Transforming Desktop Virtualization with Citrix XenDesktop and EMC XtremIO

EMC XtremIO

Chhandomay Mandal, Solutions Marketing Director, EMC
Sagnik Datta, Citrix Ready Technical Marketing Specialist, Citrix
“Citrix Ready is the #1 source to evaluate verified partner products for customers making a Citrix purchasing decision”

Citrix Ready Program


1000+ Technology Partners

27,000+ Product Verifications

2,000,000+ Online Catalog Page Views

The Citrix Ready program identifies verified solutions that are trusted to enhance virtualization, mobility, networking and cloud computing solutions from Citrix giving customers confidence in the compatibility of the joint solution offering.
Introduction

EMC
• Established: 1979
• Employees: 70,000
• Partner Since: 1990s

With EMC XtremIO all-flash array, improve
1) your competitive agility with real-time analytics & development
2) your infrastructure agility with elastic provisioning for performance & capacity
3) your TCO with 50% lower capex and opex and double the storage lifecycle.
Agenda

- Citrix & EMC XtremIO: Better Together

- XtremIO Design Fundamentals for VDI

- Citrix XenDesktop & XtremIO
  -- Image Management & Storage
  -- Demonstrations
  -- XtremIO XenDesktop Integration

- Putting it all together

- Conclusion
Desktop Needs Are Changing
Desktop and Apps as-a-Service

**Access**
From Anywhere

**Apps**
On The Go

**Devices**
Any Device They Want
XenDesktop

Any App with XenApp

- Increase employee productivity with anywhere access
- Simplify support and enable choice of BYO devices
- Centralized security to protect sensitive information
- Reduce cost and complexity of app and desktop management
- Comprehensive desktop virtualization for any use case

Any Desktop
Citrix is the clear leader

A leader in IDC MarketScape 2013

*IDC MarketScape* vendor analysis model is designed to provide an overview of the competitive fitness of ICT suppliers in a given market. The research methodology utilizes a rigorous scoring methodology based on both qualitative and quantitative criteria that results in a single graphical illustration of each vendor’s position within a given market. The Capabilities score measures vendor product, go-to-market and business execution in the short-term. The Strategy score measures alignment of vendor strategies with customer requirements in a 3-5-year timeframe. Vendor market share is represented by the size of the circles. Vendor year-over-year growth rate relative to the given market is indicated by a plus, neutral or minus next to the vendor name.

*IDC MarketScape: Worldwide Client Virtualization Software Vendor Assessment*, doc #245100, December 2013

Source: IDC, 2013
# VDI Storage Challenges

<table>
<thead>
<tr>
<th>UX</th>
<th>User Experience is the most important metric</th>
<th>VDI means real adoption, success beyond Pilot</th>
<th>Multiple user needs, bursty apps, all amplified at scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Storage is often the enemy of user experience</td>
<td>Users demand dedicated local drive performance</td>
<td>VDI places users into a shared container</td>
</tr>
<tr>
<td></td>
<td>Old-school remedies are inefficient</td>
<td>Flexible VDI intelligent data services needed</td>
<td>Linked, Full clones persistence/non persistence</td>
</tr>
<tr>
<td></td>
<td>Traditional arrays don’t deliver user experience</td>
<td>Legacy arrays can’t deliver VDI success at scale</td>
<td>Flash is the only way to succeed at scale</td>
</tr>
<tr>
<td>HELP</td>
<td>Need a total solution offering</td>
<td>Enterprise solution needs more than a fast array</td>
<td>What about the user data, backup, HA/DR?</td>
</tr>
</tbody>
</table>
XtremIO: #1 Flash Storage By All Measures

31% Market Share

$1B Revenue Run-rate

40% Fortune 100
& Fortune 200

Gartner Magic Quadrant leader

1,700 Customers

99.9999% Reliability
#1 Flash Array for VDI: >2.5M Desktops!

VDI Breakthroughs with XtremIO

<table>
<thead>
<tr>
<th>Reduction In Capacity Per Desktop</th>
<th>10:1</th>
<th>* Persistent Desktops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction In Storage Cost Per Desktop</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Lower RAM Requirement for same disk IO perf</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Reduction In Server Infrastructure</td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>Virtual Desktops Per X-Brick</td>
<td>up to 3500</td>
<td>*Non-persistent Desktops</td>
</tr>
</tbody>
</table>
Citrix and EMC XtremIO: Better Together

**Citrix**
- Market Leader for Desktop Virtualization
- Flexible access to all apps, data and desktops in one product
- Proven scale for 100s to 100,000s of users
- Windows desktops and apps on PCs, Macs, iPads, Android and smartphones at scale with consistent rich user experience

**XtremIO**
- Market Leader for Flash Arrays
- Storage platform for uncompromising USER experience – at scale, all the time, all user types
- Radically simple ADMIN experience
- Fast Provisioning
- Low $/desktop, better than physical for performance, experience and economics
What Problem Are We Solving?

Use Flash = Go Fast + Get Smarter

(maybe solve economics)

THE RIGHT ARCHITECTURE UNLOCKS UNIQUE BUSINESS VALUE
XtremIO Design Fundamentals

**SCALE-OUT**
CONSISTENT & PREDICTABLE
INHERENTLY BALANCED

**COPY DATA MANAGEMENT**
INSTANT & HIGH PERFORMANCE

**DATA SERVICES**
INLINE ALL THE TIME

- Thin Provisioning
- Deduplication
- Compression
- Flash Data Protection
- Encryption
- Writeable Snapshots

**APPLICATION & ECOSYSTEM**
INTEGRATION & AUTOMATION
Product Family, On-Demand Linear Scale-Out

5TB – over 1 PB usable capacity based on 5, 10, 20, & 40 TB X-Bricks

- 150K MIXED IOPS
- 250K READ IOPS
- <1MS Latency

New 8-Brick Cluster

- 1.2M MIXED IOPS
- 2M READ IOPS
- <1MS Latency
- Up to 320TB raw, PBs effective

SCALE-OUT <1MS LATENCY. RICH DATA SERVICES. NO TUNING.
XtremIO Data Services for VDI

Always-on, Inline, Zero Penalty

Always On Thin Provisioning

Inline Data Deduplication

Inline Data Compression

Inline Data Encryption

Flash Optimized Data protection

Agile Copy Services

Data protection

Always On Thin Provisioning

Inline Data Deduplication

Inline Data Compression

Inline Data Encryption

Flash Optimized Data protection

Agile Copy Services
Conventional VM Cloning

Array offloads the host
Brute force copy on the array
XtremIO In-memory VM cloning

VM Cloning in seconds!

X-COPY / ODX COMMAND

IN-MEMORY METADATA

UNIQUE, COMPRESSED USER DATA ON SSD

BLOCK

BLOCK

BLOCK

BLOCK
XtremIO – 15 second provisioning

1. CREATE VOLUMES
2. CREATE INITIATOR GROUPS
3. MAP VOLUMES
Citrix XenDesktop & EMC XtremIO
VDI Desktop Models – Dedicated Desktops

- Highly personalized for users
- Increased user acceptance
- Increased storage
- High per user cost
- Complex and unique base images
VDI Desktop Models – Pooled Desktops

- Reduced storage requirements
- Centralized management
- Uptime & predictability

No personalization
Poor user acceptance
Limited scope/user base

Common Base Image
Operating System
Base / Parent VM
Citrix Personal vDisk (PvD)

- Enterprise scope
- Highly personalized for users
- Increased user acceptance
- Reduced infrastructure requirements
- Centralized management

User Profile & Settings
--
Departmental Applications
--
User Installed Applications
--
Local Peripherals

PVD 1

User Profile & Settings
--
Departmental Applications
--
User Installed Applications
--
Local Peripherals

PVD 2

User Profile & Settings
--
Departmental Applications
--
User Installed Applications
--
Local Peripherals

PVD 3

Common Base Image

Operating System

BASE PARENT VM
XenDesktop 7.x Architecture Overview

Agent ➔ Remote Access ➔ Broker

Protocol

Central Image management

Hosted Shared Desktops (Terminal Server)
VDI (Windows Clients)
Windows App Virtualization
Remote PC

Unified Access Policies

User Data Profiles

PVS/MCS
XenDesktop 7.x Architecture Overview

- Agent
- Remote Access
- Broker
- Protocol

Central Image management
- Hosted Shared Desktops (Terminal Server)
- VDI (Windows Clients)
- Windows App Virtualization
- Remote PC

Unified Access Policies

User Data Profiles

PVS/MCS + Static VM Builds for dedicated desktops
Citrix Machine Creation Services (MCS)

- Uses Hypervisor API to build virtual desktops
- Base image is copied to each volume
- Difference and Identity disks for each VM
  - Difference disk captures VM writes
  - Identity disk stores desktop identity information
- Two types of desktops
  - Random
  - Static
Demonstrations

By Itzik Reich, Field CTO, XtremIO

MCS Boot Storm Demo URL:
http://youtu.be/YlsVJnlbkFM

MCS Login Storm Demo URL:
http://youtu.be/uHHb2CjV1Io

Product Version
XenDesktop: 7.6
vSphere: 6.0
XtremIO: 4.0

Highlights
Desktops: 2,500
XtremIO X-Brick: 1
Boot storm: 200,000 IOPS
Login Storm: 20,000 IOPS
Latency: Less than 1 ms
Citrix Provisioning Services (PVS)

- Streams OS to desktop

- Boot Image (vDisk)
  - Resides on PVS server
  - Cached in PVS server RAM

- Write Cache
  - Holds temporary changes to OS (pagefile, user changes)
PVS Write Cache

• RAM Cache to Disk
  • Best performance for single applications
  • Perform Server-based cache to estimate size requirement
  • Overflow to disk when RAM is exhausted

• Client Disk Cache
  • Low network traffic
  • Required for full system dumps
  • Most common in deployments
  • Can be secured through encryption

• Server Disk Cache
  • No requirement for local hard disk
  • Can be secured through encryption
Demonstrations

By Itzik Reich, Field CTO, XtremIO

PVS RAM Cache with Disk Overflow
Boot Storm and Login Storm Demo URL: http://youtu.be/6lhkcFCibWo

Product Version
XenDesktop: 7.6
vSphere: 6.0
XtremIO: 3.0

Highlights
Desktops: 3,500
XtremIO X-Brick: 1
Boot storm: 20,000 IOPS
Login Storm: 35,000 IOPS
Latency: Less than 1 ms
XtremIO XenDesktop Integration

Special, unique Plug-in leveraging XtremIO Copy Services

Automated Workflow

Example: 2,500 desktops deployment

Step 1: Clones a master VM to a VMFS datastore 100 times
XtremIO XenDesktop Integration

Special, unique Plug-in leveraging XtremIO Copy Services

Automated Workflow

Example: 2,500 desktops deployment

Step 2. Takes a snapshot of this parental datastore

Step 3. Customizes all the VMs with MS Sysprep
XtremIO XenDesktop Integration

Special, unique Plug-in leveraging XtremIO Copy Services

Automated Workflow

Example: 2,500 desktops deployment

Step 4: Repeats Steps 2 & 3 of the parental VMFS snapshot and VM Sysprep 25 times (so count reaches 2,500 VMs)
XtremIO XenDesktop Integration

Special, unique Plug-in leveraging XtremIO Copy Services

Automated Workflow

Example: 2,500 desktops deployment

Step 5: Populates XenDesktop delivery group with these computers accounts
XtremIO XenDesktop Plug-in

Enter a base name for the virtual machine clones.

Virtual machine names can contain up to 80 characters and must be unique within each vCenter Server VM folder.

Select a location for the virtual machine clones.
XtremIO XenDesktop Plug-in

cctx732 - EMC Clone Existing Virtual Machine

1. Name and Location
2. Compute Resource
3. Clone Options
4. DesktopGroup Choice
5. MachineCatalog Name
6. DesktopGroup Name
7. Ready to Complete

Clone count: 2500 Max: 6334

Generated clone name: CTXSnap-0001

Add leading zeros to index used to generate names
Number of digits in index: 4

Customization specification: wn78

Select destination datastore: New...

Power on virtual machines after creation

Connection Broker Information

Integrate with VMware View
Integrate with XenDesktop
XtremIO XenDesktop Plug-in
XtremIO XenDesktop Plug-in
XtremIO XenDesktop Plug-in
## XtremIO XenDesktop Plug-in

### ctx732 - EMC Clone Existing Virtual Machine

<table>
<thead>
<tr>
<th>Provisioning Type</th>
<th>Clone an existing virtual machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source virtual machine</td>
<td>ctx732</td>
</tr>
<tr>
<td>Clone base name</td>
<td>CTXSnap</td>
</tr>
<tr>
<td>Number of digits in name</td>
<td>4</td>
</tr>
<tr>
<td>Number of donuts</td>
<td>2500</td>
</tr>
<tr>
<td>Clone type</td>
<td>Native Clone</td>
</tr>
<tr>
<td>Folder</td>
<td>N/A</td>
</tr>
<tr>
<td>Compute Resource</td>
<td>VDI-Cluster</td>
</tr>
<tr>
<td>Datastore</td>
<td>New</td>
</tr>
<tr>
<td>Customization specification</td>
<td>win78</td>
</tr>
</tbody>
</table>

### VDI Options:

- [ ]
Putting it all together...
Non-persistent Desktops & XtremIO

- No more nights and weekends – run active desktops on XtremIO while quickly recomposing/refreshing desktops concurrently
- Simple storage design
VDI Deployment Flexibility with XtremIO

Persistent Desktops & XtremIO

Minimum Admin Management
- No need for one-size-fits-all
- No for unproven tools & new operations
- No need for complex storage design
- Superior storage reduction

Maximum Happy Users
- Fast performing desktops
- Full customization

Non-persistent Desktops & XtremIO

But if you used Linked Clones only to reduce capacity footprint...
XtremIO: High Performance with Consistently Low Latency for VDI

High IOPS

123,178 IOPS
XtremIO: High Performance with Consistently Low Latency for VDI

High Throughput

44,831 MB/s
XtremIO: High Performance with Consistently Low Latency for VDI
XtremIO VDI Data Reduction Benefits

Based on lab tests and actual customer environments, expected data reductions are:

<table>
<thead>
<tr>
<th>Desktop Type</th>
<th>Deduplication</th>
<th>Compression</th>
<th>Total Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistent</td>
<td>5.0 – 15.0</td>
<td>1.4 – 2.2</td>
<td>10.0 – 20.0</td>
</tr>
<tr>
<td>Non-persistent</td>
<td>2.5 – 4.0</td>
<td>1.3 – 2.2</td>
<td>3.3 – 8.0</td>
</tr>
</tbody>
</table>
VDI Data Reduction: Customer “A”

- Running XIOS 2.4
- Deploying full clones
- Achieving 16:1 deduplication ratio
VDI Data Reduction: Customer “B”

- Running XIOS 3.0
- Deploying full clones
- Achieving
  - 6.4:1 deduplication ratio
  - 1.8:1 compression ratio
  - 11.7:1 overall reduction
Case Study: Georgia Tech
XtremIO for critical engineering design apps on VDI

Challenge
- Keep VDI "I/O storms" under control at login and during application launch
- Facilitate access to performance-intensive engineering software
- Continuously enhance the learning environment for engineering students

Solution
- EMC XtremIO

Results
- Delivered consistent VDI user experience with high IOPS and sub-millisecond response times
- Low cost per virtual desktop and ROI achieved with inline data reduction
- Ease of use simplified the deployment and reduced the time needed to bring up the VDI environment

Applications
- VDI infrastructure supporting performance-intensive engineering applications like MATLAB, AutoCAD, and CATIA

DIDIER CONTIS
Director of IT Services

"Because of inline deduplication, we can migrate or add more workload than initially anticipated."
Case Study: Georgia Tech

XtremIO for critical engineering applications on VDI

“Because of inline deduplication, we can migrate or add more workload than initially anticipated.”

Results

- Delivered consistent VDI user experience with high IOPS and sub-millisecond response times
- Low cost per virtual desktop and ROI achieved with inline data reduction
- Ease of use simplified the deployment and reduced the time needed to bring up the VDI environment

“[Engineering applications’] launch time has been dramatically reduced from upwards of several minutes to just 20-30 seconds.”

Applications

- VDI infrastructure supporting performance-intensive engineering applications like MATLAB, AutoCAD, and CATIA

DIDIER CONTIS
Director of IT Services

“Because of inline deduplication, we can migrate or add more workload than initially anticipated.”
VBLOCK: Fastest Path to VDI with XtremIO

- Converged infrastructure
- Fast deployment <48 hours
- Standard Pods for global rollout
- Optional Isilon for scale-out user data
- Integrated Data Protection options
- 3500 Non-persistent / 2500 Persistent
- Managed as single product
- Single point of support
## Complete EMC VDI Portfolio Solution

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop Image</td>
<td>XtremsIO - high performance, inline data reduction, scale-out architecture, and easy deployment for &quot;ready to use&quot; desktops.</td>
</tr>
<tr>
<td>Store</td>
<td></td>
</tr>
<tr>
<td>User Data</td>
<td>VNX, Isilon, or Syncplicity options for traditional, scale-out, or personal cloud NAS options</td>
</tr>
<tr>
<td>Backup</td>
<td>Avamar - Fast, scalable deduplication backup software optimized for virtual environments, enterprise applications, remote offices</td>
</tr>
<tr>
<td>Disaster Recovery</td>
<td>RecoverPoint - Continuous data protection with multiple recovery points to restore virtual desktops to a specific point in time.</td>
</tr>
<tr>
<td>Security</td>
<td>RSA - user authentication, log management and data loss prevention ensures desktop security and compliance</td>
</tr>
</tbody>
</table>
Xpect More Program*
EMC is redefining the storage lifecycle

* For qualifying customers through December 31, 2015. See EMC.com/XpectMore for details, terms and conditions.
Final Takeaway: Achieving XenDesktop VDI Bliss

1. Uncompromising USER Experience
   - At Scale
   - All the Time
   - All User Types

2. Radically Simple ADMIN Experience
   - No Tuning, Easy Persistent Desktops
   - Provisioning Magic
   - EMC Portfolio Synergy

3. Breakthrough Cost & TCO
   - Best $/Desktop
   - Lowest Opex & Capex
   - Better Than Physical
Take The Next Step

XtremIO Solution Demo
Deep Dive on XtremIO and XenDesktop VDI Solutions
Custom Sizing & TCO Analysis
Reference Architectures


- Reference Architectures & Solution Guides
- All-Flash Array Testing Guide & Best Practices
- Architecture & Product White Papers
- Demo’s and Educational Videos
- Customer Case Studies