Asia/Pacific Desktop Virtualization trends and analysis

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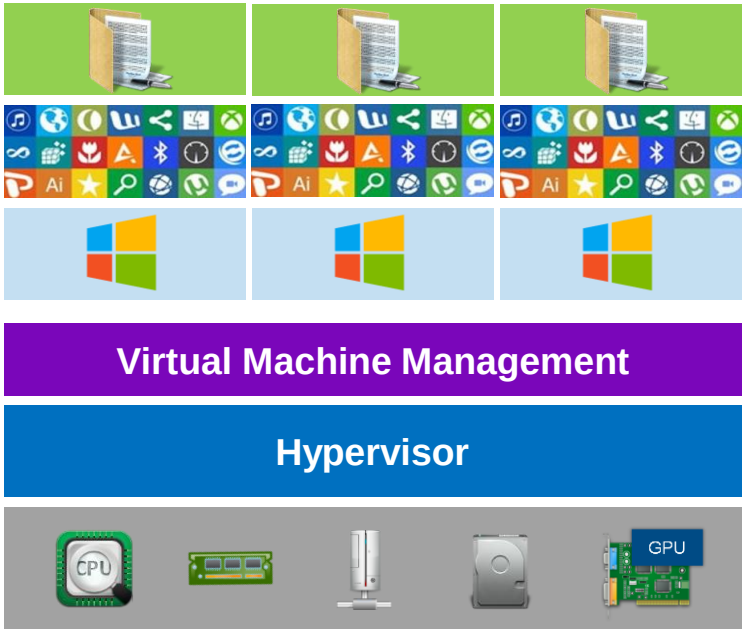
Situation Overview

Virtual Desktop Infrastructure (VDI)



- Hypervisor virtualizes underlying hardware
- Each user gets its own isolated virtual desktop, applications and data
- Relatively high technical requirements
- Comparatively low user density per server

Key Vendor Products:

Citrix XenDesktop | VMware View | Microsoft VDI Suite

RedHat RHEV for Desktop

VDI is best suited for knowledge workers, content producers where needs for customization and security are high

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Source: IDC Asia/Pacific Client Virtualization

Virtual User Session (VUS)

- Multiuser operating system supporting multiple concurrent user session
- Underlying hardware is not virtualized
- Users share desktop, applications and get their own data folders
- Mature technology, low requirement
- Comparatively high user density per server

Key Vendor Products:

Citrix XenApp	Microsoft Remote Desktop Service
Dell vWorkspace	VMware Horizon Workspace

VUS is best suited for task workers, where computing requirements are relatively uniform, security concerns are low

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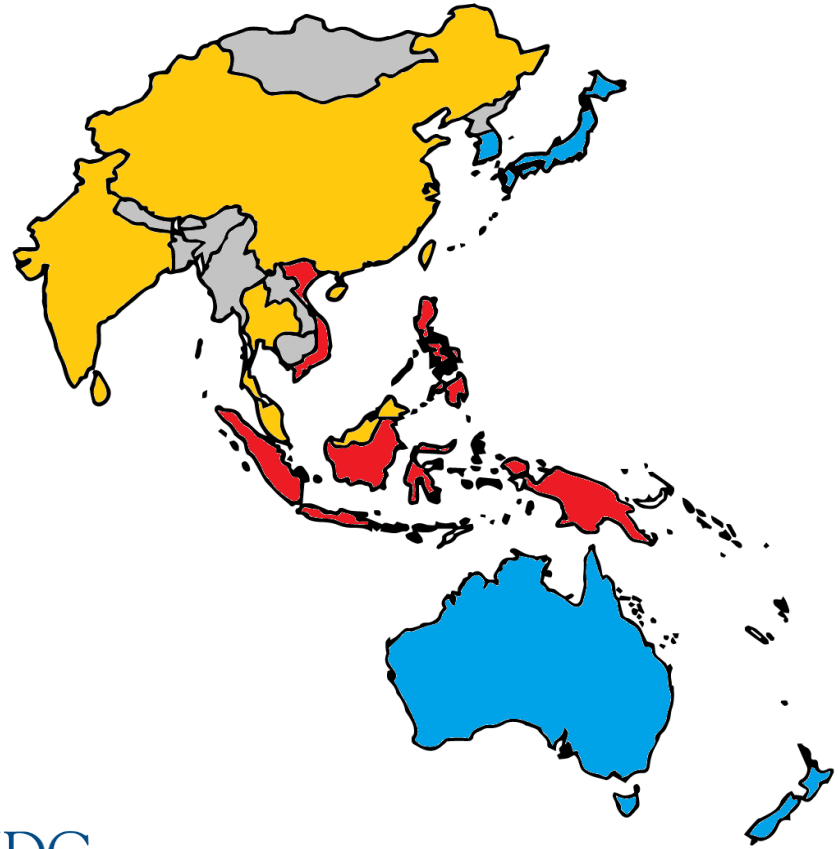
Desktop Virtualization Adoption Overview



Tier 1: On par with western countries

- **Australia and New Zealand**
- **South Korea**
- **Japan**
- **Singapore**
- **Hong Kong**

Tier 2: 12 – 18 months behind

- **China**
- **India**
- **Malaysia**
- **Taiwan**
- **Thailand**

Tier 3: More than 2 years behind

- **Most SEA countries**

Source: IDC Asia/Pacific Client Virtualization

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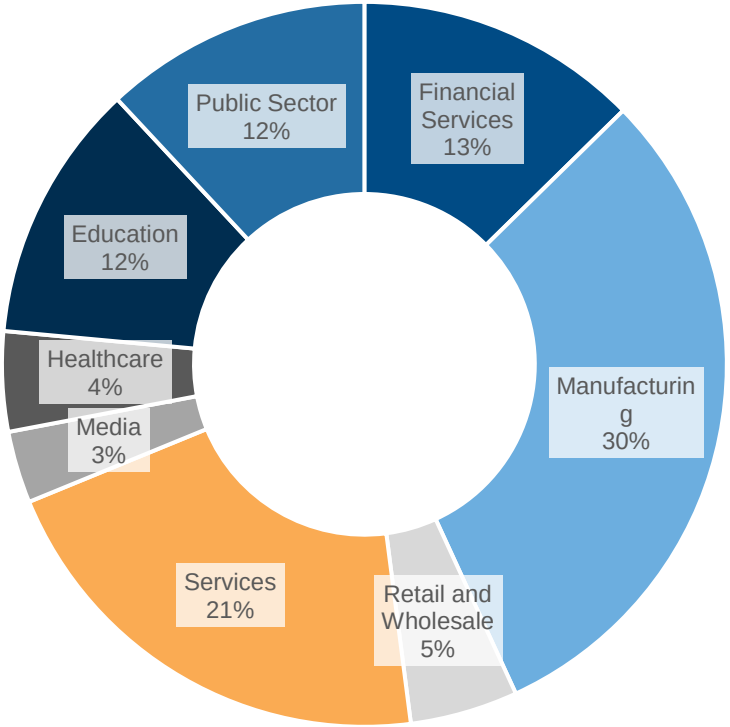
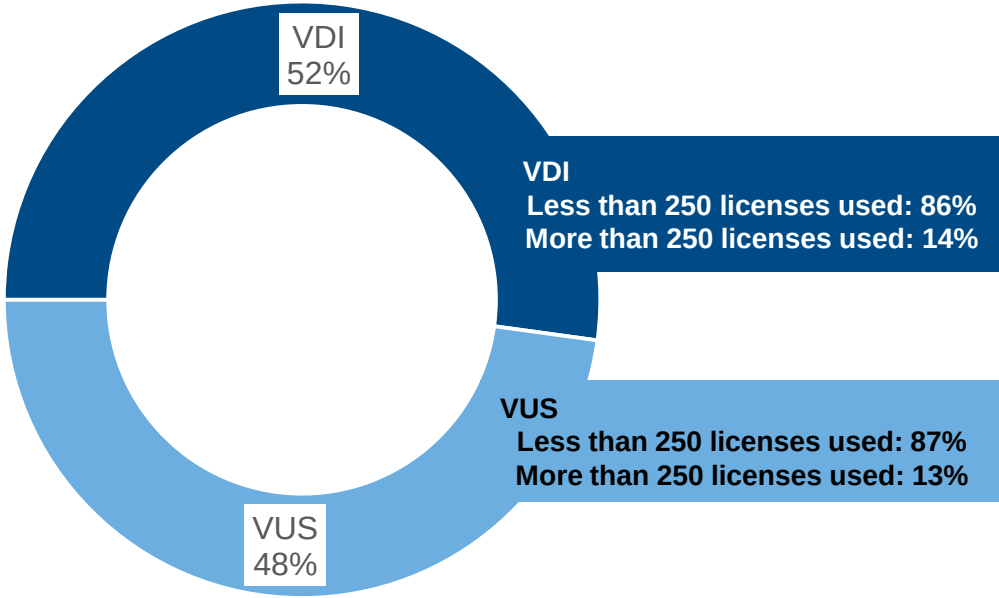
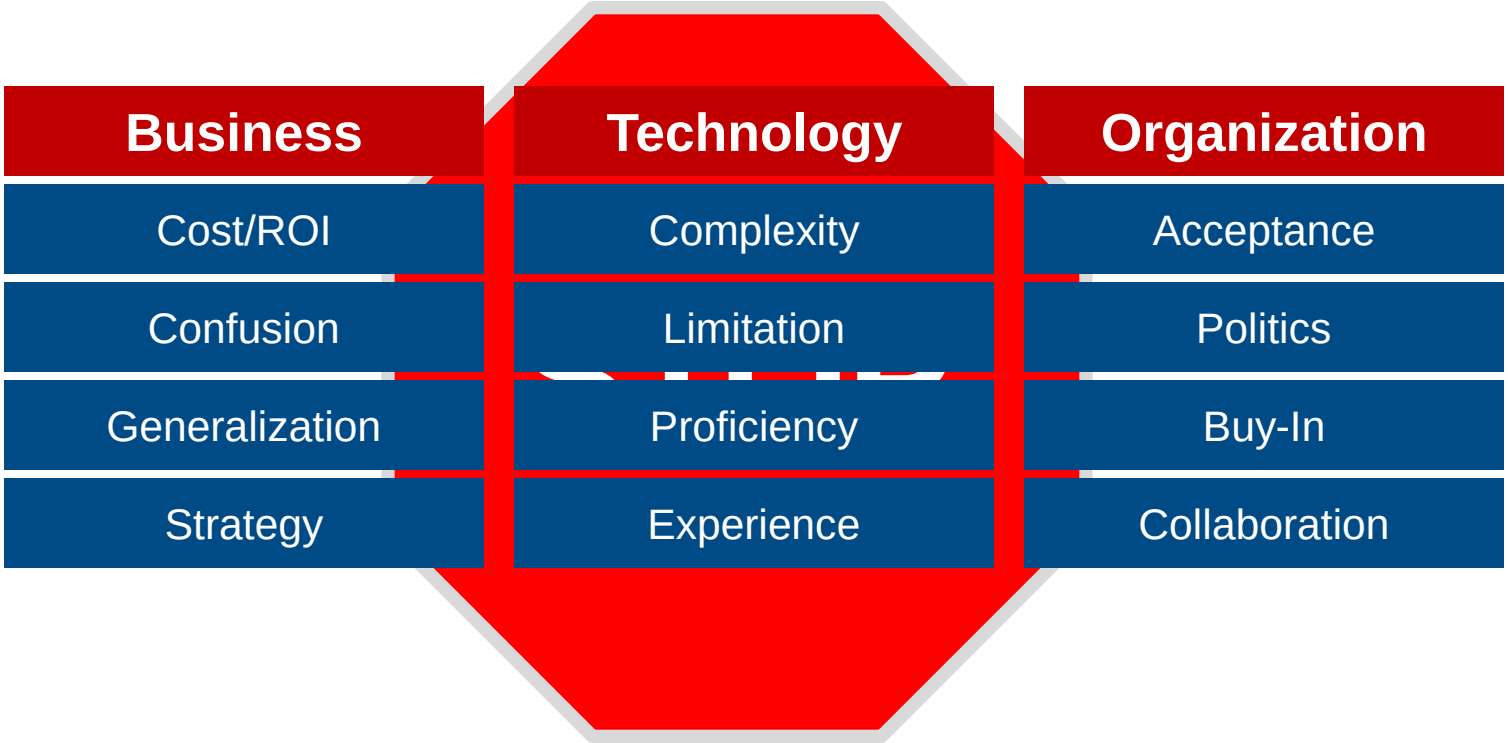
Desktop Virtualization adoption in APeJ





Source: IDC 2013 Asia/Pacific Client Virtualization Survey

Barriers to desktop virtualization adoption

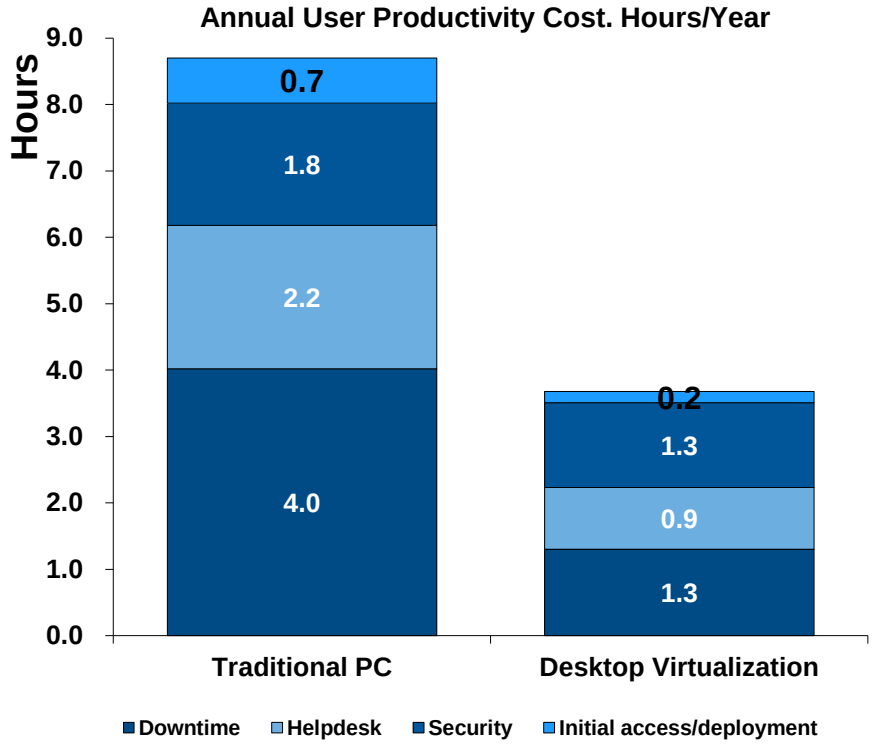


Source: IDC Asia/Pacific Client Virtualization

Reasons to implement desktop virtualization

Top 5 reason for desktop virtualization

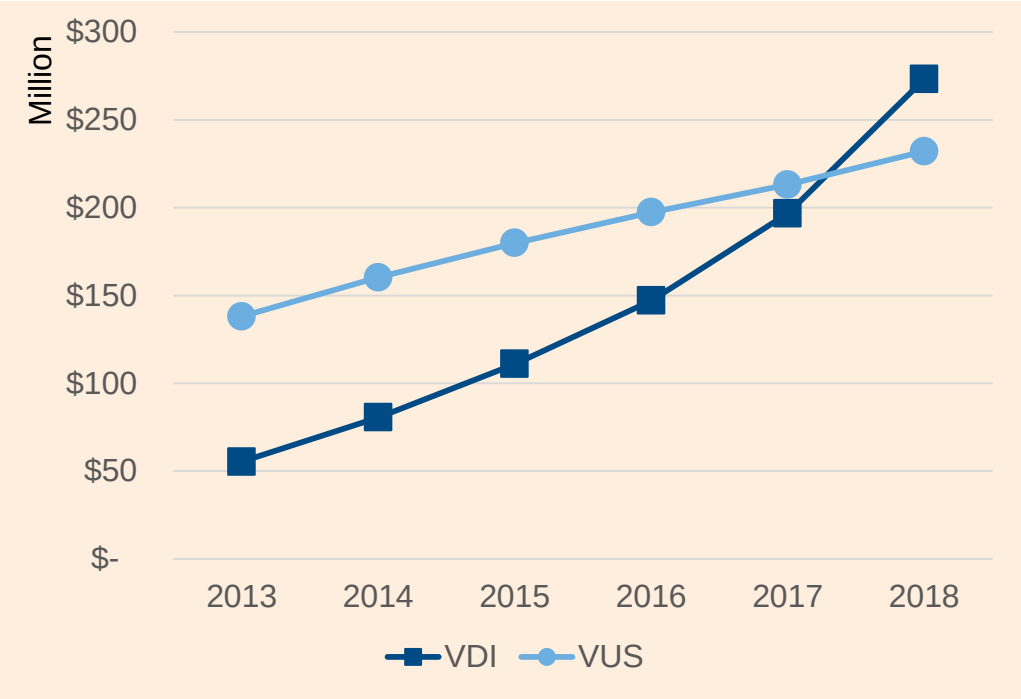
Security	62%
Simplify Application Management	54%
Simplify Hardware Management	41%
Simplify OS Management	37%
Disaster Recovery/Preparedness	32%



Source: IDC 2013 Asia/Pacific Client Virtualization Survey, VDI Business value study

Future Outlook

Expected growth for Asia/Pacific



- VDI expected to experience high growth, 5 yr CAGR at 38%
- VUS growth remain consistent, 5 yr CAGR at 11%
- By 2018, IDC expect 20+ million users to use VDI across AP
- By 2018, 40% of all VDI and VUS sessions will be delivered through cloud

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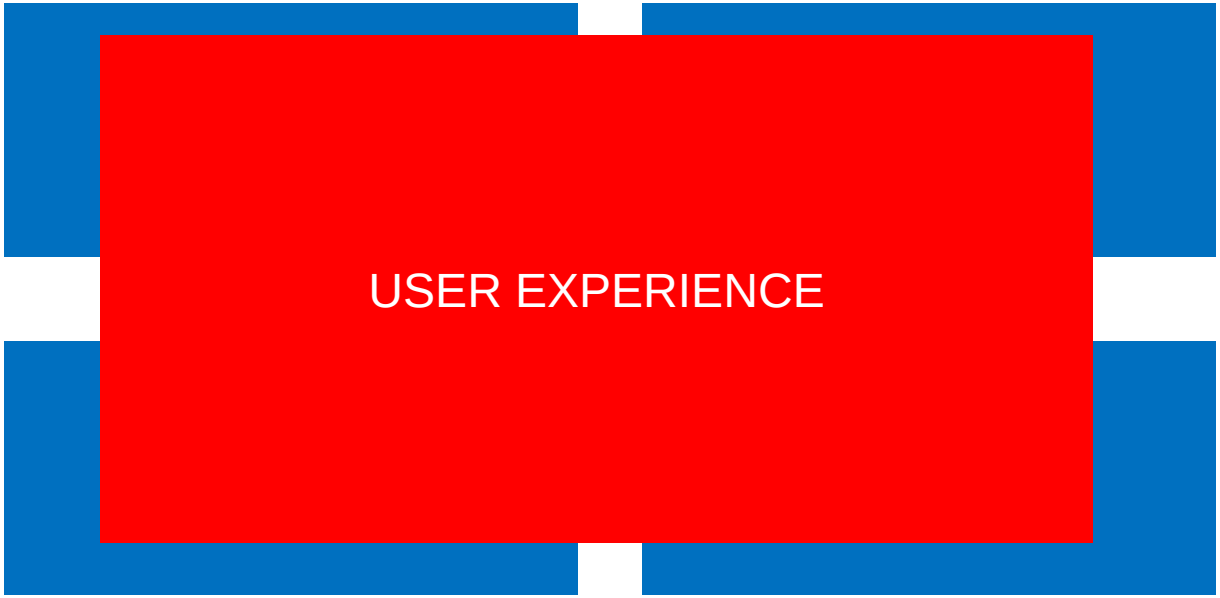
Source: IDC Asia/Pacific Client Virtualization Forecast

Desktop Virtualization Priorities in 2014



Source: IDC Asia/Pacific Client Virtualization

User Experience

Challenge

- Desktops today are very graphics intensive
- Virtual desktop with virtual CPU graphic rendering produces subpar user experience
- User are less likely to tolerate poor user experience
- Limited user segments

Solution

- GPU offload graphics processing off CPU
- Greatly improve virtual desktop graphics performance, user experience
- Opens desktop virtualization to more user segments
- Able to replace workstations at greatly reduced TCO

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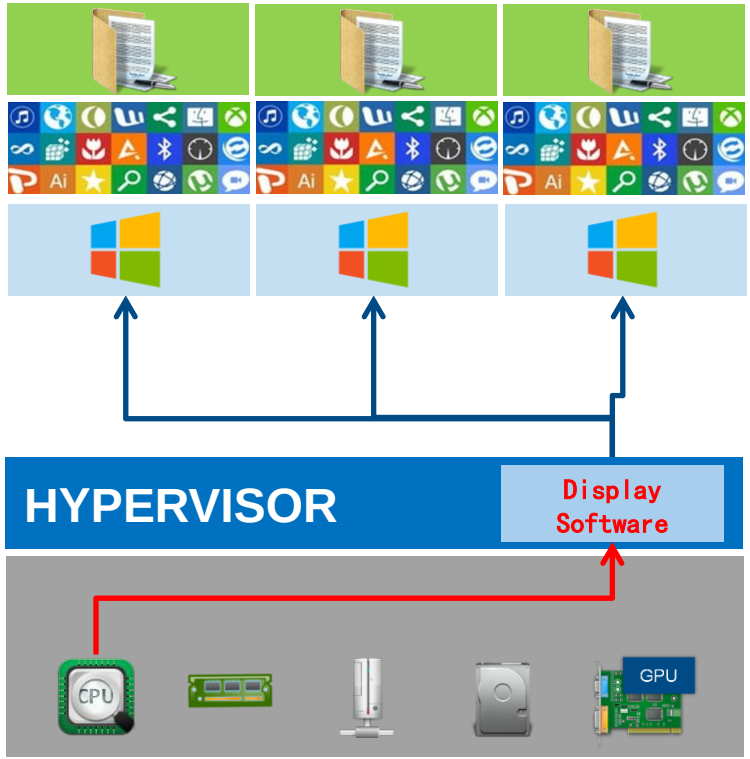
Source: IDC Asia/Pacific Client Virtualization

Technology overview – Software rendered (CPU only)



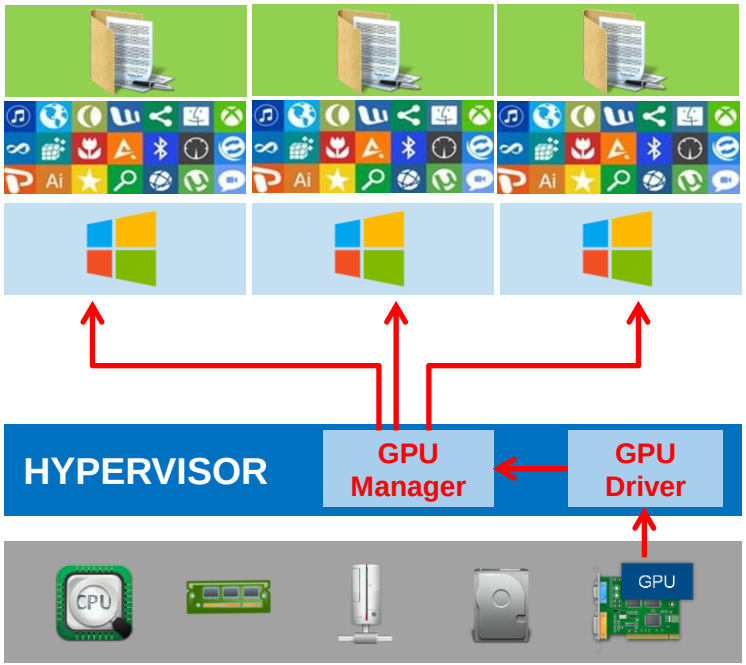
- CPU handles graphics operations
- No graphics acceleration
- Poor graphical experience under load
- Suitable for simple operations with low graphic requirement
- Supported by all VDI vendors

Supported Hypervisor:

XenServer | XenSource | vSphere | Hyper-V | KVM

Source: IDC Asia/Pacific Client Virtualization

Technology overview – Shared GPU



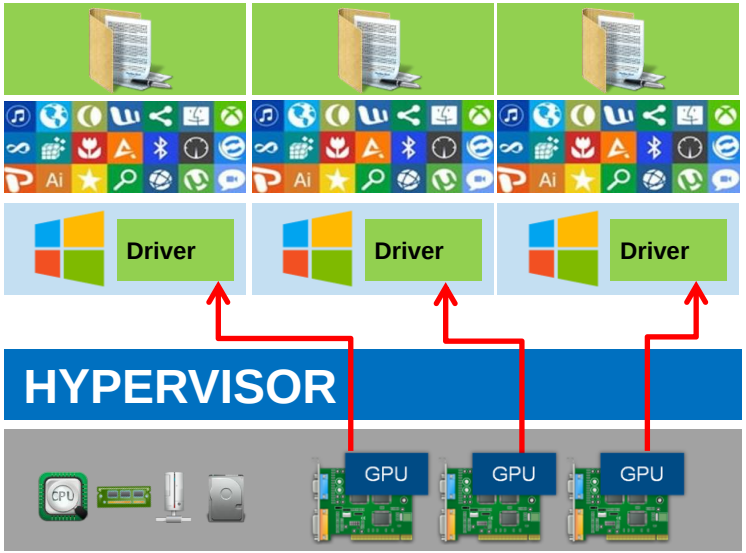
- GPU handles graphical operations
- Graphic acceleration managed by GPU driver in Hypervisor
- GPU resources allocated by Hypervisor
- Greatly improves graphical performance
- Performance will suffer under high demand
- Suitable for light to medium graphical requirements, general PC replacement

Supported Hypervisor:

XenServer | XenSource | vSphere | Hyper-V

Source: IDC Asia/Pacific Client Virtualization

Technology overview – GPU Pass-through



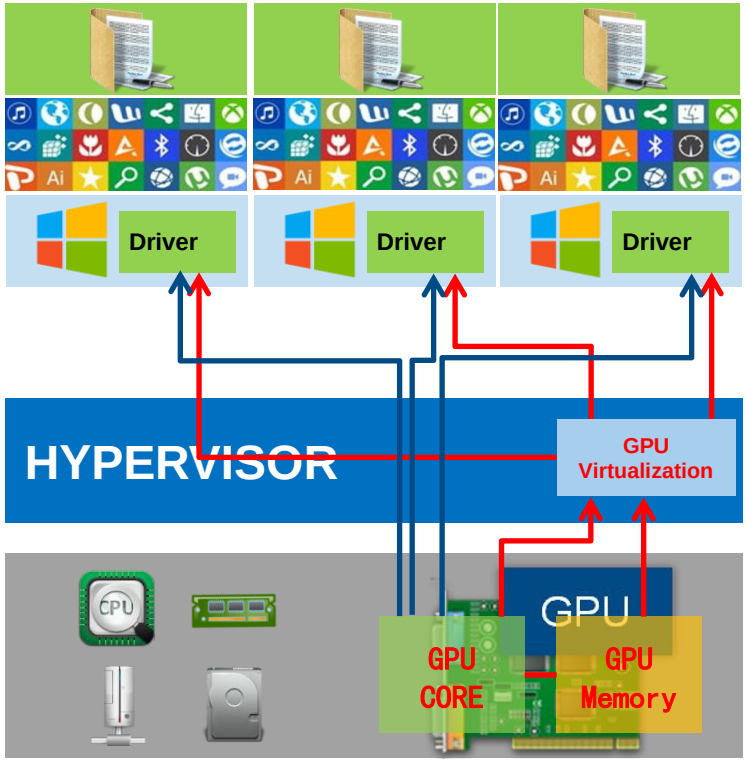
- GPU handles graphical operations
- Each physical GPU is allocated to a single VM
- GPU bypasses Hypervisor, is managed directly by driver installed in the VM
- Delivers best possible graphical performance
- 1 GPU per VM can be costly
- Suitable for workstation and high-end PC replacement

Supported Hypervisor:

XenServer | XenSource | vSphere | KVM

Source: IDC Asia/Pacific Client Virtualization

Technology overview – Virtualized GPU



- GPU handles graphical operations
- Virtualized GPUs are delivered to each VM directly
- Actual GPU resources are managed by the Hypervisor and allocated to VMs
- Virtualized GPU resources are managed by driver installed in the VM
- Full GPU resource can be utilized and allocated depending requirement
- Deliver dedicated GPU like performance
- Suitable for workstation and high-end PC replacement

Supported Hypervisor:

XenServer | XenSource | vSphere

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Source: IDC Asia/Pacific Client Virtualization

User Experience Matrix

	Task Worker	Knowledge Worker	Power User	Designer
Software Render (High VM Density)				
Shared GPU (High VM Density)				
GPU Pass-through (Low VM Density)				
Virtualized GPU (Med VM Density)				

Source: IDC Asia/Pacific Client Virtualization

Essential Guidance

Essential Guidance – Strategic Mindset

- Organizations are interested, but also confused
- Desktop Virtualization is about User Workspace transformation
  - Support multiple device platform
  - Consolidated management for PC, Tablet and Smartphone
  - Empower all users
- Desktop Virtualization is a long term, strategic solution
- **Ensuring User Experience is MUST**

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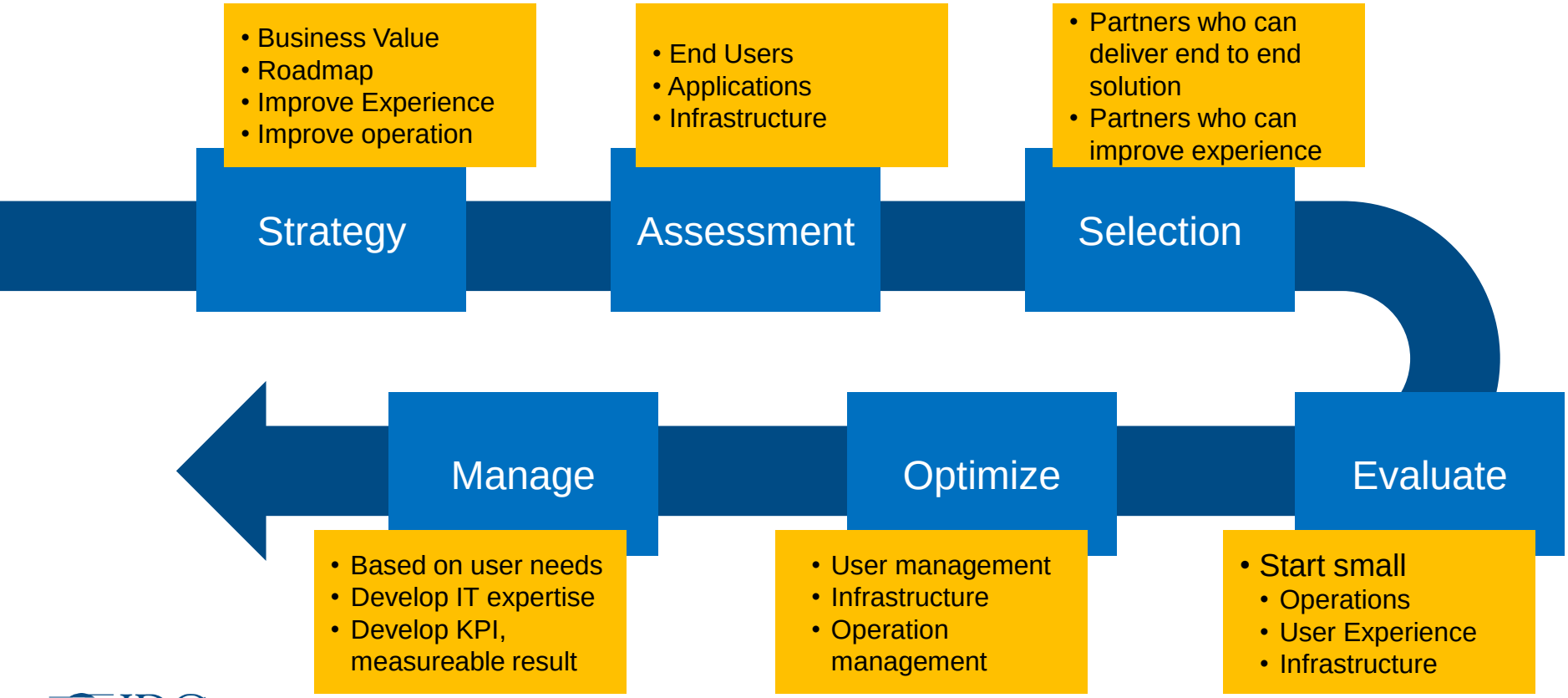
Source: IDC Asia/Pacific Client Virtualization

Essential Guidance – Strategic Mindset



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Thank You

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