CORAID
The Linux Storage People

# EtherDrive® Storage

CLUSTERED MODULAR STORAGE

# Glossary of Network Storage Terms

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# IMPORTANT WARNING

**Disk redundancy (RAID) and high availability**

**are NO SUBSTITUTE FOR BACKUPS.**

**RAID does not preserve past versions of your files**

**and does not protect from disasters that**

**damage the entire disk server.**

**NEVER BE CAUGHT WITHOUT BACKUPS!**

# Glossary of Network Storage Terms

**AoE** – ATA over Ethernet, a published, open storage protocol that describes the encapsulation of ATA block storage commands within an 802.3 Ethernet frame. AoE frames are registered by the IEEE as Ethernet type 0x88A2.

**Appliance** – A ready-to-use special-purpose computer, such as a disk- or file-sharing server.

**ATA** – Advanced Technology Attachment. ATA is a standard for connecting hard disks to a host computer. It is maintained by the X3/INCITS committee T13 (http://www.t13.org).

**blade** – Early Coraid terminology for a physical disk mounted (on a blade-shaped card) in a disk server. *Contrast* lblade.

**Block** – A unit of data stored on a hard drive, commonly 512 bytes. Blocks are also known as sectors, which are sub-units of tracks.

**Block device** – A storage device, such as a disk, that stores data in blocks.

**Block storage** – Storage devices, such as disks, that store in blocks.

**CIFS** – Common Internet File System, a file-sharing protocol formerly known as SMB (Server Message Block; *see also* Samba). CIFS is used in Microsoft networking

environments to share files over a TCP/IP network. It is the basis of Windows File Sharing.

**CLN** – Coraid Linux NAS, an optimized Linux file server that acts as an NAS gateway between AoE block storage and an NFS and/or CIFS file sharing network.

**Cluster filesystem** – A filesystem that allows multiple computers to share files by using the same block storage device at the same time, without relying on a single server to own and manage the files.

**Direct Attached Storage (DAS)** – A storage device that is physically connected to only one computer, not to a network. Direct attached storage connects to one host using an interface such as PATA, SATA, SCSI, USB, or Firewire.

**Disk server** – A computer that performs disk sharing. *Contrast* file server.

**Disk sharing** – The use of networking to make a block storage device (normally a disk drive) directly available to one or more computers, which can format the disk and use it as if it were directly attached. *Compare* SAN. *Contrast* file sharing.

**Driver** – A software component that allows an operating system to access a particular piece of hardware.

**Fabric** – Network infrastructure, connections, etc. *See* switch fabric.

**FC** – Fibre Channel.

**Fibre Channel** – A SCSI-based communication protocol developed for connecting computers to disk drives via fiber optics; versions of Fibre Channel have been adapted to Ethernet. The Fibre Channel standard is maintained by INCITS committee T11 (http://www.t11.org).

**Filer** – A file server.

**File server** – A computer that performs file sharing. *Contrast* disk server.

**File sharing** – The use of networking to make files available to computers other than the one that owns and manages them. *Compare* NAS. *Contrast* disk sharing.

**File storage** – File sharing; storage of files identified by file names and managed by a server.

**Filesystem** – An operating system software component that manages files, mapping them to particular block storage locations.

**Gateway** – A device that provides protocol translation. For example, an NAS gateway translates the NFS or SMB/CIFS file sharing protocol into a disk sharing protocol such as AoE, Fibre Channel, or iSCSI; it does this by acting as a file server.

**GFS** – Global File System, a cluster filesystem for Linux. *See* cluster filesystem.

**HBA** – Host bus adapter; an Ethernet adapter (or other network adapter) in a computer; an NIC.

**Heartbeat** – A signal periodically sent out by a hardware component in order to inform another component that it is working normally. *See* STONITH.

**Host** – Any computer on a network, whether server, client PC, or virtual machine.

**HVAC** – Abbreviation for **H**eating, **V**entilation **a**nd **C**ooling.

**INCITS** – **I**nter**n**ational **C**ommittee for **I**nformation **T**echnology **S**tandards (http://www.incits.org).

**Initiator** – A host that requests access to storage devices; originally a SCSI-specific term but now extended to other storage protocols.

**iSCSI** – **I**nternet **S**mall **C**omputer **S**ystems **I**nterface. iSCSI is a storage protocol standard that encapsulates SCSI commands into TCP/IP data packets for disk sharing over an IP network. iSCSI was originally specified in RFC 3720. *Compare* AoE; Fibre Channel.

**JBOD** – **J**ust a **B**unch **o**f **D**isks. This term describes disk sharing when multiple disk drives are accessed separately, not grouped together in RAID volumes.

**Journaling filesystem** – A filesystem that does not perform disk writes immediately, but instead saves them in a "journal" of work to be done, and performs the changes later, more safely and efficiently, in large blocks. The server uses the journal to present the data to the hosts as if the changes had already been committed to disk. (In accounting, a journal is a logbook of transactions that have not yet been posted to the main set of records.)

**Jumbo frame** – An Ethernet data packet with more than 1500 bytes of content. Jumbo frames are supported by some Gigabit Ethernet (1000base-T) switches and network interface cards. Jumbo frames typically carry 9000 bytes of content.

**Latency** – The time required to store or retrieve data from a storage device (disk), measured from making the request to completing the operation.

**lblade** – Early Coraid terminology for a shared disk as visible outside the server, now called an LUN, which may or may not correspond to a physical disk. *Contrast* blade.

**Logical unit number (LUN)** – The number that identifies a disk drive or other block device in a system; by extension, the disk itself as visible outside the server, whether it corresponds to a physical disk, a RAID group, or a virtual disk.

**Logical volume manager (LVM)** – A software or hardware component that manages virtual disk partitions and presents them to the host computer as if they were physical sections of the disk. Virtual partitions can be changed without moving their actual contents.

**Metadata** – Data describing other data. In the context of a filesystem, file metadata includes the locations of the blocks that hold the files. In a RAID group, metadata indicates the structure of the group.

**MPIO, multipath input/output** – The use of more than one Ethernet connection (through separate Ethernet adapters) to connect a single computer or other device to a network. Using multiple paths can increase throughput.

**NAS** – **N**etwork **A**ttached **S**torage, the sharing of files over a network by means of a file sharing protocol such as NFS or CIFS. *See* file sharing. *Contrast* SAN.

**NAS gateway** – a file server that connects a file sharing network (LAN) to a separate network used to share disk drives (SAN).

**Networked storage** – any type of data storage that is accessed through a network.

**NFS** – Network File System, a file sharing protocol developed at Sun Microsystems in 1985.

**NIC** – Network interface card (Ethernet card, HBA).

**Partition** – A logical division of a block storage device. Typically, a newly installed disk drive is divided into one or more partitions, and then filesystems are installed in the partitions. The locations of the partitions are recorded on the drive in its partition table.

**PATA** – Parallel ATA, the older hardware implementation of the ATA interface for connecting hard drives to computer motherboards. *Contrast* SATA.

**Physical LUN** – An individual disk drive in a RAID group or on a multi-disk server (previously referred to by Coraid as a blade).

**RAID** – **R**edundant **A**rray of **I**nexpensive **D**isks, a set of methods for grouping multiple disk drives for better performance or fault tolerance.

**RAID group** – A collection of disk drives arranged into a RAID system. A RAID group becomes a volume once it is mounted with a filesystem.

**RTO** – **R**ecovery **T**ime **O**bjective, a disaster recovery term indicating the maximum acceptable time to be taken to recover from a disruption.

**Samba** – A free, open source implementation of the CIFS (SMB) protocol that allows Linux hosts to share files and printers with a Microsoft Windows network.

**SAN** – **S**torage **A**rea **N**etwork. Strictly speaking, SAN refers to a separate network set up for disk sharing, but the term often denotes disk sharing itself, in contrast to NAS.

**SATA** – Serial ATA, a newer version of the ATA interface for connecting disk drives to computer motherboards.

**SCSI** – **S**mall **C**omputer **S**ystems **I**nterface (pronounced “scuzzy”), a standard protocol for connecting disk drives and other devices to computers. The SCSI standard is maintained by INCITS committee T10 (http://www.t10.org).

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**Sector** – A sub-unit of a track on a hard disk drive, containing a single block of data (commonly 512 bytes).

**Seek-bound, seek-limited** – Handicapped by the time needed to move the disk heads from one location to another. This describes a disk drive whose performance is limited by inefficient storage allocation that scatters files all over the disk, or by an application that inherently needs constant access to widely scattered data.

**SMB** – **S**erver **M**essage **B**lock, an older name for the CIFS protocol. *See* CIFS.

**Spindle count** – The total number of physical disks (rotating spindles) in a system.

**STONITH** – "shoot the other node in the head," a somewhat comical way to describe a high-reliability system where the standby server constantly checks for the "heartbeat" (periodically repeated OK signal) of the main server and automatically powers it off and takes over if the heartbeat goes away.

**Switch fabric, switched fabric** – The connections that link up the components of a network. In Fibre Channel, this is an elaborate mesh of switches and fiber-optic cables; in Ethernet it is a cable carrying data from any unit to any other unit.

**Target** – A term borrowed from SCSI that indicates the endpoint of communication, usually a disk drive or a RAID group.

**Track** – A circular region of a disk drive in which several sectors of data are stored. The disk rotates, bringing all those sectors under the read-write head while it stands still. To access other tracks, the head moves.

**Virtualization** – The replacement of any component of a computer system by something else that performs the same function but is physically not what it appears to

be. For example, CPU virtualization can make one computer function as several separate computers; disk virtualization can make a group of disk drives function as one large disk drive or as a group of drives different from what is really there.

**VLAN** – **V**irtual **L**ocal-**A**rea **N**etwork, a group of computers that communicate through Ethernet as if they were attached to a single cable, even though the actual interconnection between them is more complex.

**Volume** – A single block device as seen by the computer using it. It can be a disk partition, a single disk, or a group of disks assembled into a RAID volume.

**XFS** – A journaling filesystem created by Silicon Graphics and later ported to Linux. It is used in Coraid CLN series NAS appliances.