

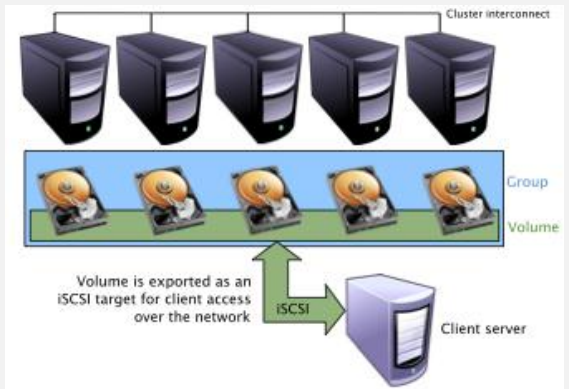


# Exanodes<sup>®</sup> 4.0 for Windows

## Shared Internal Storage Platform

### Product Highlights

- ✓ Parallel storage system providing throughput aggregation
- ✓ Tuneable parameters to meet application needs / profile
- ✓ Data protection and continuity of service ensured through RAINX (Seanodes patented technology)
- ✓ Fastest rebuild time after server or disk failure (up to 1TB in 40 minutes)
- ✓ The illustration below shows an Exanodes configuration of 5 nodes connected through a high speed interconnect and offering a volume constituted of 3 disks. A client server is accessing the volume through iSCSI.



### Overview

Exanodes for Microsoft Windows is a pure software solution that allows users to create an iSCSI clustered storage system using fully commoditized x86 servers. Exanodes aggregates and virtualizes disks and arrays directly attached to, or embedded in, storage servers to create a shared pool of storage accessible via the Seanodes' iSCSI clustered target.

Exanodes for Windows eliminates the need to buy expensive additional proprietary SAN hardware. The end users can choose the hardware that best fits their business needs: disk technology (SATA, SSD or SAS); network interfaces (1GB or 10G0 Ethernet).

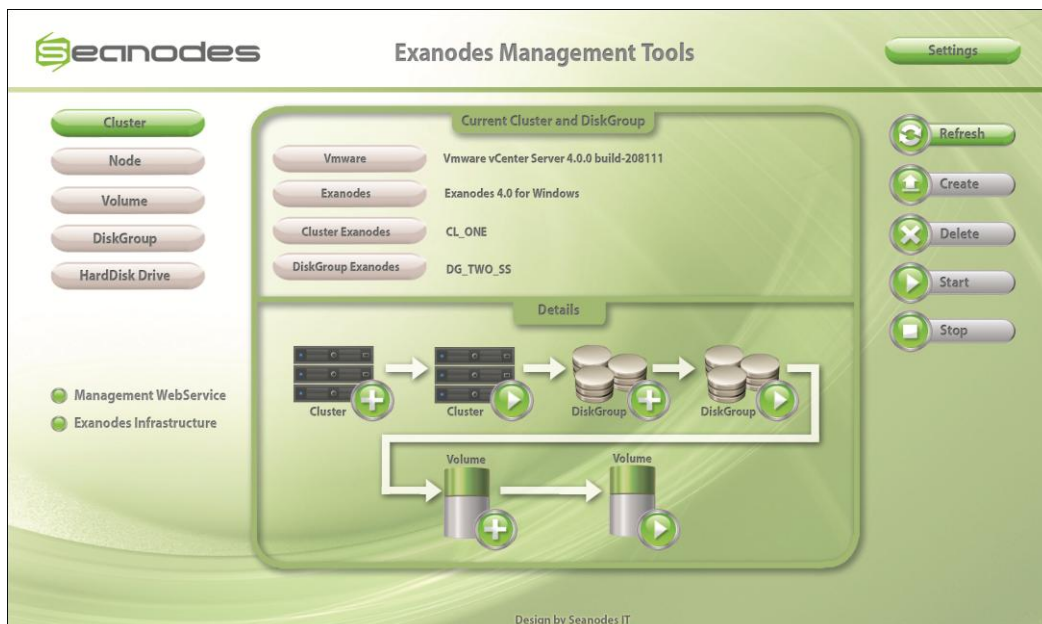
### The First Shared Internal Storage Solution

Exanodes creates disk arrays (disk groups) from disks belonging to cluster nodes. Within disk groups, Exanodes creates volumes. As many volumes can be created, resized or removed from the disk groups within the limit of the aggregated disk size.

Exanodes for Windows is based on Seanodes' Shared Internal Storage (SIS™) architecture that can transform underutilized disks of fully commoditized servers into a new type of SAN by aggregating them into a virtualized and shared storage pool, providing massive capacity and performance scalability.

With Exanodes for Windows, the volumes built on the storage pool are presented as iSCSI targets to be accessed by application servers over the network. Volumes can also be presented as block devices that can be formatted and mounted locally.

Exanodes is non-intrusive - it uses less than 5% of the CPU - and is easily implemented alongside other storage solutions. Its integration is quick and easy, and in no way affects your existing environment.



Exanodes can be managed through a very intuitive Graphic User Interface (Plug-in)



## Product Specifications

### Virtual storage

Exanodes provides logical volumes (LUNs) by aggregating the internal disks of commoditized x86 servers. The servers are pooled in a cluster defined by the user. A virtual storage is built using the cluster's disks. Any external nodes can access the virtual storage by connected to any nodes of the cluster using iSCSI. Servers can be added/removed online.

Internal disk drives are pooled within groups (raid set) defined by the user. There are two possible data layouts: simple striping (RAID 0) and RainX (patented layout, mirror-striped based).

Volumes can be defined within a group and exported. All these volumes will be accessed using an iSCSI Target integrated in Exanodes.

Exanodes supports SCSI requirements to work with Microsoft Windows 2008 Failover Clustering (VPD/Device Identification, persistent reserve) and it enforces a coherent view of all the iSCSI Targets of the Exanodes cluster i.e.: Exanodes acts as a unique iSCSI Target with several IP addresses.

### Cost Control

#### Considerable reduction of external storage needs (SAN or NAS)

Exanodes drastically reduces acquisition costs of a storage infrastructure. Indeed, external storage needs (SAN or NAS) are greatly reduced or even eliminated.

External storage is confined to less demanding uses: archiving of computing results, data distribution for workflows involving several clusters, management of backups, etc.

#### Reduction of operating costs

The simplicity of the Exanodes solution (integration and day-to-day management) makes it possible to increase the amount of storage and computing nodes that a person can administer. In addition to acquisition costs, substantial savings can thus be made throughout the use of the cluster.

### Reliability

Exanodes recovers automatically from server or disk failures. Exanodes is symmetrical clustered software: no single point of failure.

When a disk fails, data is rebuilt onto a distributed hot spare zone. This provides very fast rebuilding and the ability to support multiple consecutive disk failures (self-healing capability). When the disk comes back, only the changed data after the failure is resynchronized.

When a server fails, the other servers in the cluster cooperate to handle the failure so that the storage service can resume without manual intervention. Exanodes controls write data with SCSI Force Unit Access in order to handle even electric failures. If the whole cluster needs to be rebooted, Exanodes will start in exactly the same state it was in before the reboot (all volumes are available on exactly the same servers).

### High-Performance Storage

Exanodes is designed to take advantage of the hardware resources in the cluster and use them in parallel, providing high performance and scalability.

With Exanodes, any computing server is also a storage server. The processing of inputs / outputs is done simultaneously on a large number of servers. The application therefore benefits from cluster parallelism for computing as well as storage throughput.

Exanodes is a fully symmetric clustered software: no bottleneck

Exanodes allows the storage architecture to scale naturally with the computing architecture: adding a server to the cluster increases computing and storage performance at the same time.

### Simplicity

#### Natural compliance with standards

Exanodes has an extensive compatibility matrix. It supports all types of block devices as well as high-performance networks.

Users thus retain the freedom to choose the software and hardware technologies best suited to the requirements of their applications in order to optimize each layer of their infrastructure.

#### No change to existing system

Exanodes is non-intrusive. Applications access Exanodes' high-performance storage area, without any need for reprogramming.

Moreover, Exanodes requires no additional hardware, no need for external SAN storage or fabrics and no specific storage competencies.

Exanodes 4.0 for Windows Specifications	Exanodes 4.0 for Windows Supported Systems	
	Hardware Platform	Software Platform
<p>Exanodes cluster :</p> <ul style="list-style-type: none"> <li>From 2 to 32 servers</li> <li>Up to 512 hard drives in the cluster</li> <li>Up to 64 block devices per node</li> <li>Up to 1 Petabyte</li> </ul> <p>Exanodes disk group limits :</p> <ul style="list-style-type: none"> <li>Up to 512 block devices (full disks, disk partitions or RAID)</li> <li>Up to 1 Petabyte</li> </ul> <p>Exanodes reliability :</p> <ul style="list-style-type: none"> <li>Up to 8 spares</li> </ul>	<p>Supported CPU architecture :</p> <ul style="list-style-type: none"> <li>x86_64</li> <li>Refer to the hardware compatibility list for Windows 2008 Server R2 64bits</li> </ul> <p>Supported disk technology :</p> <ul style="list-style-type: none"> <li>Any disk drive/partition technology supported by Windows and seen as a block device (SATA, SAS, SCSI , SSD, RAID)</li> </ul> <p>Supported High Performance Interconnect :</p> <ul style="list-style-type: none"> <li>Gigabit Ethernet</li> <li>10Gigabit</li> </ul> <p>Other :</p> <ul style="list-style-type: none"> <li>Contact us</li> </ul>	<p>Microsoft Windows Version :</p> <ul style="list-style-type: none"> <li>Windows 2008 R2 64bits</li> </ul> <p>Other :</p> <ul style="list-style-type: none"> <li>Contact us</li> </ul>

## Seanodes Prizes & Awards

