

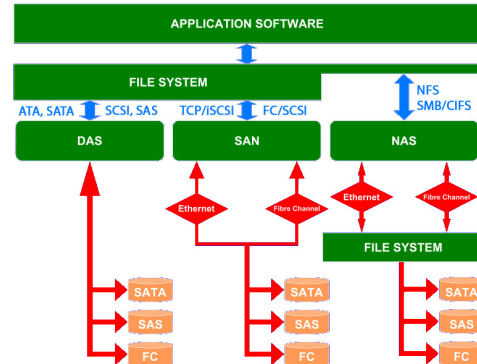
System & Service Management

Speicherprotokolle

Shared Storage

Historically, data centers first created "islands" of SCSI disk arrays as direct-attached storage (DAS), each dedicated to an application, and visible as a number of "virtual hard drives" (i.e. LUNs). Essentially, a SAN consolidates such storage islands together using a high-speed network.

SANs help to increase storage capacity utilization, since multiple servers consolidate their private storage space onto the disk arrays. Common uses of a SAN include provision of transactionally accessed data that require high-speed block-level access to the hard drives such as email servers, databases, and high usage file servers.



Storage Area Network

A storage area network (SAN) is a storage device (such as disk arrays or tape libraries) accessible to servers so the devices appear as locally attached to the operating system.

SAN versus NAS

Network-attached storage (NAS), in contrast to SAN, uses file-based protocols such as NFS or SMB/CIFS where it is clear that the storage is remote, and computers request a portion of an abstract file rather than a disk block.

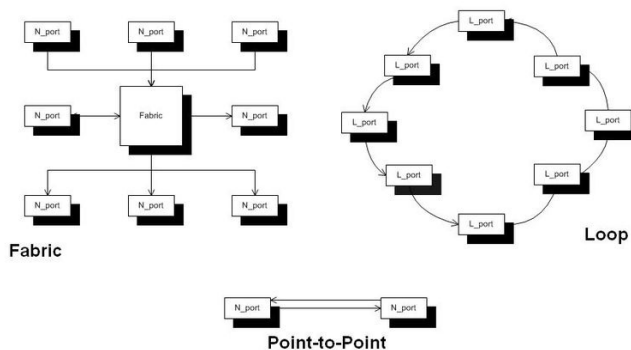
http://en.wikipedia.org/wiki/Storage_area_network

Fibre Channel

Fibre Channel, or FC, is a gigabit-speed network technology primarily used for storage networking. Fibre Channel Protocol (FCP) is a transport protocol (similar to TCP used in IP networks) which predominantly transports SCSI commands over Fibre Channel networks.

There are three major Fibre Channel topologies, describing how a number of ports are connected together. A port in Fibre Channel terminology is any entity that actively communicates over the network, not necessarily a hardware port. This port is usually implemented in a device such as disk storage, an HBA on a server or a Fibre Channel switch.

- Point-to-Point (FC-P2P). Two devices are connected directly to each other. This is the simplest topology, with limited connectivity.
- Arbitrated loop (FC-AL). In this design, all devices are in a loop or ring, similar to token ring networking. Adding or removing a device from the loop causes all activity on the loop to be interrupted. The failure of one device causes a break in the ring.
- Switched fabric (FC-SW). All devices or loops of devices are connected to Fibre Channel switches, similar conceptually to modern Ethernet implementations.



Fibre Channel does not follow the OSI model layering, but is split similarly into 5 layers, namely:

- FC4 — Protocol Mapping layer, in which application protocols, such as SCSI or IP, are encapsulated into a PDU for delivery to FC2.
- FC3 — Common Services layer, a thin layer that could eventually implement functions like encryption or RAID redundancy algorithms;
- FC2 — Network layer, defined by the FC-PI-2 standard, consists of the core of Fibre Channel, and defines the main protocols;
- FC1 — Data Link layer, which implements line coding of signals;
- FC0 — PHY, includes cabling, connectors etc.;

Layers FC0 through FC2 are also known as FC-PH, the physical layers of Fibre Channel. Fibre Channel routers operate up to FC4 level (i.e. they may operate as SCSI routers), switches up to FC2, and hubs on FC0 only.

http://en.wikipedia.org/wiki/Fibre_Channel

Small Computer System Interface

Small Computer System Interface (SCSI) is a set of standards for physically connecting and transferring data between computers and peripheral devices. The SCSI standards define commands, protocols, and electrical and optical interfaces. SCSI is most commonly used for hard disks and tape drives, but it can connect a wide range of other devices, including scanners and CD drives.

SCSI is an intelligent, peripheral, buffered, peer to peer interface. It hides the complexity of physical format. Every device attaches to the SCSI bus in a similar manner. Up to 8 or 16 devices can be attached to a single bus. There can be any number of hosts and peripheral devices but there should be at least one host.

SCSI is available in a variety of interfaces. The first, still very common, was parallel SCSI (now also called SPI), which uses a parallel electrical bus design. As of 2008, SPI is being replaced by Serial Attached SCSI (SAS), which uses a serial design but retains other aspects of the technology. iSCSI drops physical implementation entirely, and instead uses TCP/IP as a transport mechanism. Many other interfaces which do not rely on complete SCSI standards still implement the SCSI command protocol.

<http://de.wikipedia.org/wiki/SCSI>

<http://en.wikipedia.org/wiki/SCSI>

http://de.wikipedia.org/wiki/Serial_Attached_SCSI

http://en.wikipedia.org/wiki/Serial_Attached_SCSI

http://en.wikipedia.org/wiki/SCSI_commands

Example: [http://en.wikipedia.org/wiki/SCSI_Read_Commands#Read .286.29](http://en.wikipedia.org/wiki/SCSI_Read_Commands#Read_.286.29)

http://en.wikipedia.org/wiki/Logical_block_addressing

[http://en.wikipedia.org/wiki/FATA_\(hard_drive\)](http://en.wikipedia.org/wiki/FATA_(hard_drive))

http://de.wikipedia.org/wiki/Fibre_Channel

http://en.wikipedia.org/wiki/Fibre_Channel

<http://de.wikipedia.org/wiki/iSCSI> --> Verkehr trennen damit nicht NW Verkehr beeinträchtigt ist.

<http://en.wikipedia.org/wiki/Infiniband>

http://en.wikipedia.org/wiki/Manchester_protocol

Exkurs: Switching Methoden

http://en.wikipedia.org/wiki/Cut-through_switching

http://en.wikipedia.org/wiki/Store_and_forward

http://en.wikipedia.org/wiki/Fragment_free

http://en.wikipedia.org/wiki/Fibre_Channel_zoning

http://en.wikipedia.org/wiki/World_Wide_Name

http://en.wikipedia.org/wiki/TCP_Offload_Engine

http://en.wikipedia.org/wiki/Virtual_Interface_Architecture

<http://speicherguide.de/>

