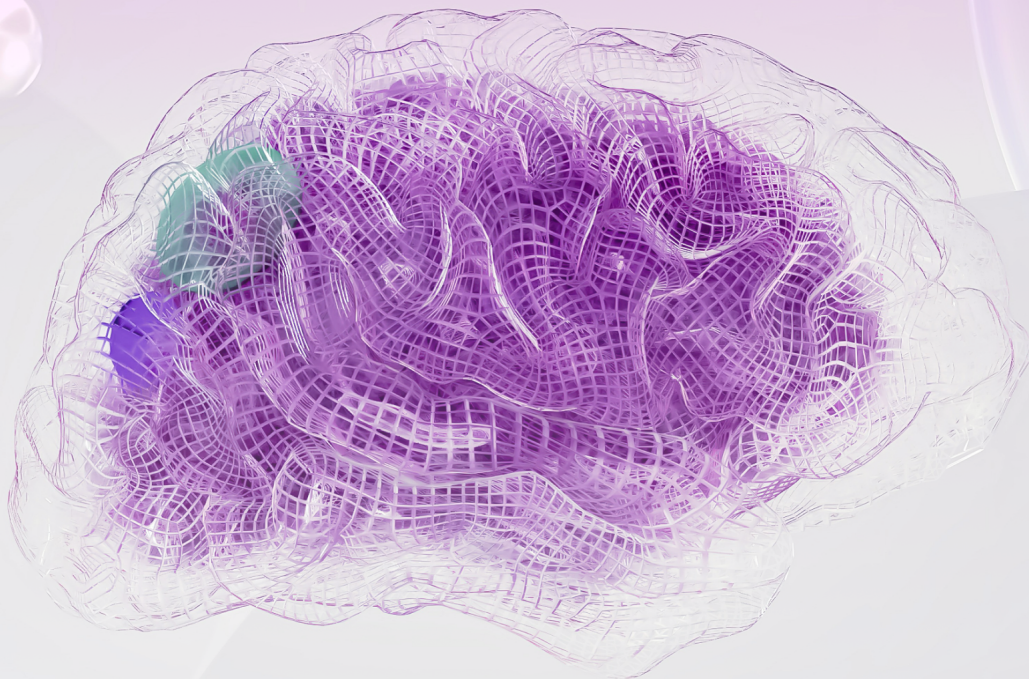


THE SNIA DICTIONARY

A glossary of storage and information
management terminology





About SNIA

SNIA is a not-for-profit global organization made up of corporations, universities, startups, and individuals. The members collaborate to develop and promote vendor-neutral architectures, standards, and education for management, movement, and security for technologies related to handling and optimizing data. SNIA focuses on the transport, storage, acceleration, format, protection, and optimization of infrastructure for data.

The SNIA Dictionary

Generated on May 13, 2026

The SNIA Dictionary contains terms and definitions related to storage and other information technologies and is the storage networking industry's most comprehensive effort to arrive at a common body of terminology for the technologies it represents. The terms go through a rigorous technical review and approval process by the SNIA Technical Council to assure their accuracy. The SNIA Technical Council is a group of technical experts elected by the members of the SNIA to guide the SNIA's technical efforts. Their extensive individual technical backgrounds cover all aspects of storage.

The reader should recognize that in this rapidly evolving field, new terminology is constantly being introduced, and common usage is shifting. SNIA regards this dictionary as a living document, to be updated as necessary to reflect a consensus on common usage and encourages readers to treat it in that spirit. Suggestions for improvement (e.g., new terms or definitions, or modifications to existing ones) are welcomed at any time and should be submitted on the form located at:

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Definition Format

Terms are defined using the substitution principle, which states that a term's definition should be substitutable for the term itself in a sentence.

In the case that more text is required or deemed helpful, it is contained in one or more separate paragraphs after the definition itself. This text is informative in nature, and while intended to be accurate, is not technically part of the definition itself.

All terms in our online dictionary (<https://www.snia.org/dictionary>) have an associated permanent link (permalink) that allows you to easily link directly to any term in our dictionary. Improve your online writing by taking advantage of this great resource.

Deprecated Synonyms

In many cases, as technology develops, companies invent new terminology to describe innovations in their products. As the technology matures and vendors attempt to compete and compare their products with others, some terms become widely used, while other terms may remain in limited use and are synonyms for the widely used terms. This causes confusion in the marketplace. To encourage crispness and uniformity in the industry, this dictionary lists synonyms of this type as "Deprecated synonym for xxxx," where xxxx is the term that has become widely used in the industry. This is to guide the reader toward use of the more widely used term.

In cases where a synonym is not deprecated, SNIA does not endorse the use of one synonym over another.

Definitions Taken from Standards Documents

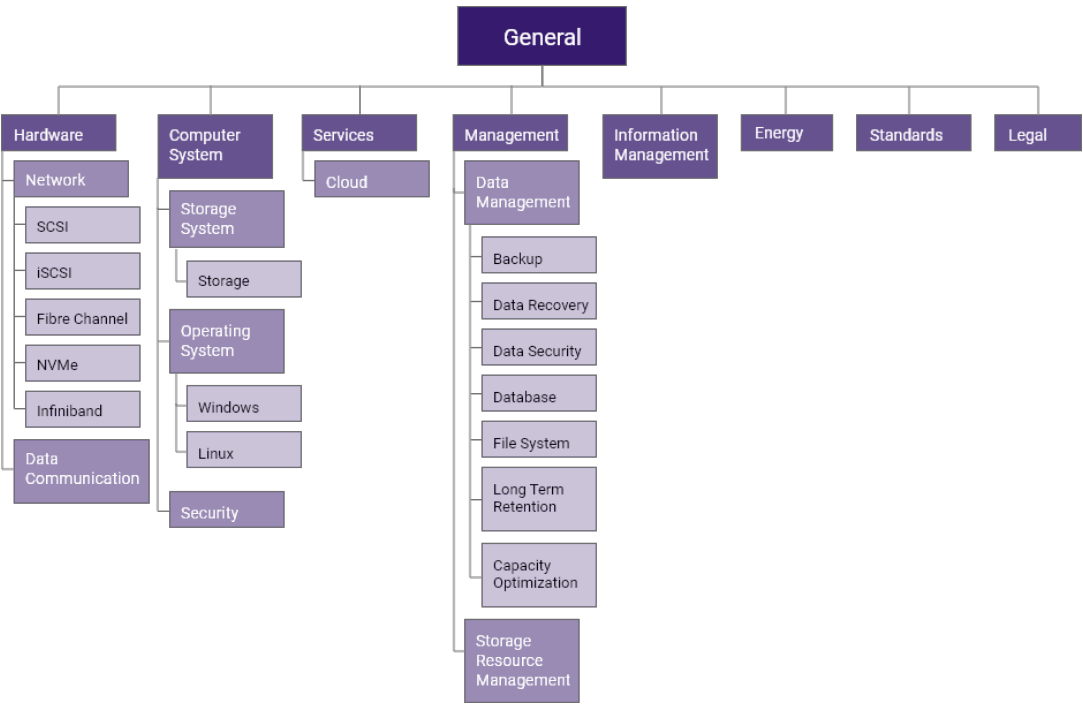
SNIA has a strong interest in keeping definitions harmonized across various industry groups and national and international standards bodies. Towards this end, some definitions have been quoted from standards (e.g., SNIA Standards, INCITS Standards, ISO/IEC Standards, IEEE Standards). In all such cases, the quoted standard is authoritative.

- Copies of SNIA standards are available at <https://www.snia.org/standards>.
- Copies of INCITS standards are available at <https://webstore.ansi.org>.
- Copies of ISO/IEC Standards are available at <https://www.iso.org/store.html>.
- Copies of IEEE Standards are available at <https://www.techstreet.com/ieee>.

The SNIA wishes to thank ANSI and INCITS for their cooperation in this matter.

Context Hierarchy

Most of the terms in this dictionary have meaning primarily in specific contexts (e.g., SCSI or File Systems). The following categories are used to specify the context for a given definition. These categories are a guide to understanding, not a formal system.



In the above hierarchy representation, context labels indented beneath other context labels represent specializations of the higher-order label concept. For additional information on contexts, see the Storage Industry Resource Domain model. Below is an example of how context is indicated:

term name

[Context] The context is called out in square brackets at the beginning of each definition, as in this example.

Numbers

3D NAND

[Hardware] A stack of multiple layers of NAND [memory cells](#).

64B/66B

[Data Communication] An algorithm for encoding data for transmission in which each 64-bit data word is converted to a 66-bit [transmission character](#).

Each transmission character is prefixed with either binary "01" or binary "10". This, combined with scrambling, gives the signal desirable engineering properties, yet incurs a much lower overhead than the traditional 8b/10b encoding.

8B/10B encoding

[Data Communication] An algorithm for [encoding](#) data for transmission in which each eight-bit [data byte](#) is converted to a 10-bit [transmission character](#).

8B/10B encoding is used in transmitting data on [Fibre Channel](#), [ESCON](#), [Gigabit Ethernet](#), and [Serial Attached SCSI](#). It supports continuous transmission with a balanced number of ones and zeros in the code stream and detects single bit transmission errors.

A

A_Port

[Fibre Channel] A type of [port](#) used to communicate within a Fibre Channel distributed switch.

A_Port Switch Link

[Fibre Channel] A [link](#) connecting one [A_Port](#) to another A_Port.

AAA

[Data Security] Acronym for [Authentication](#), [Authorization](#), and Accounting.

access control

[Data Security] Prevention of unauthorized use of a resource, including the prevention of use of a resource in an unauthorized manner [ISO/TS 14265:2011]

Access Control Entry

[File System] [Data Security] A single entry in an [Access Control List](#), which either denies or grants access to a given resource by one [principal](#) (a user or a group of users and/or groups).

Access Control List

[Data Security] [File System] List of entities, together with their access rights, that are authorized to access a resource [ISO/IEC 20944-1:2013]

access fairness

A process by which [nodes](#) are provided access to a [Fibre Channel arbitrated loop](#) independently of other nodes' activity.

access method

1. [Operating System] The means used to access a physical transmission [medium](#) in order to transmit data.
2. [Operating System] In IBM Corporation's OS/390 operating system and its precursors, a file organization method, such as sequential, random, indexed, etc., and the operating system software used to implement it.

access path

[Storage System] The combination of adapters, addresses and routes through a switching fabric used by a computer to communicate with a [storage device](#).

Some configurations support multiple access paths to a single device. See [multi-path I/O](#).

account

[Data Security] An established relationship between a [principal](#) and a computer, network or service.

accountability

1. [Data Security] The property enabling principals' actions to be attributed to them in such a way that there is little possibility for denying responsibility for those actions.
2. [Data Security] The security goal that generates the requirement for actions of an entity to be traced uniquely to that entity. This supports non-repudiation, deterrence, fault isolation, intrusion detection and prevention, and after-action recovery and legal action. [NIST SP 800-33]

ACE

[File System] [Data Security] Acronym for [Access Control Entry](#).

ACL

[File System] [Data Security] Acronym for [Access Control List](#).

ACS

[Data Recovery] Acronym for [Automated Cartridge System](#).

active

1. [Fibre Channel] The state of a [Fibre Channel Sequence Initiator](#) between the start of transmission of the first [data frame](#) of a sequence and the completion of transmission of the last data frame in the sequence.
2. [Fibre Channel] The state of a Fibre Channel [Sequence Recipient](#) between the start of reception of the first data frame of a sequence and the completion of reception of the last data frame in the sequence.

active-active

1. [Storage System] Synonym for [dual active components](#) or controllers.
2. [Computer System] A pair of components that share a task or class of tasks when both are functioning normally, where one takes on the entire task or tasks when the other component fails. An example is when active-active controllers are connected to the same set of storage devices and improve [failure tolerance](#) compared to a single controller.

Active archive

[Long-Term Retention] A [long-term data retention](#) system that allows online access to retained file and object data.

active component

[Storage System] A system component that requires electrical power to operate, such as a [power supply](#), fan, or [controller](#).

active data

[Data Management] Data that is immediately accessible to an application without the need to stage it in from a lower tier of storage.

See [near-online data](#).

Active Directory

[Windows] A Microsoft technology for the central and hierarchical administration of large groups of computers, users and groups.

active-passive

[Storage System] Synonym for [hot standby](#) components or controllers.

active power

[Energy] The power consumption of a system when powered on and under normal workload.

actuator

[Hardware] The physical element of an [HDD](#) that moves the [heads](#) to position them to a particular cylinder on the media.

AD

[Windows] Acronym for [Active Directory](#).

adapter

[General] A hardware device, typically an add-in card or specialized component on a [system board](#), that converts the timing and [protocol](#) of one bus or interface to another, to enable a computer system's processing hardware to access peripheral devices.

A [Fibre Channel Host Bus Adapter](#) and an [Ethernet Network Interface Card](#) are both kinds of adapters.

adaptive array

[Storage System] A [disk array](#) that is capable of changing its virtual-to-physical location [mapping](#) algorithm (e.g., from mirrored to [parity RAID](#)) while the array is operating.

ADC

1. [Hardware] Acronym for [Analog Digital Converter](#).
2. [SCSI] Acronym for the [INCITS T10](#) Automation/Drive Interface Commands standards family.

address

1. [Computer System] A fixed length bit pattern that uniquely identifies a [block](#) of data stored on a disk or tape.
2. [Computer System] A fixed-length bit pattern that uniquely identifies a location (bit, byte, word, etc.) in a computer memory.
3. [SCSI] An identifier whose value uniquely identifies a [SCSI port](#) connected to a [SCSI interconnect](#) for purposes of communication.
4. [Network] A bit pattern that uniquely identifies a device on a network.

address identifier

[Fibre Channel] A 24-bit value used to identify the source or destination of a [frame](#).

The source of a frame is identified by an [S_ID](#) and the destination of a frame is identified by a [D_ID](#), as specified in the [FC-FS](#) standard. The [FC-SW](#) standard includes a table of special address identifier values and their meanings.

address resolution

[Network] The process of determining a [MAC](#) address, given a more abstract [LAN](#) or [WAN](#) address.

Address Resolution Protocol

1. [Network] Any [protocol](#) used to obtain a [mapping](#) from a higher layer address to a lower layer address; when abbreviated as [ARP](#), the [Ethernet Address Resolution](#) Protocol (see 2) is most often meant.
2. [Network] The protocol used by an [IP](#) networking layer to map IP addresses to lower level hardware (i.e., [MAC](#)) addresses.

addressable capacity

[Storage System] The number of bytes available to be written via a transport protocol.

Transport protocols include [SCSI](#) and [NVMe](#). Addressable capacity does not include unaddressable space, such as ECC ([error correcting code](#)) data, remap areas, and inter-sector gaps. See [theoretical capacity](#).

addressing

[Computer System] An algorithm by which areas of fixed disk, removable cartridge [media](#), or computer system main memory are uniquely identified.

See [block addressing](#), [C-H-S addressing](#), [explicit addressing](#), [implicit addressing](#).

administration host

[Storage System] A computer that manages one or more storage subsystems (e.g., filers, [disk array](#) subsystems, tape subsystems, etc.).

administrator

[Storage System] [Data Security] A person charged with the installation, [configuration](#), and management of a computer system, network, [storage subsystem](#), database, or application.

Advanced Encryption Standard

[Data Security] A [cryptographic algorithm](#) designated by [NIST](#) [NIST FIPS 197] as a replacement for [DES](#).

Advanced Technology Attachment

[Storage System] A standard designed to connect storage devices to computer systems.

ATA is also the official name for [Integrated Drive Electronics](#) ([IDE](#)).

adverse inference

[Legal] Inference that destroyed or missing evidence (data) would have been harmful to a party who failed to provide it.

AES

[Data Security] Acronym for [Advanced Encryption Standard](#).

AFA

[Storage System] Acronym for [All Flash Array](#).

agent

[General] A program that performs one or more services (such as gathering information from the Internet), acting for or as a [principal](#).

aggregation

[Network] [Storage System] A process related to consolidation, consisting of combining multiple similar and related objects or operations into a single one.

AISL

Acronym for [Augmented ISL](#).

AISL Set

A set of AISLs that connect the controlling switches that are part of a distributed switch.

AIT

[Storage System] Acronym for Advanced Intelligent Tape.

AL_PA

Acronym for [Arbitrated Loop Physical Address](#).

algorithmic mapping

[Computer System] Use of an algorithm to translate from one data [addressing domain](#) to another.

If a [volume](#) is algorithmically mapped, the physical location of a [block](#) of data may be calculated from its virtual volume address using known characteristics of the volume (e.g., [stripe depth](#) and number of [member](#) disks). See [dynamic mapping](#), [tabular mapping](#).

alias

[General] An alternate name for an entity, sometimes used to create names that are more easily human readable.

alias address identifier

One or more address identifiers that may be recognized by an [N-Port](#) in addition to its N-Port Identifier, used to form groups of N-Ports so that frames may be addressed to a group rather than to individual N-Ports.

See [multicast group](#).

All Flash Array

[Storage System] A synonym for [all solid state array](#).

all solid state array

[Storage System] A [storage subsystem](#) or [array](#) where all persistence is provided by [Solid State Storage](#).

alternate client restore

[Data Recovery] The process of restoring files to a different [client](#) than the one from which they were backed up.

alternate path restore

[Data Recovery] The process of restoring files to a different [directory](#) than the one from which they were backed up.

always on

1. [General] The state of always having power applied (systems) or of being continually active (communication links).
2. [Computer System] A state of an [operational](#) link of always being powered on and continually transmitting either data frames, idles or fill words, in contrast to bursty transmissions and listening for a quiet line in earlier 10 and 100 [Mbit/sec Ethernet](#).

American National Standards Institute

[Standards] A body that coordinates the development and use of voluntary consensus standards in the United States and represents the needs and views of U.S. stakeholders in international standardization forums around the globe.

ANSI accredits both standards certification organizations and standards development organizations. The IEEE Standards Association (which standardizes [Ethernet](#) and many other technologies) and [INCITS](#) (which standardizes [SCSI](#), [Fibre Channel](#), MPEG, and many other technologies) are two of over 100 ANSI accredited standards organizations.

Analog Digital Converter

[Hardware] A device that converts a continuously valued (analog) input to a discretely valued (digital) output.

ANSI

[Standards] Acronym for [American National Standards Institute](#).

ANSI T10

[Standards] The standards development committee accredited by [INCITS](#) to develop [SCSI](#) standards for communication between [initiators](#) (i.e., host devices) and [targets](#) (e.g., [storage device](#) controllers).

The full name of this committee is the INCITS SCSI Storage Interfaces Technical Committee (INCITS TC T10).

ANSI T11

[Standards] The standards development committee accredited by [INCITS](#) to develop standards related to [Fibre Channel](#), related [serial](#) storage interfaces, and certain storage management interfaces.

The full name of this committee is the INCITS Fibre Channel Interfaces (T11) Technical Committee (INCITS TC T11). T11.2 (physical) and T11.3 (protocol) are current task groups in ANSI T11.

ANSI T13

[Standards] The standards development committee accredited by [INCITS](#) to develop ATA standards for communication between a [host](#) and a [storage device](#).

The full name of this committee is the INCITS ATA Storage Interfaces Technical Committee (INCITS TC T13).

API

[General] Acronym for [Application Programming Interface](#).

appliance

[General] An [intelligent device](#) programmed to perform a single well-defined function, such as providing file, web, network or print services.

Appliances differ from general purpose computers in that their software is normally customized for the function they perform, pre-loaded by the vendor, and not alterable by the user. See [filer](#).

application

[Storage System] A [client](#) of a storage system.

Applications range from desktop productivity applications to enterprise-wide federated applications spanning multiple databases and file systems.

Application Programming Interface

[General] An interface used by an application program to request services.

The term API is usually used to denote interfaces between applications and the software components that comprise the [operating environment](#) (e.g., operating system, [file system](#), [volume manager](#), device drivers, etc.).

Application Response Measurement

[Standards] An Open Group technical standard, being developed in both The Open Group and the [Distributed Management Task Force](#), which defines function calls for transaction monitoring.

Application Specific Integrated Circuit

[Computer System] An integrated [circuit](#) designed for a particular application, such as interfacing to a [SCSI interconnect](#).

application write request

[Storage System] I/O requests made by storage clients, as distinguished from I/O requests made by a [storage subsystem](#)'s own [control software](#).

arbitrated loop

1. [Fibre Channel] A [Fibre Channel interconnect topology](#) in which each port is connected to the next, forming a loop. At any instant, only one port in a [Fibre Channel Arbitrated Loop](#) can transmit data. Before transmitting data, a port in a Fibre Channel Arbitrated Loop must participate with all other ports in the loop in an [arbitration](#) to gain the right to transmit data. The arbitration logic is distributed among all of a loop's ports.
2. [Fibre Channel] The version of the [Fibre Channel protocol](#) used with the arbitrated loop physical topology.

Arbitrated Loop Physical Address

An 8-bit value used to identify a participating device in an [Arbitrated Loop](#).

arbitration

[General] Any process by which a user of a shared resource such as a port connected to a shared bus negotiates with other users for the (usually temporary) right to use the resource (in the given example, by transmitting data on the bus).

archive

1. [Data Management] A collection of data objects, perhaps with associated [metadata](#), in a storage system whose primary purpose is the [long-term preservation](#) and retention of that data.
2. [Data Management] An organization of people and systems that have accepted the responsibility to protect, retain, and preserve information and data and make it available for a Designated Community. (Source: ISO 14721)

ARM

1. [Computer System] Acronym for [Application Response Measurement](#).
2. [Computer System] A common microprocessor architecture, as well as the name of the company that created the architecture.

ARP

[Network] Acronym for [Address Resolution Protocol](#).

array

[Storage System] A [storage array](#), i.e., a [disk array](#) or tape array.

array configuration

1. [Storage System] Assignment of the disks and operating parameters for a [disk array](#) by setting parameters such as [stripe depth](#), [RAID](#) model, [cache](#) allowance, [spare](#) disk assignments, etc. See [configuration](#), [physical configuration](#).
2. [Storage System] The arrangement of disks and operating parameters that results from such an assignment.

ASIC

[Computer System] Acronym for [Application Specific Integrated Circuit](#).

ASL

[Fibre Channel] Acronym for [A_Port Switch Link](#).

assigned capacity

[Storage System] The amount of space on a system or data container which has been allotted to be written.

On [thin provisioning](#) systems, an assigned capacity number represents a promise of the amount of space that is available on demand; [usable capacity](#) is allocated as the container is written. On fully provisioned systems, usable capacity must be committed at the same time the container is allocated. See [thin provisioning](#).

Association ID

[Fibre Channel] A value that uniquely identifies an [NVMeoFC association](#).

Association Identifier

[Fibre Channel] A value that uniquely identifies an [FC_NVMe association](#).

See [FC-NVMe](#).

assurance

[Data Security] A process for demonstrating that the security goals and objectives for an IT product or system are met on a continuing basis.

assurance level

[Data Security] The measure of confidence that the security features, practices, procedures, and architecture of an [information system](#) accurately mediate and enforce the security [policy](#).

asymmetric cryptography

[Data Security] [Cryptography](#) that uses an asymmetric [cryptosystem](#).

asymmetric cryptosystem

[Data Security] A [cryptographic algorithm](#) in which different keys are used to encrypt and decrypt a single message or [block](#) of stored information.

One of the keys is kept secret and referred to as a [private key](#); the other key can be freely disclosed and is called a [public key](#).

asynchronous I/O operation

[Storage System] An [I/O operation](#) whose [initiator](#) does not await its completion before proceeding with other work, enabling an initiator to have multiple concurrent I/O operations in progress.

asynchronous I/O request

[Storage System] A request to perform an [asynchronous I/O operation](#).

asynchronous mirroring

[Storage System] Deprecated synonym for [asynchronous replication](#).

asynchronous replication

[Storage System] A replication technique in which data must be committed to storage at only the primary site and not the secondary site before the write is acknowledged to the host. Data is then forwarded to the secondary site as the network capabilities permit.

Asynchronous Transfer Mode

[Network] A [connection](#)-oriented data communications technology based on switching 53 byte fixed-length units of data called cells.

[ATM](#) transmission rates are multiples of 51.840 Mbits per second. Each cell is dynamically routed. In the United States, a public communications service called [SONET](#) uses ATM at transmission rates of 155, 622, 2048, and 9196 Mbits per second. These are called OC-3, OC-12, OC-48, and OC-192 respectively. A similar service called [SDH](#) is offered in Europe. ATM is also used as a [LAN](#) infrastructure, sometimes with different transmission rates and coding methods than are offered with SONET and SDH.

ATA

[Storage System] Acronym for [Advanced Technology Attachment](#).

ATM

[Network] Acronym for [Asynchronous Transfer Mode](#).

atomic operation

[General] An operation that, from an external perspective, occurs either in its entirety or not at all.

For example, database management systems that implement the concept of business transactions treat each business transaction as an atomic operation on the database. This means that either all of the database updates that comprise a transaction are performed or none of them are performed; it is never the case that some of them are performed and others not. [RAID](#) arrays must implement atomic write operations to properly reproduce single-disk semantics from the perspective of their clients.

attack

[Data Security] Attempt to destroy, expose, alter, disable, steal or gain unauthorized access to or make unauthorized use of an asset. [ISO/IEC 27000:2018]

attenuation

[Network] The power loss between an optical or electrical [transmitter](#) and a [receiver](#), typically expressed in units of decibels (dB).

audit

[General] Independent review and examination of records and activities to assess the adequacy of controls, to ensure [compliance](#) with established policies and [operational](#) procedures, and to recommend necessary changes in controls, policies, or procedures.

audit log

[Data Security] Synonym for [audit trail](#).

audit trail

[Network] [Data Security] A chronological record of system activities that enables the [reconstruction](#) and examination of a [sequence](#) of events and/or changes in a system such as an [information system](#), a communications system or any transfer of sensitive material and/or information.

Augmented ISL

An E_Port to E_Port link used by the FC-SW redundancy protocol.

authentic

[General] Being genuine, or accurate in representation of facts.

For evidence, being found by a jury (or trier of fact) to be what it purports to be and thus being worthy of [trust](#), reliance, or belief.

authentication

1. [Data Security] [Legal] The act of verifying the [identity](#) claimed by a party to an interaction.
2. [Data Security] [Legal] The act of meeting the threshold level for admissibility, but not necessarily of [authenticity](#), of evidence (e.g., [ESI](#)).

authenticity

1. [Data Management] [Data Security] Synonym for [data integrity](#).
2. [Data Management] [Data Security] [Legal] The property of being genuine and being able to be verified and trusted; confidence in the validity of a transmission, a message, or message originator. [NIST SP 800-53]
3. [Legal] The property, condition, or quality of being worthy of [trust](#), reliance, or belief because the proponent (offeror) has shown enough corroborating evidence to a jury (or trier of fact) to warrant such.

authorization

1. [Network] [Data Security] [Computer System] The process of determining for example via [access control](#) that a requestor is allowed to receive a service or perform an operation.
2. [Network] [Data Security] [Computer System] The limiting of usage of [information system](#) resources to authorized users, programs, processes or other systems, formally described as controlling usage by subjects of objects.

auto-swap

[Computer System] Abbreviation for [automatic swap](#).

See [cold swap](#), [hot swap](#), [warm swap](#).

auto-tiering

[Storage System] Synonym for [automated storage tiering](#).

Automated Cartridge System

[Data Recovery] Synonym for tape cartridge handling [robot](#).

automated storage tiering

[Storage System] Automatic movement of data between storage tiers based on [policy](#).

The tiers may be within a single storage system or may span storage systems, including a [cloud storage](#) tier.

automatic backup

[Data Recovery] A [backup](#) triggered by an event (e.g., a schedule point, or a threshold reached) rather than by human action.

automatic failover

[Storage System] [Failover](#) that occurs without human intervention.

automatic swap

[Computer System] The [substitution](#) of a [replacement unit](#) (RU) in a system for a defective one, where the substitution is performed by the system itself while it continues to perform its normal function (possibly at a reduced rate of performance).

Automatic swaps are functional rather than physical substitutions, and do not require human intervention. Ultimately, however, defective components must be replaced in a physical hot, warm, or cold swap operation. See [cold swap](#), [hot swap](#), [warm swap](#), [hot spare](#).

automatic switchover

[Storage System] Deprecated synonym for [automatic failover](#).

autonomic storage management

[Storage System] The ability of a storage system to self-regulate attributes such as capacity, performance, and [resiliency](#) based on application demands, without any administrative intervention.

availability

1. [General] The amount of time that a system is available during those time periods when it is expected to be available, often measured as a percentage of an elapsed year. For example, 99.95% availability equates to 4.38 hours of downtime in a year ($0.0005 * 365 * 24 = 4.38$) for a system that is expected to be available all the time. See [data availability](#), [high availability](#).
2. [General] The property of being accessible and usable upon demand by an authorized entity. [ISO/IEC 27000]

available capacity

[Data Management] [Storage System] Synonym for [free space](#).

B

B_Port

[Fibre Channel] The bridge [port](#) within a bridge used to extend an [Inter-Switch Link](#).

backup

1. [Data Recovery] A collection of data stored on (usually removable) non-volatile [storage media](#) for purposes of [recovery](#) in case the original copy of data is lost or becomes inaccessible; also called a [backup copy](#) or [replica](#). To be useful for recovery, a backup must be made by copying the source data image when it is in a consistent state.
2. [Data Recovery] The act of creating a backup. See [archive](#).

backup client

[Data Recovery] A computer system containing online data to be backed up.

backup copy

[Data Recovery] A collection of data stored on (usually removable) non-volatile [storage media](#) for purposes of [recovery](#) in case the original copy of data is lost or becomes inaccessible; also called a [backup](#) or [replica](#).

backup manager

[Data Recovery] An application program whose purpose is to schedule and manage [backup](#) operations.

backup policy

[Data Recovery] Rules for how and when [backup](#) should be performed.

The policy includes which data is to be backed up, the schedule on which backups should occur, which devices and [media](#) are eligible to receive the backups, how many copies are to be made, and actions to be performed if a backup does not succeed.

Backup to Disk

[Data Recovery] [Backup](#) onto [disk drive](#)(s).

Backup to Tape

[Data Recovery] [Backup](#) onto tape [media](#).

backup window

[Data Recovery] An interval of time during which a set of data can be backed up without affecting applications that use the data.

backup window duration

[Data Recovery] The amount of time required to create a backup.

For example, if a backup uses different resources (storage devices, I/O paths, processing power) than an application, as is common with split [mirror](#) point-in-time copies, then the backup window duration is the time required to create the image. If an [online backup](#) shares resources with the applications using the data, as is common with copy-on-write point in time copies, the backup window duration may be increased due to resource contention. For an [offline backup](#), the backup window duration is the time during which applications are not allowed to modify the data while the backup operation completes.

Bandwidth

1. [Hardware] The numerical difference between the upper and lower frequencies of a band of electromagnetic radiation.
2. [Data Communication] A deprecated synonym for [data transfer capacity](#) that is often incorrectly used to refer to throughput.

bandwidth-length product

[Network] A figure of merit for optical fiber, usually expressed as MHz*kilometer.

As an example, a [Fibre Channel](#) link operating at 1 [Gb/s](#) using a fiber with a [bandwidth](#)-length product of 500 MHz*kilometer will support a link distance of approximately 500 meters.

baud

[Network] The maximum rate of signal state changes per second on a communications [circuit](#).

If each signal state change corresponds to a [code bit](#), then the baud rate and the bit rate are the same. It is also possible for signal state changes to correspond to more than one code bit, so the baud rate may be lower than the code bit rate.

BB_credit

[Fibre Channel] Synonym for [buffer-to-buffer credit](#).

BCP

[General] Acronym for [Best Current Practice](#).

beginning running disparity

[Fibre Channel] For a data stream using [8B/10B encoding](#), the [running disparity](#) present at a [transmitter](#) or [receiver](#) when an [ordered set](#) is initiated.

BER

[Network] [Storage System] Acronym for [Bit Error Rate](#).

Berkeley RAID Levels

[Storage System] A classification of [disk array data protection](#) and [mapping](#) techniques developed by Garth Gibson, Randy Katz, and David Patterson in papers written while they were performing research into I/O subsystems at the University of California at Berkeley.

There are seven Berkeley [RAID](#) Levels, usually referred to by the names [RAID Level 0](#) through [RAID Level 6](#). See [RAID 0](#), [RAID 1](#), [RAID 2](#), [RAID 3](#), [RAID 4](#), [RAID 5](#), [RAID 6](#). Many other levels such as RAID 10, RAID 50 and so on have since been proposed.

Best Current Practice

[General] A recommendation for what is currently believed to be the best manner of proceeding.

best effort

[Network] A [class of service](#) that does not guarantee delivery of packets, frames, or datagrams, but for which the network, fabric, or [interconnect](#) makes every reasonable delivery effort.

bidirectional authentication

[Data Security] Synonym for [mutual authentication](#).

big data

[Computer System] A characterization of datasets that are too large to be efficiently processed in their entirety by the most powerful standard computational platforms available.

big endian

[Computer System] A format for the storage and transmission of binary data in which the most significant bits are stored at the numerically lowest addresses, or are transmitted first on a [serial](#) link.

BIOS

[Computer System] A program that resides in programmable, [non-volatile memory](#) on a computer and that is responsible for booting that computer and performing certain operating system independent I/O operations.

Standard BIOS interrupts are defined to allow access to the computer's disk, video and other hardware components (for example, INT13 for disk access).

bit

[Computer System] A binary digit.

bit error rate

[Network] [Storage System] The probability that a transmitted bit will be erroneously received at the point of measurement.

The [BER](#) at a measurement point is determined by counting the number of bits in error at that measurement point and dividing by the total number of bits in the transmission. BER is typically expressed as a negative power of 10.

bit synchronization

[Data Communication] The process by which the [receiver](#) of a [serial](#) communication establishes its clocking used to locate code bits in a received data stream.

blade system

[Computer System] A computer or storage system composed of a chassis that provides power, cooling and other common infrastructure, and one or more removable [server](#) or storage units, usually called blades.

Blade systems are designed as a scalable solution to efficiently package and operate multiple processing or storage units in a single enclosure, and are designed for technicians to be able to easily add or replace hot-swappable boards in the field.

blanking plate

[General] [Energy] A solid plate that mounts over unused slots to maintain efficient air flow through components.

blind mating

[Hardware] The ability of pairs of components to be connected without the [connection](#) points being visible.

Blind mating is usually accomplished by mechanical guides (e.g., slots and rails) on the components.

block

1. [Storage System] A unit in which data is stored and retrieved on storage media.
2. [Storage System] A unit of application data from a single [information category](#) that is transferred within a single [sequence](#).

block addressing

[Storage System] A form of addressing data on [storage media](#) where units (blocks) of data are identified by integers that are typically sequential.

See [C-H-S addressing](#).

block cipher

[Data Security] A symmetric encryption algorithm that operates on a block of plaintext, i.e., a string of bits of a defined length, to yield a block of ciphertext. [ISO/IEC 18033-1:2015]

block cipher mode of operation

[Data Security] Algorithm that uses a [block cipher](#) to provide an information service such as confidentiality or authenticity [ISO/TS 21219-24:2017]

block services

[Storage System] A subsystem that provides block level access to storage for other systems or other layers of the same system.

See [block](#).

block storage

[Storage System] A method of storing data in [blocks](#).

[Disk](#) devices typically store data in fixed size blocks (e.g., 512 byte blocks, or 4,096 byte blocks). Tape devices may provide fixed size blocks or variable sized blocks. The arrangement of those blocks into files occurs using a host [file system](#). Various storage protocols (e.g., SCSI, SATA, FC, iSCSI, RDMA) may be used to access the data in those blocks.

Ssee [File storage](#)

block virtualization

[Storage System] The act of applying [virtualization](#) to a [block](#) based (storage) service for the purpose of providing a new aggregated, higher level (e.g., richer, simpler, more secure) block service to clients.

Block virtualization functions can be nested. A [disk drive](#), [RAID](#) system or [volume manager](#) all perform some form of block address to (different) block address [mapping](#) or [aggregation](#). See [file virtualization](#).

Blocking

[Computer System] A property of an operation that it may stop and wait for other operations to occur.

For example, an operation on file 1 blocks (i.e., stops and waits) for another operation on file 1 to complete.

BNC

[Network] A type of [coaxial cable](#) connector formerly used in Ethernet applications; the specification is contained in EIA/TIA 403-A and MIL-C-39012.

bootstrapping

[Computer System] The process of loading Operating System code from a disk or other [storage device](#) into a computer's memory and preparing it to run.

Bootstrapping typically occurs in steps, starting with a very simple program ([BIOS](#)) that initializes the computer's hardware and reads a [sequence](#) of data blocks from a fixed location on a pre-determined disk, into a fixed memory location. The data thus read is the code for the next stage of bootstrapping, usually an operating system loader. The loader completes the hardware setup and results in an executing operating system, in memory.

break mirror

[Storage System] Remove a component from a mirror and make it an independent volume in the system, ending its synchronization with the other mirror components.

bridge

1. [Network] A technology that enables traffic from a source device using one physical transport network technology to be transmitted to the destination device using an alternative physical transport network technology. In some cases a bridge is referred to as a physical transport gateway or storage router.
2. [Network] A device that connects multiple LAN segments at the physical address layer. As opposed to a hub, which indiscriminately rebroadcasts everything from one segment to the other, a bridge only retransmits traffic from one segment to another when the traffic is intended for the destination segment.
3. [Fibre Channel] A Fibre Channel technology that provides a transparent Fibre Channel Fabric extension between two Fibre Channel Switch E_Ports through the use of two B_Ports tunneling through some alternative technology, resulting in an Inter-Switch Link.

broadcast

A single transmission of a message to all receivers connected to a transport network. Broadcast can be contrasted with [unicast](#) (sending a single message to a single receiver) and [multicast](#) (sending a single message to select subset of receivers).

buffer

[Computer System] A solid state memory device or programming construct, used to hold data momentarily as it moves along an I/O path or between software components.

buffer-to-buffer credit

Value used to determine how many frames can be sent to a recipient when [buffer-to-buffer flow control](#) is in use.

See [Credit](#).

buffer-to-buffer flow control

[Fibre Channel] Flow control between two connected [ports](#).

Flow control occurs between two connected Fibre Channel ports (e.g., an [N_Port](#) and its associated [F_Port](#) or two [E_Ports](#)). A port indicates the number of [frames](#) that can be sent to it (i.e., its [buffer-to-buffer credit](#)) before the sender is required to stop transmitting and wait for the receipt of additional credit.

business continuity

[Data Security] Capability of an organization to continue the delivery of products or services at acceptable predefined levels following a disruption [ISO 22300:2018]

bypass circuit

[Fibre Channel] A [circuit](#) that provides for removal of a device from a data path.

A device may be removed from a data path (e.g., a [Fibre Channel Arbitrated Loop](#)) if valid signaling is lost or if a [controller](#) directs the removal of the device for any reason.

byte

[Computer System] An 8 bit unit of data.

Byte and bit ordering and meaning vary depending on context. It is necessary to consult the standards that apply in a given context to determine ordering and meaning.

C

C-H-S addressing

[Storage System] Acronym for [Cylinder-Head-Sector addressing](#).

CA

[Data Security] Acronym for [Certificate Authority](#).

cable plant

[Network] All of an installation's passive communications elements (e.g., optical fiber, twisted pair, [coaxial cable](#), connectors, splices, etc.) between transmitters and receivers.

cache

1. [Computer System] To store data temporarily for expedited access.
2. [Computer System] The location in which data is stored temporarily for expedited access. There are a variety of cache types. Read cache holds data in anticipation that it will be requested. Write cache holds data written by a [client](#) until it can be stored on other (typically slower) [storage media](#) such as disk or tape. See [buffer](#), [disk cache](#), [write back cache](#), [write through cache](#).

canister

[Storage System] An enclosure for one or more [storage devices](#).

A canister is usually designed to [mount](#) in a shelf or other enclosure that supplies power, cooling, and [I/O interconnect](#) services. It is used to minimize RF emissions and to simplify insertion and removal in multi-device storage subsystems. See [shelf](#).

CAP Theorem

A hypothesis that it is impossible for a distributed system to provide Consistency, Availability, and Partition Tolerance guarantees at the same time.

See [eventual consistency](#).

capacity optimization methods

[Storage System] Methods which reduce the consumption of space required to store a data set, such as [compression](#), [data deduplication](#), [thin provisioning](#), and [delta snapshots](#).

[RAID 5](#) and [RAID 6](#) may also be considered as capacity optimizing methods, as they use less space than ordinary [mirroring](#) to perform a necessary function: protecting data from [storage device](#) failure.

capacity optimizing system

[Storage System] A system which employs at least one [capacity optimization method](#).

capacity planning

[General] The process of optimizing supply of a given resource to satisfy current and future demand for that resource.

Common methods used for capacity planning include tracking, trending, forecasting and scenario planning to predict future demand.

carousel

[Data Recovery] A [library](#) or a component of a library in which the media are stored in and selected from a rotating assembly.

Carrier Sense Multiple Access with Collision Detection

[Network] A physical layer data transmission [protocol](#) used in some [Ethernet](#) networks.

cascading

The process of connecting two or more hubs or switches together to increase the number of ports or extend distances.

catalog

1. [Data Recovery] A list of backed up files, directories, and the locations ([media](#) identifiers) of the [backup](#) copies.
2. [File System] A persistent data structure used by some file systems to keep track of the files they manage.

CBC

[Data Security] Acronym for [Cipher Block Chaining](#).

CC

[Data Security] Acronym for [Common Criteria](#).

CDB

[SCSI] Acronym for [Command Descriptor Block](#).

CDMI

[Standards] Acronym for [Cloud Data Management Interface](#).

CDP

[Data Recovery] Acronym for [Continuous Data Protection](#).

CDR

Acronym for Clock and Data [Recovery](#).

CE

[Network] Acronym for [Converged Ethernet](#).

certificate

[Data Security] A data structure signed with a [digital signature](#) that is based on a [public key](#) and which asserts that the key belongs to a [subject](#) identified in the structure.

Certificate Authority

[Data Security] In a [Public Key Infrastructure \(PKI\)](#), the authority and organization responsible for issuing and revoking user certificates, and ensuring [compliance](#) with the PKI policies and procedures.

The reputation of the certificate authority determines the trust that may be placed in the identity assurance provided by the certificates issued by the authority.

Certificate Revocation List

[Data Security] A time-stamped list of certificates, signed by the issuing Certification Authority, that have been revoked by that [CA](#).

The CRL is made available to entities that need to rely on a certificate for [authentication](#).

chain of custody

[Legal] A process that tracks the movement of evidence through its collection, safeguarding, and analysis lifecycle by documenting each person who handled the evidence, the date/time it was collected or transferred, and the purpose for the transfer. [NIST SP 800-72]

challenge

[Data Security] A step in an [authentication](#) dialog that must be answered using either a secret or process assumed to be known only by the other party.

A challenge can be as simple as "What's your [password](#)?" or as complex as "Send me the result of a retinal scan of your right eye."

Challenge Handshake Authentication Protocol

[Data Security] A [password](#)-based [authentication protocol](#) that uses a [challenge](#) to verify that a user has access rights to a system.

A hash of the supplied password with the challenge is sent for comparison so the [cleartext](#) password is never sent over the [connection](#).

channel

1. [Hardware] The electrical circuits that sense or cause the state changes in recording [media](#) and convert between those state changes and electrical signals that can be interpreted as data bits.
2. [Computer System] Synonym for [I/O interconnect](#). The term channel has other meanings in other branches of computer technology. The definitions given here are commonly used when discussing storage and networking. See [device channel](#), [I/O interconnect](#), host [I/O bus](#).

character

1. [Computer System] Synonym for [byte](#).
2. [Computer System] One or more bytes that represent a single element in a character set. Examples of character sets include ASCII and UTF-8.
3. [Network] A 10-bit [unit of information](#) transmitted and received in certain protocols, consisting of 8 bits of data encoded as 10 bits using [8B/10B encoding](#).

checkpoint

1. [Data Recovery] (noun) The recorded state of an application at an instant of time, including data, in-memory variables, program counter, and all other context that would be required to resume application execution from the recorded state.
2. [File System] (verb) An activity of a [file system](#), such as the High Performance File System, (HPFS) or the Andrew File System (AFS), in which cached [metadata](#) (data about the structures of the file system) is periodically written to the file system's permanent store, allowing the file system to maintain consistency if an unexpected stop occurs.

checksum

[Data Security] A value computed across a set of data, used to detect change.

A checksum is often used for error and manipulation detection.

CHS

[Hardware] Acronym for [Cylinder Head Sector](#).

CID

[iSCSI] Acronym for [Connection Identifier](#).

CIFS

[File System] Acronym for [Common Internet File System](#).

CIM

[Management] Acronym for [Common Information Model](#).

cipher

[Data Security] A cryptographic system where plaintext is rearranged through transposition and/or substitution under direction of a cryptographic key.

When a cipher is applied to plaintext to produce ciphertext, the process is called [encryption](#). When the cipher is applied to ciphertext to produce plaintext, the process is called [decryption](#).

Cipher Block Chaining

[Data Security] A [block cipher mode of operation](#), in which each block of [plaintext](#) is XORed with the previous [ciphertext](#) block before being encrypted, making each ciphertext block dependent on all preceding plaintext blocks.

ciphertext

[Data Security] Data that has been encrypted.

See [cleartext](#).

CKD

[Storage System] Acronym for [Count-Key-Data](#).

Class 1

[Fibre Channel] A [connection](#)-oriented class of [Fibre Channel](#) communication service in which the entire [data transfer rate](#) of the link between two ports is dedicated for communication between the ports and not used for other purposes.

Class 1 is also known as [dedicated connection service](#), and is not widely implemented. See [intermix](#).

Class 2

[Fibre Channel] An acknowledged connectionless [Fibre Channel](#) communication service.

Class 2 multiplexes [frames](#) from one or more [N_Ports](#) or [NL_Ports](#) that are explicitly acknowledged by the [receiver](#) and notification of delivery failure is provided. This [class of service](#) includes [end-to-end flow control](#).

Class 3

[Fibre Channel] An unacknowledged connectionless [Fibre Channel](#) communication service.

Class 3 multiplexes [frames](#) from one or more [N_Ports](#) or [NL_Ports](#) and are not explicitly acknowledged. These frames are delivered on a "[best effort](#)" (e.g., a datagram service) basis.

class of service

1. [Network] A mechanism for managing traffic in a network by specifying message or packet priority or delivery acknowledgement. Network mechanisms include [identification](#) and grouping of data packets based on a priority label (in the packet header) or via mechanisms such as "per hop behavior", defined by the [IETF's Differentiated Services](#).
2. [Fibre Channel] The characteristics and guarantees of the transport layer of a [Fibre Channel](#) network. Fibre Channel classes of service include acknowledged [frame](#) delivery with end to end flow control (i.e., [Class 2](#)), and packetized frame datagrams (i.e., [Class 3](#)). Different classes of service may simultaneously exist in a [Fibre Channel Fabric](#). The form and reliability of delivery in Class 3 circuits may vary with the [topology](#).

cleartext

[Data Security] Alternative term for [plaintext](#). Stating that data is in cleartext implies that the data is not scrambled or rearranged, and is in its raw form.

CLI

[Computer System] Acronym for [Command Line Interface](#).

client

1. [General] An [intelligent device](#) or system that requests services from other intelligent devices, systems, or appliances. See [server](#).
2. [Computer System] An asymmetric relationship with a second party (a server) in which the client initiates requests and the server responds to those requests.

clone

[Data Management] Synonym for [snapshot](#).

Clones and snapshots are full copies. See [delta snapshot](#).

cloud auditor

[Cloud] A party trusted conduct independent assessment of cloud services, [information system](#) operations, performance and [information security](#) of the cloud implementation. [ISO/IEC 17788]

cloud carrier

[Cloud] An intermediary that provides connectivity and transport of cloud services between cloud providers and cloud consumers. [ISO/IEC 17788]

cloud consumer

[Cloud] A person or organization that uses cloud services. [ISO/IEC 17788]

Cloud Data Management Interface

1. [Standards] A SNIA Technical Position for Data storage as a Service (DaaS).
2. [Cloud] CDMI is an interface for both the data path and the control path of cloud storage. CDMI can also be used to manage storage in Cloud Computing deployments.

cloud infrastructure

[Cloud] A set of data processing components that can be automatically provisioned by consumers, accessed over a network and that provide [secure multitenancy](#). [ISO/IEC 17788]

cloud provider

[Cloud] An entity responsible for making cloud services available to cloud consumers. [ISO/IEC 17788].

cloud security audit

[Cloud] [Data Security] Systematic evaluation of a cloud system by assessing how well it conforms to a set of established security criteria. [ISO/IEC 17788]

cloud service

[Cloud] A function useful to a [cloud consumer](#) provided by a [cloud provider](#). [ISO/IEC 17788]

cloud storage

[Services] Synonym for [Data storage as a Service](#). [ISO/IEC 17788]

cluster

[Computer System] A collection of computers that are interconnected (typically at high speeds) for the purpose of improving reliability, [availability](#), serviceability, [load balancing](#) and/or performance.

Often, clustered computers have access to a common pool of storage and run special software to coordinate the component computers' activities.

CMIP

[Management] [Network] Acronym for [Common Management Information Protocol](#).

CMR

[Storage System] Acronym for conventional magnetic recording.

code bit

[Computer System] A [bit](#) (binary digit) of an encoded datum.

Sequences of code bits make up symbols, each of which corresponds to a data element (word, byte, or other unit). For an example see [8b/10b encoding](#).

code violation

[Fibre Channel] The error condition that occurs when a received [transmission character](#) cannot be decoded into a [valid data byte](#) or [special code](#) using the validity checking rules specified by the [transmission code](#).

cold backup

[Data Recovery] Synonym for [offline backup](#).

See [hot backup](#), [online backup](#).

cold data

[Data Management] Data that is accessed infrequently.

cold storage

[Data Management] Data storage device, system, or service used to store cold data at a cost that is at least an order of magnitude less than the cost of primary storage.

Cold Storage features large capacity, energy saving and long-term data preservation, in order to achieve low-cost rather than performance.

cold swap

[Computer System] The [substitution](#) of a [replacement unit](#) (RU) in a system for a defective one, where external power must be removed from the system in order to perform the substitution.

A cold [swap](#) is a physical substitution as well as a functional one. See [automatic swap](#), [hot swap](#), [warm swap](#).

Command Descriptor Block

[SCSI] A [sequence](#) of bytes that defines a single [SCSI](#) command.

Command Line Interface

[Computer System] A form of human interface to intelligent devices characterized by non-directive prompting and [character](#) string user input.

CLIs are used by system consoles and remote shell sessions (RSH, SSH). They are very useful for scripting and other administrative purposes.

committed data

[Storage System] Data that has been written to [stable storage](#).

Common Criteria

[Data Security] A multi-part International Standard that is meant to be used as the basis for evaluation of security properties of IT products and systems.

The CC is specified in ISO/IEC 15408-1:1999, ISO/IEC 15408-2:1999, and ISO/IEC 15408-3:1999.

Common Information Model

[Data Management] [Network] An [object oriented](#) description of the entities and relationships in a business' management environment maintained by the [Distributed Management Task Force](#).

CIM is divided into a Core Model and Common Models. The Core Model addresses high-level concepts (such as systems and devices), as well as fundamental relationships (such as dependencies). The Common Models describe specific problem domains such as computer system, network, user or device management. The Common Models are subclasses of the Core Model and may also be subclasses of each other.

Common Management Information Protocol

[Management] [Network] A network management [protocol](#) built on the Open Systems Interconnection (OSI) communication model.

CMIP is more complete, and therefore larger than, [SNMP](#).

Common Schema Definition Language

[Management] An [OASIS](#) standard language used to define a [model](#) over which an [OData service](#) acts.

For more information and current state see <https://www.odata.org/documentation/>.

communications security

[Network] [Data Security] Protection of information while it's being transmitted, particularly via telecommunications.

A particular focus of communications security is message [authenticity](#). Communications security may include [cryptography](#), transmission security, emission security, and physical security.

community cloud

[Cloud] A [cloud infrastructure](#) shared by several organizations and supporting a specific community that has shared concerns (e.g., mission, security requirements, [policy](#), and [compliance](#) considerations).

compensating control

[Data Security] A way - also known as a band-aid - of mitigating a known [risk](#) where it may not be feasible to deploy specific technical enablement.

Completion Queue Entry

[NVMe] A fixed size entry in a CQ that contains completion status for a single command.

compliance

1. [General] The state of being in accordance with a standard, specification, or clearly defined requirements.
2. [Legal] The state of being in accordance with legal requirements. The "compliance market" is centered around storage and systems that support the retention and discovery of data as required by law or regulation.

Compliant Jitter Tolerance Pattern

[Data Communication] A test pattern for [jitter](#) testing.

compression

[General] Synonym for [data compression](#).

compression ratio

[Storage System] A [space reduction](#) ratio that is the ratio of the size of the uncompressed data to the size of the compressed data.

compromise

[Data Security] An [incident](#) that subjects data to [unauthorized disclosure](#), modification, destruction, or loss.

Computational Storage

[Computer System] Architectures that provide Computational Storage Functions (CSF) coupled to storage, offloading host processing or reducing data movement.

These architectures enable improvements in application performance and/or infrastructure efficiency through the integration of compute resources (outside of the traditional compute & memory architecture) either directly with storage or between the host and the storage. The goal of these architectures is to enable parallel computation and/or to alleviate constraints on existing compute, memory, storage, and I/O.

Computational Storage Array

[Computer System] Storage Array that contains one or more [Computational Storage Engines](#).

Abbreviated as CSA.

Computational Storage Device

[Computer System] A Computational Storage Drive, [Computational Storage Processor](#), or [Computational Storage Array](#).

Abbreviated as CSx.

Computational Storage Drive

[Computer System] A storage element that contains one or more [Computational Storage Engines](#) (CSE) and persistent data storage.

Abbreviated as CSD.

Computational Storage Engine

[Computer System] A Component that is able to perform computation on data. The computation is defined by a [Computational Storage Function](#) (CSF).

Abbreviated as CSE.

Computational Storage Function

[Computer System] Specific operations that may be configured and executed by a [Computational Storage Engine](#) (CSE).

Abbreviated as CSF.

Computational Storage Processor

[Computer System] A component that contains one or more [Computational Storage Engines](#) (CSE) for an associated storage system without providing persistent data storage.

Abbreviated as CSP.

Computational Storage Resource

[Computer System] Resource available for a host to provision a [Computational Storage Device](#) (CSx) that enables that CSx to be programmed to perform a [Computational Storage Function](#) (CSF).

Abbreviated as CSR.

compute virtualization

[Computer System] Software that enables a single server hardware platform to support multiple concurrent instances of an operating system and applications.

computer security

[Data Security] Measures and controls that ensure [confidentiality](#), [integrity](#), and [availability](#) of [information system](#) assets including hardware, software, [firmware](#), and information being processed, stored, and communicated.

computer virus

[Data Security] Malware that propagates itself by modifying other programs to include a possibly changed copy of itself and that is executed when the infected program is invoked.

computer worm

[Data Security] Malware that is a self-contained program that can propagate itself through data processing systems or computer networks.

concurrency

[Computer System] The property of overlapping in time, often in reference to the execution of I/O operations or I/O requests.

confidentiality

[Data Security] The property that data cannot be accessed by unauthorized parties.

Confidentiality may be created by the use of [encryption](#) or access controls.

configuration management

[General] The management of system features and behaviors through the control of changes made to hardware, software, [firmware](#) documentation and related resources throughout the life cycle of an [information system](#).

congestion

[Computer System] A condition that occurs when more services have been requested than are able to be delivered.

Congestion Notification

[Network] A notification mechanism that supports congestion management for long-lived data flows within network domains of constrained [data transfer rate](#).

connection

1. [Fibre Channel] Short form of [dedicated connection](#).
2. [iSCSI] A communication path between the [initiator](#) and [target](#) using a [TCP/IP](#) connection. In [iSCSI](#), one or more connections make up a session. Connections carry control messages, [SCSI](#) commands, parameters, and data within iSCSI PDUs.

Connection ID

[Fibre Channel] A value that uniquely identifies an [NVMe-oF/FC connection](#).

connection identifier

[iSCSI] An identifier generated by the [initiator](#) and sent to the [target](#) upon logging in or out, that uniquely identifies each [connection](#) within a session.

connectionless frame

[Network] A [frame](#) used in a [connectionless service](#) (i.e., [Class 2](#), and [Class 3](#) frames referred to individually or collectively).

connectionless integrity service

[Network] [Data Security] A security service that provides [data integrity](#) service for an individual [IP datagram](#) by detecting modification of the datagram without regard to the ordering of the datagram in a stream of datagrams.

connectionless service

[Fibre Channel] Communication between two N_Ports or NL_Ports for connectionless frames.

consistency group

[Storage System] A collection of [replication sets](#) grouped together to ensure write order consistency across all the replication sets' primary volumes.

An operation on a consistency group, such as changing replication from asynchronous to synchronous, applies to all the replication sets within the consistency group, and consequently their volumes.

consistent volume

1. [Storage System] A [volume](#) that satisfies the consistency criteria of the system on which it is hosted.
2. [File System] In [LTFS](#), a volume in which all partitions are complete, and the last [LTFS Index](#) in the Index [partition](#) has a back pointer to the last LTFS Index in the data partition. If an [LTFS volume](#) is not consistent, some form of [recovery](#) may be necessary.

console

1. [Computer System] A device for graphical or textual visual output from a computer system.
2. [Computer System] In systems, network and device management, an application that provides graphical and textual feedback regarding operation and status, and that may accept operator commands and input influencing operation and status. Sophisticated consoles designed for the management of many systems from one location are sometimes called enterprise management consoles.

content-agnostic data deduplication

[Storage System] A [data deduplication](#) method that does not require awareness of specific application data formats.

See [content-aware data deduplication](#).

content-aware data deduplication

[Storage System] A [data deduplication](#) method that leverages knowledge of specific application data formats.

See [content-agnostic data deduplication](#).

Continuous Data Protection

[Data Recovery] A class of mechanisms that continuously capture or track data modifications enabling [recovery](#) to previous points in time.

continuously increasing relative offset

[Network] A transmission control algorithm that requires the frames for a block of data to be transmitted strictly in order.

Continuously increasing relative offset offers simpler reassembly and detection of lost frames than [random relative offset](#). See [relative offset](#).

control plane

[Computer System] The portion of a system that controls the operation of the system.

Also see [data plane](#).

control software

[Computer System] A body of software that provides common control and management.

When it executes on a device, control software is often referred to as [firmware](#).

controller

1. [Hardware] A device or component of a system that performs a control function.
2. [Storage System] The control logic in an array, disk, or tape that performs command decoding and execution, host data transfer, serialization and deserialization of data, error detection and correction, and overall management of device operations.
3. [Management] The control logic in a storage subsystem that performs command transformation and routing, aggregation (RAID, mirroring, striping, or other), high-level error recovery, and performance optimization for multiple storage devices.
4. [NVMe] The interface between a host and an NVM subsystem.

controller based array / controller based disk array

[Storage System] A [disk array](#) whose [control software](#) executes in a [disk subsystem controller](#).

controller cache

[Storage System] A cache that resides within a [controller](#) and whose primary purpose is to improve storage performance.

See [cache](#), [disk cache](#), [host cache](#).

Controlling FCF

[Fibre Channel] A [Controlling Switch](#) that supports [Lossless Ethernet MACs](#).

Controlling Switch

[Fibre Channel] A switch able to control a set of [FCDFs](#) in order to create a [Distributed Switch](#) to control a set of [FCDFs](#) in order to create a distributed switch.

conventional magnetic recording

[Storage System] A recording technique for storing data on an [HDD](#) where data is recorded on individual non-overlapping [tracks](#) which may be written randomly.

Converged Ethernet

[Network] A set of Ethernet technologies and protocols defined in IEEE 802.3 that combine to reduce packet loss.

converged infrastructure

[Computer System] The pooling of compute, storage, and networking resources using either common management tools or common (shared) physical resources.

copy on write

[Data Recovery] A technique for maintaining a [point in time copy](#) of a collection of data such that when a logical data location is written, a new physical location is chosen for the existing data, and the existing data is copied to that new physical location.

See [pointer remapping](#).

copyback

[Storage System] Deprecated synonym for [rebuild / rebuilding](#).

Core N_Port_Name

A set of entities with the same [Core Switch_Name](#) that may host multiple Virtual Switches.

A Core Switch may be a set of ports in a physical chassis, or in multiple physical chassis.

Core Switch

1. [Fibre Channel] A set of entities in a [Virtual Fabric](#) that all have the same [Core Switch_Name](#). A Core Switch may contain multiple [Virtual Switches](#).
2. [Network] A backbone switch (or set of switches) that act as the final aggregation layer for its network.

Core Switch_Name

[Fibre Channel] In a [Virtual Fabric](#) capable [Fibre Channel Switch](#), the [Switch_Name](#) identifying the [Core Switch](#).

Count Key Data

[Storage System] A disk data organization model in which the disk is assumed to consist of a fixed number of tracks, each having a maximum data capacity.

Multiple records of varying length may be written on each track of a Count-Key-Data disk, and the [usable capacity](#) of each track depends on the number of records written to it. The [CKD architecture](#) derives its name from the record format, which consists of a field containing the number of bytes in the key and data fields and a record address, an [optional](#) key field by which particular records can be easily recognized, and the data itself. CKD is the storage architecture used by IBM Corporation's mainframe computer systems. See [fixed block architecture](#).

counter measure

[Data Security] Any action, device, procedure, technique, or other measure that reduces the [vulnerability](#) of or [threat](#) to a system.

covert channel

[Data Security] An unintended and/or unauthorized communications path that can be used to transfer information in a manner that violates a security [policy](#).

COW

[Data Recovery] Abbreviation for [copy on write](#).

CPU

[Hardware] Acronym for Central Processing Unit.

CQ

[NVMe] Acronym for [Completion Queue](#).

CQE

[NVMe] Acronym for [Completion Queue Entry](#).

CRC

[Data Communication] [Storage System] Acronym for [Cyclic Redundancy Check](#).

credentials

[Data Security] Information, passed from one entity to another, used to establish the sending entity's [identity](#) and/or access rights.

credit

[Fibre Channel] The number of receive buffers at a recipient available to receive [frames](#) from a transmitting [FC_Port](#).

CRL

[Data Security] Acronym for [Certificate Revocation List](#).

cryptanalysis

[Data Security] A set of operations performed in converting encrypted information to plaintext without initial knowledge of the algorithm and/or key employed in the [encryption](#).

cryptographic algorithm

[Data Security] An algorithm whose outputs have cryptanalytic security properties with respect to its inputs, or vice versa.

cryptographic erase

[Data Security] Method of sanitization in which the encryption key for the encrypted target data is sanitized, making recovery of the decrypted target data infeasible. [ISO/IEC 27040]

cryptographic erasure

[Data Security] A method for rendering encrypted data unrecoverable by securely deleting the [keying material](#) required to decrypt the data.

The encrypted data itself is not modified. The protection offered by cryptographic erasure is bounded by the work factor involved in discovering the [decryption](#) key or mounting a cryptanalytic [attack](#) on the [encryption](#) algorithm itself.

cryptographic hash function

[Data Security] A function that maps [plaintext](#) strings of any length to bit strings of fixed length, such that it is computationally infeasible to find correlations between inputs and outputs, and such that given one part of the output, but not the input, it is computationally infeasible to predict any bit of the remaining output.

Cryptographic hash functions have many [information security](#) applications, notably in digital signatures, message [authentication](#) codes (MACs), and other forms of authentication. The output from a cryptographic hash function is known as a [message digest](#) or [hash value](#).

cryptography

[Data Security] The principles, means and methods for rendering information unintelligible, and for restoring encrypted information to intelligible form.

cryptoperiod

[Data Security] The time span during which a specific key is authorized for use or in which the keys for a given system or application may remain in effect. [NIST SP 800-57 Part 1]

cryptosystem

[Data Security] A system for encrypting and decrypting data.

CSA

[Computer System] Abbreviation for [Computational Storage Array](#).

CSD

[Computer System] Abbreviation for [Computational Storage Drive](#).

CSDL

[Management] Acronym for [Common Schema Definition Language](#).

CSE

[Computer System] Abbreviation for [Computational Storage Engine](#).

CSF

[Computer System] Abbreviation for [Computational Storage Function](#).

CSMA/CD

[Network] Acronym for [Carrier Sense Multiple Access with Collision Detection](#).

CSP

[Computer System] Abbreviation for [Computational Storage Processor](#).

CSR

[Computer System] Abbreviation for [Computational Storage Resource](#).

CSx

[Computer System] Abbreviation for [Computational Storage Device](#).

cumulative incremental backup

[Data Recovery] A [backup](#) in which all data objects modified since the last full backup are retained as the backup.

To restore data when cumulative incremental backups are in use, only the latest full backup and the latest cumulative [incremental backup](#) are required.

See [differential incremental backup](#), [full backup](#).

current running disparity

[Network] [Fibre Channel] The [running disparity](#) present at a transmitter when 8B/10B encoding of a data byte or special code is initiated, or at a receiver when 8B/10B decoding of a [Transmission Character](#) is initiated.

cut through

A switching technique that allows a routing decision to be made and acted upon as soon as the destination address of a [frame](#) is received.

cut through routing

[Network] [Fibre Channel] Synonym for [cut through switching](#).

cut through switching

[Network] [Fibre Channel] A switching technique that allows a routing decision to be made and acted upon as soon as the destination address of a [frame](#) is received.

Cyclic Redundancy Check

[Data Communication] [Storage System] A scheme for checking the [integrity](#) of data that has been transmitted or stored and retrieved.

A CRC consists of a fixed number of bits computed as a function of the data to be protected, and appended to the data. When the data is read or received, the function is recomputed, and the result is compared to that appended to the data. Cyclic [redundancy](#) checks differ from error correcting codes in that they can detect a wide range of errors, but are not capable of correcting them. See [error correcting code](#).

Cylinder-Head-Sector

[Storage System] A form of [addressing](#) data stored on a disk in which the cylinder, head/platter combination, and relative [sector](#) number on a track are specified.

See [block addressing](#).

D

D_ID

[Fibre Channel] A three-byte field that contains the [address identifier](#) of the [destination Nx_Port](#).

DAC

1. [Data Security] Acronym for [Discretionary Access Control](#).
2. [Hardware] Acronym for [Digital Analog Converter](#).

daemon

[Operating System] A long running process on a computer system that services a particular type of request.

DAS

[Storage System] Acronym for [Direct Attached Storage](#).

data

[Computer System] The digital representation of anything in any form.

data at rest

[Data Security] Data stored on stable [non-volatile](#) storage. [ISO/IEC 27040].

data authentication

[Legal] The process of substantiating that the data is an accurate representation of what it purports to be.
[SWGDE/ SWGIT Glossary]

data availability

[Storage System] The amount of time that data is accessible by applications during those time periods when it is expected to be available, often expressed as a percentage.

See [availability](#), [high availability](#).

data breach

[Data Security] A compromise of security that leads to the accidental or unlawful destruction, loss, alteration, unauthorized disclosure of, or access to protected data transmitted, stored or otherwise processed. [ISO/IEC 27040]

Data Center Bridging

[Network] The suite of [Ethernet protocol](#) extensions defined for reliable storage transports such as [FCoE](#).

DCB includes the following protocols: IEEE 802.1Qau (CN), IEEE 802.1Qaz (ETS and DCBX), and IEEE 802.1Qbb (PFC).

A data center [bridge](#) implements the above protocols and capabilities for use in the data center.

Data Center Bridging eXchange protocol

[Network] A [DCB](#) component for discovery and [exchange](#) of DCB information.

data character

[Network] Any [transmission character](#) associated by the [transmission code](#) with a [valid data byte](#).

data classification

[Data Management] An organization of data into sets for management purposes.

A frequent purpose of a classification scheme is to associate service level objectives with sets of data based on their value to the business.

data compression

[General] The process of encoding data to reduce its size.

Lossy compression (i.e., compression using a technique in which a portion of the original information is lost) is acceptable for some forms of data (e.g., digital images) in some applications, but for most IT applications, lossless compression (i.e., compression using a technique that preserves the entire content of the original data, and from which the original data can be reconstructed exactly) is required.

data deduplication

[Storage System] The replacement of multiple copies of data, at variable levels of granularity, with references to a shared copy in order to save storage space and/or data transferred.

See also [inline data deduplication](#), [post-process data deduplication](#).

data deduplication ratio

[Storage System] A [space reduction](#) ratio that includes only the space reduction effects of [data deduplication](#).

data frame

[Fibre Channel] A [frame](#) containing information used by an [FC-4](#).

data in flight

[Data Security] Synonym for [data in motion](#).

data in motion

[Data Security] Data being transferred from one location to another [ISO/IEC 27040:2015].

Those transfers typically involve interfaces that are externally accessible and do not include internal transfers (i.e., never exposed to outside of an interface, chip, or device).

data in transit

1. [Data Security] Synonym for [data in motion](#)
2. [Legal] Data in motion across a jurisdictional boundary. Jurisdictions (usually nation states) may have policies and enforcement points that determine whether data may cross their borders.

data in use

[Data Security] Data in the process of being created, retrieved, manipulated, updated, or deleted.

data ingestion

[Data Management] A process for depositing data into a system.

data integrity

1. [Data Security] The property that data has not been altered or destroyed in an unauthorized manner
2. [Data Management] The property that data has not been altered or destroyed, in an unintended manner, due to physical or logical events.

data lake

[Data Management] A large repository for storing data in an unstructured way, in anticipation of future analytics.

This term originated in the [big data](#) community.

Data Lifecycle Management

[Data Management] The policies, processes, practices, services and tools used to align the business value of data with the most appropriate and cost-effective storage infrastructure from the time data is created through its final disposition.

Data is aligned with business requirements through management policies and service levels associated with performance, [availability](#), recoverability, cost, etc. DLM is a subset of [ILM](#).

data management

[Management] The discipline and function of oversight and control of data.

data management services

[Data Management] A set of services that control data from the time it is created until it no longer exists.

[Data Management](#) services are not in the data path; rather, they provide control or utilize data in the delivery of their services. This includes services such as data movement, data [redundancy](#), and data deletion. Some data management services are managed using the [control plane](#).

data manager

[File System] A function that presents a view of data to applications, and maps that view to an internal representation on a system, subsystem or device.

File systems and database management systems are examples of data managers.

data plane

[Computer System] The portion of a system that moves user data.

In a storage system the data plane is responsible for storing and retrieving data.

Also see [control plane](#).

data portability

[Data Communication] The ability to transfer data with its metadata from one system to another system that preserves meaning.

data preservation

[Data Management] The processes of ensuring data integrity, continued existence, and usability of stored data over a period of time.

data processing unit

[Network] An accelerator element capable of parsing, processing, and transferring data with performance efficiency. A data processing unit (DPU) usually has a set of programmable acceleration engines that offload and improve performance for applications such as AI/ML, security, telecommunications, or storage. DPUs may also be called SmartNICs, IPUs or NAPUs.

data protection

[Data Management] The combination of [data integrity](#), [data availability](#), and [confidentiality](#).

data reliability

[Data Management] The length of the statistically expected continuous span of time over which data stored by a population of identical storage subsystems can be correctly retrieved, expressed as [Mean Time to Data Loss](#) (MTDL).

data replication

[Storage System] Continuously maintaining a copy of data—possibly at a remote site—from a [volume](#) to provide [high availability](#) and [redundancy](#).

Data replication may be used for [disaster recovery](#) and business continuance.

data repository

[Data Security] Implementation of a collection of data along with data access and control mechanisms, such as search, indexing, storage, retrieval and security. [ISO/IEC 20944-1:2013]

EXAMPLE: A repository might support services such as search, indexing, storage, retrieval and security.

data resource domain

[Management] The category of resources that exclusively encompass [data management services](#).

data retention

[Long-Term Retention] Preserving the existence and [integrity](#) of data for some period of time or until certain events have transpired.

data service

[Data Management] A set of functions that process data without interpretation.

This processing may involve copying, movement, security and/or protection, but not the actual storage of the data.

data shredding

[Data Management] A process for deleting data that is intended to make the data unrecoverable.

One such process consists of repeated overwrites of data on the [storage media](#). Data shredding is not generally held to make data completely unrecoverable in the face of modern forensic techniques—that requires physical destruction of the [storage media](#). Forensic techniques, however, do require physical access to the [storage media](#).

Data Storage as a Service

[Services] Typically, Data Storage as a Service (DSaaS) hides limits to scalability, is either self-provisioned or provisionless and is billed based on consumption.

data striping

[Storage System] A [disk array](#) data [mapping](#) technique in which fixed-length sequences of [virtual disk](#) data addresses are mapped to sequences of [member disk](#) addresses in a regular rotating pattern.

Data striping is commonly used in RAID implementations.

data transfer capacity

[Computer System] The maximum rate at which data can be transmitted.

See [data transfer rate](#).

data transfer device

[SCSI] A [removable media storage device](#) in a [library](#).

Examples are magnetic disk drives, cartridge tape drives, optical disk drives, and CD-ROM drives.

data transfer rate

[Computer System] The amount of data per unit time actually moved across an interconnect.

Database Management System

[Database] A database management system (DBMS) removes the need for a user or program to manage low level database storage. It also provides security for and assures the integrity of the data it contains. Types of database management systems are relational (table-oriented), network, hierarchical and object oriented.

datagram

[Network] A message sent between two communicating entities for which no explicit acknowledgement is expected.

Datagrams are often said to be sent on a [best effort](#) basis.

DBMS

[Database] Abbreviation for [Database Management System](#).

DCB

[Network] Acronym for [Data Center Bridging](#).

DDR / DDR2 / DDR3 / DDR4 / DDR5

[Hardware] Acronym for [Double Data Rate](#).

The number after the DDR term designates the generation of the memory (e.g., DDR4 is the fourth generation of a DDR bus).

decoding

[Network] Conversion of received transmission characters to valid data bytes and special codes.

decryption

[Data Security] Conversion of encrypted information to [plaintext](#) based on the algorithm and key(s) used to encrypt it.

dedicated connection

A [communication circuit](#) between two N-Ports maintained by a [Fibre Channel](#) fabric.

The port resources used by a dedicated [connection](#) cannot be used for other purposes during the life of the dedicated connection.

deduplication

[Storage System] See [data deduplication](#).

defense-in-depth

[Data Security] An information assurance strategy integrating people, technology, and operations capabilities to establish multiple security barriers across layers and dimensions of a protected system. [NIST SP 800-53]

degaussing

1. [Data Security] A procedure that renders data unreadable by applying a strong magnetic field to the [media](#).
2. [Data Security] Applying a degaussing procedure. Degaussing is also called demagnetizing and erasure. Both of these terms are misleading, because in magnetic digital media the individual magnetic domains are not erased or demagnetized, but simply made to line up in the same direction, which eliminates any previous digital structure.

degraded mode

1. [Storage System] A mode of RAID array operation in which not all of the array's member disks are functioning, but the array as a whole is able to respond to application read and write requests.
2. [Storage System] A mode where redundancy of a storage system is lost impacting its performance and/or functionality while the system is still able to respond to application read and write requests.

delimiter

[Fibre Channel] An [ordered set](#) used to indicate a [frame](#) boundary.

delta-based data deduplication

[Storage System] A method of performing [data deduplication](#) by storing or transmitting data in the form of differences from a baseline [point in time copy](#).

See [hash-based data deduplication](#).

delta snapshot

[Data Recovery] A type of [point in time copy](#) that preserves the state of data at an instant in time by storing only those blocks that are different from an already existing full copy of the data.

DEN

[Network] Acronym for [Directory Enabled Network](#).

Denial of Service

[Data Security] Prevention of authorized access to a system resource or the delaying of system operations and functions, with resultant loss of availability to authorized users. [ISO/IEC 27033-1:2015]

destination identifier

[Fibre Channel] An address contained in a [Fibre Channel frame](#) that identifies the destination of the frame.

destination Nx_Port

[Fibre Channel] The [Nx-Port](#) to which a [frame](#) is addressed.

device

[Storage System] Synonym for [storage device](#).

device bus

[Storage System] Synonyms for [I/O interconnect](#).

device channel

[Storage System] A [channel](#) used to connect storage devices to a [host bus adapter](#) or an [intelligent controller](#).

The preferred term is [I/O interconnect](#).

device fanout

[Storage System] Synonym for [fanout](#).

device I/O bus

[Storage System] Synonyms for [I/O interconnect](#).

DF_ID

[Fibre Channel] Acronym for destination [Fabric_Identifier](#).

DH-CHAP

[Data Security] Acronym for [Diffie-Hellman augmented Challenge Handshake Authentication Protocol](#).

DHCP

[Network] Acronym for [Dynamic Host Control Protocol](#).

differential

[SCSI] A [SCSI](#) electrical signaling technique in which each control and data signal is represented by a voltage differential between two signal lines.

Differential signaling can be used over longer distances than the alternative [single ended signaling](#). See [single ended \(signaling\)](#).

differential incremental backup

[Data Recovery] A [backup](#) in which data objects modified since the last [full backup](#) or [incremental backup](#) are copied.

To restore data when [differential](#) incremental backups are in use, the newest full backup and all differential backups newer than the newest full backup are required. See [cumulative incremental backup](#), [full backup](#).

differential signaling

[Hardware] An electrical signaling technique in which each logical signal is represented by a voltage differential between two signal lines.

Differential signaling can be used over longer distances than the alternative [single ended signaling](#).

Differentiated Services

[Management] A [protocol](#) defined by the [IETF](#) for managing network traffic based on the type of packet or message being transmitted.

The Differentiated Services protocol is often abbreviated as [DiffServ](#). DiffServ rules define how a packet flows through a network based on a 6 bit field (the Differentiated Services Code Point) in the [IP](#) header. The Differentiated Services Code Point specifies the "per hop behavior" for the packet or message.

Diffie-Hellman

[Data Security] A key agreement [protocol](#) that was developed by W. Diffie and M. E. Hellman in allowing two entities to [exchange](#) a [secret key](#) over an insecure [medium](#) without any prior secrets.

Diffie-Hellman augmented Challenge Handshake Authentication Protocol

[Data Security] A [password](#) based [Authentication](#) and [key management protocol](#) that uses the CHAP algorithm ([RFC 1994](#)) augmented with an [optional Diffie-Hellman](#) algorithm.

DH-CHAP provides bidirectional and may provide [unidirectional Authentication](#) between a [Fibre Channel Initiator](#) and [Responder](#). DH-CHAP is defined by Fibre Channel " Security Protocols - 2 (FC-SP-2).

DiffServ

[Management] Abbreviation for [Differentiated Services](#).

digest

[Data Security] A binary string of some fixed length derived by a computationally efficient function from a binary input string of arbitrary length.

A key feature of cryptographic digests is that given a digest, it is computationally infeasible to find another [plaintext](#) string that generates the same digest.

Digital Analog Converter

[Hardware] A device that converts a discretely valued (digital) input to a continuously valued (analog) output.

digital archive

[Data Management] A storage repository or service used to secure, retain, and protect digital information and data for periods of time less than that of [long-term data retention](#).

A digital [archive](#) can be an infrastructure component of a complete [digital preservation service](#), but is not sufficient by itself to accomplish digital preservation, i.e., long-term data retention.

digital forensics

[Legal] The [identification](#), collection, [preservation](#) and analysis of digital evidence for use in legal proceedings.

Digital Linear Tape

[Data Recovery] A family of tape device and [media](#) technologies.

digital object auditing

[Long-Term Retention] A methodology to verify and detect threats to the validity of [digital preservation](#) objects.

Digital object auditing is a process of routine periodic testing of stored digital objects, usually using cryptographic techniques, by comparing their previous signatures and time stamps to their current to verify that change, loss of access, or data loss has not occurred.

digital preservation

[Long-Term Retention] Ensuring continued access to, and usability of, digital information and records, especially over long periods of time.

digital preservation object

[Long-Term Retention] A collection of data, [metadata](#) and possibly other resources treated as a unit for [digital preservation](#) purposes.

A [preservation object](#) provides the functionality required to assure the future ability to use, secure, interpret, and verify [authenticity](#) of the metadata, information, and data in the container and is the foundational element for digital preservation of information and data.

digital preservation service

[Long-Term Retention] A service providing [digital preservation](#).

A digital preservation service includes a comprehensive management and curation function that controls its supporting infrastructure, information, data, and storage services in accordance with the requirements of the information objects it manages to accomplish the goals of digital preservation.

digital signature

[Data Security] A cryptographically derived binary string used to assure information [authenticity](#), [integrity](#), and [nonrepudiation](#).

Digital signatures can generally be externally verified by entities not in possession of the key used to sign the information. For example, a [secure hash](#) of the information encrypted with the [originator's private key](#) when an [asymmetric cryptosystem](#) is used. Some algorithms that are used in digital signatures cannot be used to encrypt data. (e.g., [DSA](#)).

Digital Signature Algorithm

[Data Security] A subset of the [Digital Signature Standard](#) that represents a specific [public key](#) algorithm that is only used for digital signatures.

The [secret key](#) used in DSA operates on the message hash generated by [SHA-1](#); to verify a signature, one recomputes the hash of the message, uses the public key to decrypt the signature and then compares the results.

This algorithm is obsolete.

Digital Signature Standard

[Data Security] A standard for [digital signature](#) that is published by the [National Institute of Standards and Technology](#) (NIST) in [Federal Information Processing Standard](#) (FIPS) Publication 186-4.

DSS specifies [DSA](#) as the algorithm for digital signatures and [SHA-x](#) for hashing.

DIMM

[Hardware] Acronym for [Dual Inline Memory Module](#).

Direct Attached Storage

[Storage System] A [storage device](#) locally connected to a server and dedicated to that [server](#).

direct connected storage

[Storage System] Synonym of [direct attach storage](#).

direct memory access

[Computer System] The ability for an entity to access memory without processing CPU instructions.

direct routing method

[SCSI] A method used by expanders to route connection requests to devices directly attached to that expander, including other expanders.

directory

1. [File System] A mechanism for organizing information. Directories are usually organized hierarchically (i.e., a directory may contain information about files, objects, and other directories) that are used to organize collections of files and other objects for application or human convenience.
2. [File System] A file or other persistent data structure in a file system that contains information about other files.
3. [Management] An LDAP-based repository consisting of class definitions and instances of those classes. Microsoft's Active Directory (AD) and Novell's NetWare Directory Service (NDS) are examples of enterprise-wide LDAP directories.

directory tree

[File System] A collective term for a [directory](#), all of its files, and each of its subdirectories.

Disaster Recovery

[General] The [recovery](#) of data, access to data and associated processing after a loss of use of all or part of a data center.

This involves not only an essential set of data but also an essential set of all the hardware and software to continue processing of that data and business. Any disaster recovery may involve some amount of down time.

discard policy

[Fibre Channel] An error handling [policy](#) that allows an [N_Port](#) or [NL_Port](#) to discard [data frames](#) received following detection of a missing [frame](#) in a [Sequence](#).

disconnection

[Fibre Channel] The process of removing a [dedicated connection](#) between two N_Ports.

discovery

1. [Legal] Process by which each party obtains information held by another party or non-party concerning a matter.
2. [Legal] [ISO/IEC 27050-1] Discovery is applicable more broadly than to parties in adversarial disputes. Discovery is also the disclosure of hardcopy documents, Electronically Stored Information and tangible objects by an adverse party. In some jurisdictions the term disclosure is used interchangeably with discovery.
3. [Computer System] [Management] The process of finding accessible devices, interfaces, and services.
4. [Storage System] The process of finding devices attached to a storage infrastructure.
5. [Network] The process of finding network interfaces in a networking infrastructure.
6. [Services] The process of finding service interfaces.

Discretionary Access Control

[Data Security] A type of [access control](#) that allows a [principal](#) owning an object to grant or deny access to other principals.

disk

[Storage System] Synonym for disk drive.

disk array

[Storage System] A set of disks from one or more commonly accessible disk subsystems, combined with a body of [control software](#).

The control software presents the disks' storage capacity to hosts as one or more virtual disks. Control software is often called [firmware](#) or microcode when it runs in a disk [controller](#). Control software that runs in a [host computer](#) is usually called a [volume manager](#).

disk cache

1. [Storage System] A cache that resides within a disk.
2. [Storage System] A cache that resides in a controller or host. The primary purpose of a disk cache is to improve disk or disk array I/O performance. See controller cache, host cache.

disk drive

[Storage System] A non-volatile, randomly addressable, re-writable data [storage device](#) made up of one or more rotating platters.

This definition includes rotating magnetic and optical disks.

disk image backup

[Data Recovery] A [backup](#) consisting of a copy of each of the blocks comprising the usable storage area of a [storage device](#).

disk striping

[Storage System] Deprecated synonym for [data striping](#).

disk subsystem

[Storage System] A [storage subsystem](#) that supports only [disks](#).

disparity

[Network] For a data stream using [8B/10B encoding](#), the difference between the number of ones and the number of zeros in a [transmission character](#).

disposition

[Legal] Range of processes associated with implementing records retention, destruction or transfer decisions that are documented in disposition authorities or other instruments.

[ISO 15489-1:2016]

disposition policy

[Data Management] A [policy](#) that defines when [lifecycle deletion](#) should occur, and/or what actions to perform.

Distributed FCF

[Fibre Channel] Synonym for [Distributed Switch](#).

Distributed Switch

[Fibre Channel] A set of [FCDFs](#) associated with at least one [Controlling Switch](#) that controls the operations of the set of FCDFs.

DLM

[Data Management] Acronym for [Data Lifecycle Management](#).

DLT

[Storage System] Acronym for [Digital Linear Tape](#).

DMA

[Computer System] Shorthand for [direct memory access](#).

DMTF

[Management] An industry organization that develops management standards for computer system and enterprise environments.

DMTF standards include [CIM](#) and [Redfish](#). The DMTF web site is www.dmtf.org.

DNS

[Network] Acronym for [Domain Name Service](#).

Document Type Definition

[Standards] In [XML](#), a specification of the permissible tags or "markup codes" in a document, and their meanings.

XML tags are delimited by the characters, "<" and ">". When a Document Type Definition (DTD) is available for a document, a universal reader (program) can parse the document and display or print it.

domain

1. [Computer System] A shared user authorization database that contains users, groups, and their security policies.
2. [Fibre Channel] The portion of the Fibre Channel address identifier that represents the highest level in the three-level addressing hierarchy. A domain typically is associated with a single Fibre Channel Switch.
3. [Network] A set of interconnected network elements and addresses that are administered together and that may communicate.
4. [NVMe] The smallest indivisible unit of an NVMe subsystem that has a common state.

domain controller

1. [Operating System] A Windows or Linux server that contains a copy of a user account database. A domain may contain zero or more backup domain controllers and contains a primary domain controller.
2. [Fibre Channel] The control function addressable by an N_Port attached to a Switch using the Domain Controller address identifier of 0xFFFFnn, where nn is the Domain Controller being accessed.

Domain Name Service

[Network] A computer program that converts between [IP](#) addresses and symbolic names for nodes on a network in a standard way.

Domain Name Service ([DNS](#)) is defined by [IETF](#) RFC 1035. Most operating systems include a version of DNS.

DoS

[Data Security] Acronym for [Denial of Service](#).

double buffering

[Computer System] {Historical} A technique used to increase [data transfer rate](#) by keeping two I/O requests outstanding.

Double Data Rate

[Hardware] A type of bus used to connect a memory [DIMM](#) to a [CPU](#).

DPU

[Network] Shorthand for [data processing unit](#)

DR

[General] Acronym for [Disaster Recovery](#).

DRAM

[Hardware] Acronym for [Dynamic Random Access Memory](#).

drive

[Storage System] Synonym for [storage element](#) (e.g., [disk drive](#), solid state drive, or [tape drive](#)).

drive letter

[Windows] A single letter of the alphabet by which applications and users identify a [partition](#) or physical or [virtual disk](#) to the Windows operating system.

driver

[Computer System] A [host computer](#) software component (usually part of an operating system) whose function is to control the operation of peripheral controllers or adapters attached to the host computer.

Drivers manage communication and data transfer between applications and devices.

DSA

[Data Security] Acronym for [Digital Signature Algorithm](#).

DSaaS

[Services] Acronym for [Data Storage as a Service](#).

DSS

[Data Security] Acronym for [Digital Signature Standard](#).

DTD

[General] Acronym for [Document Type Definition](#).

dual active

[Computer System] Synonym for [active-active](#).

Dual Inline Memory Module

[Hardware] A set of random access memory integrated circuits or chips mounted on a circuit board, providing a 64-bit or greater data path using connectors on both sides of a single card edge.

Abbreviated as DIMM.

dual parity

[Storage System] A synonym for RAID 6.

due care

[Data Security] The responsibility that managers and their organizations have a duty to provide for information security to ensure that the type of control, the cost of control, and the deployment of control are appropriate for the system being managed. [NIST SP 800-30]

duplicate

1. [Data Management] A general term for a copy of a collection of data, including point in time copies.
2. [Data Management] The action of making a copy of a collection of data. See replicate, snapshot.
3. [Computer System] Any redundant component in a system.

duplicate data

[Storage System] Data that is [redundant](#) with data that is already in a dataset or I/O stream.

Dynamic Host Control Protocol

[Network] An [Internet protocol](#) that allows nodes to dynamically acquire ("lease") network addresses for periods of time.

Dynamic Host Control Protocol (DHCP) simplifies the administration of networks by avoiding the need to pre-configure nodes.

dynamic mapping

[Storage System] A form of [mapping](#) in which the correspondence between addresses in the two address spaces can change over time.

See [algorithmic mapping](#), [tabular mapping](#).

Dynamic Random Access Memory

[Hardware] Byte-addressable computer memory that requires periodic refreshing.

E

e-discovery

[Legal] Short for electronic discovery.

E_Port

[Fibre Channel] The [port](#) within a [Fibre Channel Switch](#) that connects to another Fibre Channel Switch via an [Inter-Switch Link](#).

E_Ports are used to connect Fibre Channel Switches to form a multi-Switch Fabric.

EAL

[Data Security] Acronym for [Evaluation Assurance Level](#).

EAMR

[Hardware] Acronym for [energy assisted magnetic recording](#).

EB

[General] Shorthand for [exabyte](#).

Ebit

[General] Shorthand for [exabit](#).

Ebyte

[General] Shorthand for [exabyte](#).

ECC

[Data Communication] [Storage System] Acronym for [error correcting code](#).

economizer

1. [Energy] Heat exchanger technology used to leverage colder external air to provide data center cooling. Dry side economizers use cooler outdoor air; wet side economizers use cooling towers or chillers.
2. [Management] An accountant that prevents the use of new technology. (e.g. commonly uses the phrase “It’s out of budget or too expensive”).

EE_credit

[Fibre Channel] A [credit](#) scheme used to manage [end-to-end flow control](#) during the [exchange](#) of [frames](#) between two communicating devices using [Class 2](#) service.

effective capacity

[Storage System] The amount of data stored on a storage system, plus the amount of unused [formatted capacity](#) in that system.

This measure is normally used on systems employing space optimization technologies. On these systems, there is no way to precisely predict the effective capacity.

egress routing function

[Fibre Channel] An entity within a [Routing Function](#) that performs the [egress routing function role](#).

egress routing function role

[Fibre Channel] A process within a [Routing Function](#) that validates the [frame](#), translates the [S_ID](#), and then forwards the frame to the [Native Fabric](#).

EiB

[General] Shorthand for [exbibyte](#).

Eibit

[General] Shorthand for [exbibit](#).

electronic discovery

[Legal] Discovery that includes the identification, preservation, collection, processing, review, analysis, or production of [Electronically Stored Information](#). [ISO/IEC 27050-1]

Although electronic discovery is often considered a legal process, its use is not limited to the legal domain.

Electronically Stored Information

[Legal] Data or information of any kind and from any source, whose temporal existence is evidenced by being stored in, or on, any electronic medium. [ISO/IEC 27040]

Electronically Stored Information (ESI) includes traditional e-mail, memos, letters, spreadsheets, databases, office documents, presentations, and other electronic formats commonly found on a computer. ESI also includes system, application, and file-associated [metadata](#) (3.26) such as timestamps, revision history, file type, etc. Electronic medium can take the form of, but is not limited to, storage devices and storage elements.

embedded controller

[Storage System] A [controller](#) that is a non-removable component within a larger system.

embedded storage controller

[Storage System] An [embedded controller](#) that exclusively performs storage functions.

Emerald

[Storage System] SNIA Emerald™ Power Efficiency Measurement Specification or SNIA Emerald™ Program.

Emerald Specification

[Storage System] SNIA Emerald™ Power Efficiency Measurement Specification [ISO/IEC 24091:2019].

Defines a uniform taxonomy of storage subsystems and a standard way of measuring power efficiency of the storage subsystems defined in the taxonomy. For more detailed information, please consult the SNIA Emerald Program website (<https://www.snia.org/emerald>).

Enc_Header

[Fibre Channel] An encapsulation header used for forwarding [FC](#) frames from a source [Routing Function](#) to a destination Routing Function.

Encapsulating Security Payload

[Data Security] A component of [IPsec](#) that permits the specification of various [confidentiality](#) mechanisms.

encoding

Process of generating transmission characters from data bytes.

encryption

[Data Security] Reversible operation by a cryptographic algorithm converting data into ciphertext so as to hide the information content of the data [ISO/IEC 9798-1:2010]

End-of-frame

[Fibre Channel] A sequence of bits that delineate the end of a [frame](#).

end-to-end encryption

[Data Security] [Encryption](#) of information at its origin and [decryption](#) at its intended destination without intermediate decryption.

end-to-end flow control

1. [Network] Control of message flow between the two end parties of a communication on a network.
2. [Fibre Channel] Flow control that occurs between two communicating [Fibre Channel](#) Nx_Ports.

end-to-end flow control buffer

[Fibre Channel] A buffer associated with [end-to-end flow control](#).

end-to-end security

[Data Security] Safeguarding information in an information system from point of origin to point of destination.
[CNSSI-4009]

energy assisted magnetic recording

[Hardware] A recording technique that directs energy at the media to aid the recording process of an [HDD](#).

energy efficiency

[Computer System] The [power efficiency](#) of a system over time.

While power and energy efficiency look about the same to a layman, the numbers may be different (even neglecting the units) on account of temporal variations in supply voltages, power and load factors and so on.

Enhanced Transmission Selection

[Network] A Data Center Bridging component that specifies a [frame](#) scheduling mechanism to support the allocation of data transmission capacity amongst traffic classes that share a link.

ENode

[Network] [Fibre Channel] Synonym for [FCoE Node](#).

ENode MAC address

[Fibre Channel] The [MAC](#) address used by the ENode during the [FCoE Initialization Protocol](#).

Enterprise Resource Management

[Management] [Network] Software that manages all aspects of an organization's assets, systems, services and functions.

ERM systems manage a set of resources in the wider perspective of an organization's entire business. Managing in an enterprise context requires that entities be named uniquely and locatable within the enterprise, that heterogeneity of platforms and services may be assumed, and that the dynamic nature of the environment is taken into account.

Enterprise Systems Connection

[Storage System] A [serial I/O interconnect](#) used on data center mainframes.

Similar to [Fibre Channel](#) in many respects, ESCON is based on [redundant](#) switches to which computers and storage subsystems connect using serial optical connections.

entropy

[Data Security] A measure of the amount of uncertainty that an attacker faces to determine the value of a secret. [NIST SP 800-63]

The value is sometimes measured in bits of [security strength](#), where a value of 0 indicates no security strength (i.e., full predictability or no randomness) and a positive value indicates increasing security strength.

entry/exit slot

[Storage System] A location in a [library](#) through which a removable [volume](#) can be inserted or removed.

EOF

1. [Fibre Channel] Abbreviation for [End-of-Frame](#).
2. [File System] A designation or marker for the end of a file.

erasure coding

[Data Recovery] An error correcting coding technology.

ERM

[Management] [Network] Acronym for [Enterprise Resource Management](#).

Error Correcting Code

[Data Communication] [Storage System] A scheme for checking the correctness of data and correcting errors in that data.

ESCON

[Storage System] Acronym for [Enterprise Systems Connection](#).

ESI

[Legal] Acronym for [Electronically Stored Information](#).

ESP

[Data Security] Acronym for [Encapsulating Security Payload](#).

Ethernet

[Network] A local area networking technology based on packetized transmissions between physical ports over a variety of electrical and optical [media](#).

Ethernet transports various upper layer protocols, the most popular of which is [TCP/IP](#). Ethernet standards are maintained by the IEEE 802.3 committee.

Ethernet adapter

[Network] An [adapter](#) that connects an [intelligent device](#) to an [Ethernet](#) network, usually called an Ethernet [network interface card](#) or Ethernet [NIC](#).

eventual consistency

A behavior of a distributed system that provides consistency over time but does not provide immediate consistency guarantees.

EVSN

[Data Recovery] Acronym for [External Volume Serial Number](#).

Exabit

[General] Shorthand for 1,000,000,000,000,000 (10¹⁸) bits.

See also [exbibit](#).

Exabyte

[General] Shorthand for 1,152,921,504,606,846,976 (2^{60}) bytes.

Binary notation is commonly used for semiconductor memory sizes.

See also [exabyte](#).

Exbibit

[General] Shorthand for 1,152,921,504,606,846,976 (2^{60}) bits.

Binary notation is most commonly used for semiconductor memory sizes.

See also [Exabit](#).

Exbibyte

[General] Shorthand for 1,152,921,504,606,846,976 (2^{60}) bytes.

Binary notation is most commonly used for semiconductor memory sizes.

See also [Exabyte](#).

Exchange

[Fibre Channel] A set of one or more non-concurrent related [Sequences](#) passing between a pair of [Fibre Channel](#) ports.

An Exchange encapsulates a "conversation". Exchanges may be bidirectional and may be short or long lived.

Exchange_Identifier

[Fibre Channel] A generic term denoting either an [Originator Exchange](#) Identifier ([OX-ID](#)) or a [Responder Exchange Identifier](#) ([RX_ID](#)).

Exchange Status Block

[Fibre Channel] A data structure that contains the state of an [Exchange](#).

An [originator](#) FC_Port has an Originator Exchange Status Block for each concurrently active Exchange and a [responder](#) FC_Port has a Responder Exchange Status Block for each concurrently active Exchange.

expansion card

[Computer System] A term for [optional](#) adapters in the form of printed [circuit](#) modules that can be added to [intelligent devices](#).

Expansion cards include [host bus adapter](#)s, network interface cards, [NVRAM](#), and other special purpose adapters.

expansion module

[Computer System] Synonym for [expansion card](#).

expansion slot

[Computer System] A mounting and internal bus attachment point within an [intelligent device](#) into which [expansion cards](#) are able to be inserted.

expired data

[Data Management] Data that is no longer required to be retained for any reason.

Data may become expired data when it has reached its defined [retention period](#) or when an event makes it obsolete and it has no further value to the organization becoming a candidate for [permanent deletion](#).

See [disposition policy](#).

explicit addressing

[Storage System] A form of [addressing](#) in which the data's address is explicitly specified in the access request.

See [implicit addressing](#).

exploit

[Data Security] A defined way to breach the security of an IT system through a [vulnerability](#).

export

1. [General] To cause to appear or make available.
2. [Computer System] [File System] To move objects, such as data, from within a system to a location outside the system, usually requiring a [transformation](#) during the move. [Disk array control software](#) exports [virtual disks](#) to its [host environment](#). In file systems, a [directory](#) may be exported or made available for access by remote clients.
3. [Legal] To move across international borders.

extended file attribute

[File System] An element of file [metadata](#).

Extended_Header

[Fibre Channel] A sequence of words that may be present in a [frame](#) between the [SOF delimiter](#) and the [Frame_Header](#) to support frame handling functions not enabled by the [Frame_Header](#).

eXtensible Access Method

[Standards] An interface standardized by the SNIA that provides applications with standard methods for storing data and associated [metadata](#) on [fixed content storage](#).

The eXtensible Access Method (XAM) [Application Programming Interface](#) (API) is standardized by SNIA.

eXtensible Markup Language

[Standards] A universal format for structured documents and data on the World Wide Web.

The World Wide Web Consortium is responsible for the eXtensible Markup Language (XML) specification. See www.w3.org.

extent

1. [File System] A set of consecutively addressed blocks that is allocated to a single file.
2. [Storage System] A set of consecutively located tracks on a [CKD](#) disk that is allocated to a single file.
3. [Storage System] A set of consecutively addressed blocks that is part of a single [virtual disk](#). A single [storage device](#) may be organized into multiple extents of different sizes, and may have multiple (possibly) non-adjacent extents that are part of the same virtual disk-to-member disk array mapping. This type of extent is sometimes called a [logical disk](#).

external controller

[Storage System] An intelligent [controller](#) that exists outside the [host computer](#) enclosure and attaches via external connections.

external disk controller

[Storage System] Synonym for [external storage controller](#).

external storage controller

[Storage System] A type of [external controller](#) used to control storage.

External storage controllers usually mount in the enclosure containing the disks they control and may be a component of a [disk array](#).

External Volume Serial Number

[Data Recovery] A human-readable [volume serial](#) number on a removable volume.

eye

[Data Communication] The center region of an [eye diagram](#) that does not occur for correctly formed signals, that distinguishes presence of signal (region above the eye) from absence of signal (region below the eye).

eye diagram

[Data Communication] A diagram used to specify optical or electrical signal transition characteristics for transmitters, in which the horizontal axis represents normalized time from pulse start and the vertical axis represents normalized amplitude.

eye opening

[Data Communication] Quantitative measure of the space in an [eye diagram](#) that does not occur for correctly formed signal transitions, and that prevents signal values from incorrectly being identified as high or low.

F

F_ID

[Fibre Channel] Abbreviation for [Fabric_Identifier](#).

F_Port

[Fibre Channel] A [port](#) within a [Fibre Channel Switch](#) that provides a point-to-point [link](#) attachment to a single [PN_Port](#).

An F_Port is assumed to always refer to a port to which non-loop PN_Ports are attached to a [Fibre Channel Fabric](#), and does not include [FL_Ports](#).

F_Port Name

[Fibre Channel] A [Name-Identifier](#) associated with an [F-Port](#).

fabric

[Network] Synonym for a [network](#).

Fabric_Identifier

An identifier assigned to each Fabric in an [Inter-Fabric Routing](#) environment.

Fabric Login

[Fibre Channel] The process by which a [Fibre Channel node](#) establishes a logical [connection](#) to a [Fibre Channel Fabric](#) Switch.

Fabric_Name

[Fibre Channel] A [Name_Identifier](#) associated with a [Fibre Channel Fabric](#).

Fabric Provided MAC Address

[Network] A [MAC](#) address that is assigned by an FCF and is fabric-wide unique.

failback

[Computer System] The [restoration](#) of a failed system component's share of a load to a replacement component after a failback event.

When a failed [controller](#) in a [redundant configuration](#) is replaced, the devices that were originally controlled by the failed controller are usually failed back to the replacement controller to restore the I/O balance, and to restore [failure tolerance](#). Similarly, when a defective fan or [power supply](#) is replaced, its load, previously borne by a redundant component can be failed back to the replacement part.

failed over

[Computer System] A [mode of operation](#) for failure tolerant systems in which a component has failed and its function has been assumed by a [redundant](#) component.

A system that protects against single failures operating in failed over mode may not be failure tolerant, since failure of the redundant component may render the system unable to function. Some systems (e.g., clusters) are able to tolerate more than one failure; these remain failure tolerant until no redundant component is available to protect against further failures.

failover

[Computer System] The automatic [substitution](#) of a functionally equivalent system component for a failed one.

The term failover is most often applied to intelligent controllers connected to the same storage devices and host computers. If one of the controllers fails, failover occurs, and the survivor takes over its [I/O load](#).

failure tolerance

[Computer System] Synonym for [fault tolerance](#).

fanout

[Storage System] The number of storage devices to which a storage controller is connected.

fast SCSI

[SCSI] A form of [SCSI](#) that provides 10 megatransfers per second.

Wide fast SCSI has a 16-bit data path, and transfers 20 MBytes per second. Narrow fast SCSI transfers 10 MBytes per second. See [wide SCSI](#), [Ultra SCSI](#), [Ultra2 SCSI](#), [Ultra3 SCSI](#).

fault domain

[Hardware] A set of hardware components that share a [single point of failure](#).

fault tolerance

[Computer System] The ability of a system to continue to perform its function (possibly at a reduced performance level) when one or more of its components has failed.

Fault tolerance in disk subsystems is often achieved by including [redundant](#) instances of components whose failure would make the system inoperable, coupled with facilities that allow the [redundant components](#) to assume the function of failed ones.

FBA

[Storage System] Acronym for [Fixed Block Architecture](#). Acronym for Fixed Block Address.

FC

[Fibre Channel] Abbreviation for [Fibre Channel](#).

FC-0

[Fibre Channel] The level that encompasses the physical characteristics of the interface and data transmission [media](#).

FC-1

[Fibre Channel] The level that encompasses the [encoding](#) and transmission protocol.

FC-2

[Fibre Channel] The level that encompasses signaling protocol rules and the organization of data into [frames](#), [Sequences](#), and [Exchanges](#).

FC-2M

[Fibre Channel] The sublevel that routes [frames](#) between [VN_Ports](#) and [Link Control Facilities](#), based on the [D_ID](#) in the [Frame_Header](#) and the [VF_ID](#) in the [VFT_Header](#) if there is a VFT_Header.

FC-2P

[Fibre Channel] The physical sublevel that defines the rules and provides mechanisms that shall be used to transfer [frames](#) via the [FC-1](#) level.

FC-2V

[Fibre Channel] The virtual sublevel that defines functions and facilities that a [VN_Port](#) may provide for use by an [FC-4](#) level, regardless of the [FC-1](#) that is used.

FC-3

[Fibre Channel] The level that defines a set of services that are available in a Fabric.

FC-4

[Fibre Channel] The level that encompasses the [mapping](#) of upper layer protocols ([ULP](#)) such as [IP](#) and [SCSI](#) to lower protocol layers ([FC-0](#) through [FC-3](#)).

Examples of FC-4 standards are the mapping of SCSI commands to Fibre Channel ([FCP](#)), mapping of Single-Byte Command Code Sets (FC-SB), and the mapping of [NVMe](#) to Fibre Channel (FC-NVMe-3).

FC-AE

[Fibre Channel] Shorthand for [Fibre Channel Avionics Environment](#).

FC-AL

[Fibre Channel] Shorthand for [Fibre Channel Arbitrated Loop](#).

When used with a number, the number (e.g., FC-AL-2) denotes a version of the standard.

FC-AV

[Fibre Channel] Shorthand for [Fibre Channel Audio Video](#).

FC-BB

[Fibre Channel] Shorthand for [Fibre Channel Backbone](#).

When used with a number, the number (e.g., FC-BB-6) denotes a version of the standard.

FC-DA

[Fibre Channel] Shorthand for [Fibre Channel Device Attach](#).

When used with a number, the number (e.g., FC-DA-2) denotes a version of the standard.

FC Entity

[Fibre Channel] The interface between a [Fibre Channel Switch](#) or a Fibre Channel stack and the [FCoE Entity](#).

Each FC Entity contains a single instance of either a [VE_Port](#), a [VF_Port](#), or a [VN_Port](#).

FC-FS

[Fibre Channel] Shorthand for [Fibre Channel Framing and Signaling](#).

When used with a number, the number (e.g., FC-FS-4) denotes a version of the standard.

FC-FS-4

Shorthand for [Fibre Channel Framing and Signaling](#).

When used, the number denotes a version of the spec. The listed version is current as of this writing.

FC-GS

[Fibre Channel] Shorthand for [Fibre Channel Generic Services](#).

When used with a number, the number (e.g., FC-GS-8) denotes a version of the standard.

FC-IFR

[Fibre Channel] Shorthand for [Fibre Channel Inter-Fabric Routing](#).

This standard is maintained by the [INCITS Fibre Channel \(T11\) Technical Committee](#).

FC-LS

[Fibre Channel] Shorthand for [Fibre Channel Link Services](#).

When used with a number, the number (e.g., FC-LS-4) denotes a version of the standard.

FC-MI

[Fibre Channel] Shorthand for [Fibre Channel Methodologies for Interconnects](#).

When used with a number, the number (e.g., FC-MI-3) denotes a version of the standard.

FC-NVMe

[Fibre Channel] Shorthand for [Fibre Channel NVMe](#).

When used with a number, the number (e.g., FC-NVMe-3) denotes a version of the standard.

FC_NVMe association

[Fibre Channel] An NVMe/FC layer abstraction specified by [FC-NVMe](#) for an exclusive communication relationship between an [NVMe host](#) and an NVMe controller connected by an [initiator NVMe_Port](#) and a [target NVMe_Port](#).

FC_NVMe connection

[Fibre Channel] An NVMe/FC layer abstraction representing an [NVMe Submission Queue](#) and [NVMe Completion Queue](#) pair.

FC_NVMe I/O operation

[Fibre Channel] A Fibre Channel Exchange that is uniquely associated with an [NVMe command](#).

FC_NVMe port

[Fibre Channel] An [NVMe_Port](#) connecting one or more [NVMe hosts](#) or [NVM subsystems](#) in a [Fibre Channel](#) environment.

FC-PI

[Fibre Channel] Shorthand for [Fibre Channel Physical Interface](#).

When used with a number, the number (e.g., FC-PI-7) denotes a version of the standard.

FC_Port

[Fibre Channel] A [port](#) that is capable of transmitting and receiving [Fibre Channel](#) frames according to the [FC-0](#), [FC-1](#), [FC-2](#), and [FC-3](#) levels of the Fibre Channel standards.

An FC_Port includes an [LCF](#). The following are examples of FC_Ports: N_Ports, F_Ports, E_Ports, and B_Ports.

FC-SB

[Fibre Channel] Shorthand for [Fibre Channel Single Byte command sets](#).

When used with a number, the number (e.g., FC-SB-6) denotes a version of the standard.

FC-SP

[Fibre Channel] Shorthand for [Fibre Channel Security Protocols](#).

When used with a number, the number (e.g., FC-SP-2) denotes a version of the standard.

FC-SW

[Fibre Channel] Shorthand for [Fibre Channel Switch Fabric](#).

FC-VI

[Fibre Channel] Shorthand for [Fibre Channel Virtual Interface](#).

This standard is maintained by the [INCITS Fibre Channel \(T11\) Technical Committee](#).

FCDF

1. Shorthand for [Fibre Channel Data-Plane Forwarder](#)
2. [Fibre Channel] Shorthand for [Fibre Channel Data-Plane Forwarder](#).

FCF

[Network] [Fibre Channel] Shorthand for [FCoE Forwarder](#).

FCIA

[Fibre Channel] Shorthand for [Fibre Channel Industry Association](#).

FCoE

[Network] Acronym for [Fibre Channel over Ethernet](#).

FCoE Controller

[Network] [Fibre Channel] A functional entity, coupled with a [Lossless Ethernet MAC](#), that instantiates [VE_Ports](#), [VF_Ports](#), and [VN_Ports](#), and/or creates [FCoE_LEPs](#).

FCoE Entity

[Network] [Fibre Channel] The interface between the [FC Entity](#) and a [Lossless Ethernet MAC](#). Each [FCoE](#) Entity contains one or more [FCoE_LEPs](#).

FCoE Forwarder

[Network] [Fibre Channel] An element of a [Fibre Channel Switch](#) with one or more [lossless Ethernet MACs](#), each coupled with an [FCoE Controller](#).

An FCoE Forwarder (FCF) forwards FCoE frames based on the [D_ID](#) of the encapsulated [Fibre Channel](#) frames. An FCoE Forwarder may contain one or more Lossless Ethernet bridging elements and may contain a [Fibre Channel Fabric](#) interface.

FCoE Initialization Protocol

[Network] [Fibre Channel] A [protocol](#) that enables the [discovery](#), [initialization](#), and [link](#) maintenance of [FCoE](#) devices.

FCoE_LEP

[Network] [Fibre Channel] Shorthand for [FCoE Link Endpoint](#).

FCoE Link Endpoint

[Network] [Fibre Channel] The data forwarding component of an [FCoE Entity](#) that handles Fibre Channel frame encapsulation/decapsulation, and transmission/reception of the encapsulated frames through a single [Virtual Link](#).

FCoE Node

[Network] [Fibre Channel] A [Fibre Channel Node](#) with one or more [lossless Ethernet MACs](#), each coupled with an [FCoE Controller](#).

FCP

[Fibre Channel] Shorthand for [Fibre Channel Protocol for SCSI](#)

When used with a number, the number (e.g., FCP-2) denotes a version of the standard.

FEC

[Data Communication] Synonym for [forward error correction](#).

Federal Information Processing Standard

[Data Security] Standards (and guidelines) produced by [NIST](#) for government-wide use in the specification and procurement of Federal computer systems.

Fiber Distributed Data Interface

[Network] An [ANSI](#) standard for a [token ring](#) Metropolitan Area Networks (MANs), based on the use of optical fiber cable to transmit data at a rate of 100 Mbits/second.

Both optical fiber and twisted copper pair variations of the FDDI physical standard exist. FDDI is a completely separate set of standards from [Fibre Channel](#). The two are not directly interoperable.

fibres

The international spelling of the American word fiber.

The British spelling was selected for the [Fibre Channel](#) technology, though the American spelling is used to describe the fiber optic technologies defined for Fibre Channel.

Fibre Channel

[Fibre Channel] A [serial I/O interconnect](#) capable of supporting multiple protocols.

Protocols supported include FCP, [FICON](#), and IP.

Fibre Channel (FC) supports switched, point-to-point, and [Arbitrated Loop](#) topologies with a variety of copper and optical [links](#) running at speeds from 1 [Gb/s](#) to 128 Gb/s. The committee standardizing Fibre Channel is the [INCITS Fibre Channel \(T11\) Technical Committee](#).

Fibre Channel Arbitrated Loop

[Fibre Channel] A form of [Fibre Channel interconnect](#) in which up to 126 nodes are connected in a loop [topology](#), with each node's [L_Port transmitter](#) connecting to the L_Port [receiver](#) of the next node on the loop.

The network is defined by the FC-AL standard.

Fibre Channel Audio Video

[Fibre Channel] The standard that defines the mapping of digital audio and video formats to [Fibre Channel](#).

This standard is maintained by the [INCITS Fibre Channel \(T11\) Technical Committee](#).

Fibre Channel Avionics Environment

[Fibre Channel] The technical report describing a specific subset of [Fibre Channel](#) for use in defense and avionic applications.

Fibre Channel Backbone

[Network] [Fibre Channel] Standard that defines mappings for transporting [Fibre Channel](#) over different network technologies, including operation of [Fibre Channel over Ethernet](#) (FCoE).

Fibre Channel Data-Plane Forwarder

[Fibre Channel] A simplified [Fibre Channel Switch](#) that forwards [Fibre Channel frames](#) via [A_Ports](#) and [F_Ports](#) through an FCDF switching element.

Fibre Channel Device Attach

[Fibre Channel] A technical report that selects and restricts logical options from the [Fibre Channel Framing and Signaling](#), [Fibre Channel Protocol for SCSI](#), [Fibre Channel Arbitrated Loop](#), [Fibre Channel Generic Services](#), and [Fibre Channel Single Byte Command Set](#) standards.

Fibre Channel Device Attach (FC-DA) standardization is the responsibility of the [INCITS Fibre Channel \(T11\) Technical Committee](#)

Fibre Channel Fabric

[Fibre Channel] A [fabric](#) composed of [Fibre Channel](#) entities.

Fibre Channel Framing and Signaling

[Fibre Channel] A standard describing the framing and signaling requirements for [Fibre Channel links](#).

Fibre Channel Generic Services

[Fibre Channel] A standard describing in detail the Generic Services used for Fibre Channel management.

Fibre Channel Generic Services include name services, management services, and discovery services.

Fibre Channel Industry Association

[Fibre Channel] A trade association that promotes all forms of [Fibre Channel](#) technology.

See www.fcia.org.

Fibre Channel Inter-Fabric Routing

[Fibre Channel] A standard that specifies a set of protocols and methods to enable selective communication among [Nx_Ports](#) connected to different [Fibre Channel Fabrics](#).

Fibre Channel Interaction Space

The set of [Fibre Channel](#) ports, devices, and Fabrics that are connected by Fibre Channel links or are accessible by a common instance of an administrative tool or tools.

Fibre Channel Link Services

[Fibre Channel] A series of standards describing the functions that support [Fibre Channel links](#).

Fibre Channel Methodologies for Interconnects

[Fibre Channel] A technical report specifying common methodologies for both switched and [Arbitrated Loop](#) environments, with the intention of facilitating [interoperability](#) between devices whether they are connected in a loop or [Fibre Channel Fabric topology](#).

Fibre Channel NVMe

[Fibre Channel] A series of standards that define the requirements for operation of the [NVMe](#) protocol in a Fibre Channel environment.

Fibre Channel over Ethernet

[Network] [Fibre Channel] A technology that encapsulates [Fibre Channel frames](#) in [Ethernet](#) frames, allowing Fibre Channel traffic to be transported over Ethernet networks.

Fibre Channel Physical Interface

[Fibre Channel] The standard that describes the point-to-point physical interface of a high-performance [serial link](#) for support of the higher level protocols associated with [HIPPI](#), [IPI](#), [SCSI](#), and others.

Fibre Channel Protocol for SCSI

[Fibre Channel] The standard that defines the mapping of [SCSI](#) over [Fibre Channel](#).

Fibre Channel Protocol for SCSI (FCP) standardization is the responsibility of the [INCITS T10](#) committee.

Fibre Channel Security Protocols

[Fibre Channel] The standard that describe the protocols used to implement security in a [Fibre Channel Fabric](#).

This standard includes the definition of protocols to authenticate [Fibre Channel](#) entities, protocols to set up session keys, protocols to negotiate the parameters required to ensure frame-by-frame [integrity](#) and [confidentiality](#), and protocols to establish and distribute policies across a Fibre Channel Fabric.

Fibre Channel Service Protocol

A [FC-4 protocol](#) that defines all services independently of [topology](#) or fabric type.

Fibre Channel Single Byte

[Fibre Channel] The industry standard command [protocol](#) for [ESCON](#) over [Fibre Channel](#).

This is also referred to as FICON.

Fibre Channel Switch

[Fibre Channel] An entity that routes [frames](#) in a [Fibre Channel Fabric](#).

Fibre Channel Switch Fabric

[Fibre Channel] The series of standards that describe the requirements for an interconnecting [Fibre Channel Fabric](#) consisting of one or more [Fibre Channel Switches](#) that support the [Fibre Channel](#) protocols.

Fibre Channel Virtual Interface

[Fibre Channel] A standard for application-level distributed interprocess communication.

The standard is based on Intel Corporation's V1.0 Virtual Interface (VI) Architecture formerly known as VIA.

Fibre Connection

[Fibre Channel] IBM Corporation's implementation of the [Fibre Channel Single Byte](#) Command Set standards.

FICON

[Fibre Channel] IBM Corporation's implementation of the [Fibre Channel Single Byte Command Set](#) standards.

FICON was developed to provide a [Fibre Channel](#) compatible implementation of Enterprise Systems Connection ([ESCON](#)).

Field Programable Gate Array

[Hardware] An integrated circuit composed of an array of transistors that may be programmed after manufacture to perform a specific function.

field replaceable unit

[Computer System] A unit or component of a system that is designed to be replaced at a customer location.

A field replaceable unit (FRU) may either be customer-replaceable or replacement may require trained service personnel.

file

[File System] An abstract data object made up of (a.) data bytes stored on a [storage element](#), (b.) a symbolic name by which the object can be uniquely identified, and (c.) a set of properties that allow the object to be managed.

A file may be created and deleted and, in most file systems, be extended or contracted in size during its lifetime.

file extent

[File System] A logically contiguous region of file data.

file level deduplication

[File System] Reduction of the number of copies of a file by replacing duplicate copies with pointers to a single copy of the file.

See [data deduplication](#).

file mark

[Storage System] A data separator within a [volume](#).

Commonly used to indicate the boundary between files on a tape.

file server

[File System] A computer that serves [files](#) to [clients](#).

A file [server](#) may be a general purpose computer that is capable of hosting additional applications or a special purpose computer capable only of serving files (see [filer](#)).

file storage

[Storage System] A method of storing data as [files](#).

See block storage.

file system

[File System] A software component that imposes structure on the address space of one or more storage elements or [virtual disks](#) so that applications may deal with [files](#).

File systems are often supplied as operating system components, but are also implemented and marketed as independent software components.

file system virtualization

[File System] The act of aggregating multiple file systems into one virtual [file system](#).

Users access data objects through the virtual file system and are unaware of the underlying file systems.

The act of providing different functionality, e.g., a different file access [protocol](#), on top of one or more existing file systems.

file virtualization

[File System] The use of [virtualization](#) to present several underlying file or [directory](#) objects as one single composite file.

The use of virtualization to provide [HSM](#) like properties in a storage system.

The use of virtualization to present an integrated file interface where file data and [metadata](#) are managed separately in the storage system.

filer

[File System] An intelligent network [node](#) whose hardware and software are designed to provide file services to [client](#) computers.

Filers are pre-programmed by vendors to provide file services. See [appliance](#), [file server](#).

filesystem

[File System] Synonym for [file system](#).

Fill Word

[Fibre Channel] A [transmission word](#) that is an [idle](#) or an ARBx [primitive signal](#).

Fill words are transmitted between frames, primitive signals, and [Primitive Sequences](#) to keep a [Fibre Channel](#) network active.

FIM

[Data Recovery] Acronym for [Frozen Image Method](#).

fingerprint

[Storage System] An identifier derived from the data, used to detect [redundancy](#).

FIPS

[Data Security] Acronym for [Federal Information Processing Standard](#).

firmware

[Computer System] Low-level software for booting and operating an [intelligent device](#).

Firmware generally resides in read-only memory (ROM) on the device.

First Burst

An optimization for the transmission, by an initiator, of the first DATA [IU](#) in a Data Series for a write operation.

Fixed Block Architecture

[Storage System] A data layout model in which storage space is organized as linear, dense address spaces of blocks of a fixed size.

Fixed block architecture is the disk model on which [SCSI](#) is predicated. See [count-key-data](#) for an alternate approach.

fixed content

[Data Management] Content that does not change.

Content that is prevented from changes by the storage container in which it is kept.

fixed content storage

[Storage System] Storage systems and technology specialized for storing [fixed content](#) .

fixed-length segmentation

[Storage System] [Partitioning](#) a byte stream into parts that are a constant number of bytes when performing [compression](#) or [hash-based data deduplication](#).

See [variable-length segmentation](#) for an alternative method.

FL_Port

[Fibre Channel] A [Fibre Channel Fabric](#) Loop port within a [Fibre Channel Switch](#), capable of [Fibre Channel Arbitrated Loop](#) operations and connected to one or more [NL_Ports](#) via a Fibre Channel Arbitrated Loop.

flash

Shorthand for [flash memory](#).

flash array

[Storage System] Synonym for solid state storage [array](#).

flash memory

[Hardware] A type of non-volatile memory used in solid state storage.

flash memory array

[Storage System] Synonym for [solid state storage array](#).

FLOGI

[Fibre Channel] Acronym for [Fabric LOGIn](#).

flywheel UPS

[Energy] A [UPS](#) that uses the momentum of a spinning disk or wheel to temporarily generate electricity in the event of a power failure.

Flywheel energy storage technology provides a bridge between normal power distribution and backup diesel generators and can replace conventional battery rooms.

FOB

[Solid State] The Fresh (new) Out-of-the-Box state of an [FRU](#).

Used in reference to flash storage.

forensic copy

[Data Security] An accurate bit-for-bit reproduction of the information contained on an electronic device or associated media, whose validity and integrity has been verified using an accepted algorithm. [NIST SP 800-72]

formatted capacity

[Storage System] The total amount of bytes available to be written after a system or device has been formatted for use.

Formatted capacity, also called [usable capacity](#), is less than or equal to [raw capacity](#). It does not include areas set aside for system use, spares, [RAID](#) parity areas, [checksum](#) space, host- or [filesystem-level remapping](#), "[right sizing](#)" of disks, [disk labeling and so on](#). However, it may include areas that are normally reserved—such as [snapshot](#) set-asides—if they can alternatively be configured for ordinary data storage by the storage admin.

formatting

[Storage System] The preparation of a [device](#) for use by writing required information on the [media](#).

Device controllers format devices by writing [block](#) header and trailer information for every block on the device. Host software components such as [volume](#) managers and file systems format devices by writing the initial structural information required for the volume or [file system](#) to be populated with data and managed.

forward error correction

[Data Communication] A set of algorithms that perform corrections on received data.

FPGA

[Hardware] Acronym for Field [Programable Gate Array](#).

FPMA

[Fibre Channel] Abbreviation for [Fabric Provided MAC Address](#).

frame

1. [Network] The basic unit of data transmission in a network.
2. [Fibre Channel] The basic unit of data transmission in a Fibre Channel network. In Fibre Channel, a frame consists of: a Start-of-Frame (SOF), frame headers, data, a CRC, and an End-of-Frame (EOF). See data frame.

frame content

[Fibre Channel] The information contained in a [frame](#) between its [Start-of-Frame](#) and [End-of-Frame](#).

Frame_Header

[Fibre Channel] A sequence of words in a [frame](#) that contain routing and identification information.

The Frame_Header follows the [SOF delimiter](#) and any [Extended_Headers](#) in a [frame](#).

Frame Scrambling

[Fibre Channel] [Encoding frame content](#) to minimize repetitive bit sequences.

Frame Scrambling is used to lower the electromagnetic emission from [Fibre Channel](#) equipment.

free capacity

Deprecated synonym for [free space](#).

free space

1. [Storage System] [Data Management] The amount of capacity reported to an end user as unused [assigned capacity](#). In a simple world, free space is normally the same as assigned capacity less the amount of assigned capacity already written. But restrictions such as quotas, thin provisioning, and interactions between systems using different arithmetic may cause the reported free space to vary from the actual quantity.
2. [Storage System] [Data Management] The amount of capacity reported to the storage admin as unused [formatted capacity](#).

Front Domain

[Fibre Channel] A [domain](#) presented by a [Front Domain Switch](#).

Front Domain Switch

[Fibre Channel] A [Fibre Channel Switch](#) within an [Inter-Fabric Router](#) that provides connectivity to the [Fibre Channel Fabrics](#) that are interconnected by the Inter-Fabric Router.

frozen image

[Data Recovery] Synonym for [point in time copy](#).

FRU

[Computer System] Acronym for [field replaceable unit](#).

FSP

Acronym for [Fibre Channel Service Protocol](#).

full backup

[Data Recovery] A [backup](#) in which all of a defined set of data objects are copied, regardless of whether they have been modified since the last backup.

A full backup is the basis from which incremental backups are taken. See [cumulative incremental backup](#), [differential incremental backup](#).

full duplex

[Data Communication] Concurrent transmission and reception of data on a single link.

Fx_Port

[Fibre Channel] A [Fibre Channel Switch port](#) capable of operating as an [F_Port](#) or [FL_Port](#).

G

G_Port

[Fibre Channel] A generic [Fibre Channel Switch port](#) that is able to operate as an [A_Port](#), [E_Port](#), or an [F_Port](#).

The operating mode of the G_Port is determined during Fibre Channel Switch port [initialization](#).

garbage collection

[Computer System] The process of reclaiming resources that are no longer in use.

Garbage collection has uses in many aspects of computing and storage. See also [trim](#).

gateway

[Network] A device that receives data via one [port](#) and transmits it via another port.

This may involve the use of different [protocols](#) on each port.

Gb / Gbit

[General] Shorthand for [Gigabit](#).

GB / GByte

[General] Shorthand for [Gigabyte](#).

GB/W

[General] Short for [Gigabytes](#) gigabytes per watt.

GB/W is a metric for evaluating the storage capacity provided per unit of power.

GBE

[Network] Synonym for [Gigabit Ethernet](#).

GBIC

[Network] [Fibre Channel] Acronym for [gigabit interface converter](#).

Gbps

[General] [General] gigabits per second.

A measure of data transfer rate.

The base 10 notation is at times misused to represent the base 2 notation (i.e., gigabits/sec (10⁹ bits/sec) used when gibibits/sec (2³⁰ bits/sec) is intended).

Gbps/W

[General] Short for [Gigabits](#) per second per watt.

Gbps/W is a metric for evaluating data transfer rate provided per unit of power.

geometry

[Storage System] The mathematical description of the layout of blocks on a disk.

The primary aspects of a disk's geometry are the number of recording bands and the number of tracks and blocks per track in each, the number of data tracks per cylinder, and the number and layout of [spare](#) blocks [reserved](#) to compensate for [media](#) defects.

GFC

[Fibre Channel] The defined label associated with a Fibre Channel speed.

Examples include 32GFC, 64GFC, and 128GFC.

GiB

[General] Synonym for [Gibibyte](#).

GiB/W

[General] Short for gibibytes per watt.

GiB/W measures capacity in units of 230 bytes/watt, while GB/W uses units of 109 bytes/watt.

Gibibit

[General] Shorthand for 1,073,741,824 (2^{30}) bits.

See also [gigabit](#).

Gibibyte

[General] Shorthand for 1,073,741,824 (2^{30}) bytes.

Binary notation is commonly used for semiconductor memory sizes.

See also [gigabyte](#).

Gibit

[General] Synonym for [Gibibit](#).

Gibps/W

[General] Short for [gibibits](#) per second per watt.

Gibps/W measures data transfer rate in units of 230 bits/second/watt, in contrast to Gbps/W, which measures it in units of 109 bits/second/watt.

GiByte

[General] Synonym for [gibibyte](#).

GID

[Management] [Data Security] Abbreviation for "[group identifier](#)" (Group Identifier).

Gigabit

[General] Shorthand for 1,000,000,000 (10^9) bits.

Gigabit Ethernet

[Network] A group of [Ethernet](#) standards that define the transmission of data at 1 [Gbit](#) per second.

Gigabit Ethernet (GBE) standards are defined by IEEE 802.3.

gigabit interface converter

[Network] [Fibre Channel] A [transceiver](#) that converts between electrical signals internal to a device and the external optical or electrical interface of that device.

These devices are obsolete and have been replaced by other devices, including [SFP](#), SFP+, and XFP.

Gigabyte

[General] Shorthand for 1,000,000,000 (10^9) bytes.

The SNIA uses the base 10 convention commonly found in I/O-related and scientific literature rather than the base 2 convention (1,073,741,824, i.e., 2^{30}) common in computer system and software literature.

See also [gibibyte](#).

GL_Port

[Fibre Channel] A generic loop port that is able to operate as an [A_Port](#), [E_Port](#), [F_Port](#) or [FL_Port](#).

The operating mode of the GL_Port is determined during [Fibre Channel Switch](#) port [initialization](#).

Graphical User Interface

[Computer System] A form of user interface to intelligent devices characterized by pictorial displays and highly structured, forms oriented input.

A GUI is valued for perceived ease of use compared with a [command line interface](#).

Green Storage Initiative

[Standards] [Energy] An initiative within the SNIA with a special interest in marketing, education, promotion and development of green storage technologies and support for the technical work of the Green Storage [TWG](#).

greenwashing

[Energy] A result of excessive marketing and ineffective engineering.

In fond memory of Tom Clark, who penned this definition ca. 2008.

Group Identifier

[Data Security] A collection of computer user identifiers and possibly other group identifiers used as a convenience in assigning resource access rights or [operational](#) privileges.

groupid

[Data Security] Shorthand for [group identifier](#).

GSI

[Standards] Acronym for the SNIA [Green Storage Initiative](#).

GSN

[Network] Acronym for [Gigabyte System Network](#).

GUI

[Computer System] Acronym for [Graphical User Interface](#).

H

hacker

[Data Security] An unauthorized user who attempts to gain and/or succeeds in gaining access to an [information system](#).

halt

[Computer System] To stop all activity in a computer system in an orderly manner.

halt and catch fire

[Computer System] To stop all activity in a computer system in a disorderly manner.

HAMR

[Hardware] Acronym for [heat assisted magnetic recording](#)

Hard Disk Drive

[Storage System] Rotating magnetic non-volatile [disk drive](#).

hard link

[File System] A path that provides a different name for a file.

Hard links are independent references to the same file; the file content is not deleted until every hard link to the file is deleted.

Hard Zone

[Fibre Channel] A [zone](#) consisting of zone members that are permitted to communicate with one another via the [Fibre Channel Fabric](#) where the zoning is enforced by hardware.

See [zone](#), [Soft Zone](#).

hash-based data deduplication

[Storage System] A method of performing [data deduplication](#) by calculating and comparing hash values.

See [delta-based data deduplication](#).

hash value

[Data Management] A value deterministically derived from data and assumed to be unique enough within the [domain](#) of that data for the purposes of its application.

Hashed Message Authentication Code

[Data Security] A value calculated over the contents of a message (usually using a cryptographic hash algorithm) that can be used to demonstrate that the contents of the message have not been changed during transmission.

HBA

[Computer System] Acronym for [Host Bus Adapter](#).

HDD

[Storage System] Acronym for Hard Disk Drive

head

[Hardware] Synonym for [Read/Write head](#).

heat assisted magnetic recording

[Hardware] A recording technique that directs heat at the media to aid the recording process of an [HDD](#).

heuristic

[General] An approximation for a calculation that is too expensive to perform in its entirety.

hierarchical storage management

[Data Management] The automated [migration](#) of data objects among storage devices, usually based on inactivity.

Hierarchical storage management (HSM) is based on the concept of a cost-performance storage hierarchy. By accepting lower access performance (higher access times), one can store objects less expensively. By automatically moving less frequently accessed objects to lower levels in the hierarchy, higher cost storage is freed for more active objects, and a better overall cost to performance ratio is achieved.

High Availability

[Computer System] The ability of a system to perform its function continuously (without interruption) for a significantly longer period of time than the reliabilities of its individual components would suggest.

High [availability](#) (HA) is most often achieved through [failure tolerance](#). High availability is not an easily quantifiable term. Both the bounds of a system that is called highly available and the degree to which its availability is extraordinary must be clearly understood on a case-by-case basis.

High Performance Parallel Interface

[Network] [Standards] An obsolete [ANSI](#) standard.

HIPPI

[Network] [Standards] Acronym for [High Performance Parallel Interface](#).

HMAC

[Data Security] Acronym for [Hashed Message Authentication Code](#).

host

[Computer System] Synonym for [host computer](#).

host adapter

[Computer System] Synonym for [host bus adapter](#).

host based array

[Storage System] A [disk array](#) whose [control software](#) executes in one or more host computers rather than in a disk [controller](#).

The [member](#) disks of a host-based array may be part of different disk subsystems. See [controller based array](#).

host based disk array

[Storage System] Synonym for [host based array](#).

host based virtualization

[Computer System] [Virtualization](#) implemented in a [host computer](#).

host bus

[Computer System] Synonym for [host I/O interconnect](#).

Host Bus Adapter

[Computer System] An [I/O adapter](#) that connects a [host computer](#) bus to an [I/O interconnect](#).

[HBA](#) is the preferred term for [Fibre Channel](#) and [SAS](#) interconnects.

host cache

[Storage System] A [cache](#) that resides within a [host computer](#) whose primary purpose is to improve disk or [array](#) I/O performance.

Host cache may be associated with a [file system](#) or database, in which case, the data items stored in the cache are file or database entities. Alternatively, host cache may be associated with the device [driver](#) stack, in which case the cached data items are sequences of disk blocks. See [cache](#), [controller cache](#), [disk cache](#).

host computer

[Computer System] Any computer system to which disks, disk subsystems, or file servers may be attached and accessible for data storage and I/O.

Mainframes, servers, workstations and personal computers, as well as multiprocessors and clustered computer complexes, are all referred to as host computers in SNIA publications.

host I/O interconnect

[Computer System] An I/O interconnect used to connect a [host computer](#)'s [host bus adapter](#) to storage subsystems or storage devices.

See [I/O interconnect](#), [channel](#).

hot aisle/cold aisle

[Energy] Arranging Data Center IT equipment in racks such that heat is exhausted in designated aisles while cool air is supplied in the alternating aisles.

hot backup

[Data Recovery] Synonym for [online backup](#).

See [cold backup](#), [offline backup](#).

hot band

[Storage System] A range of storage addresses that are accessed with relatively high frequency.

hot banding

[Storage System] The use of hot bands in a workload for test purposes to reward cache behavior.

hot disk

[Storage System] A disk whose capacity to execute I/O requests is saturated by the aggregate [I/O load](#) directed to it from one or more applications.

hot file

[File System] A frequently accessed file.

Hot files are generally the root cause of hot disks, although this is not always the case. A [hot disk](#) can also be caused by [operating environment](#) I/O, such as paging or swapping.

hot spare

[Storage System] A [disk](#) being used as a [hot standby](#) component.

hot spot

[Storage System] Synonym for [hot band](#)

hot standby

[Computer System] A [redundant](#) component in a failure tolerant subsystem that is powered and ready to operate and does not operate as long as the primary component is functioning.

Hot standby components increase [storage subsystem availability](#) by allowing systems to continue to function when the associated primary component fails. When the term *hot standby* is used to denote a disk, it specifically means a disk that is ready to perform I/O operations, for example, as the target of a [rebuilding](#) operation.

hot swap

[Computer System] The [substitution](#) of a [replacement unit](#) (RU) in a system for a defective unit, where the substitution can be performed while the system is performing its normal functioning normally.

Hot swaps are physical operations typically performed by humans. See [automatic swap](#), [cold swap](#), [warm swap](#).

hot swap adapter

[Computer System] An [adapter](#) that supports [hot swap](#).

Houlderize

[General] Flip/flopping; when an opinion continually switches back and forth between choices.

For example: Design choice "A" is selected; but a week later, design choice "B" is selected; then after another week of consideration, the design choice is switched back to "A".

HSM

[Data Recovery] Acronym for [hierarchical storage management](#).

HTML

[Standards] Acronym for [HyperText Markup Language](#).

HTTP

[Standards] Acronym for [HyperText Transfer Protocol](#).

hub

[Network] A communications infrastructure element to which nodes on a multi-point bus or loop are physically connected.

Unlike switches, hubs do not aggregate [data transfer capacity](#).

hub port

A port on a [Fibre Channel hub](#) whose function is to pass data transmitted on the physical loop to the next port on the hub.

Hub ports include loop healing port bypass functions. Some hubs have additional management functionality. There is no definition of a hub port in any Fibre Channel standard.

hybrid array

[Storage System] A [storage array](#) consisting of multiple types of [storage devices](#).

hybrid cloud

[Cloud] A composition of two or more clouds of different types (private, community, or public).

Hybrid DIMM

[Hardware] A [dual in-line memory module](#) that contains both volatile memory and [non-volatile memory](#).

See [NVDIMM](#).

hybrid drive

[Storage System] A drive that consists of multiple types of [storage media](#).

hyper-converged system

[Computer System] A product that combines server, client, storage, network, and management software in a single unit.

HyperText Markup Language

[Standards] A computer language consisting of a set of tags or "markup" codes that describe how a document is displayed by a web browser.

HyperText Markup Language (HTML) tags are delimited by the characters "<" and ">". For example, the markup code "

" indicates that a new paragraph is beginning, while "

" indicates that the current paragraph is ending.

HyperText Transfer Protocol

[Standards] An application level [protocol](#), usually run over [TCP/IP](#), that enables the [exchange](#) of data via the Internet.

I_T nexus

[SCSI] A relationship specified in [SAM](#) between a [SCSI initiator port](#) and a [SCSI target port](#).

I/O

[Computer System] Abbreviation for input/output.

I/O adapter

[Computer System] An [adapter](#) that converts between the timing and [protocol](#) requirements of a system's memory bus and those of an [I/O interconnect](#) or network.

In the context of storage subsystems, I/O adapters are contrasted with embedded storage controllers, that not only adapt between buses and interconnects, but also perform transformations such as device fan-out, data caching, and [RAID](#). [Host bus adapters](#) (HBAs) and [Ethernet](#) NICs are types of I/O adapters.

I/O bottleneck

[Computer System] Any resource in the I/O path that limits [data transfer capacity](#) of a system.

Examples of resources that may limit the data transfer capacity of a system include a device [driver](#), [host bus adapter](#), [I/O interconnect](#), [intelligent controller](#), and disk.

I/O bus

[Computer System] Synonym for [I/O interconnect](#).

I/O driver

[Computer System] A [host computer](#) software component (usually part of an operating system) whose function is to control the operation of peripheral controllers or adapters attached to the host computer.

I/O drivers manage communication and data transfer between applications and I/O devices.

I/O intensity

[Computer System] A characterization of an application that describes how strongly performance depends on the performance of the [I/O subsystem](#) that provides I/O services to the application.

I/O intensive applications may be either data transfer intensive or I/O [request intensive](#) or both.

I/O interconnect

[Computer System] Any path used to transfer data and control information between components of an [I/O subsystem](#).

An I/O [interconnect](#) consists of cables, connectors, and all associated transmitters, receivers, and other required components. I/O interconnects are typically optimized for the transfer of data. See [channel](#), [device channel](#), [network](#).

I/O load

[Computer System] A metric of I/O requests made to an [I/O subsystem](#) over a period of time.

I/O load balancing

[Computer System] [Load balancing](#) of I/O.

I/O operation

[Computer System] A read, write, or control function performed to, from or within a computer system.

See [I/O request](#).

I/O power efficiency

1. [Energy] The ratio of maximum [IOPS](#) deliverable by a system, to the input power required to deliver those IOPS.
2. [Energy] The ratio of data transfer rate readable or writable by a system, to the input power required to achieve that data transfer rate.

I/O request

[Computer System] A request by an application to read or write a specified amount of data.

In the context of real and virtual disks, I/O requests specify the transfer of a number of blocks of data. See [I/O operation](#).

I/O subsystem

[Computer System] A set of devices and software components that operate together to provide data services.

A [storage subsystem](#) is one type of I/O subsystem.

I2C

[Network] The first generation of a hardware bus typically used to connect management related devices to a system.

See [System Management Bus](#).

I3C

[Hardware] The second generation of a hardware bus typically used to connect management related devices to a system.

IaaS

[Services] Acronym for [Infrastructure as a Service](#).

ICMP

[Network] Acronym for [Internet Control Message Protocol](#).

IDE

[Storage System] Acronym for [Integrated Drive Electronics](#).

idempotence

[General] A property of an operation in which the same result is obtained no matter how many times the operation is repeated.

idempotent

[Computer System] A property of an operation in which a single effect occurs no matter how many times the operation is invoked.

identification

[Data Security] The process of determining the unique [identity](#) of an entity.

identity

[Data Security] Representation of an actual user (or application or service or device).

An example is the assignment of the user name joej (the identity) to represent the human user Joe Jones for purposes of [authentication](#) and [authorization](#).

idle

[Storage System] A state in which a storage system is serving no user-initiated I/O requests, but is ready to service them upon arrival with normal [latency](#).

Storage systems may perform extensive system-initiated I/O during idle periods as they execute routine background housekeeping tasks.

idle power

[Energy] The power consumption of a system that is idle.

Idle word

[Network] In a data stream using [8B/10B encoding](#), an [ordered set](#) of four transmission characters normally transmitted between frames to indicate that no data is being transmitted.

IDS

[Data Security] Acronym for [Intrusion Detection System](#).

IETF

[Network] [Standards] Acronym for [Internet Engineering Task Force](#).

iFCP

[Network] [Fibre Channel] A gateway-to-gateway [protocol](#) that provides [Fibre Channel Fabric](#) services to [Fibre Channel](#) devices over a [TCP/IP](#) network.

ignored

A field that is not interpreted by its [receiver](#).

IKE

[Network] [Data Security] Acronym for [Internet Key Exchange](#).

ILM

[Data Management] Acronym for [Information Lifecycle Management](#).

IMA

[iSCSI] Acronym for [iSCSI Management API](#).

implicit addressing

[Storage System] A form of [addressing](#), usually used with tapes, in which the data's address is inferred from the form of the access request.

Tape commands that do not include an explicit [block](#) address but implicitly specify the *next* or *previous* block from the current tape position, from which the block address must be inferred by the device. See [explicit addressing](#).

import/export element

[SCSI] Synonym for [entry/exit slot](#).

in-band

[Network] Transmission of a separate data stream, such as management information, over the same [medium](#) as the primary data stream.

See [out-of-band](#).

in-band data deduplication

[Storage System] Deprecated synonym for [inline data deduplication](#).

incident

[Data Security] An occurrence that actually or potentially jeopardizes the confidentiality, integrity, or availability of an information system or the information the system processes, stores, or transmits or that constitutes a violation or imminent threat of violation of security policies, security procedures, or acceptable use policies. [NIST FIPS 200]

incineration

[Data Security] A method of sanitization that reduces a storage device or element to ash, in an approved facility. [ISO/IEC 27040]

INCITS

[SCSI] [Standards] The [INCITS SCSI](#) Storage Interfaces Technical Committee.

The INCITS T10 Technical Committee is the standards development committee accredited by INCITS to develop SCSI standards for communication between host devices (initiators) and [external](#) controllers (targets).

INCITS Fibre Channel (T11) Technical Committee

[Fibre Channel] [Standards] The standards development committee accredited by INCITS to develop standards related to [Fibre Channel](#).

INCITS T10

[SCSI] [Standards] The [INCITS SCSI](#) Storage Interfaces Technical Committee (INCITS TC T10).

The INCITS T10 Technical Committee is the standards development committee accredited by INCITS to develop SCSI standards for communication between from host devices (initiators) to [storage device](#) controllers (targets).

INCITS T13

[Standards] The INCITS ATA Storage Interfaces Technical Committee.

The INCITS T13 Technical Committee is the standards development committee accredited by INCITS to develop [ATA](#) standards for communication between a host and a [storage device](#).

incremental backup

[Data Recovery] A [backup](#) of data objects modified since a previous backup.

Incremental backup is a collective term for [cumulative incremental backups](#) and [differential incremental backups](#). See [full backup](#).

independent access array

[Storage System] A [disk array](#) whose data [mapping](#) is such that different [member](#) disks can execute multiple application I/O requests concurrently.

See [parallel access array](#).

InfiniBand

[Computer System] An industry standard, channel-based, switched fabric interconnect architecture for server and storage connectivity

The committee standardizing InfiniBand™ is the InfiniBand® Trade Association.

information

[Data Management] Data that is interpreted within a context such as an application or a process.

information assurance

[Data Security] Measures that protect and defend information and information systems by ensuring their [availability](#), [integrity](#), [authentication](#), [confidentiality](#), and [nonrepudiation](#).

Information [assurance](#) encompasses system reliability and strategic [risk management](#), and includes providing for [restoration](#) of information systems using protection, detection, and reaction capabilities.

Information Lifecycle Management

[Data Management] The policies, processes, practices, services and tools used to align the business value of information with the most appropriate infrastructure from the time information is created through its final disposition.

Information is aligned with business requirements through management policies and service levels associated with applications, [metadata](#) and data.

information management

[Data Management] The discipline and function of oversight and control of information resources.

information management services

[Data Management] The processes associated with managing information as it progresses through various lifecycle states associated with a business process.

These services [exploit](#) information about data content and relationships in making decisions. Examples include records management and content management applications.

information model

[Data Management] A repository-independent definition of entities (objects) and the relationships and interactions between these entities.

The [CIM](#) schemas are an example of an information model. An information model differs from a [data model](#), which is repository-specific.

information resource domain

[Management] The category of resources that exclusively encompass information services.

information security

[Data Security] Preservation of confidentiality, integrity and availability of information. [ISO/IEC 27000:2018]

In addition, other properties such as authenticity, accountability, non-repudiation and reliability can also be involved.

information service

[Management] A set of functions that treat data within an interpretation context.

information system

[Data Security] The entire infrastructure, organization, personnel and components for the collection, processing, storage, transmission, display, dissemination and disposition of information.

Information Technology

[General] All aspects of digital information creation, access, use, storage, transport and management.

The term Information Technology addresses all aspects of computer and storage systems, networks, users and software in an enterprise.

Information Unit

1. [iSCSI] A delimited and sequenced set of information in a format appropriate for transport by the service delivery subsystem. An iSCSI Information Unit may contain a command, data, response, or task management request.
2. [Fibre Channel] A related collection of data specified by an FC-4 to be transferred as a single FC-2 Sequence.

Infrastructure as a Service

[Services] Delivery over a network of an appropriately configured virtual computing environment, based on a request for a given service level.

Typically, Infrastructure as a Service (IaaS) is either self-provisioned or provisionless and is billed based on consumption.

infrastructure-based virtualization

[Computer System] [Virtualization](#) implemented in the storage fabric, in separate devices designed for the purpose, or in network devices.

Examples are separate devices or additional functions in existing devices that aggregate multiple individual [file system](#) appliances or [block](#) storage subsystems into one such virtual service, functions providing transparent block or file system [mirroring](#) functions, or functions that provide new security or management services.

ingress Routing Function role

[Fibre Channel] A process within a [Routing Function](#) that forwards the [frame](#) to the next hop Routing Function or [Egress Routing Function](#).

initial relative offset

[Network] The [relative offset](#) of the [block](#) or sub-block transmitted by the first [frame](#) in a [sequence](#), specified by an [upper layer protocol](#).

The initial relative offset need not be zero.

initialization

[Computer System] The startup and initial [configuration](#) of a system or component.

initiator

1. [Computer System] The system component that originates an I/O command over an [I/O interconnect](#).
2. [SCSI] The endpoint that originates a [SCSI](#) I/O command [sequence](#). [I/O adapters, network interface cards, and intelligent I/O interconnect control ASICs are typical initiators. See LUN, originator, target, target port identifier.](#)

initiator NVMe_Port

[Fibre Channel] [NVMe_Port](#) that is the [NVMe host port](#) for an [FC_NVMe association](#).

initiator port identifier

[SCSI] The [interconnect](#) address of an [initiator](#).

Initiator Session Identifier

[iSCSI] The unique identifier that an [initiator](#) assigns to its end point of the session.

When combined with the [iSCSI Initiator Name](#), the Initiator Session Identifier provides a worldwide unique name for its [SCSI Initiator Port](#).

inline data deduplication

[Storage System] [Data deduplication](#) performed before writing the deduplicated data.

See [post-process data deduplication](#)

inode

[File System] A persistent data structure in a UNIX or UNIX-like [file system](#) that describes the location of some or all of the disk blocks allocated to a file.

input/output

The process of moving data between a computer system's main memory and an external device or interface.

Input/output (I/O) encompasses *reading*, or moving data into a computer system's memory from another location, and *writing*, or moving data from a computer system's memory to another location. Example locations include [storage device](#), display, printer, or network connected to another computer system.

instantiation

[General] The creation of an instance of a class or [object oriented](#) abstraction.

Integrated Drive Electronics

[Computer System] A type of hardware interface formerly used to connect hard disks, CD-ROMs and tape drives to a PC.

The IDE interface is defined by the [ATA](#) specification.

integrity

[Data Security] Property of accuracy and completeness. [ISO/IEC 27000:2018]

intelligent controller

[Computer System] A device for handling requests that includes a processor or sequencer programmed to autonomously process a substantial portion of requests.

A [storage controller](#) is an example of an intelligent controller.

intelligent device

[Computer System] A computer, [storage controller](#), [storage device](#), or [appliance](#).

Intelligent Platform Management Interface

[Management] A protocol used to perform management and monitoring operations on a system independent of the host system components.

Inter-Fabric

The entire interconnection of Fabrics and Inter-Fabric Routers.

Inter-Fabric Router

[Fibre Channel] A device that performs [Inter-Fabric Routing](#) and consists of a [Routing Function](#), [Translate Domain Switches](#), and [Front Domain Switches](#).

Inter-Fabric Routing

The process of forwarding frames through a specific [Routing Function](#), including the translation of [N_Port](#) IDs.

Inter-Switch Link

[Fibre Channel] A [Fibre Channel link](#) connecting one switch to another switch.

See FC-SW.

interconnect

[Computer System] A physical means by which system elements and devices are connected together and through which they can communicate with each other.

I/O buses and networks are examples of interconnects.

interface connector

[Network] An optical or electrical connector that connects the [media](#) to the [transmitter](#) or [receiver](#).

An interface connector consists of a [receptacle](#) and a plug.

Intermediate Routing Function

A process within a [Routing Function](#) that validates the [frame](#) headers, updates the IFR-Header, removes and adds a new [Enc_Header](#), then forwards the frame to the next hop Routing Function.

intermix

A [Fibre Channel class of service](#) that provides a full [data transfer capacity](#) dedicated [Class 1 connection](#), but allows connectionless [Class 2](#) and [Class 3](#) traffic to share the link during intervals when data transfer capacity is unused.

International Organization for Standardization

[Standards] A worldwide federation of national standards bodies.

A non-governmental organization, covering more than 145 countries, whose work results in international agreements that are published as International Standards and other types of ISO documents.

Internet Control Message Protocol

[Network] A control [protocol](#), strongly related to [IP](#) and [TCP](#), used to convey a variety of control and error messages.

Internet Engineering Task Force

[Network] [Data Security] [Standards] The community concerned with evolution and operation of the Internet.

The IETF is the standards body responsible for Internet standards called RFCs, including [SNMP](#), [TCP/IP](#) and [policy](#) for [QoS](#). The IETF has a web site at www.ietf.org.

Internet Key Exchange

[Network] [Data Security] A [protocol](#) specified by the IETF that performs mutual authentication between two parties and establishes an IKE Security Association (SA) that includes shared secret information that can be used to efficiently establish SAs for Encapsulating Security Payload (ESP) or Authentication Header (AH) and a set of [cryptographic algorithms](#) to be used by the SAs to protect the traffic that they carry.

IKEv2 is defined in RFC-4306.

IKE Version 2 (IKEv2) is not compatible with Version 1.

Internet Protocol

[Network] A standard [protocol](#) that provides connectionless, [best effort](#) delivery of datagrams across heterogeneous physical networks.

See [TCP](#), [UDP](#).

Internet Small Computer Systems Interface

[Storage System] A transport [protocol](#) that provides for the [SCSI](#) protocol to be carried over a [TCP](#) based [IP](#) network, standardized by the [Internet Engineering Task Force](#) and described in [RFCs 791, 1122, 2003, and 3720](#).

Internet Storage Name Service

[iSCSI] A [protocol](#) and mechanism for intelligent discovery of storage devices in an [IP](#) network.

interoperability

[Computer System] The ability of systems to work with or use data and protocols from other systems.

interrupt

[Computer System] A hardware or software signal that causes a computer to stop executing its instruction stream and [switch](#) to another stream.

Software interrupts are triggered by application or other programs. Hardware interrupts are caused by external events, to notify software so it can deal with the events.

intrusion

[Data Security] Unauthorized access to a network or a network-connected system, that is, deliberate or accidental unauthorized access to information systems, to include malicious activity against information systems, or unauthorized use of resources within information systems. [ISO/IEC 27039:2015]

intrusion detection

[Data Security] The process of identifying that an [intrusion](#) has been attempted, is occurring, or has occurred.

Intrusion Detection System

[Data Security] Technical system that is used to identify that an intrusion has been attempted, is occurring, or has occurred and possibly respond to intrusions in information systems and networks. [ISO/IEC 27039:2015]

IOPS / IOPs / iops

[Storage System] Shorthand for [I/O Operations](#) per second.

IOPs can also be the plural of IOP (short for I/O operation), depending on context.

IOPS/W

[Energy] Input/Output operations per second per watt.

IOPS/W is a metric for evaluating storage I/O performance per unit of power.

IP

[Network] Acronym for [Internet Protocol](#).

IP Security

[Network] [Data Security] A suite of cryptographic algorithms, protocols and procedures used to protect information, authenticate communications, control access, and provide non-[repudiation](#) at the [IP](#) layer.

The two key protocols in IPsec are the [Authentication Header](#) (AH) and [Encapsulating Security Payload](#) (ESP) protocols.

IPMI

[Hardware] Acronym for [Intelligent Platform Management Interface](#).

IPsec

[Network] [Data Security] Shorthand for [IP security](#).

iSCSI

[Storage System] Acronym for [internet Small Computer Systems Interface](#).

iSCSI Device

[iSCSI] A [SCSI device](#) using an [iSCSI](#) service delivery subsystem, in other words an iSCSI-specific transport mechanism for SCSI commands and responses.

See [IETF RFC 3720](#).

iSCSI initiator Name

[iSCSI] The worldwide unique name of an [iSCSI initiator](#).

iSCSI Initiator Node

[iSCSI] The [initiator](#) in an [iSCSI Device](#).

iSCSI initiator port

[iSCSI] A [SCSI initiator port](#) used for [iSCSI](#).

iSCSI layer

[iSCSI] The layer that builds/receives [iSCSI Protocol Data Units](#) and relays/receives them to/from one or more [TCP](#) connections that form an [iSCSI session](#).

iSCSI Management API

[iSCSI] SNIA [standard](#) for a C language based [API](#) for managing [iSCSI](#) capable HBAs and NICs, along with the device drivers that control them.

iSCSI name

[iSCSI] The name of an [iSCSI initiator](#) or iSCSI [target](#).

iSCSI Network Entity

[iSCSI] A device or gateway that is accessible from a [TCP/IP](#) network and has one or more [iSCSI](#) Network Portals.

iSCSI Network Portal

[iSCSI] A component of an [iSCSI Network Entity](#) that has a [TCP/IP](#) address and can be used by a [node](#) within that component for connections to another [iSCSI Node](#).

An [Initiator](#) iSCSI Network Portal is identified by its IP address. A [target](#) iSCSI Network Portal is identified by its IP address and listening TCP port.

iSCSI Node

[iSCSI] A single [iSCSI Initiator Node](#) or [iSCSI Target Node](#).

iSCSI Portal Group

[iSCSI] A set of [iSCSI Network Portals](#) within an [iSCSI Node](#).

When a session has multiple connections, all connections in a session must use the portals in a single iSCSI Portal Group.

iSCSI Portal Group Tag

[iSCSI] A tag identifying all portals in an [iSCSI Portal Group](#).

iSCSI SAN

[iSCSI] [Block](#)-level [Storage Area Network](#) over [TCP/IP](#) using the [iSCSI protocol](#).

iSCSI Session

[iSCSI] The top level relationship between a specific [iSCSI Initiator Node](#) and [iSCSI Target Node](#), equivalent to the [L_T nexus](#).

A session contains one or more connections.

iSCSI Session Identifier

[iSCSI] A unique identifier for a session between an [iSCSI Initiator Node](#) and [iSCSI Target Node](#).

iSCSI Target Name

[iSCSI] The worldwide unique name of an [iSCSI Target Node](#).

iSCSI Target Node

[iSCSI] The [target](#) in an [iSCSI Device](#).

iSCSI Target Port

[iSCSI] A [SCSI target port](#) used for [iSCSI](#).

iSER

[Storage System] [iSCSI](#) Extensions for [RDMA](#).

See IETF RFC 7145.

ISID

[iSCSI] Acronym for [Initiator Session Identifier](#).

ISL

[Fibre Channel] Abbreviation for [Inter-Switch Link](#).

iSNS

[iSCSI] Acronym for [Internet Storage Name Service](#).

iSNS Discovery Domain

[iSCSI] Grouping of storage nodes for facilitating discovery and login control of these nodes.

ISO

[Standards] Acronym for [International Organization for Standardization](#).

IT

[General] Acronym for [Information Technology](#).

IT security

[Data Security] All aspects related to defining, achieving, and maintaining confidentiality, integrity, availability, non-repudiation, accountability, authenticity, and reliability of information assets.

IU

[General] Acronym for [Information Unit](#).

iWARP

[Network] [Storage System] The Internet Wide Area Remote Direct Memory Access Protocol.

See IETF RFC 7306.

J

Java

[Computer System] An [object oriented](#) computer programming language that is similar to C++.

JBOD

[Storage System] Acronym for [Just a Bunch Of Disks](#).

JBOF

[Storage System] Acronym for [Just a Bunch Of Flash](#).

Jini

[Computer System] A [Java](#)-based architecture and supporting services for publishing and discovering devices and services on a network.

jitter

[Hardware] Deviation in timing that a bit stream encounters as it traverses a physical [medium](#).

Just a Bunch Of Disks

[Storage System] A collection of disks without the coordinated control provided by [control software](#).

Just a Bunch Of Flash

[Storage System] A collection of solid state storage drives without the coordinated control provided by [control software](#)

K

K28.5

[Fibre Channel] A 10-bit [special character](#) used in [8B/10B encoding](#) to indicate the beginning of an [Ordered Set](#).

kb / kbit

[General] Abbreviations for [kilobit](#).

kB / kbyte

[General] Abbreviations for [kilobyte](#).

key

1. [Storage System] The address of an object in a key-value storage system.
2. [Data Security] A sequence of bits used for cryptographic operations and/or for producing other keys. The same plaintext encrypted with different keys yields different ciphertexts, each of which requires a different key for decryption. In a symmetric cryptosystem the encryption and decryption keys are the same. In an asymmetric cryptosystem the encryption and decryption keys are different.

key backup

[Data Security] A process used in a cryptographic system that provides key deposit and [recovery](#).

Key [backup](#) is sometimes used as a replacement term for [key escrow](#), which has become encumbered with additional meanings.

key escrow

[Data Security] A process in which the storage of a cryptographic key is entrusted to a third party escrow [agent](#) who will disclose it only to the owner or another authorized user.

key exchange

[Data Security] A cryptographic [protocol](#) and procedure in which two communicating entities determine a shared key in a fashion such that a third party that reads all of their communication cannot effectively determine the value of the key.

A common approach to key [exchange](#) requires such a third party to compute a discrete logarithm over a large field in order to determine the key value, and relies for its security on the computational intractability of the discrete logarithm problem.

key management

[Data Security] The supervision and control of the process, usually in accordance with a security policy, by which cryptographic keys are generated, stored, protected, distributed, applied, archived, revoked and destroyed.

Key Management Interoperability Protocol

[Data Security] An [OASIS](#) standard that establishes a single, comprehensive [protocol](#) for communication between [key management](#) servers and cryptographic clients.

key pair

[Data Security] A [public key](#) and its corresponding [private key](#) as used in [public key cryptography](#).

See [asymmetric cryptosystem](#).

key recovery

[Data Security] A system characterized by the presence of some mechanism for obtaining exceptional access to a cryptographic key in case of loss by error, disaster, or malicious intent.

See also [key escrow](#).

key-value storage

[Storage System] A type of object storage interface where a [key](#) is used to address the associated object.

key wrapping

[Data Security] A method of encrypting keys (along with associated integrity information) that provides both confidentiality and integrity protection using a symmetric [key](#). [NIST SP 800-57 Part 1]

keying material

[Data Security] A key or [authentication](#) information in physical or magnetic form.

KiB / KiByte

[General] Shorthand for [kibibyte](#).

Kibibit

[General] Shorthand for 1,024 (2^{10}) bits.

Binary notation is most commonly used in computer system and software literature.

See also [kilobit](#).

Kibibyte

[General] Shorthand for 1,024 (2^{10}) bytes.

Binary notation is most commonly used in computer system and software literature.

See also [kilobyte](#).

Kibit

[General] Shorthand for [kibibit](#).

Kilobit

[General] 1,000 (10^3) bits.

The base 10 convention is commonly found in I/O-related and scientific literature.

See also [kibibit](#).

Kilobyte

[General] 1,000 (10^3) bytes.

The base 10 convention is commonly found in I/O-related and scientific literature.

See also [kibibyte](#).

KMIP

[Data Security] Acronym for [Key Management Interoperability Protocol](#).

L

L_Port

[Fibre Channel] An [FC-Port](#) that contains functions associated with the [Arbitrated Loop topology](#).

label

[Storage System] An identifier associated with a removable [media](#) or cartridge.

Labels may be humanly readable, machine readable, or both. See [external volume serial number](#), [media ID](#).

laboratory attack

[Data Security] Use of sophisticated signal recovery equipment in a laboratory environment to recover information from data storage media. [NIST SP 800-88]

Magnetic force microscopes and other similar equipment can be used to recover data from magnetic [media](#) that has been erased or damaged.

LAN

[Network] Acronym for [Local Area Network](#).

LAN-free backup

[Data Recovery] A [backup](#) methodology that moves data without using [LAN](#) resources.

Data may be moved over a [SAN](#) or via [direct attached storage](#).

lane

[Network] One of multiple point-to-point physical connections that make up a single [link](#).

latency

[Computer System] A time period between two events.

Synonym for [I/O request](#) execution time, the time between the making of an I/O request and completion of the request's execution.

Short for [rotational latency](#), the time between the completion of a seek and the instant of arrival of the first [block](#) of data to be transferred at the disk's [read/write head](#).

latent fault

[Computer System] A failure of a system component that has not been observed because the failed aspect of the component has not been exercised since the occurrence of the failure.

A [media](#) defect on a disk surface is a latent fault until an attempt is made to read the data in a [block](#) that spans the defect.

LBA

[Storage System] Acronym for [Logical Block Address](#).

LC

[Network] An optical fiber connector complying with international standard IEC 61754-20.

LC connectors are the most common connector in optical data communications networks, including [Ethernet](#) and [Fibre Channel](#). A dual LC connector is used, carrying separate fibers for transmitted and received data.

LCF

[Fibre Channel] Abbreviation for [Link Control Facility](#).

LDAP

[Network] Acronym for [Lightweight Directory Access Protocol](#).

LDM

[Storage System] Acronym for [Logical Disk Manager](#).

least privilege

[Data Security] The security objective of granting users only those accesses they need to perform their official duties. [NIST SP 800-12]

LED

[Computer System] Acronym for [light emitting diode](#).

legal hold

[Legal] Process of suspending the normal [disposition](#) or processing of records and [Electronically Stored Information](#) as a result of current or anticipated litigation, audit, government investigation or other such matters. [ISO/IEC 27050-1]

The issued communication that implements the legal hold can also be called a "hold," "preservation order," "suspension order," "freeze notice," "hold order," or "hold notice."

library

[Storage System] A [storage device](#) containing a [robotic media handler](#) capable of storing multiple pieces of removable media and loading and unloading them from one or more drives in arbitrary order.

See also [virtual tape library](#).

lifecycle deletion

[Storage System] The deletion of data at the end of its lifecycle.

See [disposition policy](#).

light emitting diode

[Computer System] A [multimode](#) light source based on optical diodes.

Lightweight Directory Access Protocol

[Network] An [IETF protocol](#) for creating, accessing and removing objects and data from a [directory](#).

LDAP, originally a subset of the X.500 protocol, provides the ability to search, compare, add, delete and modify directory objects, as well as modifying the names of these objects.

Linear Tape File System

1. [File System] A self-describing, self-contained tape storage format intended for interchange of data between different software systems. See ISO/IEC 20919.
2. [File System] A software or hardware implementation of a [file system](#) using the LTFS format.

Linear Tape Open

[Tape] An open standard magnetic tape technology developed in cooperation by HP, IBM and Quantum.

link

1. [Network] A physical [connection](#) (electrical or optical) between two nodes of a network.
2. [Network] Two unidirectional fibers or conductors transmitting in opposite directions and their associated transmitters and receivers.
3. [Network] A collection of multiple [lanes](#).
4. [Fibre Channel] The full-duplex [FC-0](#) level association between [FC-1](#) entities in directly attached ports.
5. [Fibre Channel] The point-to-point physical connection from one element of a [Fibre Channel](#) fabric to the next.

Link Control Facility

[Fibre Channel] A function of a [link](#) that facilitates transmission and reception of data.

LIP

[Fibre Channel] Acronym for [Loop Initialization Primitive](#).

LISM

[Fibre Channel] Acronym for [Loop Initialization Select Master](#).

litigation hold

[Legal] Synonym for [legal hold](#).

load balancing

[Computer System] The adjustment of system and/or application components and data so that work is spread as evenly as possible across a system's physical resources.

Load balancing may be done manually (by a human) or automatically (by some means that does not require human intervention). See [load optimization](#), [load sharing](#).

load generator

[Hardware] [Computer System] Hardware and software environment executing the [workload generator](#) to drive the system under evaluation.

load optimization

[Computer System] The manipulation of an [I/O load](#) in such a way that performance is optimal by some objective metric.

Load optimization may be achieved by load balancing across several components, or by other means, such as request reordering or interleaved execution. See [load balancing](#), [load sharing](#).

load sharing

[Computer System] The division of a task among several components, without any attempt to equalize each component's share of the work.

See [I/O load balancing](#), [load optimization](#).

load/store architecture

[Computer System] A CPU architecture in which memory is only accessed through load and store instructions, and all other instructions access data in registers only.

load/store operations

[Computer System] Operations that move data between CPU registers and memory.

local area network

[Network] A communications infrastructure, typically [Ethernet](#), designed to connect intercommunicating nodes over a limited distance.

See [wide area network](#).

Local Area Network Emulation

[Network] A collection of protocols and services that combine to create an emulated [local area network](#) using [ATM](#) as the underlying network.

Local area network emulation (LANE) enables intelligent devices with ATM connections to communicate with remote [LAN](#)-connected devices as if they were directly connected to the LAN.

local backup

[Data Recovery] A [backup](#) methodology that utilizes host resources to copy data to a backup location that is accessible to the same host.

See [LAN-free backup](#).

local F_Port

[Fibre Channel] The [F_Port](#) to which a particular [N_Port](#) is directly attached by a [link](#).

locking

[General] Any method of managing concurrent access to a resource.

logical block

[Storage System] A [block](#) of data stored on a [storage device](#), and associated with an address for purposes of retrieval or overwriting.

The term *logical block* is typically used to refer to the host's view of data [addressing](#) on a physical device. Within a [storage device](#), there is often a further conversion between the logical block addresses presented to hosts and the physical [media](#) locations at which the corresponding data is stored. See [physical block](#), [virtual block](#).

logical block address

[Storage System] The address of a [logical block](#).

Logical block addresses are typically used in hosts' I/O commands. The [SCSI](#) block command [protocol](#), for example, uses logical block addresses.

logical disk manager

[Windows] A name for the [volume](#) management [control software](#) used by Microsoft Windows.

logical drive

[Storage System] A deprecated synonym for [virtual drive](#).

logical unit

[SCSI] The addressable entity within a [SCSI target](#) that executes I/O commands.

logical unit number

1. [SCSI] The SCSI identifier of a logical unit within a target.
2. [Storage System] The address for a logical unit.

logical volume

[Storage System] A synonym for [virtual disk](#).

long-term data retention

[Data Management] The practice of storing data for an extended period of time.

In order to achieve long-term data retention, issues related to security, [media](#), and data formats must be addressed. See [data preservation](#).

long-term preservation

The act of maintaining information, in a correct and independently understandable form, over a period of decades or longer.

See [digital preservation](#).

long wavelength laser

[Network] A [laser](#) with a wavelength of 1300 nm or longer.

A long wavelength laser usually has a wavelength of 1300 or 1550 nanometers.

loop initialization

[Fibre Channel] A [Fibre Channel Arbitrated Loop](#) primitive used during [loop initialization](#).

Loop Initialization Primitive

[Fibre Channel] A [Fibre Channel Arbitrated Loop](#) primitive used during [loop initialization](#).

loopback

[Network] An operational mode where transmitted data is directed back to the local receiver.

lossless Ethernet bridging element

[Network] An [Ethernet](#) bridging function supporting [lossless Ethernet MACs](#).

lossless Ethernet MAC

[Network] A [full duplex Ethernet MAC](#) that supports at least 2.5KB jumbo frames and implements extensions to avoid Ethernet [frame](#) loss due to congestion (e.g., the Ethernet Pause mechanism).

lossless Ethernet network

[Network] An [Ethernet](#) network composed only of [full duplex](#) links, Lossless Ethernet MACs, and Lossless Ethernet bridging elements.

LTFS

[File System] Acronym for [Linear Tape File System](#).

LTFS Index

[File System] [Metadata](#) which describes the file data types and locations on an [LTFS volume](#).

LTFS Volume

[File System] A tape cartridge utilizing the [LTFS](#) format.

LTO

[Storage System] Acronym for [Linear Tape Open](#).

LU

[SCSI] Acronym for [logical unit](#).

LUN

1. [SCSI] Abbreviation for logical unit number.
2. [Storage System] Synonym for logical volume

LWL

[Network] Acronym for [long wavelength laser](#).

M

M.2

[Hardware] A card form factor and connector interface defined by the PCI-SIG that is most commonly used for [solid state storage](#).

M.2 interfaces to [PCI Express](#), SATA-IO, and USB.

MAC

1. [Network] Acronym for [Media Access Control](#).
2. [Data Security] Acronym for [Message Authentication Code](#).
3. [Data Security] Acronym for [Mandatory Access Control](#).

magnetic remanence

[Data Security] Residual magnetic information remaining on a magnetic [medium](#) after the medium has been degaussed.

malware

[Computer System] [Data Security] Malicious software designed specifically to damage or disrupt a system, attacking confidentiality, integrity and/or [availability](#). [ISO/IEC 27033-1]

Examples are a [computer virus](#), [computer worm](#), [Trojan horse](#), spyware, adware, [ransomware](#), or scareware.

MAM

[Storage System] Acronym for [Medium Auxiliary Memory](#).

MAMR

[Hardware] Acronym for [microwave-assisted magnetic recording](#).

MAN

[Network] Acronym for [Metropolitan Area Network](#).

Managed Object Format

[Management] The syntax and formal description of the classes and associations in a [CIM schema](#).

Managed Object Format (MOF) can be translated to [XML](#) using a [Document Type definition](#) published by the [DMTF](#).

Management Component Transport Protocol

A [DMTF](#)-defined protocol that supports management communication between internal hardware components.

MCTP is carried over an underlying bus (e.g., SMBus/I2C, serial links, PCI Express, or USB).

management framework

[Management] A structure and set of services exposed for use by management applications and other services in the management environment.

Management Information Base

[Management] The specification and formal description of a set of objects and variables that can be read and possibly written using the [SNMP protocol](#).

Various standard Management Information Bases (MIBs) are defined by the [IETF](#) and other standards bodies. Vendors define vendor-specific MIBs.

mandatory

[Standards] A provision in a standard that must be supported in order for an implementation of the standard to be compliant with the standard.

Mandatory Access Control

[Data Security] A type of [access control](#) based on the security clearance of the [subject](#) and the classification of the object.

The control is [mandatory](#) in that a subject is not allowed to change either their security clearance or the classification of an object.

map

[General] The relationship between two or more items.

For example, the relationship of virtual memory addresses to a portion of a file (e.g., POSIX).

mapping

[General] The establishment of a relationship between two or more items.

An example is the establishment of a relationship between [physical disk block](#) addresses and the block addresses of the virtual disks presented to operating environments.

maximum time to first data

[Storage System] The maximum time required to start receiving data from a storage system to satisfy a read request for data.

maximum transfer unit

[Network] The largest amount of data that it is permissible to transmit as one unit according to a [protocol](#) specification.

MaxTTFD

[Storage System] Shorthand for [maximum time to first data](#).

Mb / Mbit

[Computer System] Abbreviations for [Megabit](#).

MB / MByte

[Computer System] Shorthand for [megabyte](#).

Mbps

[Computer System] [Megabits](#) per second.

A measure of [data transfer rate](#).

MCTP

[Management] Acronym for [Management Component Transport Protocol](#)

MD5

[Data Security] Acronym for [Message Digest 5](#).

mean time between failures

[General] The average time between consecutive failures of a system or component.

Mean Time To

[General] The average time from start of use to first failure in a large population of identical systems, components, or devices.

mean time to data

[Storage System] The average time required to stage a data stream from storage and make it available for reading by a [client](#).

mean time to data loss

[Storage System] The average time, in a large population of storage elements, from first use until a failure results in a permanent loss of user data.

mean time to failure

[General] The average time from start of use to first failure in a large population of identical systems, components, or devices.

mean time to loss of data availability

[Storage System] The average time, in a large population of storage elements, from first use until a failure results in a loss of timely user data access.

Loss of [availability](#) does not mean loss of data; data remains intact.

mean time to repair

[General] The average time, in a large population of identical systems, components, or devices, between a failure and completion of repair.

Mean time to repair (MTTR) comprises all elements of repair time, from the occurrence of the failure to [restoration](#) of complete functionality. This includes time to notice and respond to the failure, time to repair or replace the failed component, and time to make the replaced component fully [operational](#).

meaningful

[Standards] In a standard, a control field or bit that must be correctly interpreted by a [receiver](#).

Control fields are either meaningful or "not meaningful." In the latter case they must be ignored.

meaningful control field

[Standards] In a standard, a control field or bit that must be interpreted.

Control fields are either meaningful or "not meaningful." In the latter case they must be ignored.

measured service

[Services] Metered dispensation of resources appropriate to a given type of service.

Usage can be monitored, controlled, reported and billed. Examples include storage, processing, [data transfer rate](#), and active user accounts.

mebibit

[General] Shorthand for 1,048,576 (2^{20}) bits.

See also [Megabit](#).

mebibyte

[General] Shorthand for 1,048,576 (2^{20}) bytes.

See also [megabyte](#).

media

1. [Storage System] Synonym for [storage media](#).
2. [Storage System] A physical link on which data is transmitted between two points.

media access control

1. [Network] Algorithms that control access to physical [media](#).
2. [Network] The media access control (MAC) layer in the [Ethernet protocol](#).

media changer

[Storage] Deprecated term for [library](#).

media ID

[Data Recovery] A machine-readable identifier written on a storage [volume](#) that remains constant throughout the volume's life.

See [external volume serial number](#), [label](#).

media manager

[Storage System] A software component responsible for tracking the location, contents, and state of removable storage volumes.

media robot

[Storage System] Synonym for [robotic media handler](#).

media sanitization

[Data Security] A general term referring to the actions taken to render data written on media unrecoverable by both ordinary and extraordinary means. [NIST SP 800-88]

medium

[Network] [Storage System] Synonym for [media](#).

Medium Auxiliary Memory

[Storage System] A non-volatile memory, other than the recording [medium](#), residing in a [storage element](#) (e.g., a tape cartridge) that is accessible to the [storage device](#).

medium transport element

[SCSI] Synonym for [robotic media handler](#).

megabaud

[Data Communication] One million [baud](#).

megabit

[Computer System] 1,000,000 (10^6) bits.

See also [Mebibit](#).

megabyte

[Computer System] 1,000,000 (10^6) bytes.

See also [mebibyte](#).

megatransfer

[SCSI] The transfer of one million data units per second.

The term is used to describe the characteristics of [parallel](#) I/O interconnects like [SCSI](#), for which the [data transfer rate](#) depends upon the amount of data transferred in each data cycle.

melting

[Data Security] A method of sanitization that uses extreme heat to cause a device or component to change state, from solid to liquid and/or gas, in an approved facility. [ISO/IEC 27040]

member disk

[Storage System] A disk used as a member of a [disk array](#).

memory cell

[Hardware] The smallest physical storage entity within storage.

Message Authentication Code

[Data Security] A cryptographic hash appended to a message to allow a [receiver](#) to ensure that the contents have not been changed in transit.

message digest

[Data Security] Synonym for [hash value](#).

Message Digest 5

[Data Security] A [message digest](#) algorithm producing a 128-bit digest.

This algorithm is deprecated for cryptographic use.

message digest algorithm

[Data Security] An algorithm that produces a [secure hash](#).

metadata

[Data Management] Data associated with other data.

Examples of metadata are protection information, time last accessed, and permissions.

metering

[Services] Measuring resources appropriate to the type of service.

Metropolitan Area Network

[Network] A network that connects nodes distributed over a city-wide area.

MIB

1. [Management] Acronym for [Management Information Base](#).
2. [Security] [Men in Black](#)

Mibit

[General] Shorthand for [mebibit](#).

Mibyte

[General] Shorthand for [mebibyte](#).

microwave-assisted magnetic recording

[Hardware] A recording technique that directs microwaves at the media of an [HDD](#) to aid the recording process.

Abbreviated as MAMR.

migration

[Data Management] Movement of data or information between information systems, formats, or [media](#).

Migration is performed for reasons such as possible decay of [storage media](#), obsolete hardware or software (including obsolete data formats), changing performance requirements (see [tiered storage](#)), or the need for cost efficiencies.

MIME

[Network] Acronym for [Multipurpose Internet Mail Extensions](#).

mirror

1. [Storage System] A [replica](#) of a storage [volume](#), consisting of separate components with identical contents on each component, that can be accessed independently by the storage system.
2. [Storage System] A [RAID 1](#) volume, consisting of separate components with identical contents on each component, that can be accessed independently by the storage system.

mirrored array

[Storage System] A [disk array](#) that implements [RAID Level 1](#).

mirrored disks

[Storage System] The disks of a [mirrored array](#).

mirroring

[Storage System] Maintaining two or more separate, identical copies of data.

MLC

[Hardware] Acronym for [multi-level cell](#)

MMA

[Management] Acronym for [Multipath Management API](#).

modal dispersion

[Network] Distortion in the optical signal transmitted through a [multimode](#) fiber caused by different time delays for the various modes of propagation.

Modal dispersion results in a smearing of the signal edges that increases with the length of a fiber, thereby limiting the useful maximum length of a fiber as a function of the data rate.

model

[Management] A set of entities and the relationships among them that define the semantics, behavior, and state of that set.

modeling language

[Management] A language for describing the concepts of an information or [data model](#).

A popular modeling language in use today is [UML](#) ([Unified Modeling Language](#)).

MOF

[Management] Acronym for [Managed Object Format](#).

monitor program

[Computer System] A program that keeps track of system resource utilization.

Monitor programs typically record CPU utilization, [I/O request](#) rates, data transfer rates, RAM utilization, and similar statistics. A monitor program, which may be an integral part of an operating system, a separate software product, or a part of a related component, such as a [database management system](#), is a necessary prerequisite to manual [I/O load balancing](#).

mount

[File System] An operation that makes a block or file device, that is local or network attached, available to an operating system.

MTBF

[Computer System] Acronym for [mean time between failures](#).

MTDL

[Computer System] Acronym for [mean time to data loss](#).

MTTD

[General] Acronym for [mean time to data](#).

MTTF

[General] Abbreviation for [Mean Time to \(first\) Failure](#).

MTTR

[General] Acronym for [mean time to repair](#).

MTU

[Network] Acronym for [maximum transfer unit](#).

multi-actuator

[Hardware] The presence of more than one [actuator](#) within a single [HDD](#).

multi-factor authentication

[Data Security] Verification of an individual's identity using more than one factor pertaining to knowledge, possession or biometrics.

A knowledge factor is something an individual knows; a possession factor is something an individual has, and a biometric factor is something an individual is or is able to do.

multi-level cell

[Hardware] A solid state [memory cell](#) that stores two bits of data.

Multi-level cell ([MLC](#)) is not a generic term for all [memory cell](#) types that store more than one bit.

multi-threaded

[Computer System] Having multiple concurrent or pseudo-concurrent execution sequences.

multicast

[Network] A single transmission of a message to a select subset of [receivers](#) connected to a transport network.

Multicast is contrasted with [broadcast](#) (sending a message to all receivers on a network) and [unicast](#) (sending a message to a single receiver).

multicast group

[Network] A set of addresses that serves as the destination for [multicast](#) packets or frames.

multilevel security

[Data Security] A security system that allows users and resources of different sensitivity levels to access a system concurrently, while ensuring that only information for which the user or resource has [authorization](#) is made available.

multimode

[Network] Designed to carry multiple light rays or modes concurrently.

In optical fiber, each mode is transmitted at a slightly different reflection angle within the optical fiber core. Multimode fiber transmission is used for relatively short distances.

multimode fiber optic cable

[Network] An optical fibre designed to carry multiple light rays or modes concurrently.

In optical fiber, each mode is transmitted at a slightly different reflection angle within the optical fiber core. Multimode fiber transmission is used for relatively short distances.

multipath I/O

[Storage System] The facility for a host to direct I/O requests to a [storage device](#) on more than one [access path](#).

Multipath Management API

[Management] A SNIA Standard for discovery and management of the multipath devices on a host system and the associated local and device ports.

multiprotocol storage

[Storage System] A storage system that provides consolidated file, block, object, and possibly other storage interfaces.

Multipurpose Internet Mail Extensions

[Network] A set of IETF specifications that define the mechanisms for specifying and describing the format of Internet message bodies.

An [HTTP](#) response containing a Multipurpose Internet Mail Extensions (MIME) Content-Type header allows the HTTP [client](#) to invoke the appropriate application for processing the received data.

multitenancy

[Data Security] Allocation of physical and virtual resources such that multiple tenants and their computations and data are isolated from and inaccessible to one another. [ISO/IEC 17788]

mutual authentication

[Data Security] A process that verifies the [identity](#) of two entities prior to establishing communication between those entities.

N

N_Port

[Fibre Channel] A [port](#) that connects via a point-to-point [link](#) to either a single N_Port or a single [F_Port](#).

N_Port_ID

[Fibre Channel] A unique 24 bit address used for [frame](#) routing that is assigned to an [N_Port](#) or [NL_Port](#).

N_Port_ID Virtualization

[Fibre Channel] The ability of an [F_Port](#) or a [PN_Port](#) to support more than one [VN_Port](#) on a single point-to-point [link](#).

N_Port Login

[Fibre Channel] The [port](#)-to-port login process by which [Fibre Channel](#) end devices establish sessions.

N_Port_Name

[Fibre Channel] A [Name-Identifier](#) associated with an [N_Port](#).

NAA

[Network] [Standards] Acronym for [Network Address Authority](#).

Name_Identifier

[Fibre Channel] An identifier used to identify entities in [Fibre Channel](#).

Example Name_Identifiers are [Port_Name](#) and [Node_Name](#).

Name Server

1. [Fibre Channel] A distributed service provided by the Fibre Channel Fabric to register and discover the attributes of Fibre Channel N_Ports. Once registered, the attributes may be viewed by requesting N-ports.
2. [Network] Another name for the DNS server.

namespace

1. [General] A domain of identifiers.
2. [File System] The set of valid names recognized by a file system.
3. [Management] In CIM and WBEM, a collection of object definitions and instances that are logically consistent.
4. [NVMe] Formatted non-volatile storage that may be accessed by a host. For example, an NVMe namespace may contain logical blocks for storing data or key-value pairs for storing data.

NAND

1. [General] The boolean logic operation 'not and'.
2. [Hardware] A type of non-volatile memory commonly used in flash memory.

NAS

[Network] [Storage System] Acronym for [Network Attached Storage](#).

National Institute of Standards and Technology

[Data Security] [Standards] A non-regulatory federal agency within the U.S. Commerce Department's Technology Administration.

National Institute of Standards and Technology's (NIST) mission is to develop and promote measurement, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life.

native data format

[Legal] The original, non-derived format and structure of data, together with its associated [metadata](#).

Where data is unstructured, native file format means the original format of a file. While [structured data](#) or [unstructured data](#) may be read by other programs, native data format means data whose state and [integrity](#) are unchanged since generation by its instantiating application.

Native Fabric

[Fibre Channel] In [Inter-Fabric Routing](#), the local [Fibre Channel Fabric](#) where the [Native Nx_Port](#) resides.

Native Nx_Port

[Fibre Channel] A role of an [Nx_Port](#) in an IFR environment.

A Native Nx_Port is physically attached to the local fabric.

NDMP

[Management] [Network] Acronym for [Network Data Management Protocol](#).

NDU

[Hardware] [Computer System] Acronym for [non-disruptive upgrade](#).

near-online data

[Data Management] Data that is accessible within some moderate length of time, usually some number of seconds.

See [active data](#), [offline data](#).

near-online storage

1. [Storage] Storage that is accessible within some moderate length of time, usually some number of seconds.
2. [Energy] Storage systems with first data access times > 80 ms and less than several seconds, as specified in the SNIA Emerald™ Power Efficiency Measurement Specification.

network

[Network] An [interconnect](#) that enables communication among a collection of attached [nodes](#).

A network consists of optical or electrical transmission [media](#), infrastructure in the form of hubs and/or switches, and protocols that make message sequences meaningful. In comparison to I/O interconnects, networks are typically characterized by large numbers of nodes that act as peers, large inter-node separation, and flexible configurability. See [channel](#), [I/O interconnect](#), [local area network](#), [storage area network](#).

network adapter

[Network] An [adapter](#) that connects an [intelligent device](#) to a network, also called a [network interface card](#), or NIC.

See [Ethernet adapter](#), [NIC](#).

Network Address Authority

1. [Network] A management authority that allocates addresses used to create unique names.
2. [Fibre Channel] A 4-bit field used to identify the controlling authority for guaranteeing uniqueness of World Wide Names (WWNs). In a [Fibre Channel](#) environment, several [Naming](#) Authorities can be active at the same time, therefore Fibre Channel prepends the NAA field to World Wide Names to guarantee global uniqueness. An NAA =1, for example, indicates IEEE 48-bit Identifiers.

Network Attached Storage

[Storage System] A storage device that connects to a network and provides file access services to [clients](#).

Network Attached Storage (NAS) devices generally consist of an engine that implements file services and one or more [storage devices](#). File services are provided to clients using file access protocols such as [NFS](#) and [SMB](#).

See [storage area network](#).

network backup

[Data Recovery] A [backup](#) methodology that copies data over a [network](#) to a backup [server](#).

Network Data Management Protocol

[Data Recovery] A communications [protocol](#) that allows data storage devices, robotic [library](#) devices, and [backup](#) applications to intercommunicate for the purpose of performing backups.

Network Data Management Protocol (NDMP) is an open standard protocol for network-based backup of [NAS](#) devices. It allows a [network backup](#) application to control the retrieval of data from, and backup of, a [server](#). The control and data transfer components of backup and restore are separated. NDMP is intended to support tape drives and can be extended to address other devices and [media](#). The SNIA offers an [NDMP v4 reference implementation](#).

Network File System

[File System] [Standards] A family of network [protocols](#) defined by the [IETF](#) to access a [file system](#).

Network Interface Card

[Network] An [I/O adapter](#) that connects a [node](#) to a [network](#).

A network interface card (NIC) is commonly a plug-in [circuit](#) board, however, the term is also used to denote an [ASIC](#) or set of ASICs on a computer [system board](#) that perform the network I/O adapter function. The term NIC is universally used in [Ethernet](#) context. In [Fibre Channel](#) contexts, the terms host bus adapter, HBA and adapter are used in preference to NIC. See [host bus adapter](#), [I/O adapter](#).

nexus

[SCSI] A temporary relationship, consisting of at least a target identifier and initiator identifier, between two [SCSI](#) devices.

NFS

[File System] [Standards] Abbreviation for [Network File System](#).

NIC

[Network] Acronym for [Network Interface Card](#).

NIST

[Data Security] Acronym for [National Institute of Standards and Technology](#).

NL_Port

[Fibre Channel] An [Nx_Port](#) that is communicating via an [Arbitrated Loop](#).

node

[Network] An addressable entity connected to an [I/O interconnect](#) or network.

The term *node* is used to refer to computers, storage devices, and network interconnection devices such as switches, routers and gateways. The component of a node that connects to the bus or network is a port.

Node_Name

[Fibre Channel] A [Name-Identifier](#) that is associated with a [Fibre Channel node](#).

non-blocking

1. [Computer System] A property of an operation such that the operation does not stop and wait for other operations to occur.
2. [Computer System] A property of an operation such that the operation does not cause delay in other operations.
3. [Network] A property of a switch such that one data path through the switch does not delay the flow of traffic on another data path through that switch.

non-disruptive serviceability

[Hardware] [Computer System] Support for continued availability of data during [FRU](#) service operations.

Some examples of non-disruptive serviceability are code patches, software/firmware upgrades, configuration changes, data migrations, and system expansion done during production time.

Non-disruptive service operations may result in performance impacts to data availability but do not result in a loss of access.

non-disruptive upgrade

[Hardware] [Computer System] A type of [non-disruptive serviceability](#) that upgrades the entity without impacting availability of that entity during the upgrade process.

non-erasable content

[Data Management] Content that should not be deleted except in accordance with a [retention policy](#).

non-linear mapping

[Storage System] Any form of [tabular mapping](#) in which there is not a fixed size correspondence between mapped address spaces.

Non-linear mapping is required in disk arrays that compress data, since the space required to store a given range of virtual blocks depends on the degree to which the contents of those blocks can be compressed, and therefore changes as [block](#) contents change. See [algorithmic mapping](#), [dynamic mapping](#), [tabular mapping](#).

non-transparent failover

[Computer System] A [failover](#), visible to external components of a system, of one component of that system to another component of that system.

An example is a [controller](#) failover in a redundant [disk subsystem](#) if the surviving controller exports the other's virtual disks at different addresses or on a different host I/O interconnect. See [transparent failover](#).

non-uniform memory access

[Hardware] A computer architecture with memory shared by multiple processors, but with different processors having different access times to memory.

Non-Uniform Memory Architecture

[Computer System] A computer architecture that enables memory to be shared by multiple processors, but with different processors having different access speeds to different parts of the memory.

non-volatile

[Storage System] The property that data is preserved in the absence of electrical power.

non-volatile cache

[Storage System] A cache that retains data through power cycles.

non-Volatile Dual Inline Memory Module

[Hardware] A [dual inline memory module](#) (DIMM) that operates as standard RAM while also having persistence across power cycles.

non-volatile memory

[Computer System] Synonym for [non-volatile random access memory](#).

non-volatile random access memory

[Computer System] Computer system random access memory that preserves data over power failures.

Non-volatile random access memory (NVRAM) is typically implemented through the use of [UPS](#), batteries, or implementation technology such as flash memory.

non-volatility

[Storage System] The property of an electronic device that data is preserved even when electrical power is removed.

nonrepudiation

[Data Security] Ability to prove the occurrence of a claimed event or action and its originating entities [ISO/IEC 27000].

NPIV

[Fibre Channel] Acronym for [N_Port_ID Virtualization](#).

NQN

[NVMe] Shorthand for [NVMe Qualified Name](#).

NUMA

[Computer System] Abbreviation for [non-uniform memory access](#).

NVDIMM

[Hardware] Acronym for [non-volatile dual inline memory module](#).

NVDIMM-F

[Hardware] A [non-volatile dual in-line memory module](#) that is accessed using a block access protocol.

NVDIMM-N

[Hardware] A [dual in-line memory module](#) that operates as non-volatile [DRAM](#).

NVDIMM-P

[Hardware] A [dual in-line memory module](#) that operates as non-volatile [DRAM](#) (NVDIMM-N) and also as a non-volatile block-accessed device (NVDIMM-F).

NVM

[Computer System] [Shorthand for non-volatile memory](#).

NVM Express Management Interface

[NVMe] [Management] A protocol for managing an [NVMe subsystem](#) that is carried over a management bus such as [MCTP](#).

NVM Express™

1. [Standards] An organization responsible for developing the family of NVM Express specifications and marketing NVM Express technologies. The NVM Express Work Group was incorporated as NVM Express in 2014.
2. [Storage System] NVM Express (NVMe™) is an open collection of standards and information created to fully expose the benefits of non-volatile memory in all types of computing environments from mobile to data center. The family of NVMe specifications defines how host software communicates with non-volatile memory.

NVM subsystem

[NVMe] A device that implements the NVMe protocol.

NVMe

[NVMe] An acronym for NVM Express™.

NVMe command

[NVMe] A command issued by an NVMe host to an NVMe [controller](#).

NVMe Completion Queue

[NVMe]] A circular buffer used to return status for completed [NVMe commands](#).

NVMe_DATA IUs

[Fibre Channel] The [FC-NVMe](#) Information Unit for [data frame](#)(s) transfers.

NVMe host

[NVMe] An entity that submits [NVMe commands](#) to an NVMe [controller](#) through an [SQ](#) for processing and receives NVMe command completions from that controller through a [CQ](#).

NVMe host port

[Fibre Channel] [VN_Port](#) that acts as an interface between an [NVMe host](#) and an [NVMe/FC](#) Fabric.

NVMe-MI™

[NVMe] [Management] An acronym for [NVM Express Management Interface](#).

NVMe-oF™

[NVMe] An acronym for [NVMe over Fabrics](#).

NVMe over fabrics

[NVMe] A protocol that supports message-based [NVMe](#) operations over a network fabric.

Example network fabrics include [Ethernet](#), [Fibre Channel](#), and [InfiniBand](#).

NVMe over Fibre Channel

[Fibre Channel] A protocol defined by the [INCITS Fibre Channel \(T11\) Technical Committee FC-NVMe](#) standard.

NVMe_Port

[Nx_Port](#) that supports the [FC-NVMe](#) standard.

NVMe Qualified Name

[NVMe] Name that uniquely describe an NVMe host or NVM subsystem.

NVMe Submission Queue

[NVMe] A circular buffer used to submit [NVMe commands](#) for processing.

NVMe subsystem

[NVMe] A component that processes NVMe commands.

NVMe/FC

[Fibre Channel] An acronym for [NVM Express over Fibre Channel](#).

NVRAM

[Computer System] Acronym for [non-volatile random access memory](#).

NVRAM cache

[Storage System] A quantity of [NVRAM](#) used as a [cache](#).

NVRAM cache is particularly useful in [RAID array](#) subsystems, filers, database servers, and other intelligent devices that must keep track of the state of multi-step I/O operations even if power fails during the execution of the steps. It also allows arrays to reply to writes before they are committed to disk, as the NVRAM becomes the non-volatile store for the writes.

NVRAM card

[Computer System] A printed [circuit](#) module containing [NVRAM](#).

Nx_Port

[Fibre Channel] An end point for [Fibre Channel frame](#) communication, having a distinct [address identifier](#) and [Name_Identifier](#), providing an independent set of Fibre Channel functions.

O

OASIS

[General] The Organization for the Advancement of Structured Information Standards.

See <https://www.oasis-open.org>.

object

1. [General] An instantiated instance of a class in an Object Oriented system.
2. [Data Security] In the context of access control, an entity such as an information system resource to which access is controlled and/or usage of which is restricted to authorized subjects.
3. [Data Management] The encapsulation of data and associated metadata.

object drive

[Storage System] A storage element that directly provides [object services](#).

object-oriented

[General] A methodology for decomposing an entity or problem by its key abstractions, versus by its procedures or steps.

The key abstractions become classes in an information or [data model](#), and embody well-defined behaviors called methods, with a unique set of data attributes. An instance of a class is an [object](#).

object service

[Storage System] Object-level access to storage.

object storage

[Storage System] A [storage device](#) that provides [object services](#).

Object storage includes [DSaaS](#).

OC-n

[Network] An optical carrier data rate that is a multiple of the fundamental [SONET](#) rate of 51.84 Mbits/sec.

OC-3 (155 Mbits/sec), OC-12 (622 Mbits/sec), OC-48 (2488 Mbits/sec) and OC-192 (9953 Mbits/sec) are currently in common use. See [Asynchronous Transfer Mode](#).

OData

[Management] The Open Data Protocol.

OData is an [OASIS](#) standard protocol that enables the creation and consumption of RESTful APIs.

OData service

[Management] A service conforming to the [OData](#) standard.

OData allows resources, identified using [Uniform Resource Locators](#) (URLs) and defined in a model, to be published and edited by Web clients using simple HTTP messages.

offline backup

[Data Recovery] A form of [backup](#) in which the data being backed up is not accessed by applications for the duration of the backup.

offline data

[Data Management] Data that may not be accessible for an extended period of time, for example data on removable [media](#) at a remote site.

See [near-online data](#).

OM1

[Network] A designation for a [multimode](#) optical fiber with a 62.5 micrometer core diameter and a [bandwidth-length product](#) of 200 MHz*km for 850 nm optical signals.

This fiber is typical of [FDDI](#) installations. Specified by ISO 11801 second edition.

OM2

[Network] A designation for a [multimode](#) optical fiber with a 50 micrometer core diameter and a [bandwidth-length product](#) of 500 MHz*km for 850 nm optical signals.

This fiber is typical of 1 [Gb/s Ethernet](#) and [Fibre Channel](#) installations. Specified by ISO 11801.

OM3

[Network] A designation for a [multimode](#) optical fiber with a 50 micrometer core diameter and a [bandwidth-length product](#) of 2000 MHz*km for 850 nm optical signals.

Specified by ISO 11801.

OM4

[Network] A designation for a [multimode](#) optical fiber with a 50 micrometer core diameter and a [bandwidth-length product](#) of 4700 MHz*km for 850 nm optical signals.

Specified by ISO 11801.

OM5

[Network] A designation for a [multimode](#) optical fiber with a 50 micrometer core diameter and a [bandwidth-length product](#) of 4700 MHz*km for 850 nm optical signals and a [bandwidth-length product](#) of 2470 MHz*km for 953 nm optical signals.

Specified by ISO 11801.

online backup

[Data Recovery] A form of [backup](#) in which the data being backed up may be accessed by applications during the backup.

Online backup of a set of data is usually accomplished using a [frozen image](#) of the data.

Op/s

[Storage System] Operations per second.

This is similar to [IOPS](#) but includes non-read and non-write operations (e.g., NFS SETATTR call, SCSI TEST UNIT READY).

Op/s is the preferred term as opposed to OPS or OPs since these terms are more often associated with the plural operations.

Open Group

[General] An organization for open systems standards and their certification.

UNIX, management, and security standards are developed within the Open Group, homed at www.opengroup.org.

open interconnect

[Computer System] Synonym for [standard interconnect](#).

operating environment

[Computer System] A collective term for the hardware architecture and operating system of a computer system.

operational

The condition of a [receiver](#) that is capable of receiving an encoded bit stream based on the rules defined by [FC-FS-2](#) for the FC receiver state machine.

Operational Recovery

[Data Recovery] [Recovery](#) of one or more applications and associated data to correct [operational](#) problems such as a corrupt database, user error or hardware failure.

Operational recovery may use a [point in time copy](#) or other techniques that create a consistent set of recoverable data.

optical fall time

[Network] The time interval required for the falling edge of an optical pulse to transition between specified percentages of the signal amplitude.

optional characteristics

[Standards] Characteristics of a standard that are specified by the standard but not required for [compliance](#), but which, if implemented, must be implemented as defined in the standard.

Ordered Set

[Fibre Channel] A [transmission word](#) with a [special character](#) in its most significant position and data characters in the remaining three positions.

An Ordered Set is identified by the combination of special codes and data bytes that, when encoded, result in the generation of the transmission characters specified for the ordered set. Ordered Sets are used for low-level [Fibre Channel](#) link functions such as [frame](#) demarcation, signaling between the ends of a link, [initialization](#) after power on, and some basic [recovery](#) actions.

Originator

1. [General] In a negotiation, the party that initiates the negotiation.
2. [Fibre Channel] With reference to an [Exchange](#), the [Nx_Port](#) that sent the [frame](#) that caused the Exchange to become open.

Originator Exchange_Identifier

[Fibre Channel] An identifier assigned by an [Exchange Originator](#) to identify an Exchange.

OSD

[Storage System] Acronym for [Object Storage Device](#).

out-of-band

[Network] A separate data stream sent over a different protocol than the primary data stream.

An example is management information.

See [in-band](#).

out-of-band data deduplication

[Storage System] Deprecated synonym for [post-process data deduplication](#).

over provisioning

[Storage System] [Management] Purposely providing more capacity than advertised.

The over provisioned capacity is used to replace capacity that is no longer useable (e.g., due to media defects or wear out). The over provisioned capacity is reserved for controller use, is not addressable by the user, and is used to improve performance and device life.

oversubscription

[Computer System] A property where more services are requested than are able to be delivered.

overwrite procedure

[Data Security] A process of writing patterns of data on a [medium](#) for the purpose of obliterating data that was formerly stored there.

See [purge](#).

OX_ID

[Fibre Channel] Acronym for [Originator Exchange_Identifier](#).

P

PaaS

[Services] Shorthand for [Platform as a Service](#).

panic

[Computer System] A colloquial term describing a software program's reaction to an incomprehensible state.

parallel transmission

[Network] Simultaneous transmission of multiple data bits over multiple physical lines.

parity data

[Storage System] In a [RAID array](#), data stored on [member](#) drives that can be used for regenerating any user data that becomes inaccessible.

parity drive

[Storage System] In a [RAID 3 array](#) or [RAID 4](#) array and some [RAID 6](#) arrays, a dedicated drive on which [parity data](#) is stored.

partition

1. [Computer System] A subdivision of the capacity of a physical disk or [virtual disk](#).
2. [Computer System] A contiguously addressed range of logical blocks on a physical [media](#) that is identifiable by an operating system. Partitions are consecutively numbered ranges of blocks that are created and used by Windows and most UNIX operating systems.

partitioning

[Storage System] Presentation of the usable storage capacity of a drive or [array](#) to an [operating environment](#) in the form of several virtual drives.

The aggregate capacity of the partitions of a drive approximates the capacity of the underlying physical drive or virtual drive. Partitioning is common in modern operating systems.

passphrase

[Data Security] A [sequence](#) of characters longer than the typical length of a [password](#).

password

[Data Security] A private alphanumeric string used to authenticate an [identity](#).

password digest

[Data Security] The hashed form of a [cleartext password](#).

path

1. [Storage System] The access path from a host computer to a storage device.
2. [File System] The combination of device address and file system directory elements used to locate a file within a file system.
3. [Network] Any route through an interconnect that allows two devices to communicate.
4. [Computer System] A sequence of computer instructions that performs a given function, such as I/O request execution.
5. [Cloud] The access path from an internet-connected computer to a cloud service endpoint, typically in the form of a URI or URL.

path length

1. [Computer System] The number of instructions (a rough measure of the amount of time) required by a computer to perform a specific activity, such as I/O request execution.
2. [File System] The number of characters in a path name.

path name

[File System] The complete list of nested sub-directories through which a file is reached.

payload

1. [Network] Contents of the data field of a communication frame or packet.
2. [Fibre Channel] The user data contained in a frame, excluding optional headers and fill bytes, if present.

PB

[Computer System] Shorthand for [Petabyte](#) (10^{15} bytes).

PBA

[Storage System] Shorthand for [physical block address](#).

Pbit

[General] Shorthand for [petabit](#).

Pbyte

[Computer System] Shorthand for [petabyte](#) (10^{15} bytes).

PCI

[Computer System] Shorthand for Peripheral Component Interconnect

PCI Express Queuing Interface

[SCSI] [Standards] A standard describing a circular queue interface for transferring information between a host and a device on a PCI Express bus or fabric.

PCI Express®

[Computer System] High speed interconnect specification developed and maintained by [PCI-SIG](#).

PCI-SIG®

Shorthand for [Peripheral Component Interconnect Special Interest Group](#).

This is the commonly used term for this organization.

PCIe®

[Computer System] An acronym for Peripheral Component Interconnect Express.

pcnfsd

[File System] A [daemon](#) that permits personal computers to access file systems via the [NFS protocol](#).

PDU

1. [Network] Acronym for [Protocol Data Unit](#).
2. [Energy] Acronym for [Power Distribution Unit](#).

pebibit

[General] Shorthand for 1,125,899,906,842,624 (2^{50}) bits.

Binary notation is most commonly used for semiconductor memory sizes.

See also [petabit](#).

Pebibyte

[General] Shorthand for 1,125,899,906,842,624 (2^{50}) bytes.

Binary notation is most commonly used for semiconductor memory sizes.

See also [Petabyte](#).

peer

[Computer System] One of multiple complementary but physically separate systems.

penetration

[Data Security] An unauthorized bypassing of the security mechanisms of a system.

penetration testing

[Data Security] A test methodology that attempts to circumvent or defeat the security features of an [information system](#).

penta-level cell

[Hardware] A [memory cell](#) that stores five bits of data.

performance audit

[Computer System] Systematic evaluation of a system by assessing how well it conforms to a set of established performance criteria.

Peripheral Component Interconnect

[Computer System] A set of standards for buses connecting interface modules to a computer system.

Older variations of the PCI standards support 32 bit and 64 bit [parallel](#) data transfers at 33 MHz and 66 MHz rates. The newer [PCIe](#) standards support one bit wide [serial](#) "lanes" operating at various data rates (e.g., 250MB/sec or 500MB/sec). See [PCI-SIG](#).

Peripheral Component Interconnect Special Interest Group

An organization responsible for developing the family of [PCI™](#) specifications and [PCIe®](#) specifications.

The commonly used term for this organization is PCI-SIG®.

Permanent Port Name

[Fibre Channel] The [Name_Identifier](#) common among all [VN_Ports](#) that are associated with the [PN_Port](#), and is set to the [F_Port_Name](#) of the [F_Port](#) that is attached to the physical interface.

persistence

[Computer System] A synonym for [non-volatility](#), usually used to distinguish between data and [metadata](#) held in DRAM, which is lost when electrical power is lost, and data held on non-volatile storage (disk, tape, battery-backed DRAM, etc.) that survives, or persists across power outages.

persistent memory

[Computer System] Non-volatile, byte addressable, low latency memory.

persistent memory access model

[Computer System] Semantic definition of how software accesses persistent memory hardware

persistent memory hardware

[Computer System] [NVRAM](#) that is byte addressable.

Personally Identifiable Information

[Data Security] Information associated with a person, as defined in ISO/IEC 29100.

petabit

[General] Shorthand for 1,000,000,000,000,000 (10^{15}) bits.

The base 10 convention is commonly found in I/O-related and scientific literature; the base 2 convention (1,125,899,906,842,624, i.e., 2^{50}) is commonly used for memory capacity.

See also [pebibit](#).

petabyte

[Computer System] Shorthand for 1,000,000,000,000,000 (10^{15}) bytes.

The base 10 convention is commonly found in I/O-related and scientific literature; the base 2 convention (1,125,899,906,842,624, i.e., 2^{50}) is commonly used for memory capacity.

See also [pebibyte](#).

PFC

[Network] Shorthand for [Priority-based Flow Control](#).

phy

[Computer System] The component that connects a port to a physical link.

The physical link may be electrical, optical, radio, or other.

physical block

[Storage System] A physical location on [storage media](#) where data is stored.

A physical block is different from the [logical block](#) and [virtual block](#) typically presented to the [operating environment](#) by a [storage device](#).

physical block address

[Storage System] A number that is associated with a [physical block](#).

physical configuration

1. [General] The installation, removal, or re-installation of disks, cables, HBAs, and other components required for a system or subsystem to function.
2. [General] The combination of disks, cables, HBAs, and other components required for a system or subsystem to function.

physical disk

1. [Storage System] A disk that is not virtual.
2. [Storage System] [Computer System] An online [storage device](#) that is visible to a host operating system.

physical extent

[Storage System] A number of physically consecutive blocks on a [physical disk](#).

Physical extents are created by [control software](#) as building blocks from which [redundancy](#) groups and [volume](#) sets are created. Called a p-extent by [ANSI](#).

physical extent block number

[Storage System] The relative position of a [block](#) within a [physical extent](#).

Physical extent block numbers are used to develop higher-level constructs in [RAID array](#) striped data [mapping](#), not for application or data [addressing](#).

Pib

[General] Shorthand for 1,125,899,906,842,624 (2^{50}) bits.

Binary notation is commonly used for semiconductor memory sizes.

See also [petabit](#).

Pibit

[General] Shorthand for [Pebibit](#).

PiByte

[General] Shorthand for [Pebibyte](#).

PII

[Data Security] Shorthand for [Personally Identifiable Information](#).

PIT copy

[Data Recovery] Shorthand for [point in time copy](#).

PKCS

[Data Security] Shorthand for [Public Key Cryptography](#) Standards.

PKI

[Data Security] Shorthand for [Public Key Infrastructure](#).

plaintext

[Data Security] Unencrypted information.

platform

A physical entity that contains [nodes](#).

Platforms include all end devices that are attached to a Fabric, for example, hosts and storage subsystems. Platforms communicate with other platforms in the [storage area network](#) using the facilities of a Fabric or other [topology](#)

Platform as a Service

[Services] Delivery over a network of a virtualized programming environment, consisting of an application deployment stack based on a virtual computing environment.

Typically, PaaS is based on [IaaS](#), is either self-provisioned or provisionless, and is billed based on consumption.

PLC

[Hardware] Shorthand for [Penta-Level Cell](#)

PLOGI

[Fibre Channel] Acronym for N_ [Port Login](#).

PN_Port

[Fibre Channel] A [Fibre Channel Link Control Facility](#) that supports only [Nx_Ports](#) in a [node](#).

point in time copy

[Data Recovery] A fully usable copy of a defined collection of data that contains an image of the data as it appeared at a single instant in time.

A point in time copy is considered to have logically occurred at that point in time, but implementations may perform part or all of the copy at other times (e.g., via database log replay or rollback) as long as the result is a consistent copy of the data as it appeared at that point in time.

See [snapshot](#), [copy on write](#), and [pointer remapping](#).

point of encryption

[Data Security] Location within the Information and Communications Technology (ICT) infrastructure where data are encrypted on its way to storage (3.43) and, conversely, where data are [decrypted](#) when accessed from storage.

[ISO/IEC 27040]

The point of [encryption](#) is only applicable for data at rest.

pointer copy

[Data Recovery] A [point in time copy](#) made using the [pointer remapping](#) technique.

pointer remapping

[Data Recovery] A technique for maintaining a [point in time copy](#) such that when a logical data location is written, a new physical location is chosen for the updated data, and the pointer for that data is remapped to point to it.

See [Copy on Write](#).

Policy

1. [General] A definite goal, course, or method of action to guide and determine present and future decisions.
2. [Management] Policies as a set of rules to administer, manage, and control access to network resources. This definition reflects the definition in RFC 3198. Policies are implemented or executed within a particular context, such as policies defined within a business unit. See policy goal and policy rule. See RFC 3060.

policy goal

[Management] The objectives or desired state intended to be maintained by a [policy](#) system.

This definition reflects the definition in RFC 3198. As the highest level of abstraction of policy, these goals are most directly described in business rather than technical terms. For example, a goal might state that a particular application operate on a network as though it had its own dedicated network, despite using a shared infrastructure. 'Policy goals' can include the objectives of a [service level agreement](#), as well as the assignment of resources to applications or individuals. A policy system may be created that automatically strives to achieve a goal through feedback regarding whether the goal (such as a service level) is being met.

policy processor

[Computer System] The processor that schedules the overall activities in an [intelligent device](#).

Policy processors are usually augmented by additional processors, state machines, or sequencers that perform the lower-level functions required to implement overall policy.

policy rule

[Management] The binding of a set of actions to a set of conditions, where the conditions are evaluated to determine whether the actions are performed.

port

1. [Network] An entrance to or exit from a storage network.
2. [Network] A [connection](#) point for a peripheral device or an application program. Ports can be logical, physical or both. Examples include [Fibre Channel](#) ports, [Internet Protocol](#) ports and [SCSI](#) ports.

Port_ID

[Fibre Channel] Shorthand for [N_Port_ID](#).

port login

The port-to-port login process by which [Fibre Channel](#) initiators establish sessions with targets.

Port_Name

[Fibre Channel] A [Name-Identifier](#) that is associated with a [Fibre Channel port](#).

Port_VF_ID

[Fibre Channel] A configurable [VF-ID](#) that is associated with any untagged [frame](#) received by a VF capable [multiplexer](#).

POST

[Computer System] Acronym for [power-on self-test](#).

post-process data deduplication

[Storage System] [Data deduplication](#) performed after the data to be deduplicated has been initially stored.

See [inline data deduplication](#).

power conditioning

[General] The regulation of power supplied to a system so that acceptable ranges of voltage and frequency are maintained.

Power [conditioning](#) is sometimes done by a [storage subsystem](#), but may also be an environmental requirement.

power distribution unit

[Computer System] An element or device which distributes power to and possibly monitors the power consumption of other devices in a system.

power efficiency

[Computer System] Synonym for [electrical efficiency](#).

power-on self-test

[Computer System] A set of internally stored diagnostic programs run by intelligent devices when powered on, that verify the basic [integrity](#) of hardware before software is permitted to run on it.

power supply

[Computer System] A component which converts an AC or DC voltage input to one or more DC voltage outputs for the purpose of powering a system or subsystem.

Power supplies may be [redundant](#) and hot swappable.

power supply efficiency

[Storage System] The [efficiency](#) of a [power supply](#).

power supply unit

[Computer System] Synonym for [power supply](#).

PP

[Data Security] Acronym for [Protection Profile](#).

PQI

[SCSI] Shorthand for [PCI Express Queuing Interface](#).

preservation

[Data Management] The processes and operations involved in ensuring the ability to read, interpret, authenticate, secure and protect against the loss of data or information throughout its lifecycle.

preservation object

[Long-Term Retention] The basic unit of data or information that is preserved by a [preservation system](#).

The Archival Information Package (AIP) defined in [Open Archival Information System](#) (OAIS) is an example of a preservation object.

preservation system

[Long-Term Retention] A repository that, either as its sole responsibility or as one of multiple responsibilities, undertakes all necessary actions for the [long-term preservation](#) of the data or information in its custody.

Primary storage

[Data Management] Data storage device, system, or service used to store data that is accessed frequently by applications.

Primitive Sequence

[Fibre Channel] In an encoded data stream, an [Ordered Set](#) transmitted repeatedly and continuously until a specified response is received.

Primitive Signal

[Fibre Channel] In an encoded data stream, an [Ordered Set](#) with a special meaning such as an [idle](#) or Receiver_Ready (R_RDY).

Priority-based Flow Control

[Network] A Data Center Bridging ([DCB](#)) mechanism that provides link level flow control on a per-priority basis for full-duplex links.

privacy breach

[Data Security] Situation where personally identifiable information is processed in violation of one or more relevant privacy safeguarding requirements [source: ISO/IEC 29100:2011].

private cloud

[Services] Delivery of [SaaS](#), [PaaS](#), [IaaS](#) and/or [DaaS](#) to a restricted set of customers, usually within a single organization.

Private Clouds are created due to issues of [trust](#).

private key

[Data Security] The cryptographic key in an [asymmetric cryptosystem](#) that is not made public.

private key cryptography

[Data Security] An [encryption](#) methodology in which the encryptor and decryptor use the same key, which must be kept secret.

See [symmetric cryptosystem](#).

private loop

[Fibre Channel] A [Fibre Channel Arbitrated Loop](#) with no [Fibre Channel Fabric](#) attachment.

privilege

[Data Security] A right granted to an individual, a program, or a process. [source: CNSSI-4009]

privileged user

[Data Security] A user who, by virtue of function or seniority, has been allocated powers within a system that are significantly greater than those available to the majority of users.

Such persons will include, for example, the system [administrator\(s\)](#), storage administrator(s), and network administrator(s) who are responsible for keeping the system available and may need powers to create new user profiles as well as add to or amend the powers and access rights of existing users.

process policy

[Fibre Channel] An error handling [policy](#) that allows a [port](#) to continue processing [data frames](#) following detection of one or more missing [frames](#) in a [Sequence](#).

product under test

[Computer System] A system or component that is the subject of a test.

profile

[Standards] A proper subset of a standard or specification that supports [interoperability](#) across a set of products or in a specific application.

A profile is a vertical slice through a standard or specification containing physical, logical and behavioral elements required for interoperability. A profile may make some optional features of a standard or specification mandatory or prohibited.

proprietary interconnect

[Computer System] An [I/O interconnect](#) or network [interconnect](#) whose transmission characteristics and/or protocols are not standardized and require the permission of the owner to be implemented.

See [standard interconnect](#).

protection profile

[Data Security] An implementation-independent set of security functional and [assurance](#) requirements for a category of IT products that meet specific consumer needs.

Protection profiles (PP) are most commonly associated with ISO 15408.

protocol

[General] A set of rules that control an interaction between two or more entities in communication with one another.

Rules may specify the formats of a set of communication messages, and in what sequences they are expected to occur. Examples of protocols include [TCP/IP](#) and [Fibre Channel](#).

Protocol Data Unit

[Network] A single message between two network nodes used for communication.

provenance

[General] Information regarding an item's source, origin, custody and ownership.

provisioning

[Computer System] The process of initializing and equipping a system to provide services.

Proxy Fabric

[Fibre Channel] In an [IFR](#) environment, the remote [Fibre Channel Fabric](#) associated with a [Proxy Nx_Port](#).

Proxy Nx_Port

A role of an [Nx_Port](#) in an IFR environment.

From the perspective of a remote (Proxy) Fabric, an Nx_Port assumes the role of a Proxy Nx_Port.

PSU

[Computer System] Shorthand for [power supply unit](#).

public cloud

[Services] Delivery of [SaaS](#), [PaaS](#), [IaaS](#) and/or [DaaS](#) to a relatively unrestricted set of customers.

public key

[Data Security] A cryptographic key that is made public for purposes of using [asymmetric encryption](#) with an entity that has the [private key](#).

public key cryptography

[Data Security] Synonym for asymmetric [cryptography](#).

Public Key Infrastructure

[Data Security] A collection of software, hardware, people and procedures that facilitate secure creation and management of digital certificates.

public loop

[Fibre Channel] A [Fibre Channel Arbitrated Loop](#) with an attachment to a [Fibre Channel Fabric](#).

pull technology

[Computer System] The transmission of information in response to a request for that information.

An example of a pull technology is polling. See [push technology](#).

pulverization

[Data Security] A method of sanitization that reduces devices or components to fine particles of a specified size.

Pulverization is related to shredding, but usually uses a grinding process as opposed to a cutting process. [ISO/IEC 27040]

purge

1. [Data Security] A class of sanitization that makes recovery infeasible using state of the art laboratory techniques, but which preserves the storage media in a potentially reusable state.
2. [Storage System] The process of returning a solid state storage device to a state in which subsequent writes execute, as closely as possible, as if the device had never been used and does not contain any valid data. See FOB.

push technology

[Computer System] The transmission of information from a source or [initiator](#) without a request to the source to send that information.

An example of a push technology is an [SNMP trap](#). See [pull technology](#).

Q

QLC

[Hardware] Acronym for [Quad-Level Cell](#)

QoS

[Management] Acronym for [Quality of Service](#).

Quad-Level Cell

[Hardware] A [memory cell](#) that stores four bits of data.

Quality of Service

[Management] A technique for managing computer system resources by specifying user visible parameters.

[Policy](#) rules are used to describe the operation of network elements to make QoS guarantees. Message delivery time is an example of a user visible parameter that manages the rate of a data transfer. Relevant [IETF](#) standards for QoS are RSVP ([Resource Reservation Protocol](#)) and COPS (Common Open Policy Service).

quiesce

[Computer System] To bring a system or component to a [quiescent state](#).

quiescent state

[Computer System] A state in which all activity has been suspended.

quota

[File System] A limit that restricts the amount of a resource that a user, group or [directory](#) structure may consume.

An example of a resource that may have an associated quota is storage capacity.

R

RADIUS

[Data Security] Acronym for [Remote Authentication Dial In User Service](#).

RAID

[Storage System] Acronym for [Redundant Array of Independent Disks](#).

RAID 0

[Storage System] A data placement policy where consecutive [logical blocks](#) of data are uniformly distributed across a set of independent [storage devices](#) without offering any form of redundancy.

This is commonly referred to as [data striping](#). This form of [RAID](#) will encounter data loss with the failure of any storage device in the set.

RAID 00

[Storage System] A data placement policy that creates a [RAID 0](#) stripe set over two or more RAID 0 sets.

This is commonly referred to as RAID 0+0. This form of data layout is not fault tolerant; if any [storage device](#) fails there will be data loss.

RAID 1

[Storage System] A data placement policy where each [logical block](#) of data is stored on more than one independent [storage device](#).

This is commonly referred to as [mirroring](#). Data stored using this form of [RAID](#) is able to survive a single storage device failure without data loss.

RAID 10

[Storage System] A data placement policy that creates a striped device ([RAID 0](#)) over a set of mirrored devices ([RAID 1](#)).

This is commonly referred to as RAID 1/0. Data stored using this form of *RAID* is able to survive a single [storage device](#) failure in each RAID 1 set without data loss.

RAID 2

[Storage System] A data placement policy in which an error detecting code computed on stripes of data from some independent [storage devices](#) is stored on additional independent storage devices.

RAID 2 is not widely used.

RAID 3

[Storage System] A data placement policy using parity-based protection where logical bytes of data are uniformly distributed across a set of independent [storage devices](#) and the parity is stored on a dedicated independent storage device.

Data stored using this form of [RAID](#) survives a single storage device failure.

If the storage devices use rotating media, they are assumed to be rotationally synchronized, and the data stripe size should be no larger than the exported block size.

RAID 4

[Storage System] A data placement policy using parity-based protection where [logical blocks](#) of data are uniformly distributed across a set of independent [storage devices](#) and the parity is stored on a dedicated independent storage device.

Data stored using this form of [RAID](#) is able to survive a single storage device failure without data loss.

RAID 5

[Storage System] A data placement policy using parity-based protection for storing stripes of 'n' logical blocks of data and one logical block of parity across a set of 'n+1' independent [storage devices](#) where the parity and data blocks are interleaved across the storage devices.

Data stored using this form of [RAID](#) is able to survive a single storage device failure without data loss.

RAID 6

[Storage System] A data placement policy using parity-based protection that allows stored data to survive any two storage device failures without data loss.

RAID array

[Storage System] Shorthand for [Redundant Array of Independent Disks](#).

RAID-Z

[Storage System] A form of [RAID](#) implemented in the open source ZFS project.

RAID01

[Storage System] A data placement policy that creates a mirrored device ([RAID 1](#)) over a set of striped devices ([RAID 0](#)).

This is commonly referred to as RAID 0+1 or RAID 0/1. Data stored using this form of [RAID](#) is able to survive a single [RAID 0](#) data set failure without data loss.

RAID1Triple

[Storage System] A placement policy where each [logical block](#) of data is mirrored three times across a set of three independent [storage devices](#).

This is commonly referred to as three-way mirroring. This form of [RAID](#) can survive two device failures without data loss.

raised floor

[General] An elevated floor providing space for cable runs between equipment cabinets and cold air flow for cooling.

Many mainframe systems are designed to intake cool air from the bottom and exhaust heat from the top of a closed cabinet system.

RAM drive

[Storage System] A quantity of host system random access memory (RAM) managed by software and presented to applications as a high-performance drive.

RAM drives generally emulate disk I/O functional characteristics, but unless augmented by special hardware to make their contents non-volatile, they cannot tolerate loss of power without losing data. See [solid state drive](#).

random I/O load

[Storage System] An [I/O load](#) that consists of [random I/Os](#).

The term random I/O is commonly used to denote an I/O load that is not sequential, whether or not the distribution of data locations is indeed random. Random I/O is characteristic of [I/O request](#)-intensive applications. See [sequential I/O](#).

random I/Os

[Storage System] A combination of [random reads](#) and/or [random writes](#).

random number

[General] A number having properties of randomness or unpredictability.

There are three basic classes of random number. Deterministic or pseudorandom numbers are generated by an algorithm that produces a predictable [sequence](#) of values from an initial value called a seed. Cryptographically secure random numbers are produced in a sequence that, while deterministic, cannot be feasibly discovered or computed by examination of previous numbers in the sequence. Nondeterministic generators incorporate input from some unpredictable physical source that is outside human control.

random reads

[Storage System] Consecutively issued read requests that do not specify adjacently addressed data.

random relative offset

[Network] A transmission control algorithm that allows frames for a block of data to be transmitted in any order.

Each frame of a block of data contains an offset relative to the beginning of that block of data. See [relative offset](#) and [continuously increasing relative offset](#).

random writes

[Storage System] Consecutively issued write requests that do not specify adjacently addressed data.

rank

1. [Storage System] A set of [physical disk](#) positions in an enclosure.
2. [Storage System] The set of corresponding [target](#) identifiers on all of a [controller](#)'s device I/O interconnects.
3. [Storage System] Synonym for a [stripe](#) in a [redundancy group](#). Because of the diversity of meanings attached to this term, SNIA publications make minimal use of it.

ransomware

[Data Security] A type of malicious software designed to block access to data until funds are paid.

rapid elasticity

[Computer System] Quick scaling of resources and capabilities to meet expansion and contraction of demand.

To the consumer, the capabilities available for [provisioning](#) often appear to be unlimited and available for purchase in any quantity at any time.

rapid provisioning

[Computer System] Quickly and automatically deploying services in response to requests.

RAS

1. [Computer System] Acronym for reliability, [availability](#), and serviceability.
2. [Windows] Acronym for [Remote Access Service](#).

raw capacity

[Storage System] The total [addressable capacity](#) of the storage devices in a storage system.

raw partition

[Storage System] A [device partition](#) not managed by a [volume manager](#).

The term raw partition is frequently encountered when discussing database systems because some database system vendors recommend volumes or files for underlying database storage, while others recommend direct storage on raw partitions.

raw partition backup

[Data Recovery] A bit-by-bit copy of a [partition](#) image.

A [raw partition backup](#) incorporates no information about the objects contained on the partition, and hence cannot be used for individual object [restoration](#). See [disk image backup](#).

RBAC

[Data Security] Acronym for [role-based access control](#).

RDMA

[Computer System] Acronym for [remote direct memory access](#)

read/write head

[Storage System] The magnetic or optical recording element of a [disk drive](#).

ready idle

[Storage System] Synonym for [idle](#).

real time data deduplication

[Storage System] Synonym for [inline data deduplication](#).

rebuild

[Storage System] The [regeneration](#) and writing onto one or more replacement devices of all of the data that was on a failed device in a [RAID array](#).

In most arrays, a rebuild can occur while applications continue to access the data.

receiver

1. [Hardware] An [interconnect](#) or network device that includes a detector and signal processing electronics.
2. [Hardware] A [circuit](#) that converts an optical or electrical [media](#) signal to an electrical [serial](#) logic signal.
3. [Fibre Channel] The portion of a Link Control Facility dedicated to receiving an encoded bit stream using the rules specified by [FC-0](#).

receptacle

[Network] The stationary half of the [interface connector](#) on a [transmitter](#) or [receiver](#).

reconstruction

[Storage System] Synonym for [rebuilding](#).

Recorded Volume Serial Number

[Data Recovery] Synonym for [media ID](#).

recovery

[Data Recovery] The recreation of a past [operational state](#) of an entire application or computing environment.

Recovery is required after an application or computing environment has been destroyed or otherwise rendered unusable. It may include [restoration](#) of application data, if that data had been destroyed as well.

Recovery Point Objective

[Data Recovery] The maximum acceptable time period prior to a failure or disaster during which changes to data may be lost as a consequence of [recovery](#).

Data changes preceding the failure or disaster by at least this time period are preserved by recovery. Zero is a valid value and is equivalent to a "zero data loss" requirement.

Recovery Time Objective

[Data Recovery] The maximum acceptable time period required to bring one or more applications and associated data back from an outage to a correct [operational state](#).

Redfish

[Management] A [DMTF](#) open standard specification and schema that specifies a RESTful interface that utilizes JSON and [OData](#) for managing scalable hardware platforms.

Redfish schema

[Management] The representation of [Redfish](#) resources and data model using [Common Schema Definition Language](#).

Redfish service

[Management] An [OData service](#) that conforms to [Redfish](#).

Redfish service entry point

[Management] A [URI](#) through which a particular instance of a [Redfish service](#) is accessed.

reduced mode

[Storage System] Synonym for [degraded mode](#).

reduction

[Storage System] The removal of a [member disk](#) from a [RAID array](#), placing the array in [degraded mode](#).

Reduction most often occurs because of a member [drive](#) failure, however, some RAID implementations allow reduction for system management purposes.

redundancy

[General] The inclusion of extra components of a given type in a system (beyond those required by the system to carry out its function) for the purpose of enabling continued operation in the event of a component failure.

redundancy group

[Storage System] A collection of extents organized for the purpose of providing [data protection](#).

Within a [redundancy](#) group in a [storage array](#), a single type of data protection is employed. All of the usable storage capacity in a redundancy group is protected by [check data](#) stored within the group, and no usable storage external to a redundancy group is protected by check data within it.

redundancy group stripe

[Storage System] A set of [strips](#) comprising a [redundancy group](#).

The [check data](#) blocks in a redundancy group [stripe](#) protect the [protected space](#) in that stripe.

redundancy group stripe depth

[Storage System] The number of blocks in one [strip](#) of a [redundancy group stripe](#).

In the conventional striped data [mapping](#) model, redundancy group [stripe depth](#) is the same for all stripes in a redundancy group.

Redundant Array of Independent Devices

[Storage System] A [storage array](#) in which part of the physical storage capacity is used to store [redundant](#) information about user data stored on the remainder of the storage capacity.

The redundant information enables [regeneration](#) of user data in the event that one of the array's [member](#) disks or the [access path](#) to it fails. Although it does not conform to this definition, [disk striping](#) is often referred to as [RAID 0](#).

The phrase Redundant Array of Independent Devices is adapted from the 1988 SIGMOD paper *A Case for Redundant Arrays of Inexpensive Disks*. The term was changed to Redundant Array of Independent Disks. In modern systems, RAID techniques are often applied to independent [storage devices](#) that implement [block storage](#), including technologies other than [disk](#).

Redundant Array of Independent Disks

[Storage System] Deprecated term for [Redundant Array of Independent Devices](#)

Redundant Array of Independent Nodes

[Storage System] A collection of networked [server](#) nodes with software that provides and maintains pools of highly available storage capacity.

redundant configuration

1. [Computer System] A [configuration](#) of a system in which [failure tolerance](#) is achieved by the presence of [redundant](#) instances of all components that are critical to operation.
2. [Computer System] A [configuration](#) of a system in which [failure tolerance](#) is achieved by the presence of [redundant](#) instances of all components that are critical to operation.

redundant system

[Computer System] A system in which [failure tolerance](#) is achieved by the presence of [redundant](#) instances of all components that are critical to operation.

reference data

[Data Management] Synonym for [fixed content](#).

reference information

[Data Management] Synonym for [fixed content](#).

refreshment

Synonym for beer.

regeneration

[Storage System] Recreation of user data from a failed [drive](#) in a [RAID array](#) using [check data](#) and user data from surviving members.

Regeneration may be used to recover data from an unrecoverable [media](#) error.

registered state change notification

[Fibre Channel] A [Fibre Channel](#) function that allows notification to registered nodes if a change occurs to other specified nodes.

rejoin mirror

[Storage System] To bring a [split mirror](#) component back into the [mirror](#).

rekeying

[Data Security] Process of updating and redistributing the shared secret key, and optionally, key encryption keys [ISO/IEC 11770-5].

This process is executed by the key distribution center.

relative offset

[General] The offset of a piece of data relative to a reference point.

Remote Access Service

[Windows] A Windows service that provides remote access capabilities to client applications.

Remote Authentication Dial-In User Service

[Data Security] An [authentication](#) and accounting [protocol](#) used by many Internet Service Providers (ISPs).

Information such as username and [password](#) is entered when a [connection](#) is made. This information is passed to a RADIUS [server](#) that verifies the information in order to authorize access to the system. RADIUS is defined in [RFC 2865](#).

remote direct memory access

[Network] A protocol that enables [direct memory access](#) over a network.

removable media library

[Backup] Synonym for [library](#).

removable media storage device

[Storage System] A [storage device](#) designed so that its storage volumes can be readily removed and inserted.

Tapes, DVDs, and optical disks are examples of removable [media](#) storage devices.

replacement disk

[Storage System] Synonym for [spare disk](#).

replay attack

[Data Security] An [attack](#) in which a valid data transmission is maliciously or fraudulently repeated, either by the [originator](#) or by an adversary who intercepts the data and retransmits it.

replica

1. [Data Recovery] A general term for a copy of a collection of data. See [duplicate](#), [point in time copy](#), [snapshot](#).
2. [Data Recovery] An image of data usable by one or more applications without an intermediate restore process.

replicate

[Data Recovery] The action of making a [replica](#).

Representational State Transfer

[Services] A specific set of principles for defining, addressing and interacting with resources addressable by URIs.

Architectures that follow these principles are said to be RESTful. The principles include: abstraction of state into resources and a uniform set of representations and operations (e.g., [HTTP](#) verbs like GET and PUT as the only means to manipulate a resource).

repudiation

[Data Security] The act of a [principal](#) in denying, disowning or disavowing an act, event or transaction.

request for comment

[General] A process used to request feedback.

reserved field

[Standards] A field in a data structure set aside for future definition.

Some standards prescribe implementation behavior with respect to reserved fields (e.g., originators of data structures containing reserved fields must zero fill them; consumers of data structures containing reserved fields must ignore them, etc.).

resiliency

[Storage System] The ability of a storage subsystem to preserve [data integrity](#) and [availability](#) of access despite the unavailability of one or more of its storage devices.

resource pooling

[Computer System] [Aggregation](#) of a provider's resources to serve multiple consumers using a multitenant model, with physical and virtual resources dynamically assigned and reassigned on demand.

Resource Reservation Protocol

[Management] An [IETF](#) protocol for requesting reservation of network bandwidth in advance.

responder

1. [Computer System] The entity that responds to a request.
2. [Fibre Channel] The Nx-Port that received a frame that caused an Exchange to become open.

Responder Exchange Identifier

[Fibre Channel] An identifier assigned by a [responder](#) to identify an [Exchange](#).

REST

[Services] Abbreviation for [Representational State Transfer](#).

restoration

[Data Recovery] Synonym for [recovery](#).

retention period

1. [Data Recovery] The length of time that a [backup copy](#) should be kept.
2. [File System] A property of a file that can be used to implement backup and data [migration](#) policies.
3. [Data Management] The length of time a [compliance volume](#) or file must be maintained undeleted and unchanged.

retention policy

[Data Management] A [policy](#) governing when and for how long a record must be retained by a storage system.

This may be a rule that applies to a record or groups or categories of records. The policy may be time or event based.

retimer

[Hardware] A [circuit](#) that uses a clock independent of the incoming signal to generate an outbound signal.

return loss

[Hardware] The ratio of the strength of a returned signal to that of the [incident](#) signal that caused it.

In electrical circuits, return loss is caused by impedance discontinuities. Optical return loss is caused by index of refraction differences.

RFC

1. [General] Shorthand for request for comment.
2. [Standards] A series of documents published by the IETF that are developed by the IETF, the Internet Architecture Board (IAB), and the Internet Research Task Force (IRTF).

risk

[Data Security] The combination of the probability of an event and the significance of its consequences. [ISO Guide 73].

The term "risk" is generally used only when there is at least the possibility of negative consequences. In some situations, risk arises from the possibility of deviation from the expected outcome or event.

risk acceptance

[Data Security] Informed decision to take a particular risk [ISO Guide 73].

Risk acceptance can occur without risk treatment or during the process of risk treatment. Accepted risks are subject to monitoring and review.

risk analysis

[Data Security] Process to comprehend the nature of risk and to determine the level of risk [ISO Guide 73].

Risk analysis provides the basis for risk evaluation and decisions about risk treatment. Risk analysis includes risk estimation.

risk management

[Data Security] Coordinated activities to direct and control an organization with regard to risk [ISO Guide 73].

risk treatment

[Data Security] Process to eliminate risk (3.16) or reduce it to a tolerable level [ISO Guide 73].

robotic media handler

[Storage System] The mechanical component of a [library](#) which moves removable media within the library.

RoCE

[Network] [RDMA](#) over [Converged Ethernet](#).

RoCE V1 is a non-routed protocol and RoCE V2 is a routed protocol. Both were developed by the [InfiniBand](#) Trade Association.

role-based access control

[Data Security] An access control method that assigns permissions to roles that reflect the organization and policies of an organization.

rollback to snapshot

1. [Storage System] The process of resetting a [volume](#)'s data to become identical to a [snapshot](#) taken of that volume.
2. [File System] In [LTFS](#), the process of modifying the index to match a previous version of the index.

rotational latency

[Storage System] The time interval between the end of a disk seek and the time at which the starting [block](#) address specified in the [I/O request](#) passes the disk head.

routing function

[Network] A switching entity that forwards packets towards their destination.

row

[Storage System] The set of blocks with corresponding [physical extent block](#) addresses in each member disks physical extents.

The concept of rows is useful for [locking](#) the minimal amount of data during a [RAID array](#) update so as to maximize the potential for [parallel](#) execution.

RPO

[Data Recovery] Shorthand for [Recovery Point Objective](#).

RSA

[Data Security] A [public key](#) algorithm developed by Rivest, Shamir & Adelman.

RSCN

[Fibre Channel] Shorthand for [registered state change notification](#).

RSVP

[Management] Shorthand for [Resource Reservation Protocol](#).

RTO

[Data Recovery] Shorthand for [Recovery Time Objective](#).

run length

[Data Communication] The number of consecutive identical bits in a transmitted signal.

For example, the pattern 0011111010 has run lengths of 2, 5, 1, 1, and 1.

running disparity

[Data Communication] In a data stream using [8B/10B encoding](#), the cumulative [disparity](#) (positive or negative) of all previously issued transmission characters.

RVSN

[Data Recovery] Shorthand for [Recorded Volume Serial Number](#).

RX_ID

[Fibre Channel] Abbreviation for [Responder Exchange Identifier](#).

S

S_ID

[Fibre Channel] Acronym for [Source Identifier](#).

SaaS

[Services] Acronym for [Software as a Service](#).

SAM

[SCSI] Acronym for [SCSI Architecture Model](#).

The SCSI Architecture Model is developed and owned by the [T10](#) working group of [ANSI](#). SAM has undergone numerous revisions, each being consecutively named as SAM-2, SAM-3 and so on, the latest revision being SAM-5.

SAN

1. [Storage System] [Network] [Storage Area Network](#). This is the normal meaning in SNIA documents.
2. [Computer System] Acronym for [Server](#) Area Network, which connects one or more servers.
3. [Computer System] Acronym for System Area Network, an interconnected set of system elements.

sanitization

[Data Security] A process or method to sanitize.
[ISO/IEC 27040]

sanitize

[Data Security] Render access to target data on storage media infeasible for a given level of effort. [ISO/IEC 27040]

Clear, purge, and destruct are actions that can be taken to sanitize storage media. See [media sanitization](#).

SAS

[SCSI] Acronym for [Serial Attached SCSI](#).

SAS Expander

[SCSI] Short for [Serial Attached SCSI Expander](#).

SAS Protocol Layer

[SCSI] The layer of the [SAS interconnect](#) that comprises the [Serial SCSI Protocol](#) (SSP), the Serial [ATA](#) Tunneled Protocol (STP) and the Serial Management Protocol (SMP).

SATA

[Storage System] Acronym for [Serial Advanced Technology Attachment](#).

saturated disk

[Storage System] A disk whose instantaneous [I/O load](#) is as great as or greater than its capability to satisfy the requests comprising the load.

Mathematically, a saturated disk's I/O queue eventually becomes indefinitely long. In practice, however, user reaction or other system factors generally reduce the rate of new request arrivals for a saturated disk.

scale

[Computer System] To grow or support growth in such a way that all capabilities of the system remain in constant ratio to each other.

A [storage subsystem](#) whose [data transfer capacity](#) increases by the addition of buses as its storage capacity increases by the addition of disks is said to scale.

schema

1. [Management] A collection of information models or data models.
2. [Data Management] Data that describes the organization and format of other data.

scrambling

[Data Communication] Modifying data to minimize repetitive character patterns.

script

1. [Storage System] A parameterized list of primitive [I/O interconnect](#) operations intended to be executed in [sequence](#). Often used with respect to ports, most of which are able to execute scripts of I/O commands autonomously (without [policy processor](#) assistance).
2. [Computer System] A sequence of instructions intended to be parsed and carried out by a command line interpreter or other scripting language. Perl, VBScript, JavaScript and Tcl are all scripting languages. See [Command Line Interface](#).

scrubbing

[Storage System] A background function that reads user data and [check data](#) blocks in a [storage](#) device and relocates them if [media](#) defects or errors are found.

SCSI

[SCSI] Acronym for [Small Computer System Interface](#).

SCSI adapter

[SCSI] An [adapter](#) that connects an [intelligent device](#) to a [SCSI interconnect](#).

See [HBA](#), [host bus adapter](#).

SCSI address

[SCSI] The full address used by a computer to communicate with a [SCSI device](#), including an [adapter](#) number (required with computers configured with multiple SCSI adapters), and the [target](#) ID of the device.

SCSI addresses do not include [logical unit number](#), because those are not used for communication.

SCSI Architecture Model

[SCSI] An [ANSI](#) standard that defines the generic requirements and overall framework in which other [SCSI](#) standards are defined.

New generations of this standard are identified by a numeric suffix; for example the second generation standard is SAM2.

SCSI bus

[SCSI] Deprecated synonym for [SCSI interconnect](#).

SCSI Device

[SCSI] Entity that contains other [SCSI](#) entities.

For example, a SCSI [initiator](#) device contains one or more SCSI initiator ports and zero or more application clients. See [SAM](#).

SCSI Enclosure Services

[SCSI] A standard for management of environmental factors such as temperature, power, voltage, etc.

SCSI Initiator Port

[SCSI] The [initiator](#) endpoint of an [I_T nexus](#).

SCSI interconnect

[SCSI] A [serial](#) or [parallel interconnect](#) that implements a [SCSI](#) transport standard.

The number of SCSI initiator ports and SCSI target ports which may be connected on a [SCSI bus](#) is dependent upon the particular transport standard. See [initiator](#), [target](#).

SCSI Media Changer Commands

[SCSI] A standard for [media changer](#) devices (i.e., libraries).

SCSI Over PCI Express

[SCSI] A protocol to transport [SCSI](#) operations over PCI Express.

SCSI Parallel Interface

[SCSI] The family of [SCSI](#) standards that define the characteristics of the [parallel](#) version of the SCSI interface.

Several versions of SPI, known as SPI, SPI2, SPI3, etc., have been developed. Each version provides for greater performance and functionality than preceding ones.

SCSI port

[SCSI] The [SCSI](#) term for an entity in a [SCSI Device](#) that provides the SCSI functionality to interface with a service delivery subsystem or transport.

SCSI Stream Commands

[SCSI] A standard for sequential-access devices (i.e., tape drives).

SCSI target port

[SCSI] The [target](#) endpoint of an [L_T nexus](#).

SCSI Trade Association

[General] A trade association incorporated in 1996 to promote all forms of [SCSI](#) technology in the market.

See <http://www.scsita.org/>.

SDDC

[Management] Acronym for [Software Defined Data Center](#).

SDH

[Network] Acronym for [Synchronous Digital Hierarchy](#).

SDS

[Storage System] Shorthand for [software-defined storage](#).

secret key

[Data Security] A key used in a [symmetric cryptosystem](#) to both encrypt and decrypt data.

The key must remain confidential to the using parties to ensure the security of the cryptosystem.

sector

[Storage System] The unit in which data is physically stored and protected against errors on a [fixed block architecture](#) disk.

A sector typically consists of a [synchronization](#) pattern, a header field containing the block's address, data, a [checksum](#) or [error correcting code](#), and a trailer. Adjacent sectors are often separated by information used to assist in track centering. Most often, each sector holds a block of data. See [disk block](#).

secure data deletion

[Data Security] Synonym for [sanitize](#).

secure hash

[Data Security] An algorithm that generates a fixed-size [digest](#) from its input (e.g., a message).

The algorithm has the properties that different inputs are extraordinarily unlikely to yield the same digest, small changes in its input lead to large changes in its output, and it is computationally intractable to generate an input that yields the same digest as another given input.

secure multi-tenancy

A type of [multi-tenancy](#) that employs security controls to explicitly guard against data breaches and provides validation of these controls for proper governance. [ISO/IEC 27040]

Secure multi-tenancy exists when the risk profile of an individual tenant is no greater than it would be in a dedicated, single-tenant environment. In very secure environments even the identity of the tenants is kept secret. See [multi-tenancy](#).

Secure Sockets Layer

[Data Security] A suite of cryptographic algorithms, protocols and procedures used to provide security for communications used to access the world wide web.

The characters "https:" at the front of a URL cause SSL to be used to enhance [communications security](#). More recent versions of SSL are known as [TLS](#) (Transport Level Security) and are standardized by the [Internet Engineering Task Force](#) (IETF).

SSL is a predecessor of TLS and is considered a vulnerability if it is supported in a product.

See also [SSL](#).

security domain

[Data Security] A set of elements, a security policy, a security authority, and a set of security-relevant activities in which the set of elements are subject to the security policy for the specified activities, and the security policy is administered by the security authority for the security domain. [ISO/IEC 10181-1:1996].

security incident

[Data Security] A single or a series of unwanted or unexpected events that have a significant probability of compromising business operations and threatening [information security](#).

security safeguards

[Data Security] The protective measures and controls that are prescribed to meet the security requirements specified for a system.

Safeguards may include but are not necessarily limited to: hardware and software security features, operating procedures, [accountability](#) procedures, access and distribution controls, management constraints, personnel security, and physical structures, areas, and devices. Also called safeguards (without the adjective).

security strength

[Data Security] A measure of the difficulty of subverting the cryptographic protection (e.g. discovering the key) using classical computers.

Security strength is specified in bits and is a specific value from the set {80, 112, 128, 192, 256}. A security strength of b bits means that of the order of 2^b operations are required to break the system.

Security Target

[Data Security] A set of security functional and [assurance](#) requirements and specifications to be used as the basis for evaluation of an identified product or system, most commonly associated with ISO 15408.

Self-contained Information Retention Format

[Long-Term Retention] A self-describing container format, developed by the SNIA, appropriate for the long-term storage of digital information.

self encrypting drive

[Storage System] A type of [self encrypting storage device](#).

self encrypting storage device

[Storage System] A [storage device](#) that has the native ability to encrypt all user data written to and decrypt the same data read from it, and that prevents access until a credential is supplied.

Tape drives, disk drives and other types of storage devices may all be designed to be self encrypting storage devices.

self-signed certificate

[Data Security] A [public key certificate](#) whose [digital signature](#) may be verified by the public key contained within the certificate.

The signature on a self-signed certificate protects the integrity of the data, but does not guarantee authenticity of the information. The trust of self-signed certificates is based on the secure procedures used to distribute them.

[NIST SP 800-57 Part 1]

sensitive information

[Data Security] Information that, as determined by a competent authority, must be protected because its disclosure, modification, destruction, or loss will cause perceivable damage to someone or something [ISO/IEC 2382:2015].

SEQ_ID

[Fibre Channel] Shorthand for [Sequence Identifier](#).

Sequence

[Fibre Channel] A set of [Fibre Channel data frames](#) with a common [Sequence_ID](#)), corresponding to one message element, [block](#), or [Information Unit](#).

Sequences are transmitted from the [Sequence Initiator](#) to the [Sequence Recipient](#).

Sequence Identifier

[Fibre Channel] A number transmitted with each [data frame](#) in a [Sequence](#) that identifies the [frame](#) as part of the Sequence.

Sequence Initiative

[Fibre Channel] A [Fibre Channel](#) signaling feature that designates which end of an [Exchange](#) has authority to send the next [Sequence](#).

Sequence Initiator

[Fibre Channel] An [FC_Port](#) that initiates a [Sequence](#) and transmits [data frames](#) to a destination FC_Port.

Sequence Recipient

[Fibre Channel] An [FC_Port](#) that receives [data frames](#) from a [Sequence Initiator](#) and, if applicable, transmits responses to the Sequence Initiator.

Sequence Status Block

[Fibre Channel] A data structure that tracks the state of a [Sequence](#).

Both [Sequence Initiators](#) and [Sequence Recipients](#) have Sequence Status Blocks for each active sequence.

sequential I/O / sequential I/O load / sequential reads / sequential writes

[Storage System] An [I/O load](#) consisting of consecutively issued read or write requests to adjacently addressed data.

Sequential I/O is characteristic of data transfer intensive applications. See [random I/O](#).

SERDES

[Computer System] Short for [Serializer Deserializer](#).

serial

[General] The transmission of data bits one at a time over a single link.

serial adapter

[Computer System] An [adapter](#) that connects an [intelligent device](#) to an RS232 or RS425 [serial](#) communications link.

Serial adapters are sometimes used by storage subsystems, filers, and other intelligent devices to connect to serial consoles for management purposes. See [host adapter](#).

Serial Advanced Technology Attachment

[Storage System] A version of the [ATA](#) interface that uses a [serial connection](#) architecture.

Serial Attached SCSI

[SCSI] A [SCSI](#) interface standard that provides for attaching hosts to SCSI devices, including SAS and [SATA](#) disk and tape drives.

[INCITS](#) Technical Committee [T10](#) is responsible for the national ([ANSI](#)) and international ([ISO](#)) standards for SAS. See www.t10.org.

Serial Attached SCSI Expander

[SCSI] A switching device that uses [virtualization](#) to allow multiple [SAS](#) devices to be connected to each [initiator](#) port.

serial console

[Computer System] A real or emulated communication terminal used by humans to manage an [intelligent device](#).

[Serial](#) consoles connect to the devices' virtual or physical serial adapters.

Serializer Deserializer

[Computer System] A mechanism for converting data from [parallel](#) to [serial](#) form and from serial to parallel form.

server

1. [Computer System] An [intelligent device](#), usually a computer, that provides services to other intelligent devices, usually other computers or appliances. See [client](#).
2. [Computer System] An asymmetric relationship with a second party (a client) in which the client initiates requests and the server responds to those requests.

server based virtualization

[Computer System] Synonym for [host based virtualization](#).

Server Message Block

[Network] A [network file system](#) access [protocol](#) designed primarily used by Windows clients to communicate file access requests to Windows servers.

Current versions of the SMB protocol are referred to as [CIFS](#), the [Common Internet File System](#).

serverless backup

[Data Recovery] A [backup](#) methodology that utilizes a device other than the [server](#) to copy data without using the [LAN](#).

The copy may be performed by a network-attached [controller](#) (e.g., utilizing [SCSI](#) Extended Copy), by an [appliance](#) within the [SAN](#), or by a Backup Server.

Service Incident Standard

[Management] A [DMTF](#) standard that defines how a support or help desk [incident](#) is processed.

Service Level Agreement

[General] An agreement between a service provider, such as an IT department, an internet services provider, or an [intelligent device](#) acting as a [server](#), and a service consumer.

A service level agreement defines parameters for measuring the service, and states quantitative values for those parameters.

Service Level Objective

[General] A [partition](#) of an [SLA](#) consisting of individual metrics and [operational](#) information to enforce and/or [monitor](#) the SLA.

Service Level Objectives may be defined as part of an SLA, an SLS, or in a separate document. Each is a set of parameters and their values. The actions of enforcing and reporting monitored [compliance](#) can be implemented as one or more policies. See [Service Level Agreement](#).

Service Location Protocol

[Management] An [IETF](#) standards track [protocol](#) that provides a framework to allow networking applications to dynamically discover the existence, location, and [configuration](#) of networked services in enterprise networks.

service root

[Management] A particular resource that is directly accessed via the [Redfish service entry point](#).

This resource serves as a starting point for locating and accessing the other resources and associated metadata that together make up an instance of a Redfish service.

SES

1. [SCSI] [Standards] Acronym for [SCSI Enclosure Services](#).
2. [Management] [Standards] Acronym for [Solution Exchange Standard](#).

SF_ID

Abbreviation for Source [Fabric_Identifier](#).

SFF

1. [Standards] The SNIA SFF Technology Affiliate Technical Work Group.
2. [Hardware] Acronym for Small Form Factor.

SFP

[Hardware] Acronym for [Small Form Factor Pluggable](#)

share

[File System] A resource such as a data [volume](#) or a printer device made available for use by users on other computer systems.

For example, a printer or a collection of files stored in a single [directory tree](#) on a [file server](#) may be made available as a share. [CIFS](#) clients, which include most networked personal computers, typically map a share to a [drive letter](#).

shared secret

[Data Security] A pre-shared key that has been distributed to communicating parties prior to beginning of an encrypted communication.

shelf

[Storage System] A modular enclosure for storage devices such as disks, tapes, and [canisters](#). Storage shelves usually contain power supplies and cooling devices, and have pre-wired backplanes that carry power and [I/O interconnect](#) signals to [storage devices](#).

shielded enclosure

[Data Security] A room or container designed to attenuate electromagnetic radiation.

shingled magnetic recording

[Storage System] A recording technique for storing data on an HDD where data is recorded on overlapping [tracks](#) which must be written sequentially.

SIA

1. [General] Acronym for Semiconductor Industries Association.
2. [SCSI] Acronym for [SCSI](#) Industry Association.

Simple Network Management Protocol

[Network] [Standards] An [IETF protocol](#) for monitoring and managing systems and devices in a network.

The data being monitored and managed is defined by a [MIB](#). The functions supported by the protocol are the request and retrieval of data, the setting or writing of data, and traps that signal the occurrence of events.

single

[General] A [configuration](#) in which the referenced component is not redundant.

See [redundant](#) (component).

single ended

[SCSI] An electrical signaling technique in which all control and data signals are represented by a voltage difference from a common ground.

See [differential](#).

single instance storage

[Storage System] A form of data deduplication that operates at a granularity of an entire file or data object.

See [data deduplication](#), [subfile data deduplication](#).

Single-Level Cell

[Hardware] A [memory cell](#) that stores a single bit of data.

single mode

[Network] A fiber optic cabling specification that provides for up to 10 kilometer distance between devices.

single mode fibre

Optical fiber that is designed for the transmission of a single ray or mode of light as a carrier.

[Single mode fibre](#) transmission is typically used for long-distance signal transmission.

Single Point Of Failure

[General] One component or path in a system, the failure of which would make the system inoperable.

Single Sign On

[Data Security] A form of centralized [authentication](#) employing a single set of [credentials](#) that are used transparently to perform subsequent authentications on behalf of the users.

SIRF

[Long-Term Retention] Acronym for [Self-contained Information Retention Format](#).

SIS

1. [Management] Acronym for [Service Incident Standard](#).
2. [Storage System] Acronym for [Single Instance Storage](#).

SLA

[General] Acronym for [Service Level Agreement](#).

SLC

[Hardware] Acronym for [Single-Level Cell](#)

SLO

[General] Acronym for [Service Level Objective](#).

SLP

[Management] Acronym for [Service Location Protocol](#).

Small Computer System Interface

[SCSI] A collection of [ANSI](#) standards and proposed standards that define I/O interconnects primarily intended for connecting storage subsystems or devices to hosts through [host bus adapters](#).

Originally intended primarily for use with small (desktop and desk-side workstation) computers, SCSI has been extended to serve most computing needs, and is arguably the most widely implemented I/O interconnect in use today.

Small Form Factor

[Hardware] Various connectors and form factors related to computers.

Small Form Factor Pluggable

[Hardware] A fiber optic socket and plug connector used by Fibre Channel and other technologies.

small read request / small write request / small I/O request

[Storage System] An I/O, read, or write request that specifies the transfer of a relatively small amount of data.

â€˜Small' usually depends on the context, but most often refers to 8 KBytes or fewer. See [large I/O request](#).

SMB

[File System] [Network] Acronym for [Server Message Block](#).

SMBus

[Management] Abbreviation for [System Management Bus](#).

SMI

1. [Standards] The [Storage Networking Industry Association](#)'s (SNIA) Storage Management Initiative (SMI). SMI develops and standardizes interoperable storage management technologies, including providing conformance testing for products.
2. [Standards] Acronym for [Structure of Management Information](#).

SMI-S

[Standards] Acronym for Storage Management Initiative Specification.

SMPTE

[Standards] Acronym for [Society of Motion Picture and Television Engineers](#).

SMR

[Storage System] Acronym for shingled magnetic recording.

snapshot

[Data Management] A [point in time copy](#) of a defined collection of data.

Clones and snapshots are full copies. See [delta snapshot](#). Depending on the system, snapshots may be of files, LUNs, file systems, or any other type of container supported by the system.

SNIA

[Storage System] [Standards] An industry organization focused on standardization and education for the transport, optimization of infrastructure, storage, acceleration, format, and protection of data.

sniffer

[Data Security] A software tool for auditing and identifying network traffic packets.

SNMP

[Network] [Management] Acronym for [Simple Network Management Protocol](#).

SNS

[Network] Acronym for Simple [Name Server](#).

SOC

[Hardware] Acronym for [System on a Chip](#).

social engineering

[Data Security] Act of manipulating people into performing actions or divulging confidential information [ISO/IEC 27033-3:2010]

Examples include tricking people into downloading and executing files that appear to be benign but are actually malicious, revealing passwords, etc.

Society of Motion Picture and Television Engineers

[Standards] An industry association whose goal is to standardize television and motion picture industry information interchange protocols.

SOF

[Fibre Channel] Abbreviation for [Start Of Frame](#).

soft link

[File System] Synonym for [symbolic link](#).

Soft Zone

[Fibre Channel] A [zone](#) consisting of zone members that are permitted to communicate with each other via the [Fibre Channel Fabric](#) where the zoning is not enforced by hardware.

See [zone](#), [Hard Zone](#).

software appliance

[Computer System] An application combined with an [operating environment](#) designed to run on industry standard hardware.

If a vendor installs the software [appliance](#) on hardware prior to customer delivery, the offering is considered an appliance.

Software as a Service

[Services] Delivery over a network, on demand, of the use of an application.

Software Defined Data Center

[Management] A virtualized data center with a service management interface.

Application requirements determine the service levels provided.

software-defined storage

[Storage System] Virtualized storage with a service management interface.

SDS includes pools of storage with data service characteristics that may be applied to meet the requirements specified through the service management interface.

solid state array

[Storage System] Synonym for [solid state storage array](#).

Solid State Disk

[Storage System] Deprecated synonym for [Solid State Drive](#).

Solid State Drive

[Storage System] A [storage device](#) in which the storage capability is provided by [Solid State Storage](#).

Abbreviated as SSD.

Solid State Storage

[Storage System] A storage capability built from solid state electronics.

solid state storage array

[Storage System] A storage [array](#) that uses solid state storage and may contain other storage media.

Solution Exchange Standard

[Management] A [DMTF](#) standard that defines the [exchange](#) of support or help desk information.

solution under test

[Computer System] All hardware and software components that are exercised during a test to verify functional behavior or determine performance characteristics.

The solution under test comprises the infrastructure including software components, application(s), test system(s), and the system(s) under test.

See also [system under test](#) and [test system](#).

SONET

[Network] Shorthand for [Synchronous Optical Network](#).

Source Identifier

[Fibre Channel] An address identifier in a [Fibre Channel frame](#) that identifies the source [FC_Port](#) of the frame.

source N_Port

[Fibre Channel] The [N_Port](#) from which a [frame](#) is transmitted.

space reduction

[Storage System] Deprecated synonym for capacity optimization.

spare disk

[Storage System] A disk [reserved](#) for the purpose of [substitution](#) for a like disk in case of that disk's failure.

spare extent

[Storage System] An extent [reserved](#) for the purpose of [substitution](#) for a like extent in case of that extent's failure.

sparse file

[File System] A file that has empty (unwritten and unallocated) data regions, which on reading back are implicitly filled with bytes containing the value zero (0x00).

On some file systems all files are implicitly sparse.

special character

Any [transmission character](#) that is valid in the [transmission code](#) but does not correspond to a [valid data byte](#).

Special characters are used to denote special functions.

special code

A code that, when encoded using the rules specified by the [transmission code](#), results in a [special character](#).

Special codes are typically associated with control signals related to [protocol](#) management (e.g., [K28.5](#)).

SPI

[SCSI] Acronym for [SCSI Parallel Interface](#).

spiral data transfer rate

[Storage System] Synonym for [full volume transfer rate](#).

split I/O request

1. [Storage System] An [I/O request](#) to a [virtual disk](#) that requires two or more I/O operations to satisfy, because the virtual data addresses in the request map to more than one extent on one or more disks.
2. [Storage System] An [application I/O request](#) that is divided into two or more sub-requests by a [file system](#) or other operating system component because the amount of data requested is too large for the [operating environment](#) to handle as a unit.

split mirror, split mirror copy

1. [Storage System] Any of a class of [point in time copy](#) implementations or the resulting copies in which the storage for the copy is synchronized to the source of the copy and then split. A split [mirror](#) copy occupies as much storage as the source of the copy.
2. [Data Recovery] A method for generating a frozen image of a set of data.

SPOF

[General] Acronym for [Single Point Of Failure](#).

spoofing

[Data Security] Unauthorized use of legitimate [identification](#) and [authentication](#) data to mimic a [subject](#) different from the attacker.

Impersonating, masquerading, piggybacking and mimicking are forms of spoofing.

SQ

Acronym for [Submission Queue](#).

SQE

[NVMe] Acronym for [Submission Queue Entry](#).

SR

Acronym for [Sequence Recipient](#).

SRAM

[Hardware] Acronym for [Static Random Access Memory](#).

SRM

[Management] Acronym for [Storage Resource Management](#).

SSD

[Storage System] Acronym for [Solid State Drive](#).

SSID

[iSCSI] Shorthand for [iSCSI Session Identifier](#).

SSL

[Data Security] Acronym for [Secure Sockets Layer](#).

SSO

[Data Security] Acronym for [Single Sign On](#).

ST

[Data Security] Acronym for [Security Target](#).

STA

[SCSI] Acronym for [SCSI Trade Association](#).

stable storage

1. [Storage System] Stable storage is persistent storage where data survives:
2. [Storage System] Repeated power failures, including cascading power failures,
3. [Storage System] Single hardware failures (of any board, power supply, etc. but not including media),
4. [Storage System] Repeated software crashes, including reboot cycle, and
5. [Storage System] A minimum number of hours without external power. For more information on stability evaluation it is suggested to read:
 - SNIA Emerald Specification annex C
 - Description of Stable Storage for SPEC SFS 2014

stand alone drive

[Data Recovery] A removable [media drive](#) that is not associated with a [media stacker](#) or [robot](#).

standard interconnect

[Computer System] [Standards] An [I/O interconnect](#) or network [interconnect](#) whose specifications are readily available to the public, and that can be implemented in products.

Also called an [open interconnect](#).

star

[Network] A physical network [configuration](#) in which every [node](#) is connected directly to, and only to, a central point; all communications pass through the central point, which may be a [hub](#) or a [switch](#).

Start-of-Frame

[Fibre Channel] A group of ordered sets that delineates the beginning of a [frame](#).

state

[Computer System] The condition of a system at a point in time.

Examples of systems that have states could be a program, software routine, or hardware component.

stateful

[Computer System] A property of a system where operation of that system is dependent on state.

Examples of systems that are stateful include SMB and NFS v4.1.

stateless

[Computer System] A property of a system where operation of that system is independent of state.

Examples of systems that are stateless include NFS v3 and HTTP.

Static Random Access Memory

[Hardware] Byte-addressable computer memory that maintains state indefinitely given continuous power.

storage

[General] A function that records data and supports retrieval.

Storage Area Network

1. [Network] [Storage System] A network whose primary purpose is the transfer of data between computer systems and storage devices and among storage devices. A SAN consists of a communication infrastructure, which provides physical connections, and a management layer, which organizes the connections, storage devices, and computer systems so that data transfer is secure and robust. The term SAN is usually (but not necessarily) identified with [block](#) I/O services rather than file access services.
2. [Storage System] A storage system consisting of storage elements, storage devices, computer systems, and/or appliances, plus all [control software](#), communicating over a network. The SNIA definition specifically does not identify the term SAN with [Fibre Channel](#) technology. When the term SAN is used in connection with Fibre Channel technology, use of a qualified phrase such as "Fibre Channel SAN" is encouraged. According to this definition, an [Ethernet](#)-based network whose primary purpose is to provide access to storage devices would be considered a SAN. SANs are sometimes also used for system interconnection in clusters.

storage array

[Storage System] A collection of [storage devices](#) from one or more commonly accessible [storage subsystems](#), combined with a body of control software that presents an abstracted view of the storage.

storage controller

[Storage System] A device for handling storage requests that includes a processor or sequencer programmed to autonomously process a substantial portion of I/O requests directed to storage devices.

Aggregating [RAID](#) controllers and filers are examples of storage controllers.

storage device

[Storage System] Any [storage element](#) or [aggregation](#) of storage elements designed and built for data storage and delivery.

storage domain

[Storage System] A collection of storage resources and supporting software and interfaces that are managed as a unit.

storage efficiency

[Storage System] The ratio of a storage system's [effective capacity](#) to its [raw capacity](#).

An estimated efficiency calculation is permissible using estimated effective capacity.

The storage efficiency of a system is normally low when it is new. On a [capacity optimizing system](#) efficiency generally increases as the system is loaded with data. There is no way to precisely predict the storage efficiency of a loaded capacity optimizing system before data is loaded onto it.

storage element

[Storage System] Any component that is used to build storage devices and which contributes to persistent data storage and delivery.

Storage elements are components of storage devices. Examples of a storage element include: disk drive, [flash memory](#), tape cartridge, [tape drive](#), and library.

storage extent

[Storage System] A contiguous [array](#) of bytes real or virtual as exposed by a storage container.

A storage extent instance may include data on either removable or nonremovable [media](#) storage devices. See [extent](#).

storage federation

[Storage System] Making multiple storage systems appear to a user as a single system.

Storage Interoperability

[Storage System] The ability of storage devices, products, or systems to work together in a correct, predictable and interchangeable fashion.

Storage Management Initiative-Specification

[Management] [Standards] A storage management interface developed by SNIA, and standardized via [ANSI](#) and [ISO](#).

storage media

[Storage System] The material in a [storage device](#) on which data is recorded.

Storage [media](#) includes electrical (e.g., solid state), magnetic (hard disk, tape), and optical media.

storage medium

1. [General] An individual that makes prophesies regarding the storage industry.
2. [Storage System] See [storage media](#).

storage networking

[Storage System] [Network] The practice of creating, installing, administering, or using networks whose primary purpose is the transfer of data between computer systems and storage elements and among storage devices.

storage protection

[Storage System] Stable storage that includes any combination of hardware and software (e.g., RAID, NVRAM, disk sparing and background disk scrubbing or media scan) that assures that all committed IO operations will be preserved in the event of power loss or [storage device](#) failure.

storage resource domain

[Management] The category of resources that encompasses storage services.

storage resource management

[Management] Management of physical and logical storage resources, including storage elements, storage devices, appliances, virtual devices, disk [volume](#) and file resources.

storage security

[Data Security] Application of physical, technical, and administrative controls to protect storage systems and infrastructure as well as the data stored (3.50) within them. [ISO/IEC 27040]

Storage security is focused on protecting data (and its storage infrastructure) against unauthorized disclosure, modification, or destruction while assuring its availability to authorized users. These controls may be preventive, detective, corrective, deterrent, recovery, or compensatory in nature.

storage service

[Management] A set of functions that provide storage.

storage subsystem

[Storage System] An integrated collection of (a.) storage controllers and/or [host bus adapters](#), (b.) storage devices, CD-ROM drives, tape drives, and libraries, and (c.) any required [control software](#), that provides storage services to one or more computers.

storage system power efficiency

[Storage System] The [power efficiency](#) of a storage system, where input power is measured at the wall socket and output power is measured at the power inputs to the disks, fans, robotics and electronics.

Measurement points of interest include the [idle](#) and maximum activity states.

storage taxonomy

[Standards] A hierarchical categorization of storage networking products based on capacity, availability, port count and other attributes.

The SNIA Emeraldâ„¢ Power Efficiency Measurement Specification presents a storage taxonomy.

storage tier

[Storage System] Storage space that has [availability](#), performance, and cost characteristics that justify the movement of data between it and other storage tiers based on the requirements of the stored data.

storage virtualization

[Storage System] The application of [virtualization](#) to storage services or devices.

Storage can be virtualized simultaneously in multiple layers of a system, for instance to create [HSM](#)-like systems.

store and forward

[Network] A switching technique that requires buffering an entire [frame](#) before it is routed.

stream

1. [Network] Continuous [media](#) content served over a specialized [protocol](#) in real-time.
2. [File System] A subfile in the [CIFS](#) protocol. NFSv4 provides equivalent functionality using Named Attributes.

streamed sequence

[Fibre Channel] A new [Sequence](#) initiated by a [Sequence Initiator](#) in any [class of service](#) for an [Exchange](#), while that Exchange already has one or more Sequences open.

strip

[Storage System] The consecutively addressed blocks in a single extent.

A [disk array](#)'s [controller](#) uses strips to map [virtual disk](#) block addresses to [member disk](#) block addresses. Also known as [stripe element](#).

strip size

[Storage System] Synonym for [stripe depth](#).

stripe

[Storage System] The set of strips at corresponding locations of each [member](#) extent of a [disk array](#) that uses striped data [mapping](#).

The strips in a stripe are associated with each other in a way (e.g., relative extent [block](#) addresses) that allows membership in the stripe to be quickly and uniquely determined by a computational algorithm. [Parity RAID](#) uses stripes to map [virtual disk](#) block addresses to member extent block addresses.

stripe depth

1. [Storage System] The number of blocks in a [strip](#) in a [disk array](#) that uses striped data [mapping](#).
2. [Storage System] The number of consecutively addressed [virtual disk](#) blocks mapped to consecutively addressed blocks on a single [member](#) extent of a disk array.

stripe element

[Storage System] Synonym for [strip](#).

stripe size

[Storage System] The number of blocks in a [stripe](#).

A [striped array](#)'s stripe size is the [stripe depth](#) multiplied by the number of [member](#) extents. A [parity RAID array](#)'s stripe size is the stripe depth multiplied by the number of member extents less the number of parity extents.

striped array / striped disk array

[Storage System] A [disk array](#) with striped data [mapping](#) but no [redundancy](#) for failure protection.

Striped arrays are sometimes used to improve I/O performance on data that is of low value or easily replaced. Virtualizers may also use simple [striping](#) of the extents that they import, on the grounds that the underlying storage is responsible for [data protection](#).

stripeset

[Storage System] Synonym for [striped array](#).

striping

1. [Storage System] Short for [data striping](#). Also known as [RAID Level 0](#) or [RAID 0](#), striping is a [mapping](#) technique in which fixed-size consecutive ranges of [virtual disk](#) data addresses are mapped to successive [array](#) members in a cyclic pattern.
2. [Network] A network technique for aggregating the [data transfer rates](#) of several links between the same pair of nodes. A single data stream can be spread across the links for higher aggregate data transfer rate. Sometimes called port [aggregation](#).

Structure of Management Information

[Management] [Network] A notation for setting or retrieving management variables over [SNMP](#).

SNMP queries are in the form of GET requests for one or more Object [IDs](#) (OIDs), which take the form 1.3.1.1.4.6.123.1.1.0; an [encoding](#) called ASN.1 is used to transmit both request and reply. The SMI spec not to be confused with the SNIA's Storage Management Initiative specifies the [schema](#) used in the OID strings.

structured data

[Data Management] Data that is organized and formatted in a known and fixed way.

The format and organization are customarily defined in a [schema](#). The term structured data is usually taken to mean data generated and maintained by databases and business applications.

subdirectory

[File System] A [directory](#) in a hierarchical [directory tree](#) whose parent is a directory.

subfile data deduplication

[Storage System] A form of data deduplication that operates at a finer granularity than an entire file or data object.

See [data deduplication](#), [single instance storage](#).

subject

[Data Security] In the context of [access control](#) or [authorization](#), an entity whose access or usage is controlled.

Submission Queue Entry

[NVMe] A fixed size entry in an SQ that contains a single command.

substitution

[General] The assumption of a component's function in a system by a functionally equivalent component.

subtractive routing method

[SCSI] A method used by [SAS expanders](#) that forwards connection requests for unknown (i.e., not directly attached) devices via special designated [phy](#) links to another more authoritative expander.

The more authoritative expander is usually, but does not have to be, the "root" expander.

SUT

[Computer System] Shorthand for [solution under test](#).

SVC

[Network] Acronym for Switched Virtual [Circuit](#).

swap

[General] The installation of a [replacement unit](#) in place of a defective unit in a system.

Units are any parts of a system that may either be field replaceable (FRUs) by a vendor service representative or consumer replaceable (CRUs). A physical swap operation may be cold, warm, or hot, depending on the state in which the [disk subsystem](#) must be in order to perform it. A functional swap operation may be an auto swap or it may require human intervention.

switch

[Network] A network infrastructure component to which multiple ports attach.

Unlike hubs, switches typically have internal [bandwidth](#) that is a multiple of link bandwidth, and the ability to rapidly switch port connections from one to another. A typical switch can accommodate several simultaneous full link bandwidth transmissions between different pairs of ports. See [hub](#).

switch-back

[Computer System] Synonym for [failback](#).

Switch_Name

[Fibre Channel] A [Name-Identifier](#) that is associated with a [Fibre Channel Switch](#) or [bridge](#).

switch-over

[Computer System] Synonym for [failover](#).

switched over

[Computer System] Synonym for [failed over](#).

Swordfish

[Storage Management] A SNIA open standard for managing data and storage services.

Swordfish is an extension of the [Redfish](#) specification that enables simple, scalable, and interoperable management of storage resources, ranging from direct attached storage to complex enterprise class storage servers.

Swordfish service

[Storage Management] A [Redfish service](#) that conforms to requirements of the [Swordfish specification](#).

Swordfish service entry point

[Storage Management] A [Redfish service entry point](#) through which a particular instance of a Swordfish Service is accessed.

symbolic link

[File System] A special type of file that can be used to redirect a file or [directory](#) path transparently to another file or directory that may be on another system.

Also known as [symlink](#) or [soft link](#). Symbolic links differ from hard links in that deletion of the underlying file causes them to be "broken", and subsequent attempts to traverse them fail.

symlink

[File System] Shorthand for a [symbolic link](#).

symmetric cryptography

[Data Security] [Cryptography](#) that uses a [symmetric cryptosystem](#).

symmetric cryptosystem

[Data Security] A [cryptographic algorithm](#) in which the same key is used to encrypt and decrypt a single message or [block](#) of stored information.

Keys used in a symmetric [cryptosystem](#) must be kept secret, yet are required on both ends of a [protocol exchange](#). They are commonly used on a per-session basis by layered protocols such as [TLS](#) and [SSL](#).

symmetric virtualization

[Computer System] Deprecated synonym for [in-band virtualization](#).

synchronization

1. [Network] A [receiver's identification](#) of a [transmission word](#) boundary.
2. [General] The act of aligning or making two entities be equivalent at a specified point in time.

synchronize

[Data Management] In the context of [data replication](#), to establish an identical copy of the user data on the primary [volume](#) onto the secondary volume.

Synchronous Digital Hierarchy

[Network] A common worldwide telecommunications methodology, standardized by [ISO](#) with 155, 622, 2048 and 9953 [Mbps serial](#) data rates in steps of 4.

An SDH uses a light scrambling of data to remove only the lowest frequency elements with the goal of achieving maximum digital [bandwidth](#) use.

synchronous mirroring

[Storage System] Deprecated synonym for [synchronous replication](#).

synchronous operations

[Computer System] Operations that have a fixed time relationship to each other.

Most commonly used to denote I/O operations that occur in time [sequence](#), i.e., a successor operation does not occur until its predecessor is complete.

Synchronous Optical Network

[Network] A standard for optical network elements and transmission.

SONET provides modular building blocks, fixed overheads, integrated operations channels, and flexible [payload](#) mappings. Basic SONET provides a [data transfer capacity](#) of 51.840 megabits/second. This is known as OC-1. Higher data transfer rates that are n times the basic rate are available (known as [OC-n](#)). OC-3, OC-12, OC-48, and OC-192 are currently in common use.

synchronous replication

[Storage System] A replication technique in which data must be committed to stable storage at both the primary site and the secondary site before the write is acknowledged to the host.

system board

[Computer System] A printed [circuit](#) module containing mounting devices for processor(s), memory, and [adapter](#) cards, and implementing basic computer functions such as memory access, processor and [I/O interconnect](#) clocking, and human interface device attachment.

system crash

[Hardware] Hardware and/or software failure that causes the system to be non-functional.

system disk

[Computer System] The disk on which a computer system's operating software is stored.

The system disk is usually the disk from which the operating system is bootstrapped (initially loaded into memory). It frequently contains the computer system's [swap](#) and/or page files as well, and may also contain libraries of common software shared among several applications.

System Management Bus

[Hardware] [Management] A management bus including hardware based on I2C and the associated protocols.

See [I2C](#).

System on a Chip

[Hardware] A composition of multiple components such as CPU, memory, and I/O interface, that perform as a system and are integrated into a single integrated circuit.

system portability

[Computer System] The ability of a service, application or system to run in more than one environment.

system under test

[General] An entity being tested to verify functional behavior or determine performance characteristics.

See also [solution under test](#) and [test system](#).

T

T10

[SCSI] Short name for the [ANSI INCITS T10](#) technical committee.

T11

Short name for the [ANSI INCITS](#) TC T11 committee.

T13

[Standards] Short name for the ANSI [INCITS T13](#) technical committee.

table routing method

[SCSI] A method used by SAS expanders for routing connection requests when multiple devices are accessible through a single SAS switch port.

tabular mapping

[Storage System] A form of [mapping](#) in which a lookup table contains the correspondence between the two address spaces being mapped to each other.

If a mapping between two address spaces is tabular, there is no mathematical formula that will convert addresses in one space to addresses in the other. See [algorithmic mapping](#), [dynamic mapping](#).

tampering

[Data Security] An unauthorized modification that alters the proper functioning of a device, system or communications path in a manner that degrades the security or functionality it provides.

tape

[Storage System] A removable [storage element](#) containing a flexible substrate stored on a reel used as a [storage medium](#).

The data on a tape is accessed by a [tape drive](#).

tape autoloader

[Storage System] A robotic tape media handler in which media is sequentially loaded and unloaded by the robot.

The term tape autoloader is typically used to indicate a single drive [library](#) that may have a sequential operation mode.

tape cartridge

[Storage System] A [tape](#) with its carrier.

A tape cartridge may also contain other [storage elements](#) (e.g., a [medium auxiliary memory](#)).

tape drive

[Storage System] A [storage device](#) that reads and writes data on tapes.

Unlike disks, tapes use implicit data [addressing](#). See [disk](#).

tape eject slot

[Storage System] An [entry/exit slot](#) in a [tape library](#).

tape library

[Storage System] A [storage device](#) that provides addressable access to multiple [tape cartridges](#), typically via multiple [tape drives](#).

A [robotic media handler](#) is used to move tape cartridges between the tape drives, [tape slots](#), and tape [entry/exit slots](#).

tape slot

[Storage System] A physical location used to hold a [tape cartridge](#) when not in a [tape drive](#).

tape virtualization

[Storage System] The application of [storage virtualization](#) to create a [virtual tape](#) or a [virtual tape library](#).

target

[SCSI] The endpoint that receives a [SCSI](#) I/O command [sequence](#).

See [initiator](#), [LUN](#), [target port identifier](#).

target NVMe_Port

[Fibre Channel] [NVMe-Port](#) which is the [NVM subsystem](#) port for an [NVMeoFC association](#).

Target of Evaluation

[Data Security] An IT product or system and its associated guidance documentation that is the [subject](#) of evaluation.

This term is most commonly associated with ISO 15408.

target port identifier

[SCSI] The [interconnect](#) address of a [target](#) or [controller](#).

Target Session Identifying Handle

[iSCSI] An identifier, assigned by the [iSCSI target](#), for a session with a specific named [initiator](#).

TB / TByte

[Computer System] Shorthand for [Terabyte](#).

Tbit

[General] Shorthand for [Terabit](#).

TCG

[Data Security] Acronym for [Trusted Computing Group](#).

TCO

[General] Acronym for [Total Cost of Ownership](#).

TCP

[Network] Acronym for [Transmission Control Protocol](#).

TCP Offload Engine

[Network] A technology for improving [TCP/IP](#) performance by offloading TCP/IP processing to a [Network Interface Card](#).

TCP/IP

[Network] Shorthand for the suite of protocols that includes [TCP](#), [IP](#), [UDP](#), and [ICMP](#).

This is the basic set of communication protocols used on the Internet.

Tebibit

[General] Shorthand for 1,099,511,627,776 (2^{40}) bits.

Binary notation is most commonly used for semiconductor memory sizes.

See also [Terabit](#).

Tebibyte

[General] Shorthand for 1,099,511,627,776 (2^{40}) bytes.

Binary notation is most commonly used for semiconductor memory sizes.

See also [Terabyte](#).

technical controls

[Data Security] Security controls (i.e., safeguards or countermeasures) for an information system that are primarily implemented and executed by the information system through mechanisms contained in the hardware, software, or firmware components of the system. [NIST Special Pub 800-53]

Technical Working Group

[Standards] A SNIA working group in which specific technical work is undertaken, protected by the SNIA IP Policy.

Within the SNIA, technical work for standards development is conducted by volunteer technologists from member companies. The TWGs report to the SNIA Technical Council, which in turn reports to the SNIA Board.

Terabit

[General] Shorthand for 1,000,000,000,000 (10^{12}) bits.

The SNIA uses the base 10 convention commonly found in I/O-related and scientific literature rather than the base 2 convention (1,099,511,627,776, i.e., 2^{40}) common in computer system and software literature.

See also [Tebibit](#).

Terabyte

[Computer System] Shorthand for 1,000,000,000,000 (10^{12}) bytes.

The SNIA uses the base 10 convention commonly found in I/O-related and scientific literature rather than the base 2 convention (1,099,511,627,776, i.e., 2^{40}) common in computer system and software literature.

See also [Tebibyte](#).

test system

[Storage System] A collection of equipment used to perform a test on a system under test.

See also [solution under test](#) and [system under test](#).

theoretical capacity

[Storage System] The total number of bytes on the physical media.

Theoretical capacity includes [addressable capacity](#), ECC ([error correcting code](#)) data, remap areas, and other capacity used for the operation of the device. See [addressable capacity](#).

thin provisioning

[Storage System] A technology that allocates the physical capacity of a [volume](#) or [file system](#) as applications write data, rather than preallocating all the physical capacity at the time of [provisioning](#).

third party authentication

[Data Security] Reliance on an [authentication](#) service, such as a [RADIUS server](#), that is separate from (or external to) the entities of an authentication transaction.

third party copy

[Data Recovery] [Management] [SCSI] A technique for performing backups using minimal host resources by copying data directly from the source to the destination without passing through a host.

threat

[Data Security] Any possible intentional action or series of actions with a damaging potential to any of the stakeholders, the facilities, operations, the supply chain, society, economy, or business continuity and integrity [ISO 28004-1:2007].

threat monitoring

[Data Security] Analysis, assessment, and review of [audit](#) trails and other information collected for the purpose of searching out system events that may constitute violations of system security.

throughput

[Computer System] A deprecated synonym for [data transfer capacity](#).

TiB / TiByte

[General] Shorthand for [Tebibyte](#).

Tibit

[General] Shorthand for [Tebibit](#).

tiered storage

[Storage System] Storage that is physically partitioned into multiple distinct classes based on price, performance or other attributes.

Data may be dynamically moved among classes in a tiered storage implementation based on access activity or other considerations.

time server

[Network] An intelligent entity in a network that enables all nodes in the network to maintain a common time base within close tolerances.

TLC

[Hardware] Acronym for [Triple-Level Cell](#)

TLS

[Data Security] Acronym for [Transport Layer Security](#).

TNC

[Network] Acronym for Threaded Neil Councilman, a type of [coaxial cable](#) connector.

Specifications for TNC style connectors are defined in MIL-C-39012 and MIL-C-23329.

TOE

1. [Network] Acronym for [TCP Offload Engine](#).
2. [Data Security] Acronym for [Target of Evaluation](#).

token ring

1. [Network] A network in which each [node](#)'s [transmitter](#) is connected to the [receiver](#) of the node to its logical right, forming a continuous ring. Nodes on a token ring network gain the right to transmit data by retaining a token (a specific unique message) when they receive it. When a node holding the token has transmitted its allotment of data, it forwards the token to the next node in the ring.
2. [Network] A [LAN protocol](#) for token ring networks governed by IEEE Standard 802.3 that operates at speeds of 4 Mbits/second and 16 Mbits/second.

topology

1. [Network] [Computer System] The logical layout of the components of a computer system or network and their interconnections. Topology deals with questions of what components are directly connected to other components from the standpoint of being able to communicate. It does not deal with questions of physical location of components or interconnecting cables.
2. [Fibre Channel] The communication infrastructure that provides [Fibre Channel](#) communication among a set of PN-Ports (e.g., a Fabric, an [Arbitrated Loop](#), or a combination of the two).

Total Cost of Ownership

[General] The comprehensive cost over its lifetime of a particular capability such as data processing, storage access, file services, etc.

Total Cost of Ownership (TCO) includes acquisition, environment, operations, management, service, upgrade, loss of service, and residual value.

TPC

[Data Recovery] [Management] Acronym for [Third Party Copy](#).

track

[Hardware] A portion of a recording address (see [CHS](#)) on an [HDD](#) that defines the combination of the cylinder and head.

transceiver

A [transmitter](#) and [receiver](#) combined in one package.

transformation

[Long-Term Retention] A type of [migration](#) in which a format or representation change occurs during the movement of data or information.

Transformation involves possible information loss, since newer formats may be incapable of capturing all the functionality of the original format, or the migration system may be unable to interpret all the nuances of the original format.

Translate Domain

[Fibre Channel] A [domain](#) presented by a [Translate Domain Switch](#).

Translate Domain switch

[Fibre Channel] A [Fibre Channel Switch](#) within an [Inter-Fabric Router](#) that is created for each set of Proxy [Nx_Ports](#) whose corresponding Native [Nx_Ports](#) exist within a set of [Native Fabrics](#).

transmission character

[Network] Any encoded [character](#) (valid or invalid) transmitted across a physical interface.

Valid transmission characters are specified by the standard defining the [transmission code](#) and include [data characters](#) and [special characters](#).

transmission code

1. [Network] A means of [encoding](#) data to enhance its transmission characteristics.
2. [Fibre Channel] A byte-oriented transmission code specified by [FC-FS-2](#) for 1/2/4/8 GFC, with valid data bytes and special codes encoded into 10-bit Transmission Characters according to the 8B10B encoding.
3. [Fibre Channel] A word-oriented transmission code specified by 10GFC, with 64 bits of data and special codes encoded into a 66-bit transmission unit according to the 64/66 encoding.

Transmission Control Protocol

[Network] The Internet [connection](#) oriented network transport [protocol](#), which provides a reliable delivery service.

transmission word

[Fibre Channel] A string of four contiguous transmission characters aligned on boundaries that are zero modulo 4 from a previously received or transmitted [special character](#).

[Fibre Channel](#) transmission and reception operates in transmission word units when using [8B/10B encoding](#).

transmitter

1. [Fibre Channel] The portion of a Link_Control_Facility that converts valid data bytes and special codes into transmission characters using the rules specified by the [transmission code](#), converting these transmission characters into a bit stream, and transmitting this bit stream on an optical or electrical transmission [medium](#).
2. [Hardware] An electronic [circuit](#) that converts an electrical logic signal to a signal suitable for an optical or electrical communications [media](#).

transparent failover

[Computer System] A [failover](#), not visible to external components of a system, of one component of that system to another component of that system.

Often used to refer to paired disk controllers, one of which exports the other's virtual disks at the same addresses after a failure. See [non-transparent failover](#).

Transport Layer Security

[Data Security] A [protocol](#) suite defined by the [IETF](#) that provides privacy and [data integrity](#) between two communicating applications, using higher-level protocols that can layer on top of the TLS protocol transparently.

There are multiple versions of TLS, which are not compatible with each other, and early versions are considered less secure and should not be used. Multiple SNIA specifications leverage TLS as an important security mechanism; to ensure both security and interoperability, SNIA has published the SNIA TLS specification for storage systems (also ISO/IEC 20648) to identify specific requirements and guidance for TLS when it is used in conjunction with these SNIA specifications.

trap

[Management] A type of [SNMP](#) message used to signal that an event has occurred.

Trap delivery to recipients uses [UDP](#) and is not completely reliable. See [best effort](#).

triaxial cable

[Network] An electrical transmission [medium](#) consisting of three concentric conductors separated by a dielectric material with the spacings and material arranged to give a specified electrical impedance.

See [coaxial cable](#).

trim

[Storage System] A method by which the host operating system may inform a storage device of blocks of data that are no longer in use and can be reclaimed.

Many storage protocols support this functionality via various names, e.g., ATA TRIM and SCSI UNMAP. See also [garbage collection](#).

Triple-Level Cell

[Hardware] A [memory cell](#) that stores three bits of data.

trojan horse

[Data Security] Malware that masquerades as a benign application containing malicious logic that allows the unauthorized collection, falsification, or destruction of data.

trust

[Data Security] Belief in the reliability, truth, ability, or strength of someone or something.

A [trusted system](#) is believed to have the ability to function as expected and to not misbehave.

Trusted Computing Group

[Data Security] A not-for-profit organization formed to develop, define, and promote open standards for hardware-enabled trusted computing and security technologies, including hardware building blocks and software interfaces, across multiple platforms, peripherals, and devices.

trusted system

[Data Security] A system that may be used for processing of sensitive or [classified information](#), that employs sufficient hardware and software [integrity](#) measures to assure that it performs according to its documented specification and acts in a predictable manner.

Such a system is developed in accordance with security criteria and evaluated by these criteria.

TSIH

[iSCSI] Acronym for [Target Session Identifying Handle](#).

tunneling

[Data Security] A technology that enables one network [protocol](#) to send its data via another network protocol's connections.

Tunneling works by encapsulating the first network protocol within packets carried by the second protocol. A tunnel may also encapsulate a protocol within itself (e.g., an [IPsec](#) gateway operates in this fashion, encapsulating [IP](#) in IP and inserting additional IPsec information between the two IP headers).

TWG

[Standards] Acronym for [Technical Working Group](#).

U

U.2

[Hardware] The SFF-8639 connector used for a Quad (4x) PCIe bus.

UDP

[Network] Acronym for [User Datagram Protocol](#).

UID

[Management] [Data Security] Short for "[user identifier](#)" (User Identifier).

ULP

[Fibre Channel] Acronym for [Upper Level Protocol](#).

Ultra SCSI

[SCSI] A form of [SCSI](#) capable of 20 megatransfers per second.

[Single ended](#) Ultra SCSI supports bus lengths of up to 1.5 meters. [Differential](#) Ultra SCSI supports bus lengths of up to 25 meters. Ultra SCSI specifications define both narrow (8 data bits) and wide (16 data bits) buses. A narrow Ultra [SCSI interconnect](#) transfers data at a maximum of 20 MBytes per second. A wide Ultra SCSI interconnect transfers data at a maximum of 40 MBytes per second.

Ultra2 SCSI

[SCSI] A form of [SCSI](#) capable of 40 megatransfers per second.

There is no [single ended](#) Ultra2 SCSI specification. Low voltage [differential](#) (LVD) Ultra2 SCSI supports bus lengths of up to 12 meters. High voltage differential Ultra2 SCSI supports bus lengths of up to 25 meters. Ultra2 SCSI specifications define both narrow (8 data bits) and wide (16 data bits) buses. A narrow Ultra [SCSI interconnect](#) transfers data at a maximum of 40 MBytes per second. A wide Ultra2 SCSI interconnect transfers data at a maximum of 80 MBytes per second.

Ultra3 SCSI

[SCSI] A form of [SCSI](#) capable of 80 megatransfers per second.

There is no [single ended](#) Ultra3 SCSI specification. Low voltage [differential](#) (LVD) [Ultra2 SCSI](#) supports bus lengths of up to 12 meters. There is no high voltage differential Ultra3 SCSI specification. Ultra3 SCSI specifications only define wide (16 data bits) buses. A wide Ultra3 [SCSI interconnect](#) transfers data at a maximum of 160 MBytes per second.

Ultrium

[Storage System] The half-inch, 'square' tape implementation of the [LTO](#) format, currently in its 4th generation, LTO-4 Ultrium.

UML

[Management] Acronym for [Unified Modeling Language](#).

unauthorized disclosure

[Data Security] The exposure of information to individuals not authorized to receive or access it.

unicast

[Network] A single transmission of a message to a single [receiver](#) connected to a transport network. Unicast is contrasted with [broadcast](#) (sending a message to all receivers on a network) and [multicast](#) (sending a message to a select subset of receivers).

Unicode

[General] A set of standards intended to allow representation of every [character](#) in each of the world's languages; usually understood to mean the 16-bit variant.

Sixteen-bit Unicode allows for up to 2^{16} , or 65,536 characters, each of which may have a unique representation. It accommodates numerous non-English character sets and symbols, and is therefore an aid to development of products with multilingual user interfaces. Sixteen bits are not enough, however, to represent all the several hundred thousand Asian ideograms. Other 32-bit variants are available for these, but the increased inefficiency in representation of Western text inherent in them has been a barrier to widespread adoption.

unidirectional authentication

[Data Security] [Authentication](#) that provides one party to a communication with [assurance](#) of another's [identity](#).

Unified Modeling Language

[Management] A visual approach that uses a variety of diagrams such as use case, class, interaction, state, activity and others to specify the objects of a model and their relationships.

Various tools exist for turning UML diagrams into program code.

Uniform Resource Identifier

URI

Compact sequence of characters that identifies an abstract or physical resource.

See RFC2396.

Uniform Resource Locator

URL

Compact sequence of characters that identifies an abstract or physical resource, including its location.

See RFC1738.

Uninterruptible Power Source

[General] A source of electrical power that is not affected by outages in a building's external power source.

UPSs may generate their own power using generators, or they may consist of large banks of batteries. UPSs are typically installed to prevent service outages due to external power grid failure in computer applications deemed by their owners to be "mission critical."

unmap

[Storage System] [Operating System] See [trim](#).

Removal of the virtual addresses from a portion of a file (e.g., POSIX).

unstructured data

[Data Management] Data that cannot be easily described as [structured data](#).

In general any non-database filesystem content is considered to be unstructured.

Upper Level Protocol

[Fibre Channel] A [protocol](#) used on a [Fibre Channel](#) network at or above the [FC-4](#) level.

[SCSI](#), [SBCCS](#), and [NVMe](#) are examples of Upper Level Protocols.

UPS

[General] Acronym for [Uninterruptible Power Source](#).

usable capacity

[Storage System] Synonym for [formatted capacity](#).

user data extent

[Storage System] The [protected space](#) in one or more contiguously located [redundancy group](#) stripes in a single redundancy group.

In [RAID](#) arrays, collections of user data extents comprise the virtual disks or [volume](#) sets presented to the [operating environment](#).

user data extent stripe depth

[Storage System] The number of consecutive blocks of [protected space](#) in a single [user data extent](#) that are mapped to consecutive [virtual disk block](#) addresses.

In principle, each user data extent that is part of a virtual disk may have a different user data extent [stripe depth](#). User data extent stripe depth may differ from the [redundancy group stripe depth](#) of the [protected space extent](#) in which it resides.

User Datagram Protocol

[Network] An [Internet protocol](#) that provides connectionless [datagram](#) delivery service to applications.

UDP over [IP](#) adds the ability to address multiple endpoints within a single network [node](#).

User Identifier

[Management] [Data Security] A unique number that identifies an individual to a computer system.

UIDs are the result of [authentication](#) processes that use account names, passwords and possibly other data to verify that a user is actually who she represents herself to be. UIDs are input to [authorization](#) processes that grant or deny access to resources based on the [identification](#) of the requesting user.

userid

[Management] [Data Security] Shorthand for [User Identifier](#).

UTF-8

[General] An [encoding](#) for multi-byte [character](#) schemes such as [Unicode](#), in which ASCII text encodes to itself and POSIX string manipulation routines work largely as expected.

A 16-bit Unicode string that encodes ASCII text will have every other [data byte](#) within it set to zero. The UTF-8 encoding of this text will have a zero only at the end.

utilized capacity power efficiency

[Storage System] The ratio of bytes stored on an [idle](#) storage system to the amount of power required to maintain the system in a [ready idle](#) state.

UUID

[Computer System] An identifier that is expected to be universally unique across systems, space and time.

V

valid frame

[Fibre Channel] A received [frame](#) containing a valid [Start of Frame](#) , a valid [End of Frame](#) , valid data characters, and proper [Cyclic Redundancy Check](#) (CRC) of the [Frame_Header](#) and Data_Field.

variable-length segmentation

[Storage System] [Partitioning](#) a byte stream into parts that are not a constant number of bytes when performing [compression](#) or [hash-based data deduplication](#).

See [fixed-length segmentation](#).

VBA

[Storage System] Acronym for [Virtual Block Address](#).

VCI

[Network] Acronym for [Virtual Channel Identifier](#).

VCSEL

Acronym for [Vertical Cavity Surface Emitting Laser](#).

VE_Port

[Fibre Channel] Shorthand for [Virtual E_Port](#).

VE_Port_Name

[Fibre Channel] The [Name_Identifier](#) of a [VE_Port](#).

vendor unique

[Standards] Aspects related to a standard (e.g., functions, codes, etc.) not defined by the standard, but offered by a single vendor within the framework of the standard.

Functionality unique to a given vendor may be exposed using standard methods. For example, many vendors offer vendor-specific [SNMP](#) MIBs that users of the SNMP standard can use to obtain system information.

verify / verification

[Data Recovery] The object-by-object comparison of the contents of a [backup](#) image with the online data objects from which it was made.

versioning

[Data Recovery] The maintenance of multiple point-in-time copies of a collection of data.

Versioning is used to minimize [recovery](#) time by increasing the number of intermediate checkpoints from which an application can be restarted.

Vertical Cavity Surface Emitting Laser

A surface emitting [laser](#) source fabricated on a planar wafer with emission perpendicular to the wafer.

VF

[Fibre Channel] Shorthand for [Virtual Fabric](#).

VF_ID

[Fibre Channel] Acronym for [Virtual Fabric Identifier](#).

VF_Port

1. [Fibre Channel] Shorthand for [Virtual F_Port](#).
2. [Fibre Channel] Shorthand for [Virtual F_Port](#).

VF_Port_Name

[Fibre Channel] The [Name_Identifier](#) of a [VF_Port](#).

VFT_Header

[Fibre Channel] Shorthand for [Virtual Fabric Tagging Header](#).

VFT Tagging E_Port

[Fibre Channel] An [E_Port](#) that has enabled processing of [Virtual Fabric Tagging Headers](#).

VFT Tagging F_Port

[Fibre Channel] An [F_Port](#) that has enabled processing of [Virtual Fabric Tagging Headers](#).

VFT Tagging PN_Port

[Fibre Channel] A [PN_Port](#) that has enabled processing of [Virtual Fabric Tagging Headers](#).

VIA

[Computer System] Acronym for [Virtual Interface Architecture](#).

virtual block

[Storage System] A [block](#) in the address space presented by a [virtual disk](#).

Virtual blocks are the atomic units in which a virtual disk's storage capacity is typically presented by [RAID](#) arrays to their operating environments.

virtual block address

[Storage System] The address of a [virtual block](#).

Virtual block addresses are typically used in hosts' I/O commands addressed to the virtual disks instantiated by [RAID](#) arrays. [SCSI](#) disk commands addressed to RAID arrays are actually using virtual block addresses in their [logical block address](#) fields.

Virtual Channel Identifier

[Network] A unique numerical tag contained in an [ATM](#) cell header.

A VCI identifies an ATM virtual [channel](#) over which the cell containing it is to travel.

virtual device

[Storage System] A device presented to an [operating environment](#) by [control software](#) or by a [volume manager](#).

From an application standpoint, a virtual device is equivalent to a physical one. In some implementations, virtual devices may differ from physical ones at the operating system level. E.g., booting from a [host based disk array](#) may not be possible.

virtual drive

[Storage System] A set of blocks presented to an [operating environment](#) as a range of consecutively numbered logical blocks.

From the operating environment's viewpoint, the virtual drive mimics a physical drive.

Virtual E_Port

[Fibre Channel] The data forwarding component of an [FC Entity](#) that emulates an [E_Port](#) and is dynamically instantiated on successful completion of an ELP SW_ILS [exchange](#).

The term virtual indicates the use of a non [Fibre Channel link](#) connecting the [VE_Ports](#).

Virtual F_Port

[Fibre Channel] The data forwarding component of an [FC Entity](#) that emulates an [F_Port](#) and is dynamically instantiated on successful completion of an [FLOGI Exchange](#).

The term virtual indicates the use of a non-[Fibre Channel link](#) connecting a [VF_Port](#) with a [VN_Port](#).

Virtual Fabric

[Fibre Channel] A [Fibre Channel Fabric](#) identified by a [VF_ID](#) composed of partitions of [Fibre Channel Switches](#) and [N_Ports](#) independent of all other Virtual Fabrics with single Fibre Channel Fabric management.

virtual fabric identifier

A value that uniquely identifies a [Virtual Fabric](#) among all the Virtual Fabrics that share a set of switches and N_Ports.

Virtual Fabric Tagging Header

[Fibre Channel] An [Extended_Header](#) that contains information to associate a [frame](#) to a specific [Virtual Fabric](#).

Virtual Interface Architecture

[Computer System] An [API](#) specification for direct communication among distributed applications developed by Intel, Compaq, and Microsoft.

VIA reduces interprocess communication [latency](#) by obviating the need for applications to use processor [interrupt](#) or operating system paths to intercommunicate, while maintaining security on the communications path. VIA is [interconnect](#) neutral. See [Fibre Channel Virtual Interface](#).

Virtual Link

[Network] [Fibre Channel] The logical [link](#) connecting two [FCoE_LEPs](#) over a [Lossless Ethernet network](#).

Virtual Local Area Network

[Network] A logical network that behaves as if it is physically separate from other physical and virtual LANs supported by the same switches and/or routers.

Virtual N_Port

[Fibre Channel] The data forwarding component of an [FC Entity](#) that emulates an [N_Port](#) and is dynamically instantiated on successful completion of a [FLOGI](#) or FDISC [Exchange](#).

Virtual Path Identifier

[Network] An eight-bit field in an [ATM](#) cell header that denotes the cell over which the cell should be routed.

Virtual Switch

1. [Fibre Channel] A Switching Construct that resides in a Core Switch and corresponds to a Virtual Fabric.
2. [Network] A software layer in a hypervisor that emulates a physical switch for the hosted virtual machines to offer connectivity to the larger physical network.

virtual tape

[Storage System] A [virtual device](#) with the characteristics of a tape.

Virtual Tape Library

[Storage System] A storage system that emulates a [tape library](#).

Virtual-Tape-Libraries are usually classified as near-online devices, and provide faster [Max TTFD](#) than tape, but normally not as fast as online systems. They typically use slower drives with higher capacities than high-performance systems, and therefore offer a better energy footprint per unit of data.

virtualization

[Computer System] Software that enable a single hardware platform to support multiple concurrent instances of systems such as storage, networking, or computing facilities.

Examples of virtualization are compute virtualization and [storage virtualization](#).

VLAN

[Network] Acronym for [Virtual Local Area Network](#).

VN_Port

[Fibre Channel] Synonym for [Virtual N_Port](#).

VN_Port MAC address

[Network] [Fibre Channel] The [MAC](#) address used by an [ENode](#) for a particular [address identifier](#) during [Fibre Channel](#) operation using [FCoE frames](#).

VN_Port_Name

[Fibre Channel] The [Name-Identifier](#) of a [VN_Port](#).

vnode

[Computer System] Synonym for [node](#), used when it is desired to emphasize the support for multiple nodes within a [platform](#).

volatility

[Computer System] A property of data yielding the possibility that it will be obliterated if certain environmental conditions are not met.

For example, data held in DRAM is volatile, since if electrical power to DRAM is cut, the data in it is lost. See [non-volatility](#), [persistence](#).

volume

1. [Storage System] Synonym for [virtual disk](#).
2. [Storage System] A [storage element](#) that has been prepared for use. Examples include [Logical Unit](#), tape cartridge, [LTFS](#) Volume, and USB thumb drive.

volume group

[Data Recovery] A collection of removable [media](#) that reside in a single location, for example in a single [robot](#) or group of interconnected robots.

volume manager

[Storage System] Common term for host-based [control software](#).

volume pool

[Data Recovery] A logical collection of removable [media](#) designated for a given purpose, for example, for holding the copies of a single repetitive [backup](#) job, or for backing up data from a given [client](#) or set of clients.

A [volume](#) pool is an administrative entity, whereas a [volume group](#) is a physical one.

volume set

[Storage System] Synonym for [virtual disk](#).

VPI

[Network] Acronym for [Virtual Path Identifier](#).

VSAN

[Network] A virtual [Storage Area Network](#).

VTL

[Backup] Acronym for [Virtual Tape Library](#).

vulnerability

[Data Security] Weakness of an asset or control that can be exploited by one or more threats [ISO/IEC 27000].

W

WAN

[Network] Acronym for [Wide Area Network](#).

warm spare

[Storage System] A [spare](#) to which power is applied, and which is not operating, but which is otherwise usable as a [hot spare](#).

warm swap

[Computer System] The [substitution](#) of a [replacement unit](#) (RU) in a system for a defective one, where in order to perform the substitution, the system must be stopped (causing it to cease performing its function), but power need not be removed.

Warm swaps are manual operations performed by humans. See [automatic swap](#), [cold swap](#), [hot swap](#).

Wave Division Multiplexing

[Network] The splitting of light into a series of "colors" from a few (sparse WDM) to many with a narrow wavelength separation (dense WDM) for the purpose of carrying simultaneous traffic over the same physical fiber (9 micron usually).

Each "color" carries a separate data stream.

WBEM

[Management] Acronym for [Web Based Enterprise Management](#).

WDM

1. [Network] Acronym for [Wave Division Multiplexing](#).
2. [Windows] Acronym for Windows [Driver](#) Model.

weak key

[Data Security] A [key](#) that interacts with some aspect of a particular cipher's definition in such a way that it weakens the security strength of the cipher. [ISO/IEC 27040]

wear leveling

[Storage System] A set of algorithms utilized by a flash [controller](#) to distribute writes and erases across the cells in a flash device.

Cells in flash devices have a limited ability to survive write cycles. The purpose of wear leveling is to delay cell wear out and prolong the useful life of the overall flash device.

Web Based Enterprise Management

[Management] An initiative in the [DMTF](#), comprising a set of technologies that enable interoperable management of an enterprise.

WBEM consists of [CIM](#), an [XML DTD](#) defining the tags (XML encodings) to describe the CIM [Schema](#) and its data, and a set of [HTTP](#) operations for exchanging the XML-based information. CIM joins the XML data description language and HTTP transport [protocol](#) with an underlying [information model](#) (the CIM schema) to create a conceptual view of the enterprise.

well-known address

[Fibre Channel] An [address identifier](#) used to access a service provided by a [Fibre Channel](#) fabric.

The service may be distributed in many elements throughout the Fibre Channel Fabric or it may be centralized in one or a few elements. A well-known address is not [subject](#) to [zone](#) restrictions (i.e., a well-known address is always accessible, irrespective of the current active [zone set](#)).

Wide Area Network

[Network] A communications network that is geographically dispersed and that includes telecommunications links.

wide link

[SCSI] A group of physical links that attaches a wide port to another wide port.

wide port

[SCSI] A port that contains more than one [phy](#).

wide SCSI

[SCSI] Any form of [SCSI](#) using a 16-bit data path.

In a wide SCSI implementation, the [data transfer rate](#) in MBytes per second is twice the number of megatransfers per second because each transfer cycle transfers two bytes. See [fast SCSI](#), [Ultra SCSI](#), [Ultra2 SCSI](#), [Ultra3 SCSI](#).

Windows Internet Naming Service

[Windows] A facility of the Windows operating system that translates between [IP](#) addresses and symbolic names for network nodes and resources.

Windows Management Instrumentation

[Windows] The Microsoft framework that supports [CIM](#) and [WBEM](#); a set of Windows operating system facilities that enable operating system components to provide management information to management agents.

WINS

[Windows] Acronym for [Windows Internet Naming Service](#).

WMI

[Windows] Acronym for [Windows Management Instrumentation](#).

word

[General] A unit of data.

The length is specified by the architecture in which it is referenced and is typically 16 or 32 [bits](#).

workgroup

[Computer System] A group of UNIX or Windows computer system users and/or computers, usually with a common mission or project, that is created for administrative simplicity.

workload

[Computer System] Characterization of the operations comprising a load placed upon a system.

workload generator

[Computer System] Software used in the [load generator](#) to stimulate the product under test.

World Wide Node Name

A [Node_Name](#) that is worldwide unique

World Wide Port Name

A [Port_Name](#) that is worldwide unique.

Worldwide_Name

A [Name_Identifier](#) that is worldwide unique, and represented by a 64-bit value.

Write Amplification

[Storage System] Increase in the number of write operations by the device beyond the number of write operations requested by hosts.

Examples: In flash storage this may happen because of [garbage collection](#). In filesystems this may happen because writes to data blocks generally also require writes to inode blocks.

See JEDEC JESD218A,2/11

write amplification factor

[Storage System] The ratio of the number of write operations on the device to the number of write operations requested by the host.

I.e., $WAF = \text{Device Write Ops} / \text{Host Write Ops}$.

write back cache

[Computer System] A caching technique in which the completion of a write request is signaled as soon as the data is in [cache](#), and actual writing to non-volatile [media](#) occurs at a later time.

Write-back cache includes an inherent [risk](#) that an application will take some action predicated on the write completion signal, and a system failure before the data is written to non-volatile media will cause media contents to be inconsistent with that subsequent action. For this reason, good write-back cache implementations include mechanisms to preserve cache contents across system failures (including power failures) and to flush the cache at system restart time. See [write through cache](#).

write consolidation

[Storage System] The process of accumulating the data for a number of sequential write requests in a [cache](#), and performing a smaller number of larger write requests to achieve more efficient device utilization.

write hole

[Storage System] A potential data corruption problem for [parity RAID](#) technology resulting from an [array](#) failure while application I/O is outstanding, followed by an unrelated [member disk](#) failure (some time after the array has been returned to service).

Data corruption can occur if member data and parity become inconsistent due to the array failure, resulting in a false [regeneration](#) when data from the failed member disk is subsequently requested by an application. Parity RAID implementations typically include mechanisms to eliminate the possibility of write holes.

Write Once Read Many

[Storage System] A type of storage, designed for [fixed content](#), that preserves what is written to it in an immutable fashion.

Optical disks are an example of WORM storage.

write through cache

[Computer System] A caching technique in which the completion of a write request is not signaled until data is safely stored on non-volatile [media](#).

Write performance with a write-through [cache](#) is approximately that of a non-cached system, but if the data written is also held in cache, subsequent read performance may be dramatically improved. See [write back cache](#).

X

X_ID

Acronym for [Exchange_Identifier](#).

XAM

[Standards] Acronym for [eXtensible Access Method](#).

XAM API

[Standards] The methods that a [XAM](#) Application uses to communicate with XAM enabled storage, via the [XAM Library](#).

XAM Storage System

[Storage System] A storage system that provides [XAM](#)-compliant storage services.

Typically this type of storage system is used for data that is not expected to change during its lifetime (e.g., [fixed content](#), [reference information](#), archival data). The contents of a XAM Storage System are exposed to applications via one or more [XSystem](#) objects in the [XAM API](#).

XML

[General] Acronym for [eXtensible Markup Language](#).

XSet

[Storage System] The primary stored object abstraction in [XAM](#).

An XSet binds data and [metadata](#) into a single entity that is stored and retrieved as a unit. [MIME](#) types are used to specify data and metadata formats.

XSystem

[Storage System] A logical container of XSets independent of the means (e.g., communication) used to access [XSet](#) contents.

An XSystem is visible to [XAM](#) applications as an abstraction in the [XAM API](#).

XTS-AES

[Data Security] An [encryption](#) mode developed for [data at rest](#) protection, specified in the IEEE Std 1619-2018 "Cryptographic Protection of Data on [Block](#)-Oriented Storage Devices."

Y

YB / YByte

[General] Shorthand for [Yottabyte](#).

Ybit

[General] Shorthand for [Yottabit](#).

YiB / YiByte

[General] Shorthand for [Yobibyte](#).

Yibit

[General] Shorthand for [Yobibit](#).

Yobibit

[General] Shorthand for 1,208,925,819,614,629,174,706,176 (2^{80}) bits.

Binary notation is most commonly used for semiconductor memory sizes.

See also [Yottabit](#).

Yobibyte

[General] Shorthand for 1,208,925,819,614,629,174,706,176 (2^{80}) bytes.

Binary notation is most commonly used for semiconductor memory sizes.

See also [Yottabyte](#).

Yottabit

[General] Shorthand for 1,000,000,000,000,000,000,000,000 (10^{24}) bits.

The SNIA uses the base 10 convention commonly found in I/O-related and scientific literature rather than the base 2 convention (1,208,925,819,614,629,174,706,176, i.e., 2^{80}) common in computer system and software literature.

See also [Yobibit](#).

Yottabyte

[General] Shorthand for 1,000,000,000,000,000,000,000,000 (10^{24}) bytes.

The SNIA uses the base 10 convention commonly found in I/O-related and scientific literature rather than the base 2 convention (1,208,925,819,614,629,174,706,176, i.e., 2^{80}) common in computer system and software literature.

See also [Yobibyte](#).

Z

ZB / ZByte

[General] Shorthand for [Zettabyte](#).

Zbit

[General] Shorthand for [Zettabit](#).

Zebibit

[General] Shorthand for 1,180,591,620,717,411,303,424 (2^{70}) bits.

Binary notation is most commonly used for semiconductor memory sizes.

See also [Zettabit](#).

Zebibyte

[General] Shorthand for 1,180,591,620,717,411,303,424 (2^{70}) bytes.

Binary notation is most commonly used for semiconductor memory sizes.

See also [Zettabyte](#).

zero-day vulnerability

[Data Security] A previously unknown vulnerability to the vendor that may or may not have been exploited by malware.

zero filling

[Data Security] The process of filling unused storage locations in an information system with the value of 0.

zeroing

[File System] The process of writing zeroes (0x00) to all the bytes in a [block](#) or an entire disk before delivering it for use, or upon its release from use.

Zeroing renders any data formerly stored on the block or device inaccessible except by forensic means such as magnetic force microscopy and other techniques that physically scan the [storage media](#).

Zettabit

[General] Shorthand for 1,000,000,000,000,000,000 (10^{21}) bits.

The SNIA uses the base 10 convention commonly found in I/O-related and scientific literature rather than the base 2 convention (1,180,591,620,717,411,303,424, i.e., 2^{70}) common in computer system and software literature.

See also [Zebibit](#).

Zettabyte

[General] Shorthand for 1,000,000,000,000,000,000 (10^{21}) bytes.

The SNIA uses the base 10 convention commonly found in I/O-related and scientific literature rather than the base 2 convention (1,180,591,620,717,411,303,424, i.e., 2^{70}) common in computer system and software literature.

See also [Zebibyte](#).

ZiB / ZiByte

[General] Shorthand for [Zebibyte](#).

Zibit

[General] Shorthand for [Zebibit](#).

zone

1. [Storage System] A group of sectors on an HDD that uses SMR that must be written sequentially.
2. [Fibre Channel] A collection of Fibre Channel N_Ports and/or NL_Ports (i.e., device ports) that are permitted to communicate with each other via the Fibre Channel Fabric.

Zone Set

[Fibre Channel] A set of [zone](#) definitions for a [Fibre Channel Fabric](#).

Zones in a zone set may overlap (i.e., a [port](#) may be a [member](#) of more than one zone). [Fibre Channel Fabric](#) management may support switching between zone sets to enforce different access restrictions (e.g., at different times of day).

zoning

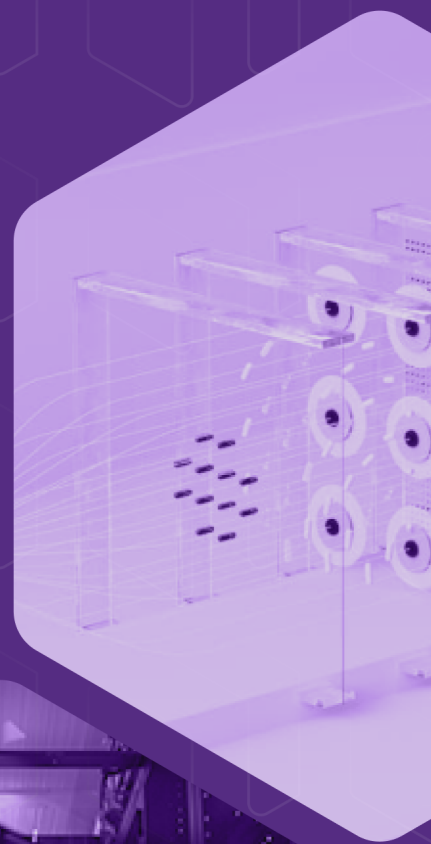
[Fibre Channel] A method of subdividing a [storage area network](#) into disjoint zones, or subsets of nodes on the network.

Storage area network nodes outside a zone, except those with well-known addresses, are invisible to nodes within the zone.



THE SNIA DICTIONARY

A glossary of storage and information
management terminology



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