Software Defined Storage

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ABSTRACT: As the density and volume of data is increasing across the globe, the demand of Big Data is also increasing. Storing of this vast data plays an important role. Software defined storage has turned into a prime possibility. The development of data server centers is growing with the tremendous speed demanding of storing the data in an extraordinary way. The traditional networked storage solutions are viewed as inappropriate to manage the substantial volume of informational data in a productive way. The SDS comes as an answer to this problem by extracting the capacity control activities from the capacity devices and considers it as an integrated controller in the product layer. In this paper the comparison is made between Software Defines Storage and Traditional SAN. The architecture of SDS and SAN is discussed. The advantages of SDS, features and factors responsible for considering the SDS are described.

Introduction:

The term BIG DATA refers to the huge volume of data. The large amount of data is produced per day across the world. Storing this huge amount of data is an important part and dealing with the enormous information of data is the greatest difficult task faced by the system administrators. It is essential for the organization that provides services to make use of system administration, networking and capacity innovation assets in a productive and viable way. The productive method to manage the resources of big data is by the network or system virtualization containing Software Defined Storage (SDS). It becomes easier for accessing the resources of big data by making the use of physical storage through virtual representation. In this paper the comparisons are made between traditional network solutions and software-defined-storage. Features and factors are discussed for the same.

Software Defined Storage (SDS):

Due to the emerging era of cloud computing and distributed computing time, there are many issues faced by the administrators. A standout amongst these issues is the development and execution of the system in a way that wipes out or conceals their difficulty from the users, and in the meantime, looks after the flexibility, security and constancy of the systems. To accomplish these objectives Software defined storage is preferred. “Software-defined storage (SDS) is a marketing term for computer data storage software for policy-based provisioning and management of data storage independent of the underlying hardware” (Wikipedia, 2018).

Figure 1 below shows the system architecture of SDS. One of the important subsystems in software defined system is SDS.

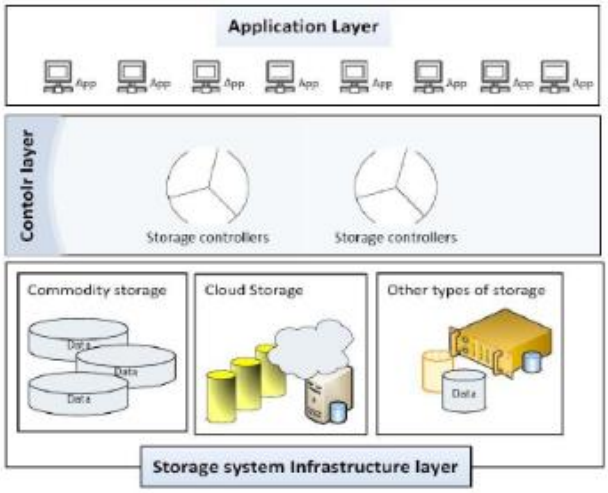

Figure 1: Software Defined Storage (SDS) system architecture (Darabseh et al., 2015)

(Darabseh et al., 2015) has described the architecture of SDS. There are three layers in the architecture: Infrastructure layer, control layer and application layer. The infrastructure layer associates several storage devices which stores, the raw data. . The control layer shown in the architecture of SDS maintains the components of software and controls the capacity assets. The controller is present in the control layer. It is considered as one of the most critical elements in SDS. By disconnecting the data control layer from storage level SDS takes the liability of dealing with tremendous information in storage system. The data layer indicates the fundamental infrastructure of the capacity resources. The control layer changes numerous dissimilar policies to diverse instructions inside the system. The last layer present in the SDS architecture is the application layer. Different applications are present in this layer which permits the end user to build the network with storage devices.

Traditional SAN:

SAN is an organized network fast foundation that set up server access to a unified group of heterogeneous storage devices, for example, RAID arrays, optical disks, and tape backup which can be used to store a lot of data, information of crucial data, and also for taking backups of data.(Padhy and Patra, 2012)
"SANs provide additional capabilities (fault tolerance, remote management, clustering, and topological flexibility) to mission-critical, data-intensive applications." (Padhy and Patra, 2012, p. 21)
SAN utilizes remote networks with fast speed.

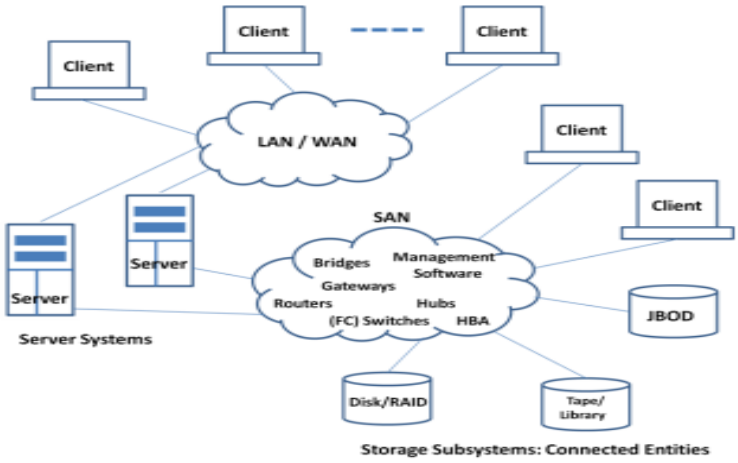

Figure 2: SAN high-level Architecture (Padhy and Patra, 2012)

(Padhy and Patra, 2012) describes the architecture of SAN.
SAN (Storage Area Network) utilizes remote networks with high speed which are generally interrelated with fiber channel. Heterogeneous capacity devices such as HDD, Tape, Laser Disks, etc. are associated remotely with block level data transfer. SAN regularly gives the rapid data information in three different ways: Server-to-storage, Server-to-server and Storage-to-storage (Padhy and Patra, 2012, p. 22)

Comparison between traditional storage model and SDS model:

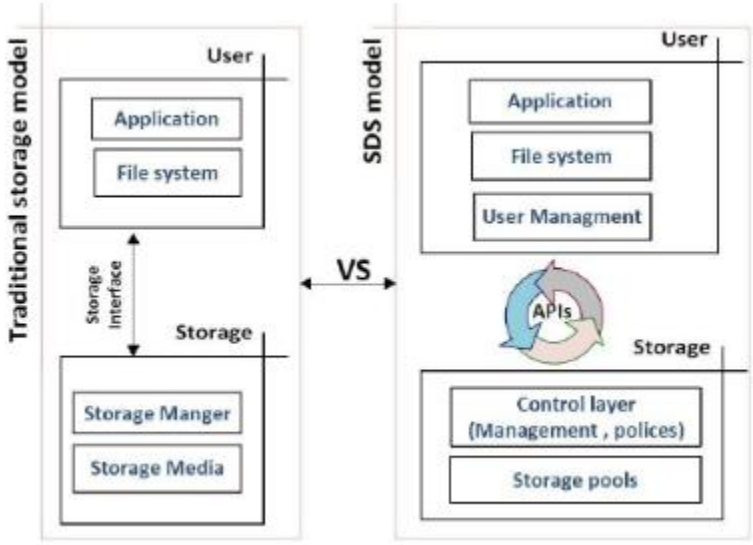

Figure 3: A design comparison between the traditional storage model and the SDS model (Darabseh et al., 2015)

(Darabseh et al., 2015) made the comparison between the traditional storage model and the software defined storage model. Here they have mentioned that; an interface is used to infer the user request to storage media in the traditional storage model. When the data type present is storage media such as, file, object, etc. is changed the interface must be changed accordingly. In SDS model the control layer is present. This control layer is used to define different policies to react to a variety of requests from end user making use of APIs (Darabseh et al., 2015)

Advantages of SDS over traditional SAN:

(StorPool, 2018) summarized top 5 advantages of SDS over traditional SAN:

1. Flexibility: The main advantage of Software Defined Storage is that it is flexible, and it can adjust or adapt to the user's need, use cases and circumstances or conditions (StorPool, 2018).

2. Performance: The performance of SDS is faster compared to the performance of traditional SAN. The SDS provides the similar results and therefore it is interchangeable in terms of speed, scalability and reliability.

3. Scalability: SDS cover and extensive variety of limits or capacity, which is from 5TB to 2PB. This range would be enclosed by numerous item groups of a traditional SAN. With the SDS having best scalability, the organization can grow without any downtime or relocation of the workloads which keeps running on the storage platform.

4. Cost Reduction: By making use of SDS or utilizing SDS the organizations can save to an alternate degree, contingent upon their beginning position and true objectives. This is explained by an example, that if an organization revives an IT system, assembled completely by a two-or three-letter merchant, with another age SDS-powered system, than the cost savings will be significant. For this situation the client will get a significantly more skilled and future-confirmation, with every single advantage the position brings (StorPool, 2018).

5. Reduced vendor lock-in: The companies using SDS are much closer to "no vendor lock-in" (StorPool, 2018). The customer can:

- Use all standard equipment, which is economical and simple to obtain (StorPool, 2018).
- Change equipment stages without difficult and hazardous information relocations, as the information lives in the software layer and is abstracted from equipment (StorPool, 2018).
- Can change software storage vendors, as most provide a storage administration and no "borders" (StorPool, 2018).

Functionality of SDS:

(Carlson et al., 2015) has discussed some necessary functionality of SDS. It should include:

1. Automation: Simplification of management diminished the expenses of conserving the infrastructure of storage (Carlson et al., 2015).
2. Standard Interfaces: The APIs which are required for management, administration and maintenance of storage devices and services (Carlson et al., 2015).
3. Virtualized Data Path: Block, File and Object interfaces that help the application for composing the interfaces (Carlson et al., 2015).
4. Transparency: The capacity of consumer storage to monitors and deals with their own capacity utilization against accessible assets and expenses (Carlson et al., 2015).

Factors responsible for consideration of SDS:

(Sinclair, 2016) has describes the factors which are responsible for consideration SDS:

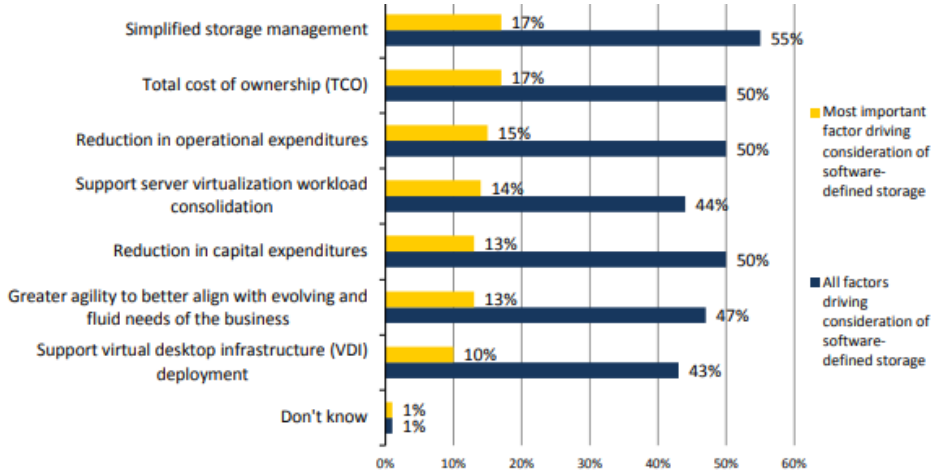

Figure 4: Factors responsible for consideration of SDS (Sinclair, 2016)

These factors are calculated in percent on the basis of most important factor and all factors driving consideration of SDS.
Some factors responsible which are shown in figure are: (Sinclair, 2016)

- Simplified storage management
- Total cost of ownership (TCO)
- Reduction in operational expenditures
- Support server virtualization workload consolidation
- Reduction in capital expenditures
- Greater agility to better align with evolving and fluid needs of the business
- Support virtual desktop infrastructure (VDI) deployment

Conclusion:

In this paper, the comparison between software defined and traditional networked storage; traditional SAN is made. And also the architecture of both SDS and SAN is discussed. The features, advantages and factors of SDS are explained. From all this we can make conclusion that the software defined storage is better than the traditional networked storage considering many factors and features. The features and the factors are explained in this paper. Due to the flexibility, scalability, cost reduction and many more features of SDS it is considered better than traditional networked storage for storing the huge amount of data that is, big data.

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