

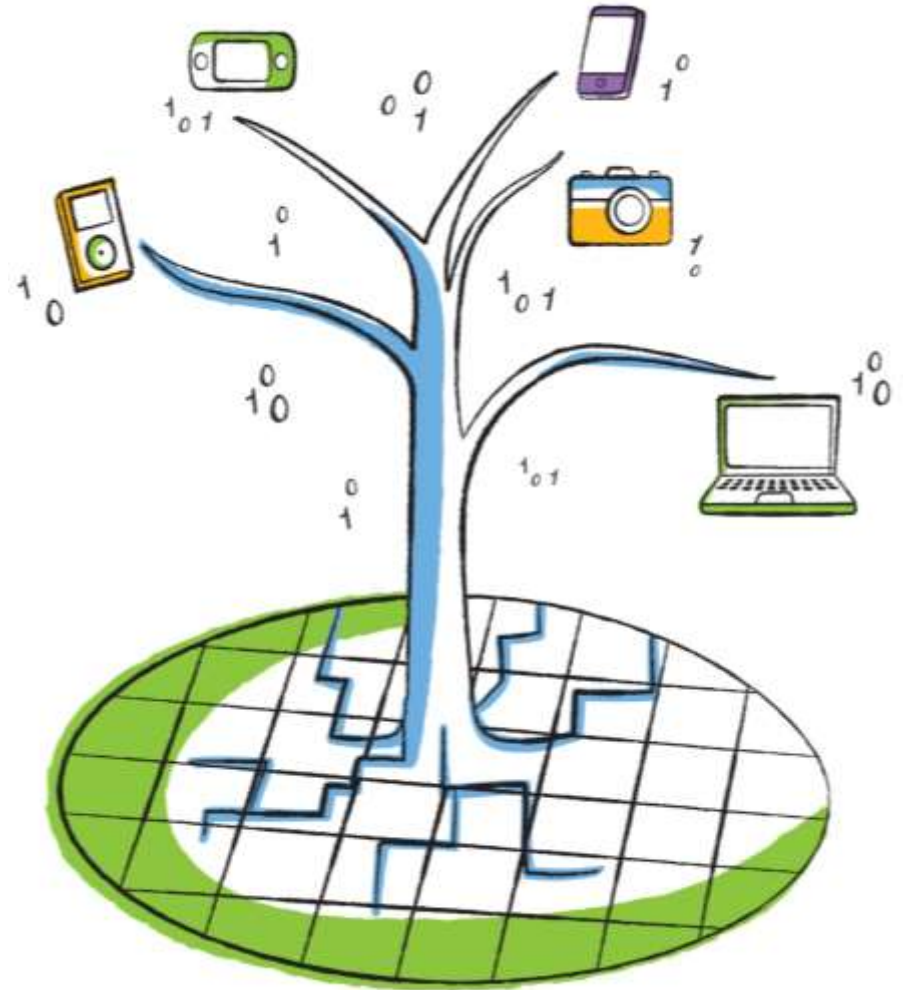


Go further, faster®

Design Collaboration

Through Cloud Converged
Infrastructure and OpenStack

April 18, 2013



Agenda



- Collaboration Types
- Issues and Considerations
- Converged Infrastructure
- OpenStack Cloud Operating System
- Private Storage with Public Compute
- New Architectures and Use Cases
- Key Take Aways

The Design Collaboration Universe



M.C. Escher illustrates collaborating in ways to collaborate

Industry Collaboration

- Standards
- Best Practices

The OpenStack Foundation
with 16 major vendors
and community representatives

Inter Company Collaboration

- Joint Programs
- Partnerships

Suitable for Hybrid or
Public Cloud

Intra Company Collaboration

- Multisite Development
- Central Repositories

Suitable for Private Cloud



Context

- Environments have two dimensions
 - Business Operations:
 - Corporate IT for business applications like mail and OLTP
 - Engineering Development
 - Design
 - Manufacturing

- Both must be supported and have unique requirements and issues



Issues and Considerations

- Security
 - IP protection is paramount
 - Multi-tenancy: Ensure that no competitors are running on the same machines at the same time
 - Secure space (including temporary scratch space)
 - Data security on storage and cache devices
 - Approvals to store library and technology data in the cloud
 - Impact on Mobile access and BYOD (Bring your own device)
- EDA tool licensing
 - Can the tool run remotely in WAN mode?
 - What is the cost model?
 - Peak/cloud-burst licensing?
- SLAs
 - Can you be guaranteed a CPU, memory, network and storage performance level?
 - Number of CPU's or cores?
 - High memory requirements



Issues and Considerations

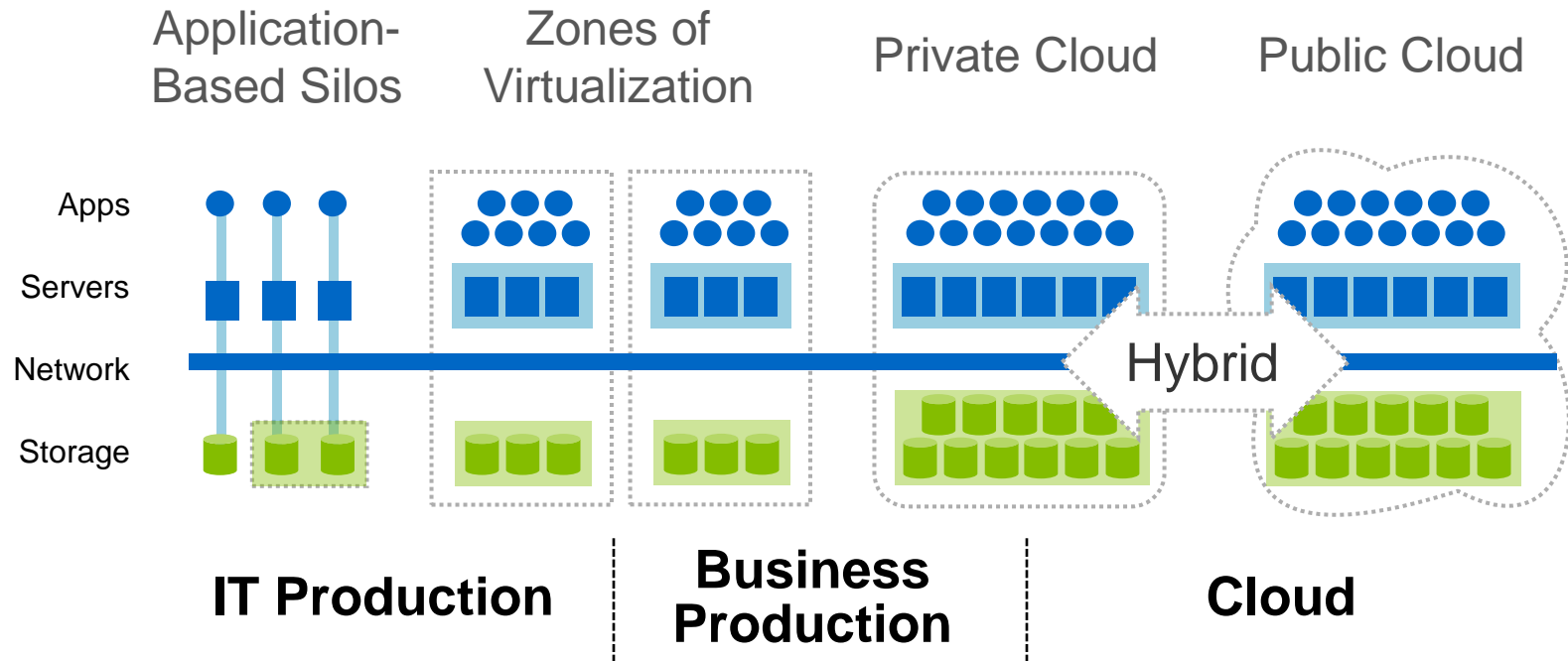
- Logistics
 - Transfer of large data sets in and out of cloud
 - Appearance of cloud as an extension of customer network
 - Integration with tool flows
 - Business Change:
 - M&As and divestitures
 - Consolidation
 - Expansion
 - Integration with batch submission systems (LSF/SGE/Univa)
 - Creation of “self-contained” data set that can be transferred and run in the cloud
 - Resolving all tool, script and data dependencies
 - Results viewing – wait to transfer back or view remotely?



Elements of Successful Collaboration

- Communication in Real Time
- Data Coherency and Integrity
- Efficient use of Space, Time, Resources
 - Central Hub with thin clients
 - Available Anytime, Anywhere
 - Ability to scale on-demand on-the-spot
 - Minimal Latency, real-time response
 - Application license sharing and re-use
 - Minimal data movement for large files, yet backed up and replicated
 - Secure against outsiders, available for insiders

Path to the Data Center Transformation

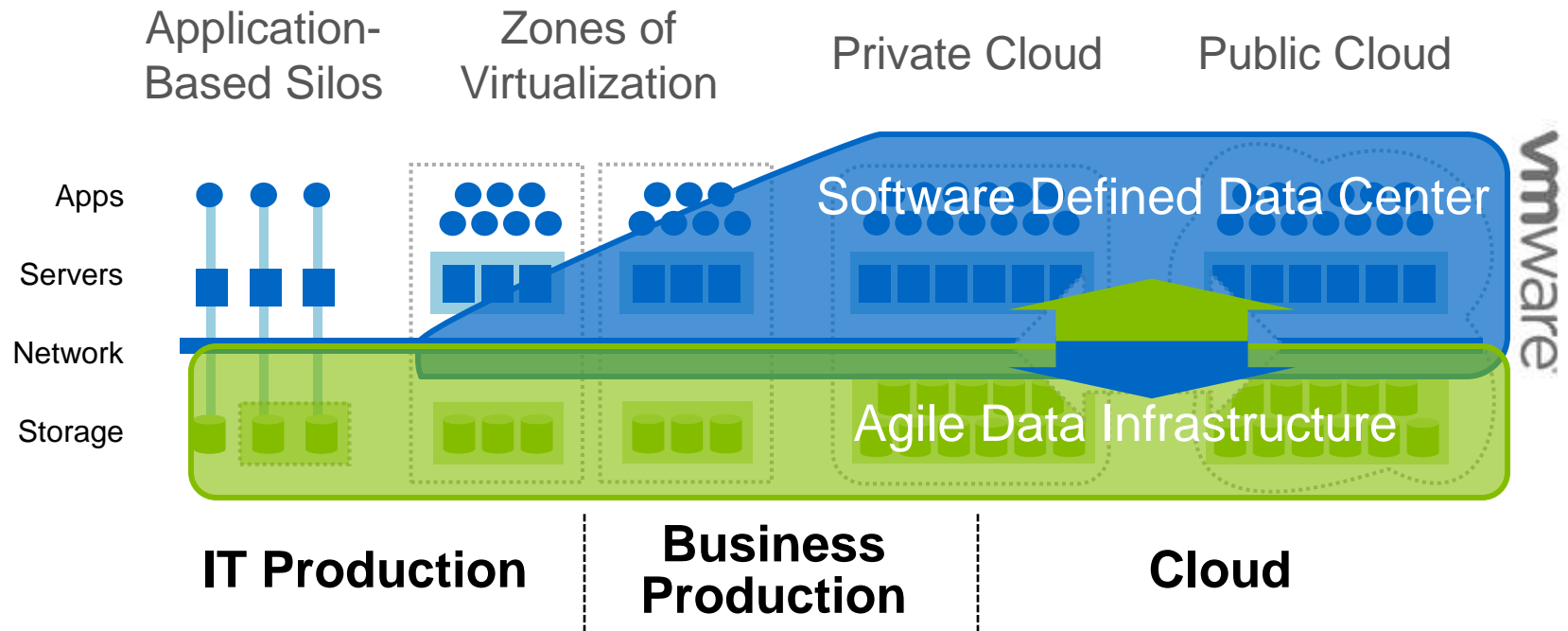


Agile IT

Higher service levels for business apps

Scale infrastructure and operations cost effectively

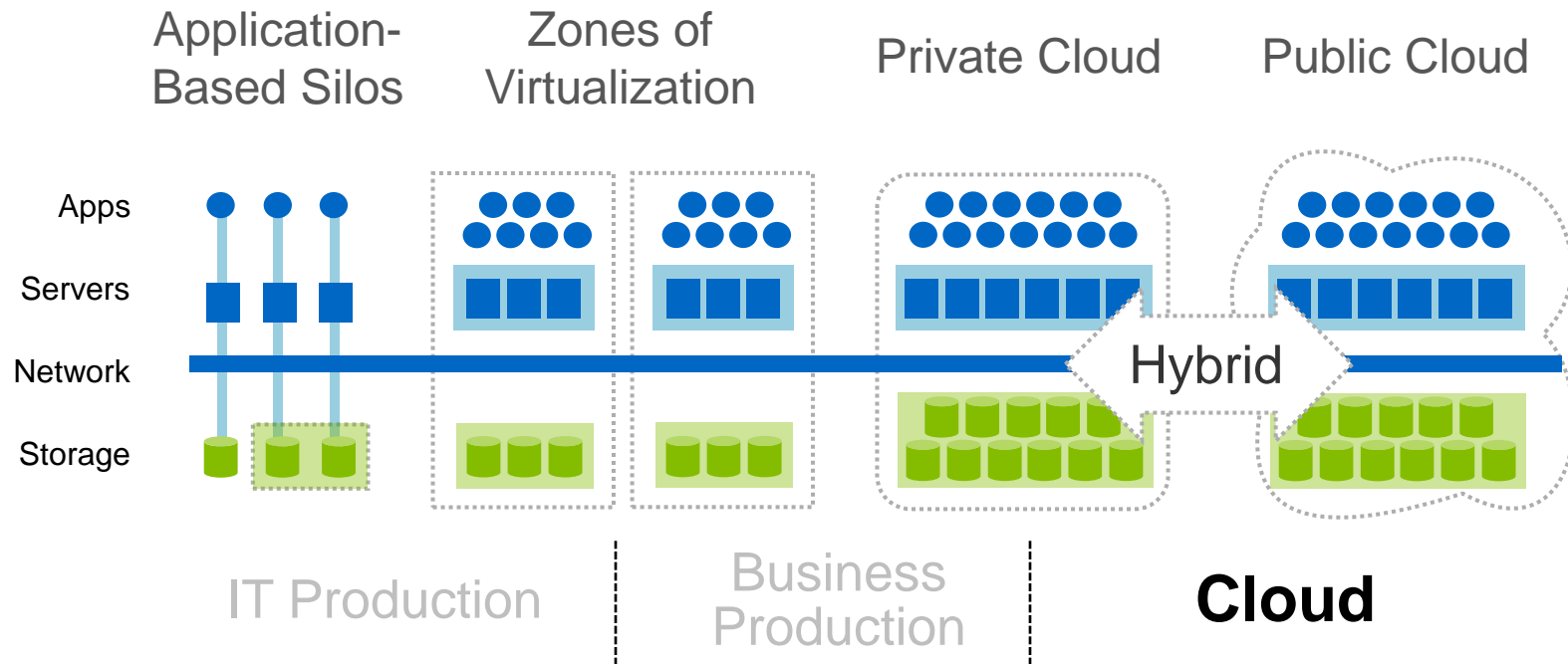
Path to the Data Center Transformation



Software Defined Data Center: Simplify IT operations through services, which pool, abstract and automate data center infrastructure

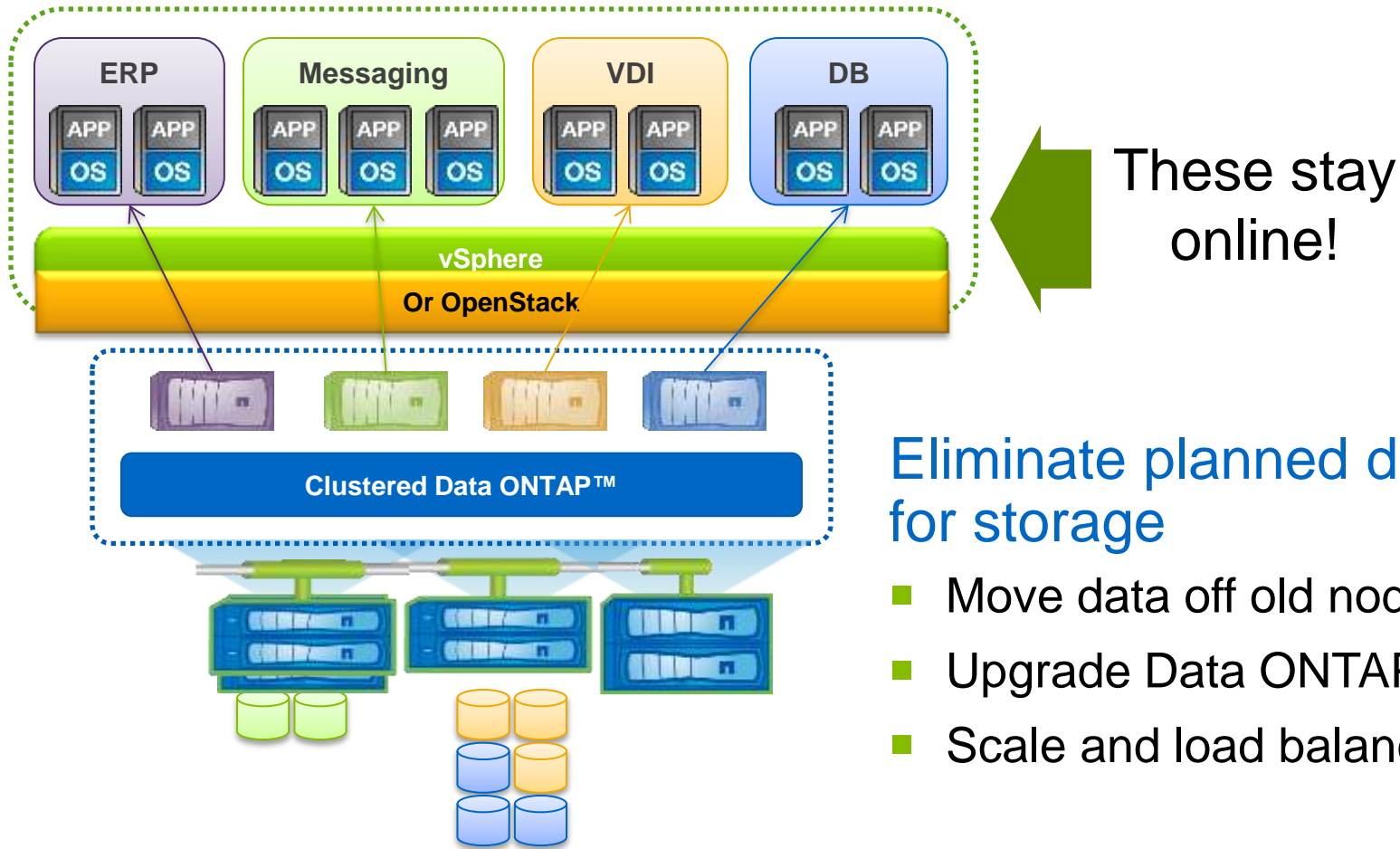
Agile Data Infrastructure: an intelligent, scalable, always-on enterprise wide data infrastructure - supports apps along the transformation

Final Step: Business Agility



Enable IT to respond rapidly to changing business demands

Non-Disruptive Operations



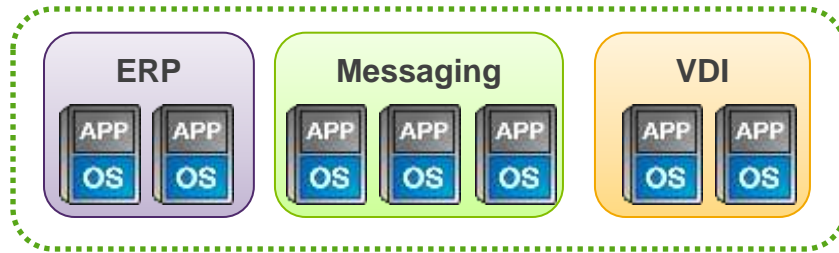
These stay online!

Eliminate planned downtime for storage

- Move data off old nodes
- Upgrade Data ONTAP software
- Scale and load balance



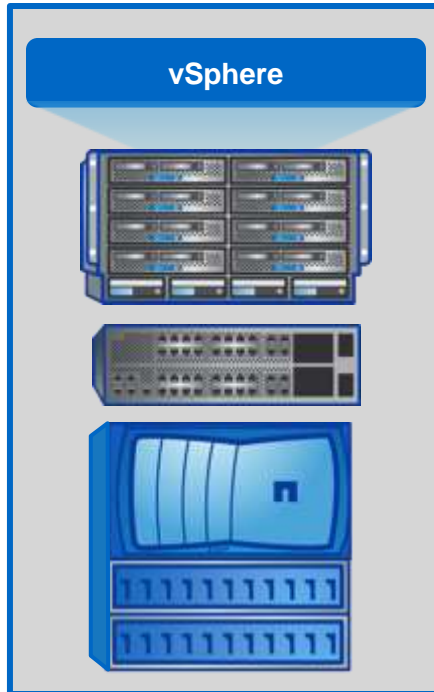
FlexPod Validated Data Center Infrastructure



VMware[®]
vSphere[™],
vCenter[™]

Cisco[®] UCS
and Nexus

NetApp
FAS



VMware vSphere on FlexPod

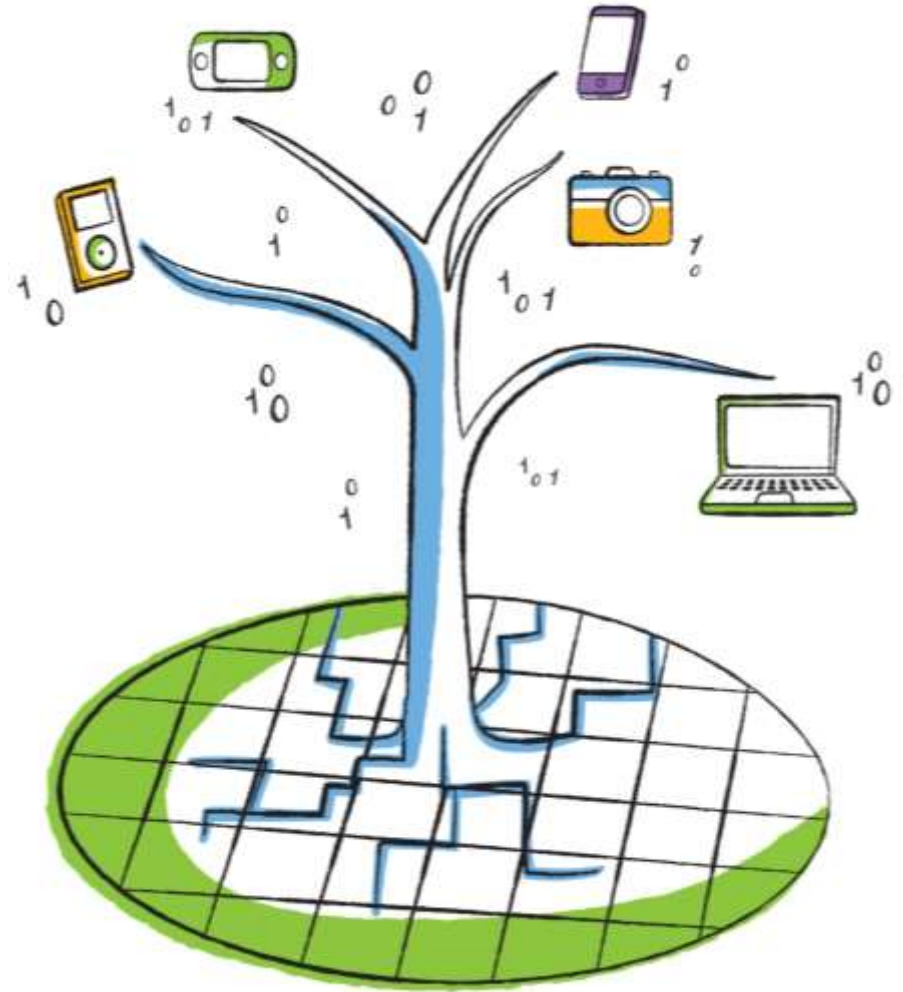
- Best-in-class converged platform
- Prevalidated with VMware and multiple workloads
- Flexible: One platform scales up or out to fit many mixed workloads

Complete data center in a rack



Go further, faster®

OpenStack





OpenStack: Here To Stay and Stacking Up

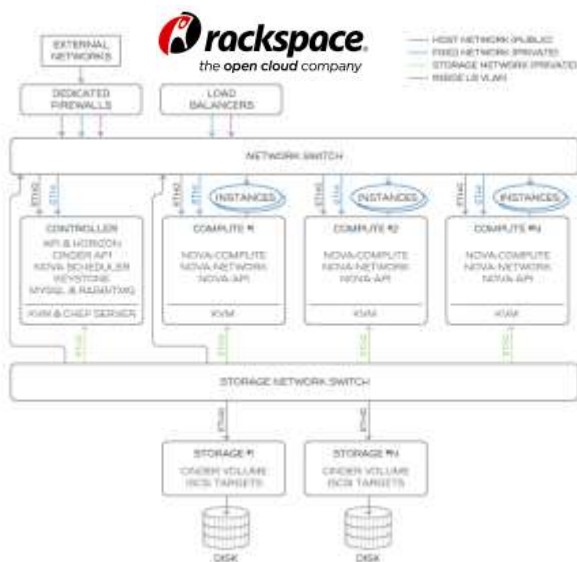
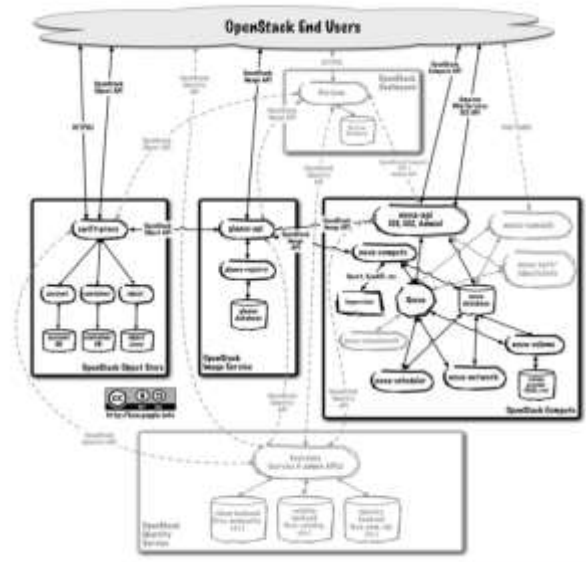
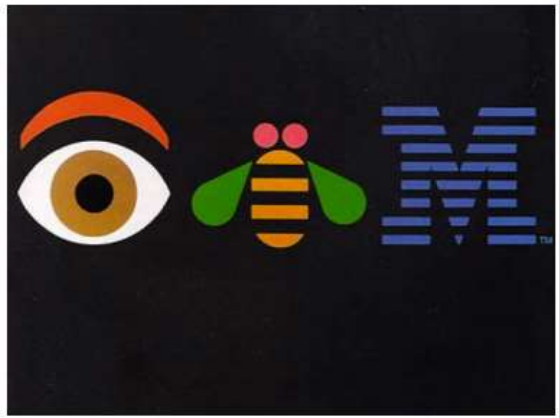
Arik Hesseldahl
ethics statement | bio | e-mail | RSS | Follow 19k | Follow @ahess247

IBM Makes a Big Bet on OpenStack in the Cloud

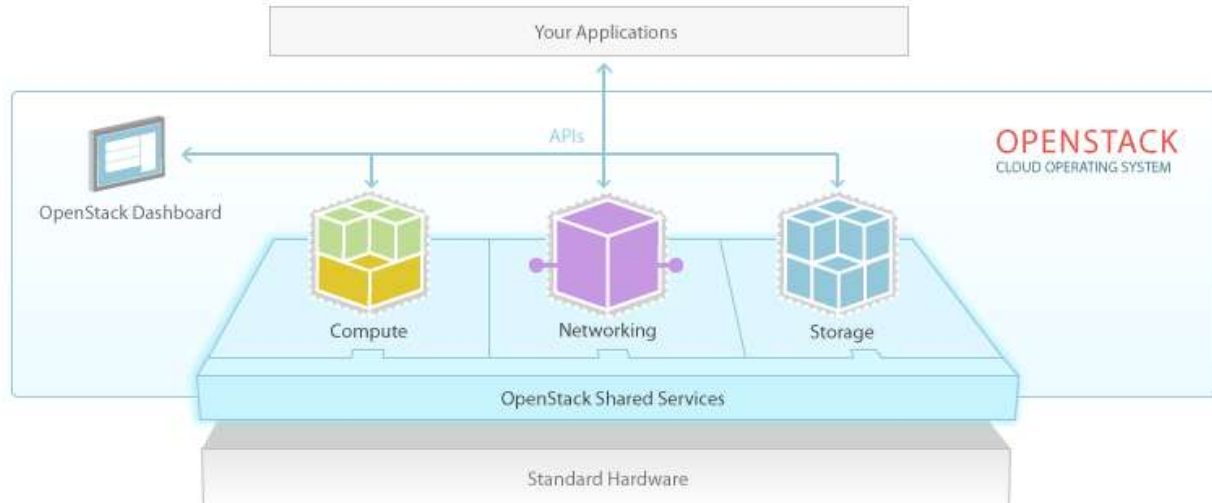
MARCH 4, 2013 AT 5:59 AM PT | Tweet | Like | +1 | Share | Share | Print

The open source software for running cloud computing installations just got a big new name in its camp: IBM.

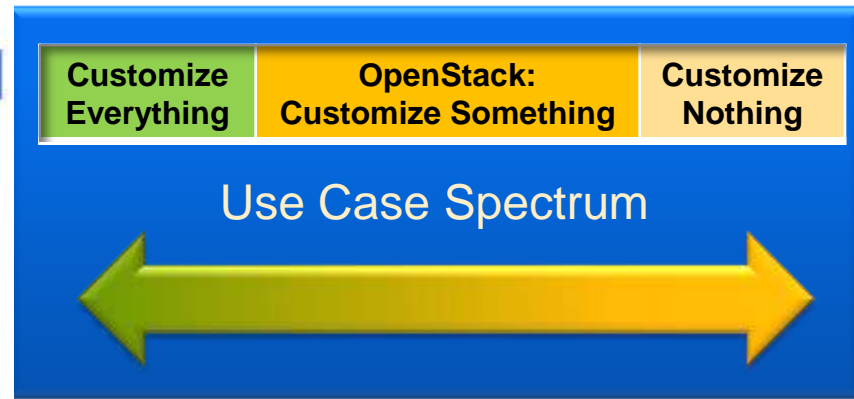
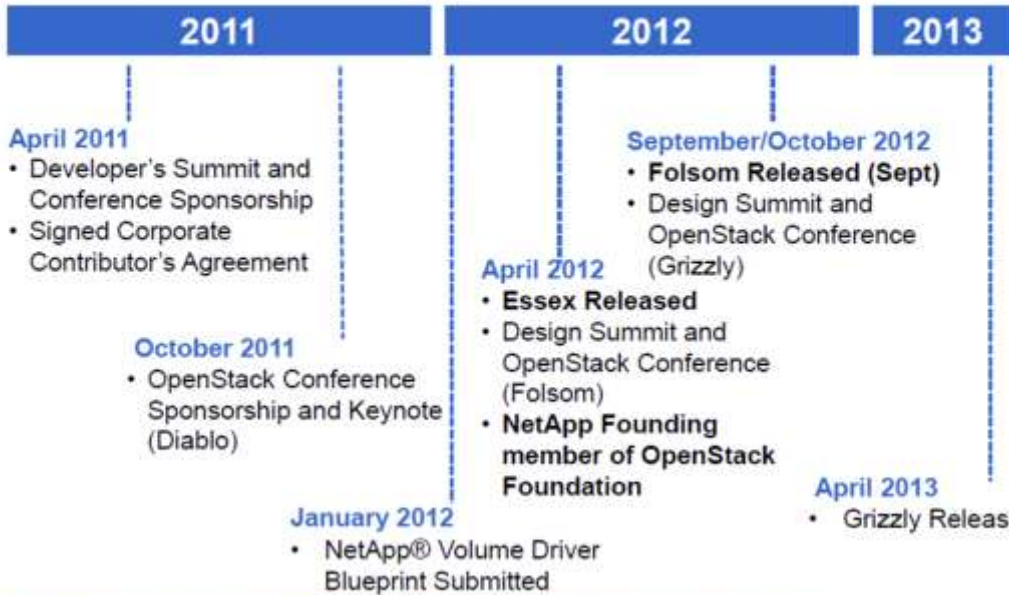
Big Blue announced today that all of its cloud services and software will be based on an open cloud architecture. It's good news for potential IBM customers because it means they can mix and match service and equipment vendors — Dell, Hewlett-Packard and Rackspace are also big OpenStack fans — without worrying about getting stuck with one.



Intel IT's OpenStack Journey
Das Kamhout, Principal Engineer, Intel IT Cloud Lead
Twitter - @ckamhout
Email - das@intel.com



NetApp's OpenStack Participation



OpenStack Architecture Components

OpenStack has a modular architecture that encompasses the following components:^[1]

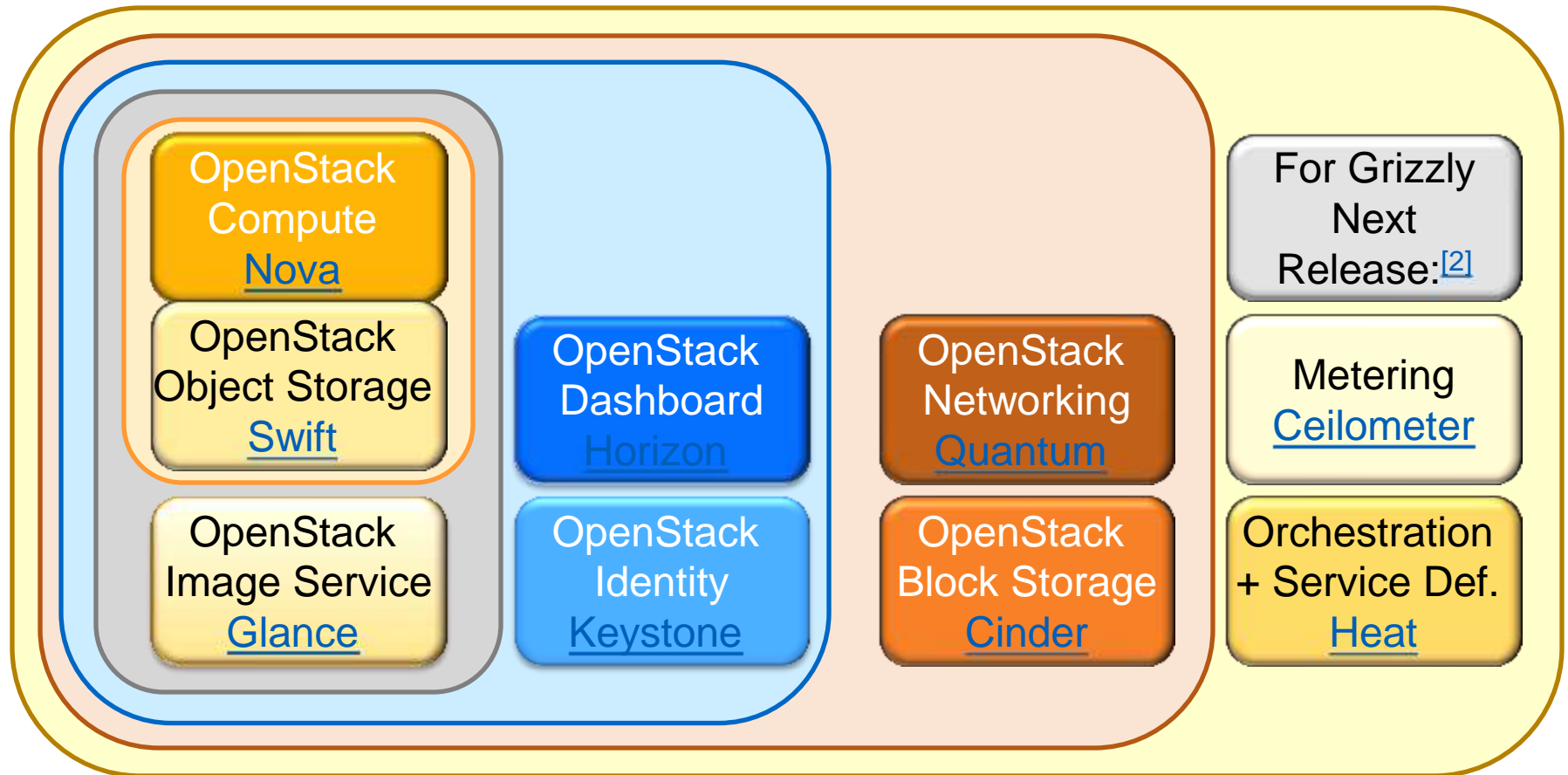
Austin (10/10)

Bexar(2/11),Cactus(4/11),Diablo(9/11)

Essex (4/12)

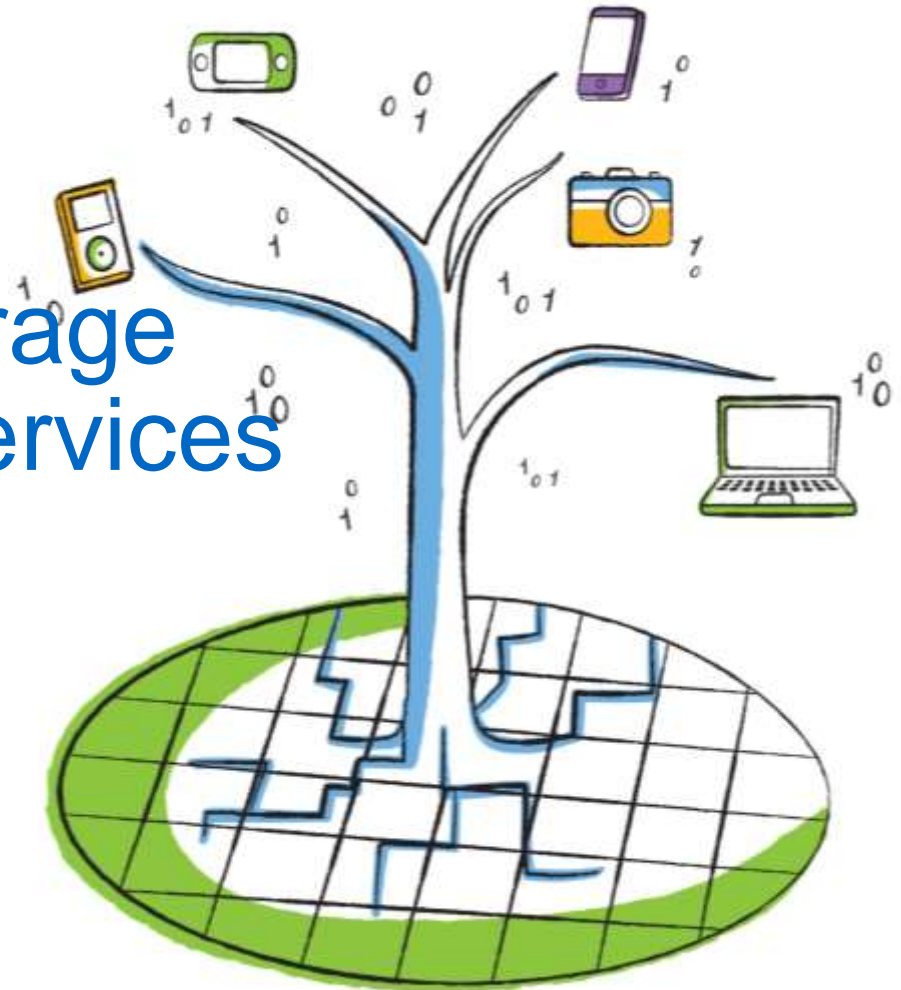
Folsom (9/12)

Grizzly(4/13)



NetApp Private Storage for Amazon Web Services

The benefits of Public Compute,
Private Storage: On-Demand
Performance with Secure
Storage

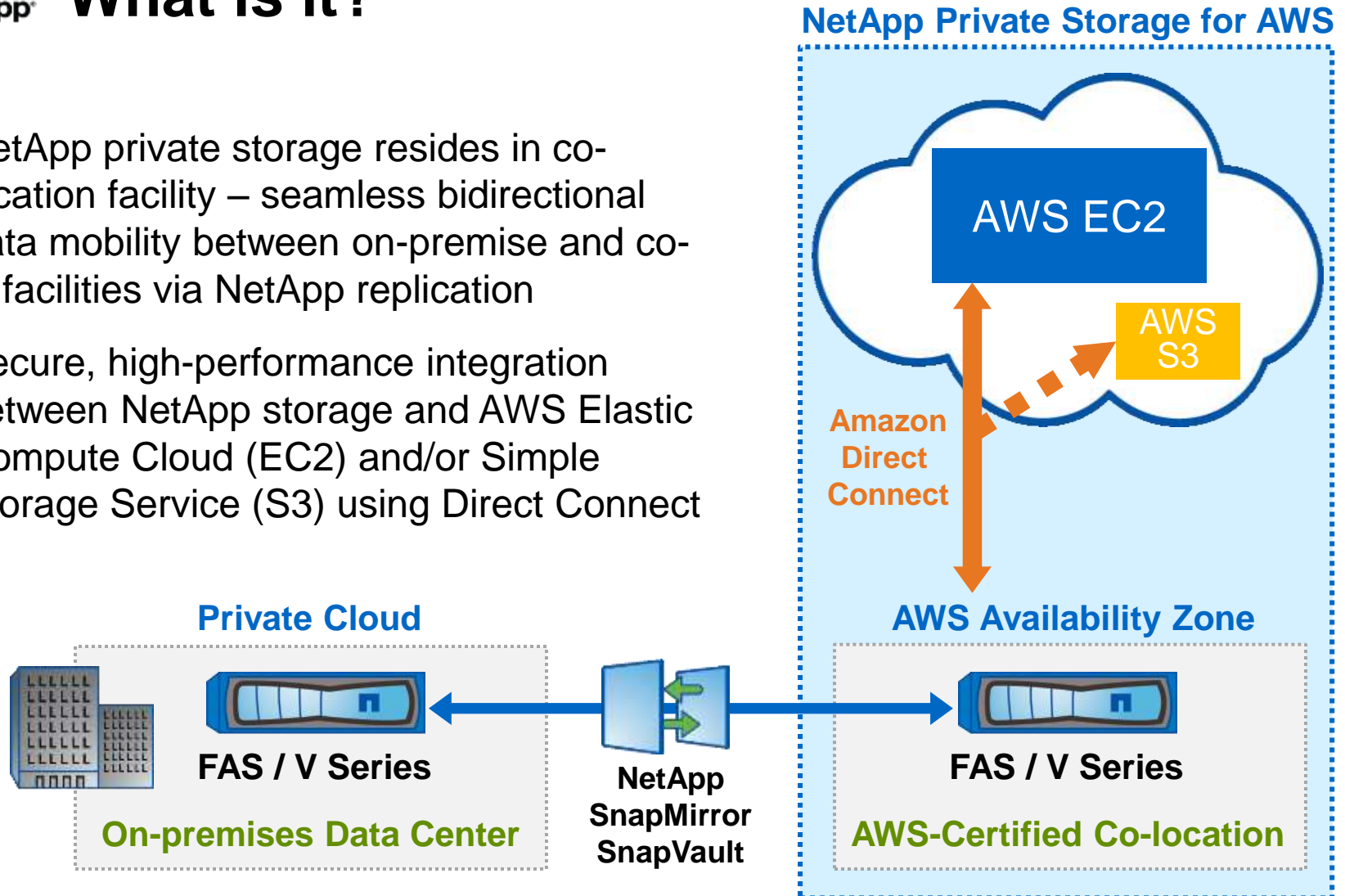




NetApp Private Storage for AWS

What is it?

- NetApp private storage resides in co-location facility – seamless bidirectional data mobility between on-premise and co-lo facilities via NetApp replication
- Secure, high-performance integration between NetApp storage and AWS Elastic Compute Cloud (EC2) and/or Simple Storage Service (S3) using Direct Connect

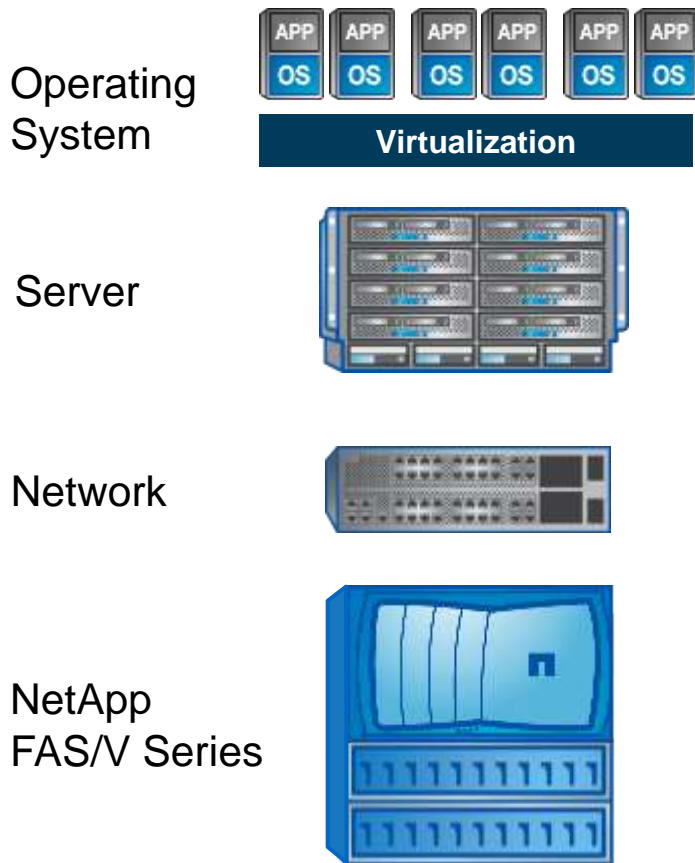




NetApp®

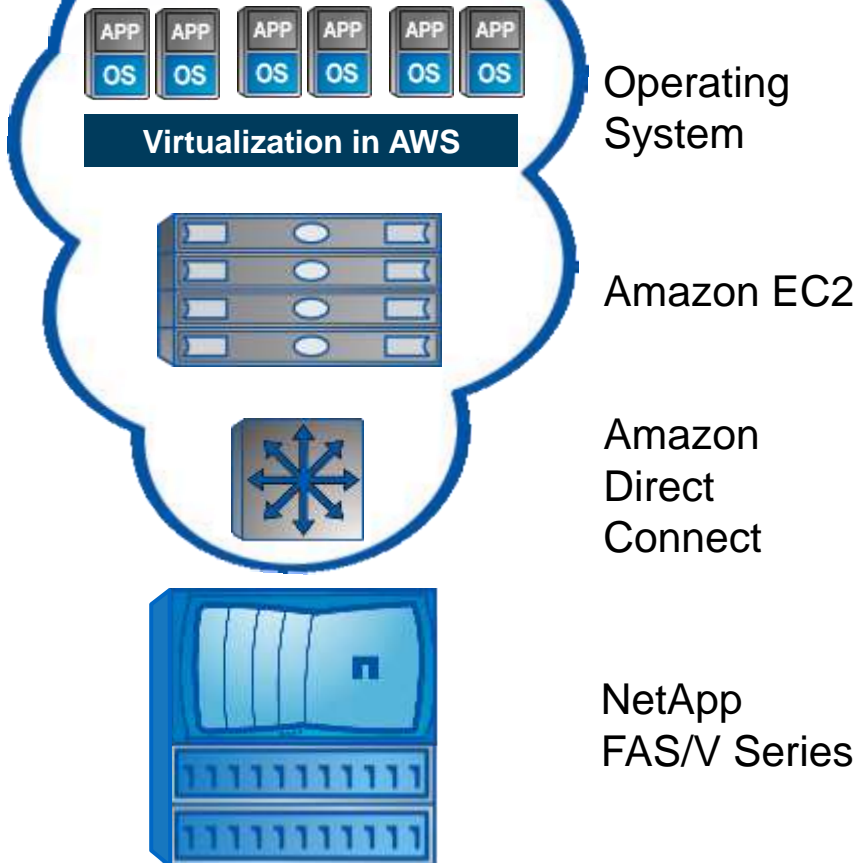
Converged Infrastructure in the Cloud

Converged Infrastructure



Complete data center in one rack cabinet

NetApp Private Storage for AWS



Flexible AWS compute backed by NetApp



NetApp Private Storage for AWS Use Cases

Several use cases appeal to a wide variety of organizations



- High-performance workloads



- Big Data Analytics

- Development and Test



- Disaster Recovery

- Multi-tier backup



- Data with compliance requirements

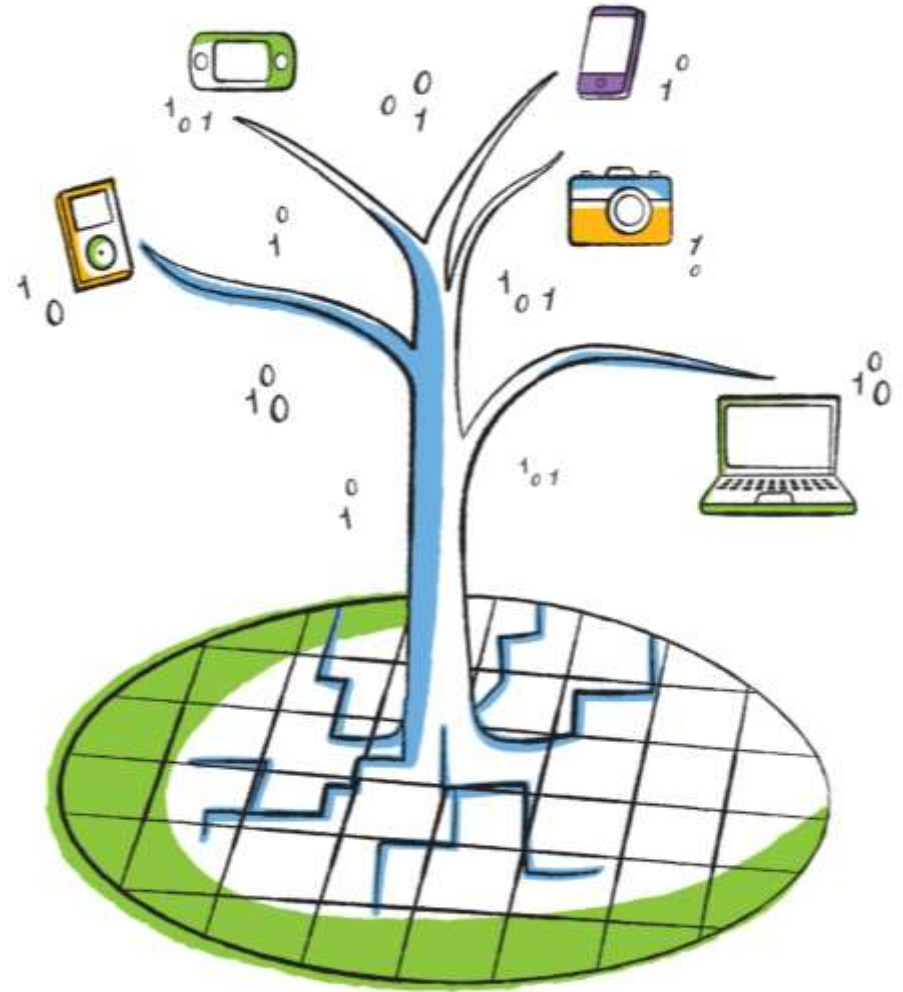
- Data center migration and consolidation



Go further, faster®

New Collaboration Architectures

Use Case Illustration
nVidia and Applied Materials





VDI Requirements

- Multiprotocol – OS, applications, user data, profiles within and across delivery models
- Low latency – Near local performance needed
- Performance on demand (burst IOPs)
- Storage Optimization
 - De-duplication
 - Compression
 - Dynamic Flash-based Tiering
 - Thin provisioning
- Cloning for quick duplication of desktop images
- Integrated local and geographical data protection
- Workload predictability

Source: IDC Desktop and Storage Solution Paper sponsored by Citrix and NetApp

Visual Computing Appliance (VCA)



Grid Enterprise Servers

nVidia's first integrated system: Grid, 4U in height, fits server rack

With Xeon processor 16 threads, 392 GB system memory, 8 grid GPUs, each with 2 Kepler GPUs, integrated into one appliance, router, hypervisor 16 VMs connected to as many devices, thin client, grid client nVidia grid VCA (coming mid 2013)

<http://www.nvidia.com/object/visual-computing-appliance.html>



More on VCA



■ KEY BENEFITS:

- A turnkey platform that simplifies installation and management
- As a stateless device, security is enhanced because valuable data sets are stored on NAS, not locally.
- A fully integrated system that maximizes concurrent user density for demanding design software
- High-end NVIDIA GPU performance on any Windows, Linux or Mac client on your network
- Highest quality-of-service for each user
- Certification and support by professional application partners, including Adobe, Autodesk, and Dassault Systems

Courtesy nVidia Web site



NetApp®

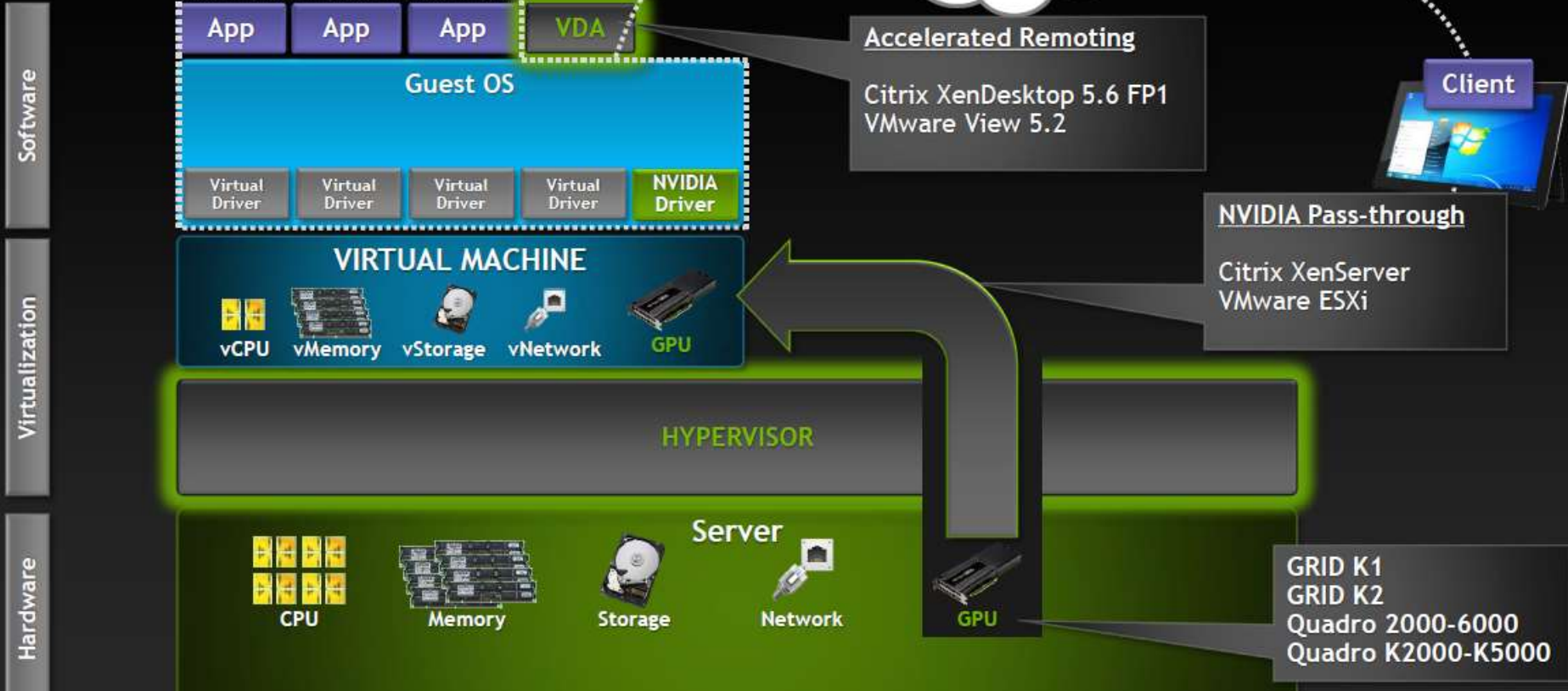
From GTC 2013 Conference

GPUs in a Virtual Desktop

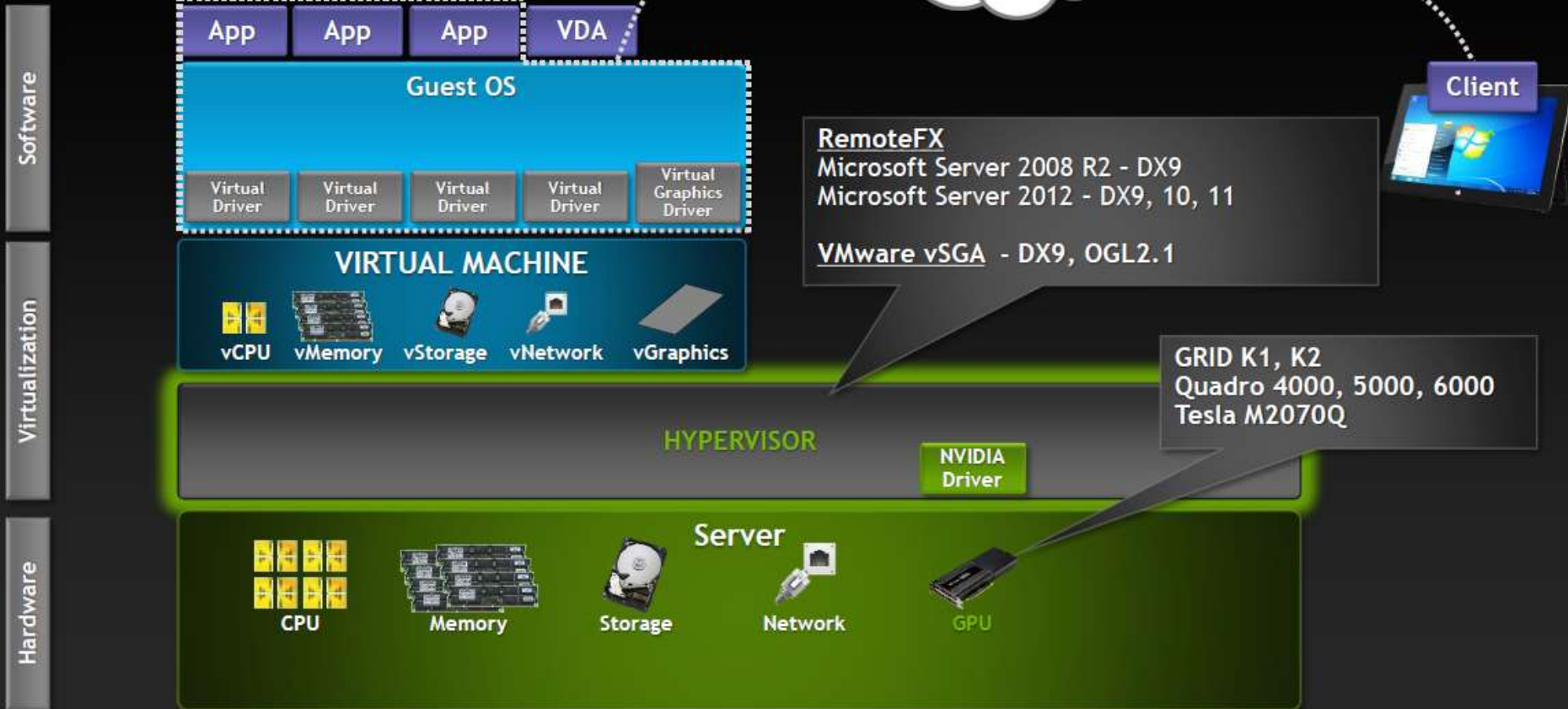


- GPU pass-through 1:1 dedicated GPU to user
- Shared GPU *Software* virtualization of the GPU
- GRID VGX *Hardware* virtualization of the GPU through the NVIDIA GRID VGX technology

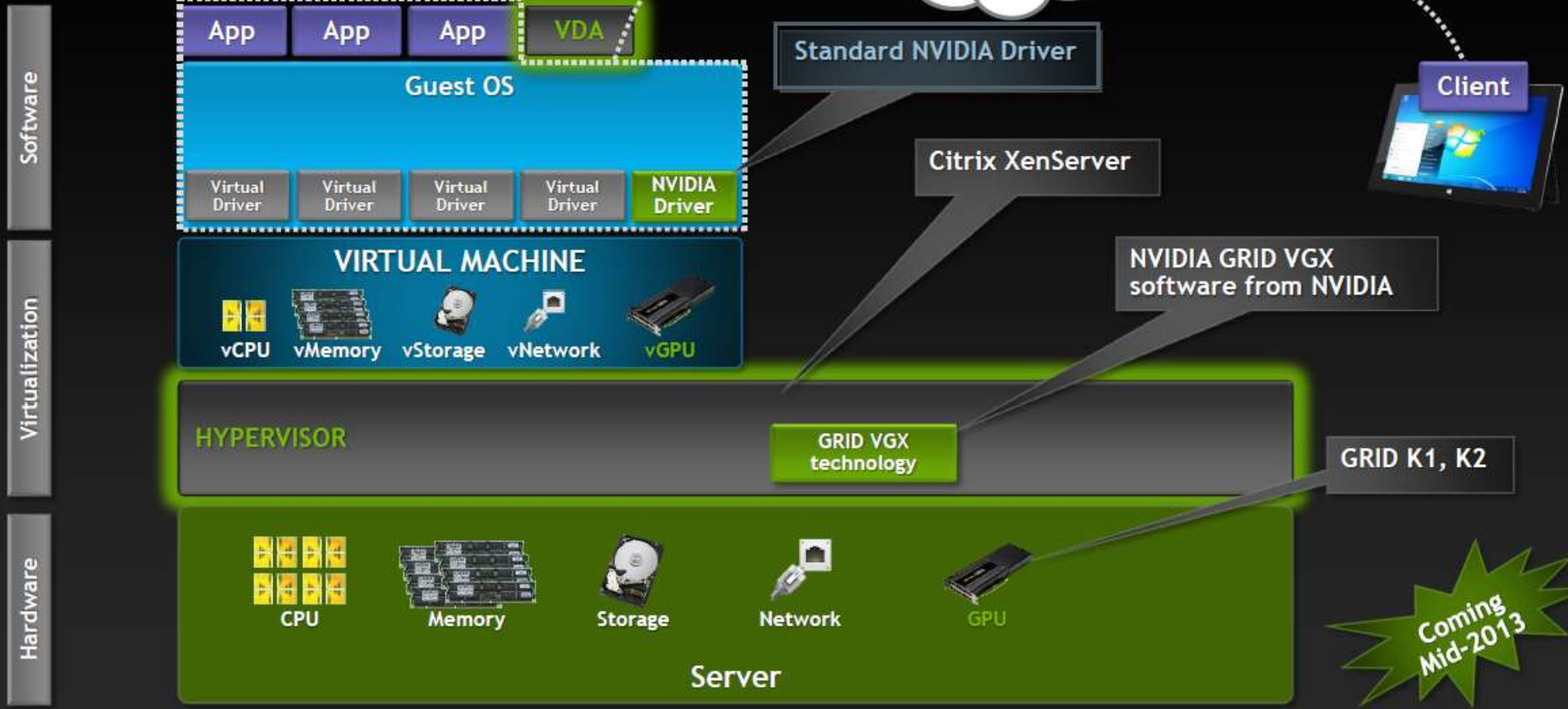
GPU Pass-Through



GPU Sharing



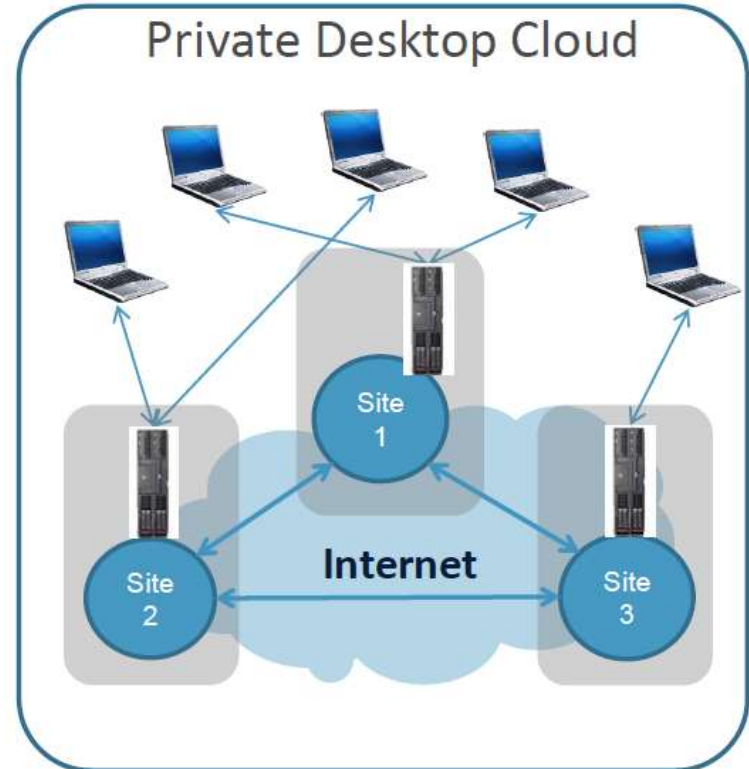
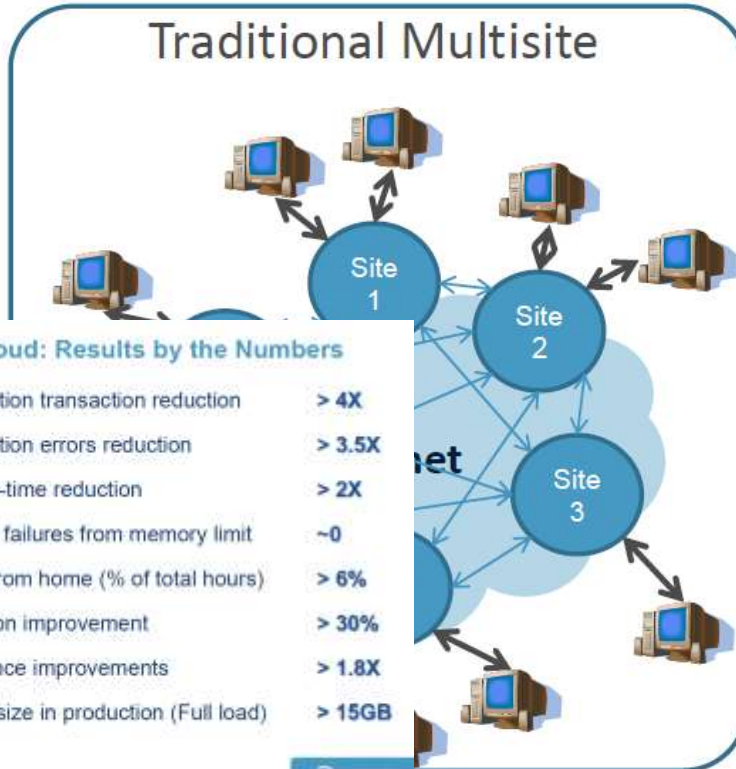
HW GPU Virtualization





NetApp

Applied's CAD Solution: Internal Desktop CAD "Cloud"

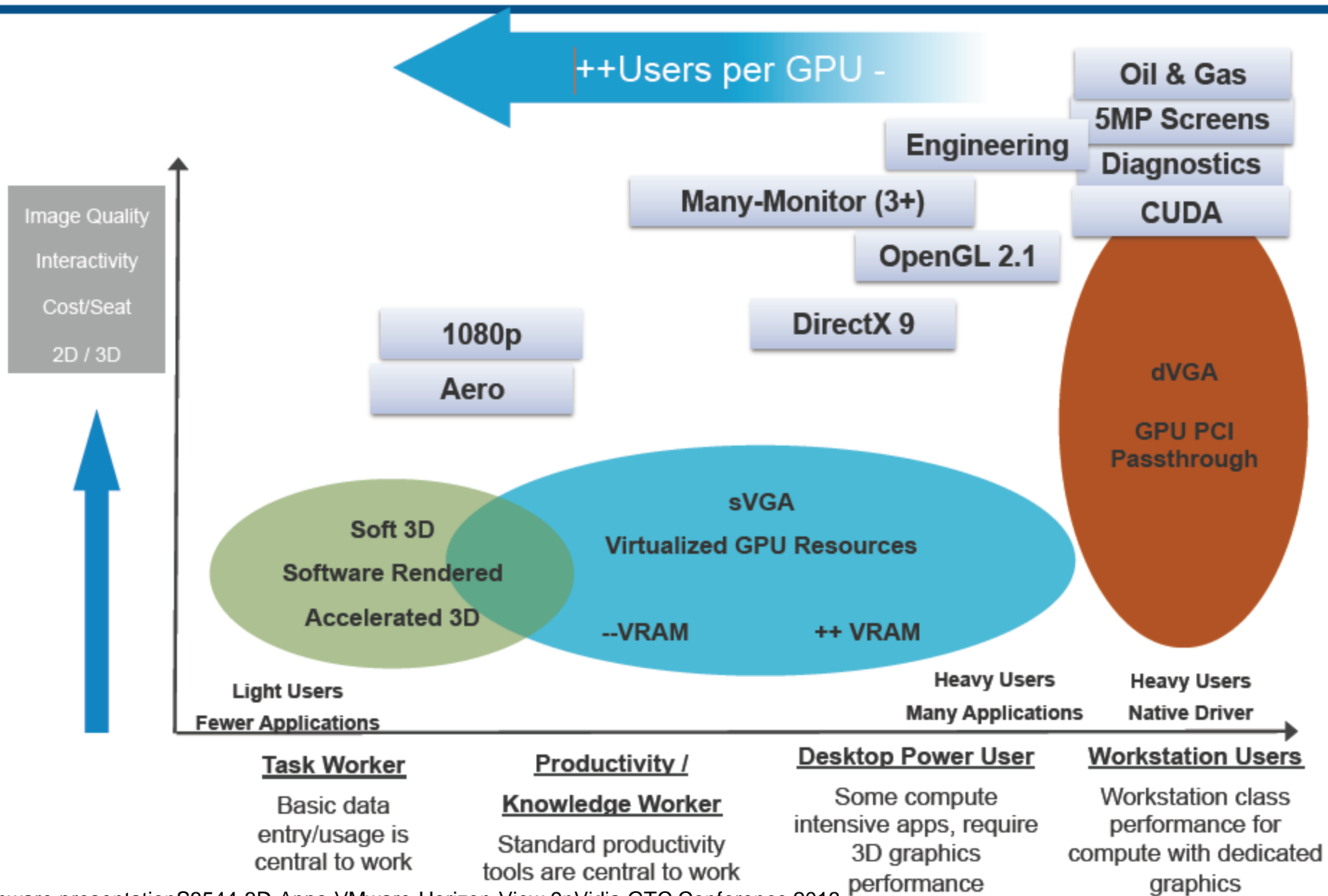


CAD Desktop Cloud: Results by the Numbers

Multisite synchronization transaction reduction	> 4X
Multisite synchronization errors reduction	> 3.5X
Large Assembly load-time reduction	> 2X
Large assembly load failures from memory limit	~0
CAD users working from home (% of total hours)	> 6%
CAD users satisfaction improvement	> 30%
Simulation performance improvements	> 1.8X
Maximum assembly size in production (Full load)	> 15GB

- Engineering desktops & applications are hosted in Applied datacenters
- Connect from anywhere with a notebook computing device – and use server CPU/GPU
- Applications are run on powerful servers connected to enterprise data via hyperLAN

Virtual Desktop User Segmentation



vmware presentationS3544-3D-Apps-VMware-Horizon-View 9nVidia GTC Conference 2013



Summary and Key Takeaways

- Collaboration Architectures and initiatives starting to converge
- The Cloud evolving to address initial challenges and issues
- OpenStack gathering momentum
- Moving from cloud definition to realization and optimization
- Novel ways to address:
 - Private storage in public cloud compute
 - Virtualized Desktop and Cloud Collaboration Optimizations Making Far as Good As Near With Added Benefits in Cost and Productivity



Resources

- NetApp Community support
<https://communities.netapp.com/groups/openstack>
- Details of NetApp® volume driver
<https://blueprints.launchpad.net/nova/+spec/netapp-volume-driver>
- NetApp storage service catalog
 - <http://www.netapp.com/us/communities/tech-ontap/tot-oncommand-1106.html>
- More information about OpenStack software
 - <http://www.openstack.org>
 - <http://www.openstack.org/software/essex/>
 - <http://www.openstack.org/software/folsom/>



-
- http://wikibon.org/wiki/v/Rackspace_Private_Cloud_Delivers_OpenStack_to_Transform_Operations
 - <http://www.nvidia.com/object/visual-computing-appliance.html#source=pr>
 - <http://insights.wired.com/profiles/blogs/collaboration-in-action-weaving-proven-tech-into-OpenStack#axzz2KcRGR6tB>
 - <http://www.OpenStack.org/summit/san-diego-2012/OpenStack-summit-sessions/presentation/intels-OpenStack-journey>
 - <http://www.opendatacenteralliance.org/docs/DevCloudCapApp.pdf>
 - http://wikibon.org/wiki/v/Rackspace_Private_Cloud_Delivers_OpenStack_to_Transform_Operations
 - <http://docs.OpenStack.org/ops/OpenStackOperationsGuide.pdf>
 - <http://www.datacenterdynamics.com/focus/archive/2013/03/equinix-and-netapp-partner-aws-connected-private-cloud-storage>
 - http://www.forbes.com/sites/netapp/2013/04/08/transform-business-cloud/?REF_SOURCE=smctwitter-cloud

Thank you

