

Atlantis Computing Customer Blueprint:

International Law Firm 2,000 User Stateless VDI Deployment with Disaster Recovery

Atlantis ILIO™ Diskless VDI, VMware Horizon View and VMware vSphere

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2525 E. Charleston Rd., Suite 100
Mountain View, CA 94043
Phone: (650) 917-9471
Email: sales@atlantiscomputing.com
Twitter: @Atlantis ILIO

! "#\$%&'()*+,-./012(34\$56-\$7"47'(!
Birchin Court, 20 Birchin Lane
London EC3V 9DU
+44.203.642.9080
Email: sales@atlantiscomputing.com
Twitter: @Atlantis ILIO

www.atlantiscomputing.com

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Executive Summary

The purpose of this document is to provide implementation details of a 2,000 user stateless VDI deployment at a major international law firm that uses Atlantis ILIO Diskless VDI, VMware Horizon View with VMware vSphere running on Dell M610 blade servers.

The Law Firm has offices in 8 countries and provides legal services to clients in 130 countries. Their VMware Horizon View implementation provides their employees remote access to their corporate desktop environment to avoid commuting to the central London business district and enables access to their desktop from mobile devices. The implementation provides extremely high-performance desktop for their lawyers with full multi-site disaster recovery.

During their VDI rollout, IT encountered a storage performance bottleneck that caused poor desktop performance. The shared storage infrastructure was not capable of delivering the IO performance required by the virtual desktops to achieve an acceptable user experience:

- Their existing shared storage provided less than 30 IOPS per user (compared to their physical PCs that provided 80-150 IOPS per desktop)
- Users complained that the desktops and applications were 'sluggish'
- Help desk calls related to VDI performance were increasing rapidly

The IT team reached out to Atlantis Computing for help with the VDI project under a tight deployment deadline. Within two weeks of contacting Atlantis Computing, the law firm deployed 1,400 virtual desktops at their London Headquarters and then deployed 600 users across two international sites using Atlantis ILIO Diskless VDI:

- **Storage and Cost Reduction** – Eliminated all SAN storage for their VMware View linked clones by using local server RAM as primary storage, enabling them to avoid purchasing a total of \$1.6million in storage and reclaim \$250,000 of their existing for other applications and lower the cost per desktop from \$1,550 to \$850.
- **Desktop Performance** – Increased IOPS from 30 to over 475 per desktop and reduced latency by 96%, accelerating boot/login time, application launch and general desktop performance.
- **Disaster Recovery** – The law firm was able to implement cost-effective disaster recovery solution with two datacenters running in an active/active configuration. This approach enabled them to ensure incredible desktop performance during normal operating and then fail-over all desktops to a single site, while maintaining better-than-PC user experience during a datacenter failure.

At a Glance	
Architecture Components	
<ul style="list-style-type: none"> • Atlantis ILIO Diskless VDI • Atlantis ILIO Center • VMware vSphere • VMware Horizon View • Dell M610 Server Blades • Dell Wyze Z50 thin clients • AppSense User Virtualization 	
Summary	
Number of desktops	2,000
Cost per desktop	Reduced from \$1,550 to \$850* (45% Reduction)
Performance	From 30 IOPS per user to 475 IOPS with 96% latency reduction
Storage Cost Savings	\$1.6 million
Storage Reclaimed	\$250,000

* Includes the cost of multi-site disaster recovery

About the Customer

The law firm, one of the largest in the UK, provides legal services to customers across 130 countries with offices in eight countries. They predominantly provide services in corporate, finance, litigation and dispute resolution, real estate and tax.

No Storage or SSDs Required

When deploying stateless virtual desktops, traditional storage and SSDs drives up the CAPEX and OPEX cost per desktop, doesn't deliver the performance of a PC, and makes it difficult to scale VDI deployments. IT administrators often choose stateless VDI based on the assumption that it requires less storage. While stateless virtual desktops do require less storage capacity than persistent virtual desktops, they have the same IOPS requirements.

Using traditional SAN/NAS storage for stateless VDI has approximately the same \$400-600 CAPEX cost per desktop as persistent desktops. With stateless VDI, organizations also have the option of using local Solid State Drives (SSDs) for the virtual desktop images (Citrix PVS write-cache or VMware View Linked Clone). However, SSDs are costly, increase operational cost and are unreliable, particularly when deployed at larger scale.

The Atlantis ILIO Diskless VDI Architecture

Atlantis ILIO Diskless VDI is the only solution in the industry to enable stateless VDI deployments without the need for virtual desktop storage – which traditionally represents 40% to 60% of the total cost of a VDI deployment. Atlantis ILIO Diskless VDI uses local server RAM as the only storage for virtual desktops, eliminating storage traffic and significantly simplifying deployment architectures. After struggling to overcome the storage challenges of VDI for more than 6 months, the customer was able to completely automated their deployment of Atlantis ILIO Diskless VDI to deploy 2,000 high-performance, low-cost, disaster recovery enabled desktops in less than 2 weeks. The Law Firm found that using Atlantis ILIO Diskless VDI for their virtual desktops delivered a fantastic user experience with performance better than a PC for all their virtual desktop users. This customer was able to reclaim all of the SAN storage they previously used for VDI, greatly reducing CAPEX as well as all storage-related OPEX.



Figure 1 - Atlantis ILIO Diskless VDI Architecture

Disaster Recovery

In the event of a site-wide disaster at one of their headquarters data centers, the Law Firm deployed virtual desktops to two load-balanced sites with AppSense replicating the user profile information between the sites. In the event of a disaster or site failure, the Dell M610 servers of each site can support all users, enabling the law firm to deliver a fully resilient system with minimal costs. The fact that Atlantis ILIO Diskless VDI eliminates all storage for VMware View linked-clones means that you don't need to purchase a SAN for both sites, dramatically lowering cost and simplifying disaster recovery.

Hardware Overview

Hardware

- Dell PowerEdge blade chassis (M1000e)
- Dell PowerEdge R610 Blade server

Architecture

The International Law Firm utilizes Dell PowerEdge R610 blade servers to host their virtual desktop environment. The blade servers are hosted in a Dell M1000e chassis, which is a 10U modular enclosure holding up to sixteen R610 blade servers. The M1000e has internal connectivity provided by an embedded 10GigE switch. In each chassis some of the blades run other virtual machines not covered in this document.



Figure 2 - Dell PowerEdge M1000e chassis with 16 M610 blades

Table 1 – Configuration

Attribute	Specification
Blade Make and Model	Dell PowerEdge M610
Number of Blades	40, 20 in each HQ data center
Number of Chassis	4, 2 in each HQ data center
Number of CPUs per Blade	2
Number of cores per CPU	6
GHz per CPU	3.467GHz*

Attribute	Specification
Memory per Blade	512GB*
Memory per Blade used by Atlantis ILIO VM	6 GB
Memory per Blade used for 40 Windows 7 Desktop VMs	80 GB
Memory per Blade used for 40 Windows 7 Desktops as storage	84 GB**

*The customer decided to conservatively configure a blade, Atlantis recommended 192 GB.
 **Atlantis recommended 55 GB.

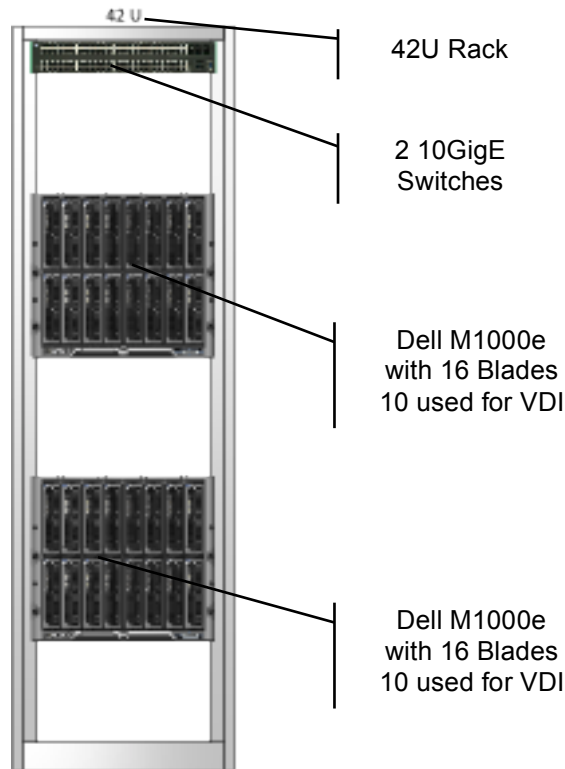


Figure 3 - Configuration in each HQ data center

Each blade used for VDI runs vSphere and Atlantis ILIO Diskless VDI VM with Microsoft Windows 7 virtual desktops. The customer’s 1,400 desktops at their headquarters sites are supported by 40 blades, with 20 blades in each of their two Data Centers. Each group of 20 blades operates as a VMware cluster. The customer uses VMware High Availability (HA). They run their virtual desktops on 19 blades with the 20th blade used for fail-over.

Each blade runs 40 virtual desktops and is configured with high-powered CPUs and 512GB RAM. With 40 users, the blade only required 192 GB of RAM for both the ILIO and the virtual desktops. However, in a failure scenario with 80 desktops running per server, the blade would require ~80 GB additional RAM. The law firm chose to purchase 512 GB of RAM (the maximum the server supported) to allow for future growth and to give them the option to run workloads other than VDI on the servers. In addition, this configuration provides an extremely high

performance desktop and makes it possible for either of the sites to support all 1,400 users in case of a site failure or disaster.

Each virtual machine on a blade is configured as follows:

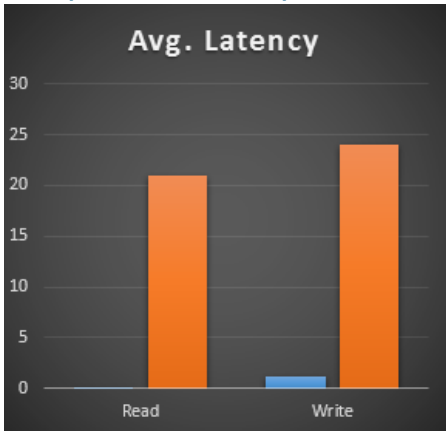
Table 2 - Virtual machine configuration

Usage	vCPU	Memory (GB)	Network Adapters	Application/Service
Windows 7 (1-40)	2	2	1 IP address	40 virtual desktops
Atlantis ILIO	2	90*	1 IP address	Runs Atlantis ILIO and provides 84 GB of RAM as high-performance storage for virtual desktops

***Atlantis recommended using 61GB, the customer decided to size conservatively and used 90GB – Results in this document are based on 55GB of RAM used as storage.**

Test Results

Improved IOPS per blade

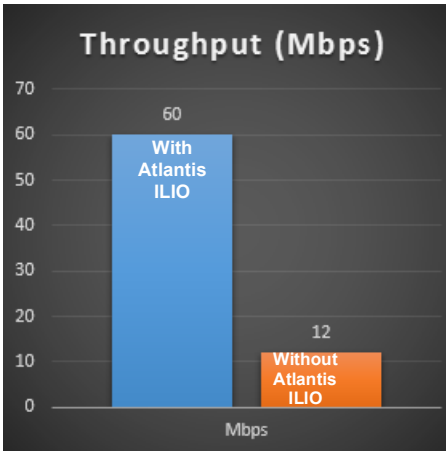


Without Atlantis ILIO

With Atlantis ILIO

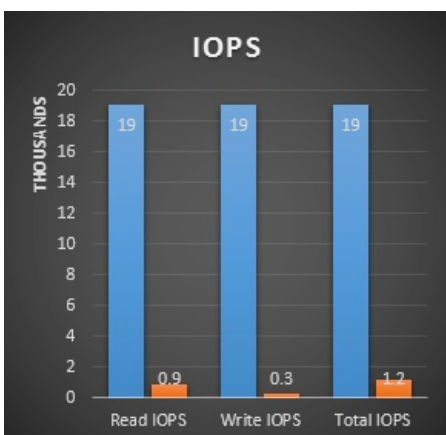
This picture shows that Atlantis ILIO Diskless VDI increased the IOPS by 15.8 times from 1,200 per server (30 per user) to 19,000 per server (475 per user).

Throughput per virtual desktop



The customer found that their throughput per virtual desktop increased from 12Mb/sec to 60Mb/sec (5x improvement).

Latency Reduction

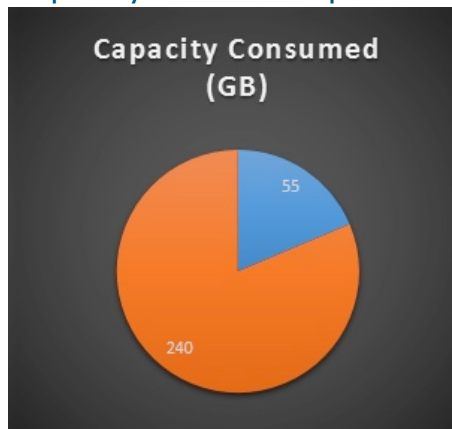


Without Atlantis ILIO

With Atlantis ILIO

The International Law Firm saw a decrease in read latency by almost 99%, from 21ms to 0.03ms and a decrease in write latency by over 96%, from 29ms to 1.1ms. With a VDI read/write ratio of 20%/80%, as stated by VMware and others, this means that overall latency as perceived by the virtual desktop users dropped by 96%.

Capacity Reduction per virtual desktop



Without Atlantis ILIO

With Atlantis ILIO

The customer saw a reduction in the amount of storage capacity consumed by each virtual desktop by 77%, enabling BLP to run their VMware View linked-clones in local server RAM and reclaim all of their SAN storage for other uses.

Best Practices

Logical Network Design

When designing the network the customer followed these practices:

- Separate networks for vSphere management, vSphere vMotion and virtual machine connectivity
- Use of multi-NIC vSphere networking
- Redundancy at the physical network switch level
- Redundant vSwitches with at least two active physical adapter ports

Shared storage

The performance of shared storage cannot be ignored when considering folder redirection and the user profile. The core desktop performs very well, but if My Documents or the user profile resides on poorly performing storage, the quality of the user experience will be degraded. The customer kept the following on their Dell SAN:

- ESXi boot image
- Server infrastructure storage
- User profile storage

Image optimization

To achieve the best end-user experience, the customer used VMware View Composer to optimize the desktop image. The image was optimized so that it contains only the operating system elements used by end-users.

A comprehensive list of these customizations can be found in the VMware document VMware View Optimization Guide for Windows 7 (<http://www.vmware.com/files/pdf/VMware-View-OptimizationGuideWindows7-EN.pdf>).

The following table lists the recommended optimizations for Windows 7 that was used by this customer after VMware View Composer applied best practices:

Table 3 - Windows 7 Optimizations

Configuration	Remarks
Disable unused hardware	Disable COM1, COM2 and LPT
Set screen saver password on resume	Provides security if a user does not lock their session
Check hardware acceleration enabled	Verify that hardware acceleration is turned on
Delete hidden uninstall folders	Delete any hidden update uninstall folders within the C:\WINDOWS folder
Enable Search	Enable Windows Desktop Search for their users

Conclusion

By using Atlantis ILIO Diskless VDI for their stateless desktops, the International Law Firm achieved the following:

Storage CAPEX/OPEX savings:

- The law firm avoided purchasing \$1.6 million in additional storage to solve their performance problems and support disaster recovery
- They were able to redeploy 100% of the storage used by virtual desktops saving almost \$250,000
- The law firm saved storage OPEX based on eliminating rack space, power consumption, cooling, training and repair costs, and daily operational tasks of maintaining disk-based storage

Faster Deployment with Automation:

- The law firm was able to deploy 1,400 virtual desktops in their two production Data Centers in under two weeks with full disaster recovery
- The law firm was able to expand VDI internationally by deploying 600 desktops in two additional regions

Lower Deployment and Operational Risk:

- Deployment automation removed human errors and addressed lack of skills
- Minimal storage traffic on the network eliminated bottlenecks
- The desktops can better handle concurrent IO operations such as boot storms and antivirus scans

Amazing User Experience:

- Atlantis ILIO Diskless VDI was able to delivered over 475 IOPS per desktop
- With the additional storage performance, the law firm was able to enabled email and desktop searching for their virtual desktops, which is critical for lawyers.

Scales Out On-Demand:

- Linear scalability without increasing risk since Atlantis ILIO Diskless VDI is 100% software which allows each blade to be used as a discrete building block

Disaster Recovery:

- With Atlantis ILIO Diskless VDI, The law firm both reduced the cost and complexity of implementing disaster recovery
- The law firm's use of VMware HA with Atlantis ILIO allowed them to minimize replication resources and recovery time