

# IBM data storage



Software Defined Storage (SDS) is a disk system technology that very quickly conquered the market.

SDS changes the existing understanding and method of work in a sense that it virtualizes the storage surroundings, thereby removing the existing complexity dependent on the manner of creation of the disk fields and type of necessary RAID protection, while also achieving the flexibility in data migration.

An additional advantage of virtualized storage surroundings is the creation of commonly available IT systems. The data (virtual disks) can be synchronously recorded in two storage systems, and be used at the same time with

use of virtualized servers. SDS follows an algorithm: each (physical) disk is connected into a logical group of disks, and the desired RAID protection field is created on that group of disks, while all the groups are connected into one large "disk" space. In this space the "virtual" disks are created, which are joined with one or more servers. In this way, each server is enabled to use all the available performances.

Data balancing: SDS will evenly balance the data through all available disks and in that way prevent the performance "bottlenecks".

SDS can use all types of currently available disk technologies. Since all these disk technologies have significantly different performances and capacities, it is possible to use the "most appropriate" disk for individual needs – for example, large and slow SATA disks for data storage and ultra fast Flash disks for transactional systems.

With all the above, SDS also standardly uses the EasyTier technology. EasyTier records the data frequency use and moves it to the fastest disk available, if needed – if one group of disks contains SAS and Flash disks (SAS disk can handle up to roughly 200 IOPS), while the Flash disk can handle up to 20,000 IOPS), through use of EasyTier technology it is possible to significantly accelerate the field of standard SAS disks with use of only a few Flash disks, which will ensure that the frequently used data is always available on the fastest disk.

## TYPES OF VIRTUAL DISKS

SDS can also create and use several types of virtual disks:

- **Standard disk** – normal disk with default capacity
- **Space Efficient disk** – disk that takes up the amount of space that exactly matches the data contained on it (it grows with the data up to the allowed size)
- **Parallel disk** – the data is simultaneously recorded to one or more SDS systems connected into a cluster
- **Compressed disk** – data is compressed (without the use of server power) during recording and decompressed during reading (completely transparent for servers) with large savings of disk space (up to 5 times).

## DATA COPYING

each SDS has the option of instantaneous (instant / flash copy) data copying. Flash copy function is a fantastic addition to the flexibility and reliability of the SDS system. The data (the entire disk or several disks in a logical sequence) can be copied very quickly (within few seconds) without stopping the server that is using these disks. In this way, the making of “frozen data image” is enabled, and these “copied” data can for instance be used for analysis, backup taking, creation of disaster recovery copy or something similar.

## DISASTER RECOVERY

each SDS has an embedded option of data copying (actually of virtual disks) to a remote location. There are always two work modes: asynchronous and synchronous. During synchronous recording of data at two locations, the SDS that sends the data (production) waits for the confirmation of successful recording on the secondary side. This sets the requirements on speed and quality of communication connection between the locations and guarantees the absolute equality of data on both sides. During asynchronous copying of data, there is no wait for confirmation of the successful recording on the secondary side (what means that the data is not necessarily identical), which sets the much looser requirements on the speed of communication and enables the work at longer distances.

## VIRTUALIZATION OF OTHER STORAGE SYSTEMS

SDS has the option of connecting and virtualizing practically any external (existing) storage system. In this way, all the functions available through the SDS also become available in the existing storage system. Almost all systems are supported, regardless of the producer.

The most recent trend in the world of storage systems are the Flash systems. The Flash storage represents a quantum leap in the performances of disk systems. For all the past (classical) disk systems, the working times were measured in milliseconds, while for Flash systems, they are measured in nanoseconds or microseconds. Through the accelerated development of technology and big market breakthrough, the prices of Flash systems have been significantly reduced and are now comparable to quality (enterprise) classical storage systems.

Besides the performances, the Flash systems also have other large advantages: very low energy consumption, small space occupation, option of virtualization and exceptional reliability.

Also, the solution to the main cause of performance problems of current IT systems – waiting for response (latency) of standard disk systems – should be noted. The extreme speed of Flash systems enables the servers to achieve the full performance.

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