Scaling to 50,000 Virtual Desktops
Architectural Requisites for Success

Phil Brotherton
Vice President and General Manager,
Microsoft Business Unit
NetApp
Promise of Desktop Virtualization

- Desktop management cost & complexity
- Improves business continuance
- Enables security and compliance
- End-point device independent
Virtual Desktop: Ready for Most Use Cases

Mobile

Non-mobile

Transaction

Consumption

Creation
Desktop Virtualization Challenges

- Alignment of IT resources
- IT vs. end users
- Security and isolation on shared infrastructure
- End user acceptance
Different Approaches

- VDI
- Hosted/Shared Desktops
- Streamed Desktops
- Streamed Apps

Storage
Virtual Desktop Complexity

- Two primary types of data
- Each with different requirements

<table>
<thead>
<tr>
<th>OS Image Data</th>
<th>User Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly redundant</td>
<td>Less Redundant</td>
</tr>
<tr>
<td>High IO spikes</td>
<td>Low IO load</td>
</tr>
<tr>
<td>Low latency required</td>
<td>Latency tolerant</td>
</tr>
<tr>
<td>Limited Backup required</td>
<td>Stringent Backup required</td>
</tr>
</tbody>
</table>
“If you don’t architect storage correctly your solution is likely to be over-built and too expensive, or under-built and unable to deliver the performance to meet end user requirements. Both scenarios put desktop virtualizations projects at risk to fail.”
Storage Challenges for Virtual Desktops

- Lengthy mass deployment timeframes
- Storage performance bottlenecks
- Maintaining high availability
- Security and control of user data
- Storage costs
Desktop Virtualization Infrastructure Expenses Categories

Source: Gartner Dataquest
Benefits of Shared Storage for VDI

- **Manageability**
  - Automatic Migrations, failover
  - Storage-assisted VM Cloning
  - Centralized Management of Infrastructure & Images
- **Unified storage, multi-protocol capability**
  - For Desktops & User Data
- **Performance acceleration**
- **Resiliency**
  - High availability
  - Backup and recovery/data protection
  - Disaster Recovery
Deduplication for Extreme Storage Savings

- Savings extend to all copies of the data
  - Including backup, DR, test clones and archival copies
Storage Impact on Desktop Performance
Eliminate Boot and Login Storms

- Boot time decreases 47%
- Storage workload decreases 50%
- Performance increases 71%

Desktop users aren’t affected during simultaneous boot or log on
Challenges Unique to Virtual Desktops

Delivering Performance and Economics

Performance (IOPS)

Capacity (TB)

Boot Storm Load

Runtime Load

Sized for Performance

Sized for Capacity

NetApp Confidential – Limited Use
Delivering Performance and Economics

- Dedupe-aware Cache or HVD software
- Write I/O Optimization
- Boot Storm Load
- Runtime Load
- Dedupe or HVD SW
- Sized for Capacity

Performance (IOPS)
Capacity (TB)

NetApp Confidential – Limited Use
Enabling Agility…

- Create 1000s of virtual desktops in a few minutes:
  - Install a security patch in minutes, vs. days
  - Bring new users on line quickly to meet demand
  - Agile “plumbing” enables agile IT processes

- Space Frugal Clones rapidly provisioned

![Diagram showing cloning of desktops and volumes from Golden Images]

- Windows 7
- WinXP-SP2
- WinXP
- Golden Images
- Clone a Desktop
- Clone a Volume
Data Protection, Rapid Recovery

- Advanced storage features, integrated with desktop virtualization management console
  - Restore desktop to previous state
  - Restore user data to previous state
  - Restore and recover databases in a few minutes
  - Underlying technology: snapshots, typically hourly
Full Stack Integration Required

Management Integration:

*Control, Automation & Service Delivery*

- Integrated data management
- Integrated data protection

**Innovation that attacks data growth**

- Reduces storage overhead with dedupe, cloning, thin provisioning, compression

Virtualized Storage Operating System

- Aggregates logical data from physical disks:
  - Within a single storage system
  - Across multiple storage systems
  - Among multiple vendor’s systems
  - Across locations
Securely Share Your Infrastructure

No Compromise: Share, Control, and Improve Efficiency

Secure Shared Resources

- End-to-end isolation
- Share more infrastructure across all your customers and applications
- Share more = save more
- Maintain the same control physical silos provided
- Increase infrastructure efficiency
- Reduce risks in deploying shared infrastructures
50,000 Seat VDI Deployment

- World’s largest documented VDI deployment
- Industry leaders collaborating together
- Cutting edge hardware and software
- Validates performance and scalability of solution
- Proof-point for technology, integration, & best practices
Goals of the Reference Architecture

1. Create a “POD” design that is…
   – Scalable
   – Cost Effective / Efficient
   – High Performing
   – Proven

2. Thorough solution component testing
   – Hypervisor, Server, Network, Storage, Thin Clients
   – State-of the-art desktop OS and virtualization SW
   – Randomly generated workloads on desktops

3. Provide a blueprint to customers
5000 Seat POD Architecture

- WYSE Zero Client
- VMware View 4.5
- Windows 7
- VMware vSphere 4.1
- Connection Broker
- Hypervisor
- Cisco UCS 5100 Blade Server (60 blades)
- Cisco UCS 6100 Fabric Interconnect
- Cisco Nexus 5020
- Cisco Nexus 7018
- NetApp FAS 3170 Cluster

NetApp Confidential – Limited Use
- Pod-based architecture
- Easily expandable
- Predictable performance

50,000 Virtual Desktops
Roadmap for Large-scale Deployments

- **Virtualize** everything
  - Servers, Networks, Storage, Desktop
- **Standardize** architectures
  - Converged networks & unified storage
- **Optimize** for greater efficiency
  - Deploy automation & efficiency technologies
- **Deploy** in phases
  - Test, scale, test, deploy

Networked Storage Enables Large-scale Desktop Virtualization
# Addressing the Storage Challenges

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agility and provisioning</td>
<td>• Rapid cloning</td>
</tr>
</tbody>
</table>
| End user experience         | • Performance acceleration
                              | • Intelligent cache                         |
| Security, availability      | • Storage-based backup & DR
                              | • Self-service file recovery                 |
| Economic challenges         | • Deduplication
                              | • Storage-based cloning
                              | • Storage Efficiency                        |