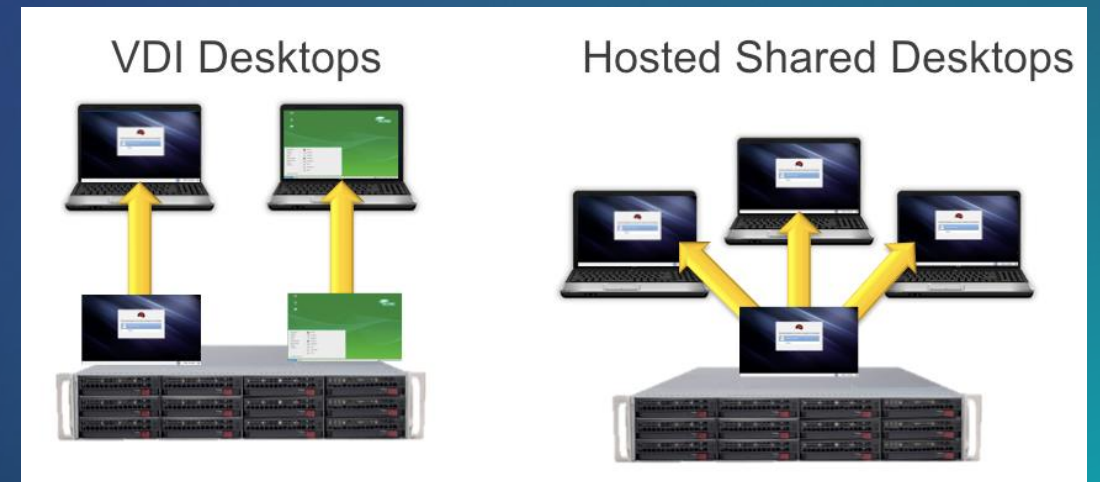
- **Remote Display Protocol-**
(Determined by hypervisor)

(RDSH) Remote Desktop Session Host



“An application or full desktop is published to multiple users on a single virtual server OS”

RDSH is designed for knowledge worker related software, and is not designed to handle 3D applications like ArcGIS Pro.

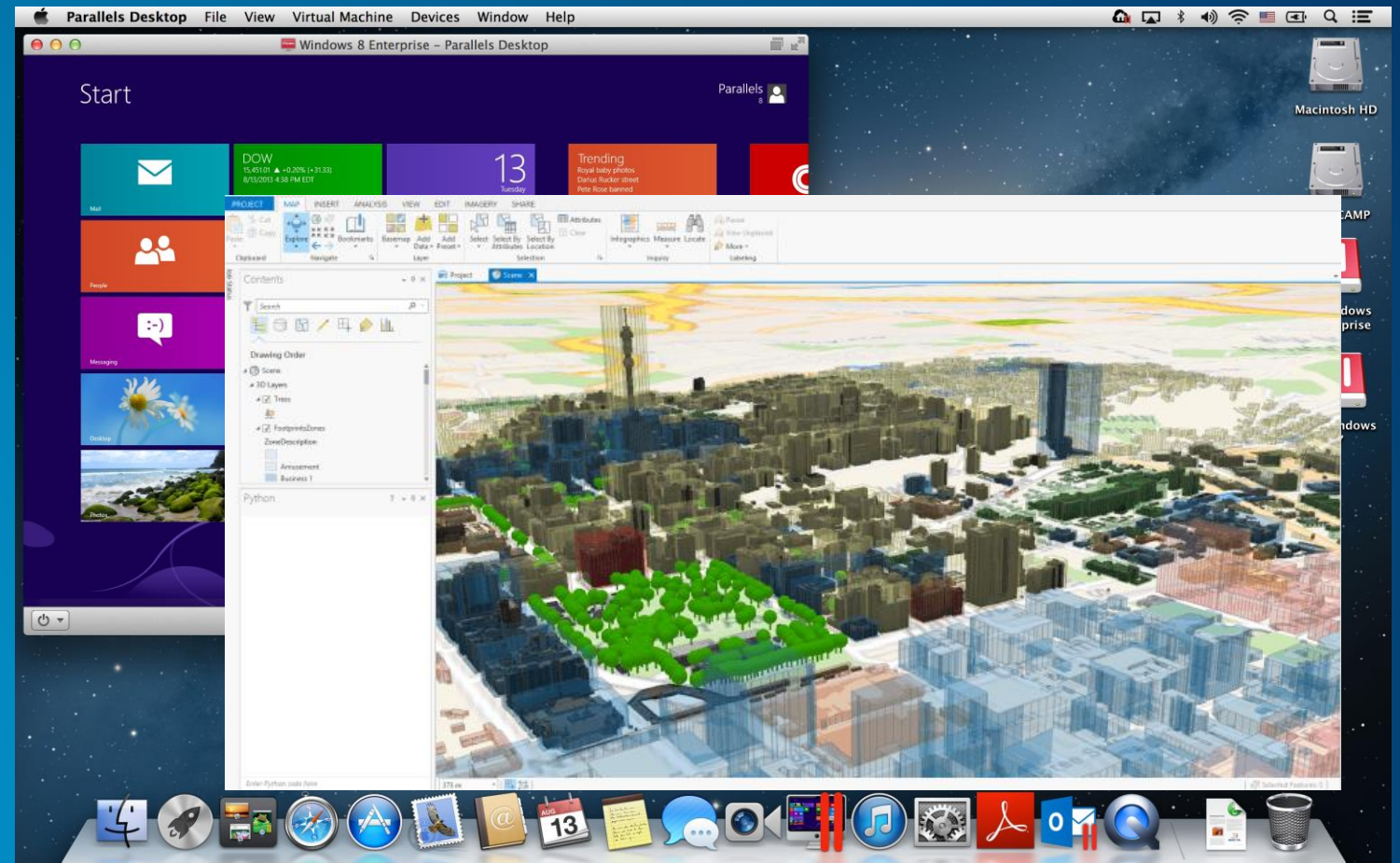


*****We recommend deploying ArcGIS Pro on a VDI product*****

On-Premises Virtualization

ArcGIS Pro on MacOS

- File based VM
- Parallels
- VMware Fusion
- Bootcamp



Cloud Computing

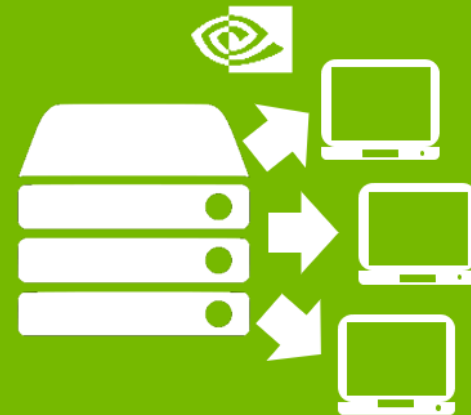
Cloud Computing

PERFORMANCE FROM THE DATA CENTER

NVIDIA Virtual GPU technology delivers graphics accelerated virtual desktops and applications



All devices have graphics



Virtual machines also need a GPU

Cloud Products

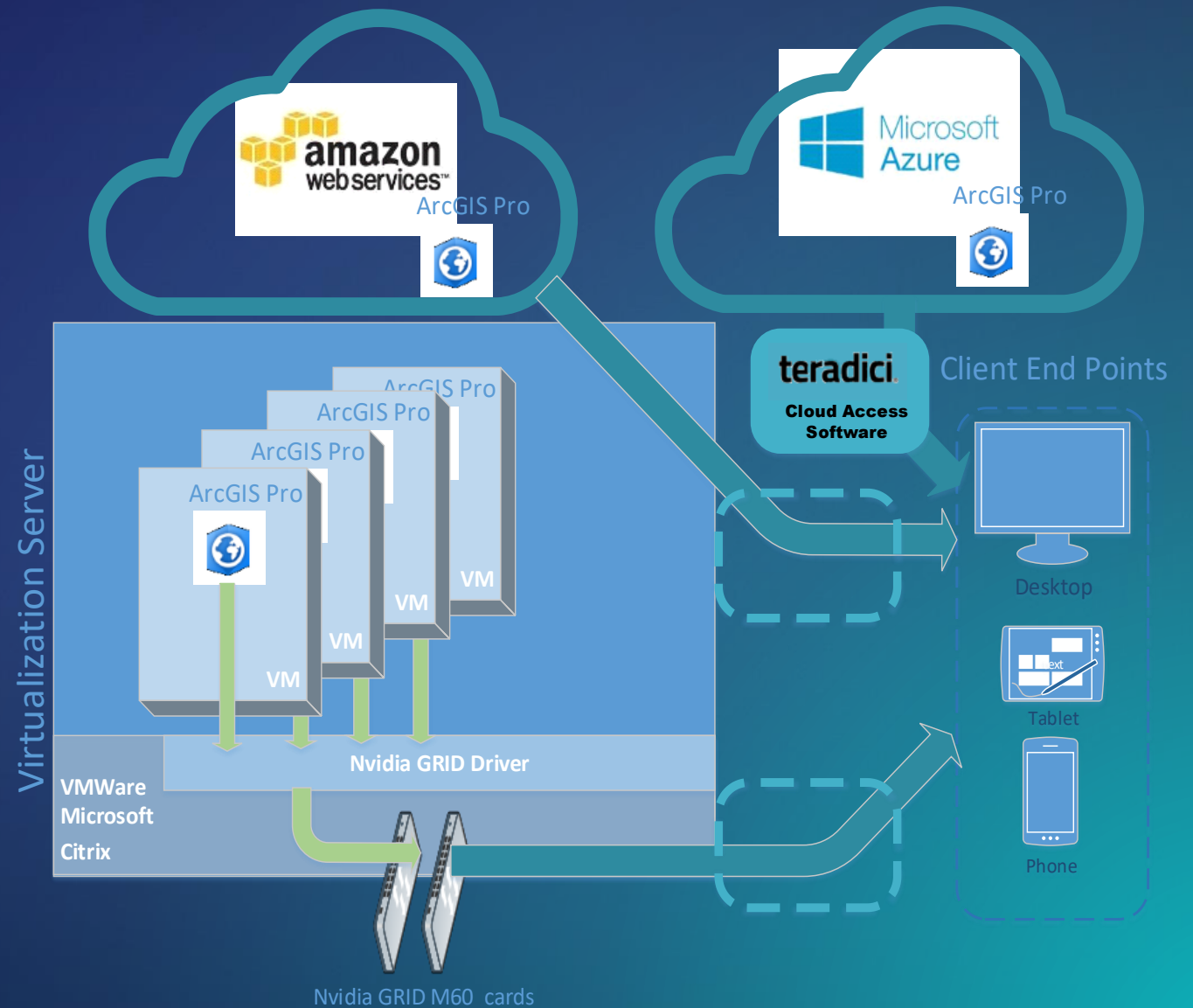
Microsoft Azure

- NV series

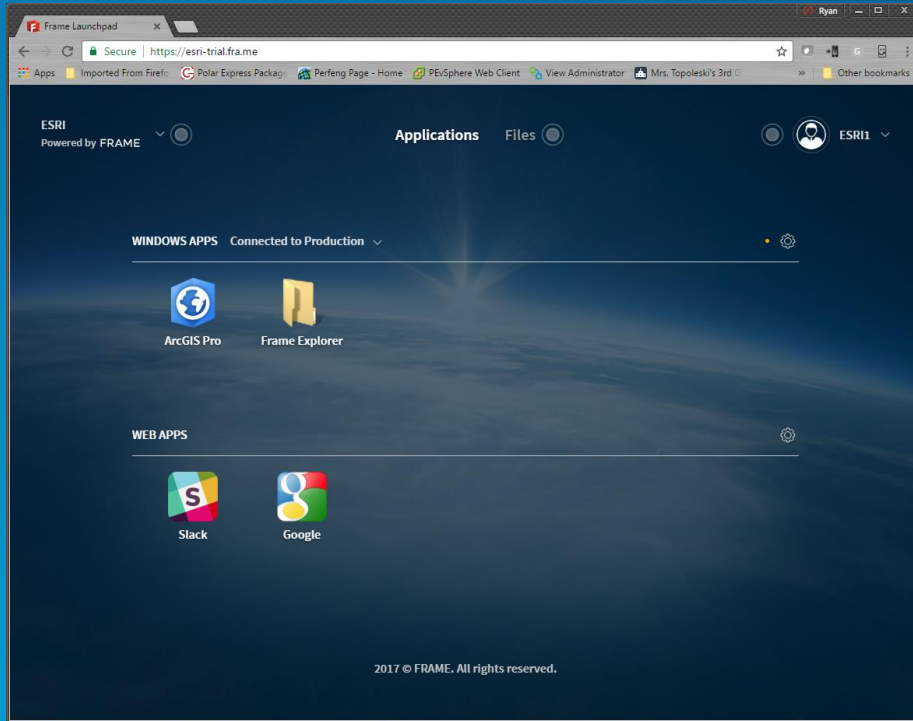
Amazon Web Services (AWS)

- AppStream
- WorkSpace Bundles

Fra.me



ArcGIS Pro From the Cloud



Step 2: Identify Users

Step 3: Select Bundles

Step 4: WorkSpaces Configuration

Step 5: Review

Select a bundle or compute, operating system, storage and applications for each of your users. The following applications are included in all bundles: Internet Explorer 11, Firefox and 7-Zip. You can install your own applications on your WorkSpace once it has launched. More details about our plus bundles can be found [here](#).

<input type="checkbox"/>	Performance with Windows 7 and Office 2013	2 vCPU	7.5 GiB	100 GB
<input type="checkbox"/>	Performance with Windows 10 and Office 2016	2 vCPU	7.5 GiB	100 GB
<input type="checkbox"/>	Graphics with Windows 7	8 vCPU	15 GiB	100 GB
<input type="checkbox"/>	Graphics with Windows 10	8 vCPU	15 GiB	100 GB

803.52 USD/MONTH (ESTIMATED)	
NV6 Standard	
6	Cores
56	GB
8	Data disks
8x500	Max IOPS
380 GB	Local SSD
	Load balancing
1x M60	Graphics
543.21 USD/MONTH (ESTIMATED)	
NC12 Standard	

ArcGIS Pro: On-Premise vs. Cloud

On Premises

- Your data stays in the datacenter
- BYOD (Bring Your Own Device)
- You are responsible for physical and data security (Hardware and Config)
- The LAN is faster than WAN – Less Latency to local users

Disadvantages:

- Hardware Costs - capex vs opex
- You get to pay for the HVAC & Power

Cloud

- Additional costs for data storage and network usage
- BYOD ok
- No up front costs for hardware- Pay as you Go
- No HVAC & Power Costs
- Significant reduction on time to production
- Network Latency is introduced to ALL users

Hardware

Hardware Requirements

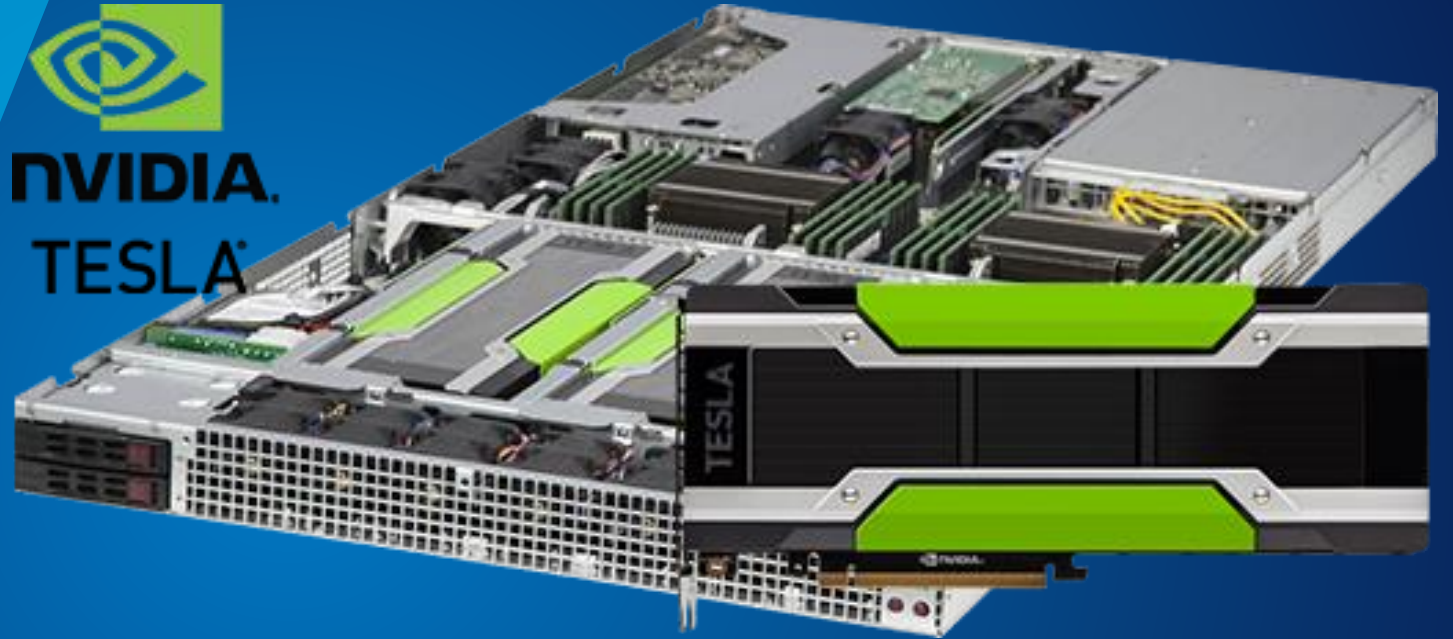
The ArcGIS Desktop Virtualization Dell Appliance

- Dual Intel Xeon Platinum Processor
- 256 GB + RAM
- Nvidia P40



On-Premises Hardware

- Dell PowerEdge R740
- Cisco UCS C240 M5
- HP ProLiant DL380 Gen10
- Nutanix NX-3155G-G5



<http://www.nvidia.com/object/gid-certified-servers.html>



ArcGIS Pro: On-Premise and from the Cloud

GPUs & Hardware Selection

- 2012: Kepler
 - GRID K1 and K2
- 2014: Maxwell
 - GRID M60, M10 and M6
- 2016: Pascal
 - P40, P4, P6, P100
- 2017 Volta
 - V100

NVIDIA TESLA GPUs Recommended for Virtualization

	V100	P100	P40	P4	M60	M10	M6	P6	
GPUs / Board (Architecture)	1 (Volta)	1 (Pascal)	1 (Pascal)	1 (Pascal)	2 (Maxwell)	4 (Maxwell)	1 (Maxwell)	1 (Pascal)	
CUDA Cores	5,120	3,584	3,840	2,560	4,096 (2,048 per GPU)	2,560 (640 per GPU)	1,536	2,048	
Memory Size	32 GB/16 GB HBM2	16 GB HBM2	24 GB GDDR5	8 GB GDDR5	16 GB GDDR5 (8 GB per GPU)	32 GB GDDR5 (8 GB per GPU)	8 GB GDDR5	16 GB GDDR5	
H.264 1080p30 streams	36	36	24	24	36	28	16	24	
vGPU Profiles	1 GB, 2 GB, 4 GB, 8 GB, 16 GB, 32 GB	1 GB, 2 GB, 4 GB, 8 GB, 16 GB	1 GB, 2 GB, 3 GB, 4 GB, 6 GB, 8 GB, 12 GB, 24 GB	1 GB, 2 GB, 4 GB, 8 GB	0.5 GB, 1 GB, 2 GB, 4 GB, 8 GB	0.5 GB, 1 GB, 2 GB, 4 GB, 8 GB	0.5 GB, 1 GB, 2 GB, 4 GB, 8 GB	1 GB, 2 GB, 4 GB, 8 GB, 16 GB	
Form Factor	PCIe 3.0 Dual Slot (rack servers)	PCIe 3.0 Dual Slot (rack servers)	PCIe 3.0 Dual Slot (rack servers)	PCIe 3.0 Single Slot (rack servers)	PCIe 3.0 Dual Slot (rack servers)	PCIe 3.0 Dual Slot (rack servers)	MXM (blade servers)	MXM (blade servers)	
Power	250W	250W	250W	75W	300W (225W opt)	225W	100W (75W opt)	90W	
Thermal	passive	passive	passive	passive	active/passive	passive	bare board	bare board	
	PERFORMANCE Optimized					DENSITY Optimized		BLADE Optimized	

ArcGIS Pro: On-Premise and from the Cloud – vGPU User Types

NVIDIA VIRTUAL GPU SOFTWARE

Quadro Virtual Data Center Workstation



For professional graphics applications; includes an NVIDIA Quadro driver.

Recommended GPU:
Tesla P4*

GRID Virtual PC



For virtual desktops delivering standard PC applications, browser, and multimedia.

Recommended GPU:
Tesla M10

GRID Virtual Applications



Use with Citrix XenApp, VMware Horizon Apps, or other RDSH solutions.

Recommended GPU:
Tesla M10

ArcGIS Pro: On-Premise and from the Cloud

vGPU Profile Examples (P40)

Virtual GPU Type	Intended Use Case	Frame Buffer (Mbytes)	Virtual Display Heads	Maximum Resolution per Display Head	Maximum vGPUs per GPU	Maximum vGPUs per Board	Required License Edition
P40-1Q	Power User, Designer	1024	2	4096×2160	24	24	Quadro vDWS
P40-2B	Power User	2048	2	4096×2160	12	12	GRID Virtual PC or Quadro vDWS
P40-1B	Power User	1024	4	2560×1600	24	24	GRID Virtual PC or Quadro vDWS
P40-24A	Virtual Application User	24576	1	1280×1024	1	1	GRID Virtual Application
P40-12A	Virtual Application User	12288	1	1280×1024	2	2	GRID Virtual Application
P40-8A	Virtual Application User	8192	1	1280×1024	3	3	GRID Virtual Application
P40-6A	Virtual Application User	6144	1	1280×1024	4	4	GRID Virtual Application
P40-4A	Virtual Application User	4096	1	1280×1024	6	6	GRID Virtual Application
P40-3A	Virtual Application User	3072	1	1280×1024	8	8	GRID Virtual Application
P40-2A	Virtual Application User	2048	1	1280×1024	12	12	GRID Virtual Application

ArcGIS Pro in a browser from the cloud



Choose your app to get started



ArcGIS Pro



File Explorer



Your session is being prepared. The session should be available in less than 01:56

Lessons Learned

ArcGIS Pro: On-Premise and from the Cloud

USER PROFILES

What type of ArcGIS Pro users do I have and how many?

What screen resolution do I want on the client?

How many monitors am I supporting for each user?

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Hardware

Will my server hardware support my physical GPU selection?

Does my GPU hardware support my user's vGPU profile requirement?

Do I have enough GPUs to support the number of users with the selected profiles?

Do my physical monitors and connections support the desired resolution?

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Virtualization Software

Does my virtualization software support VDI?
What is my time to delivery?
What is my Budget?

ArcGIS Pro: On-Premise and from the Cloud: “The Money Slide”

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Proof Of Concept / User Acceptance

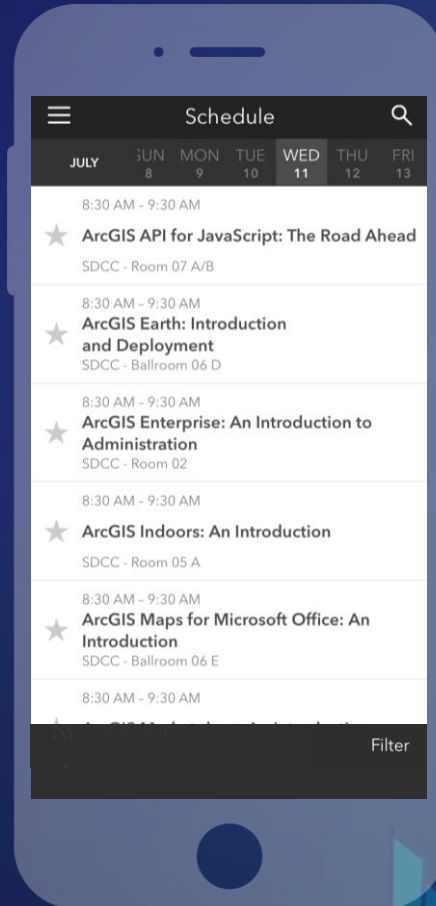
Deliver a Proof of Concept to your different types of users so that that can validate your design

Please Take Our Survey on the App

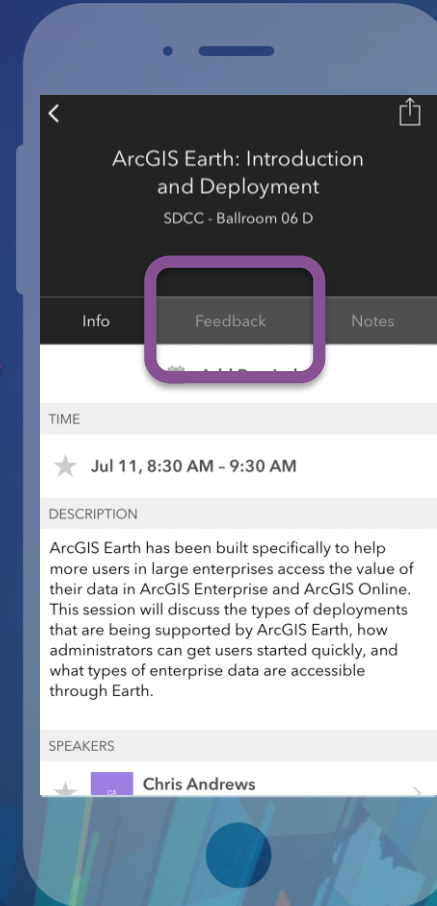
Download the Esri Events app and find your event



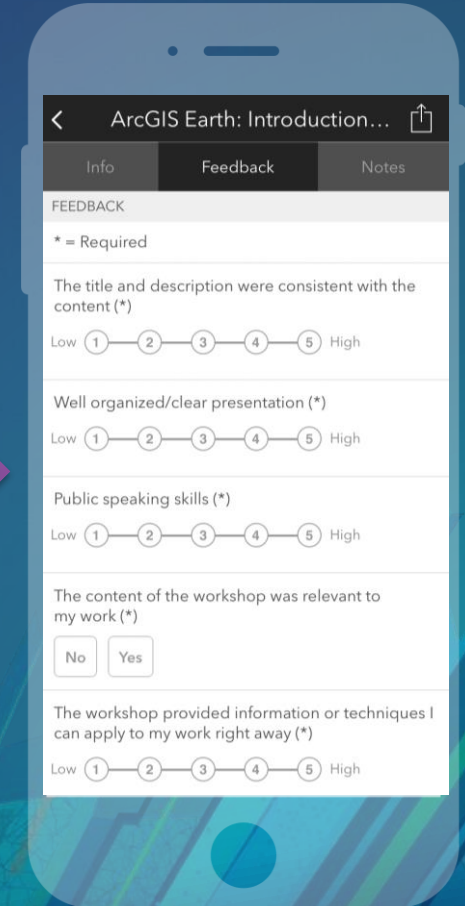
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