CLOUD COMPUTING

Storage Systems

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Major Storage architecture

DAS (Direct Attached Storage)
NAS (Network Attached Storage)
SAN (Storage Area Networks)

SAN and **network-attached storage** (**NAS**) are both network-based **storage** solutions. A **SAN** typically uses Fibre Channel connectivity, while **NAS** typically ties into to the network through a standard Ethernet connection. A **SAN** stores data at the **block** level, while **NAS** accesses data as files

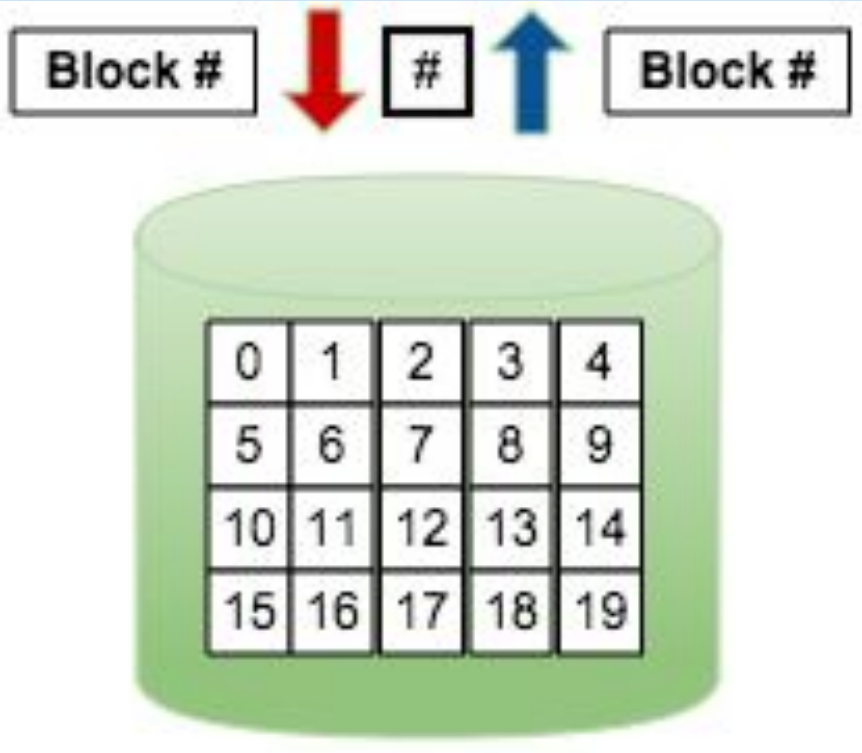
Different Access Methods

- How does the application want to access the data?
  - All at once or piece by piece?
  - Sequentially or randomly?
- What type of data is it?
  - Database, text, video/audio, photo
  - Static or fixed?

Data Sharing

- Does the data need to be shared?
  - Shared by the application vs. shared by the storage
  - Shared reading vs. shared writing
  - Narrow or broad sharing?
- Security and access controls
  - Applied at what level?

Available Storage System



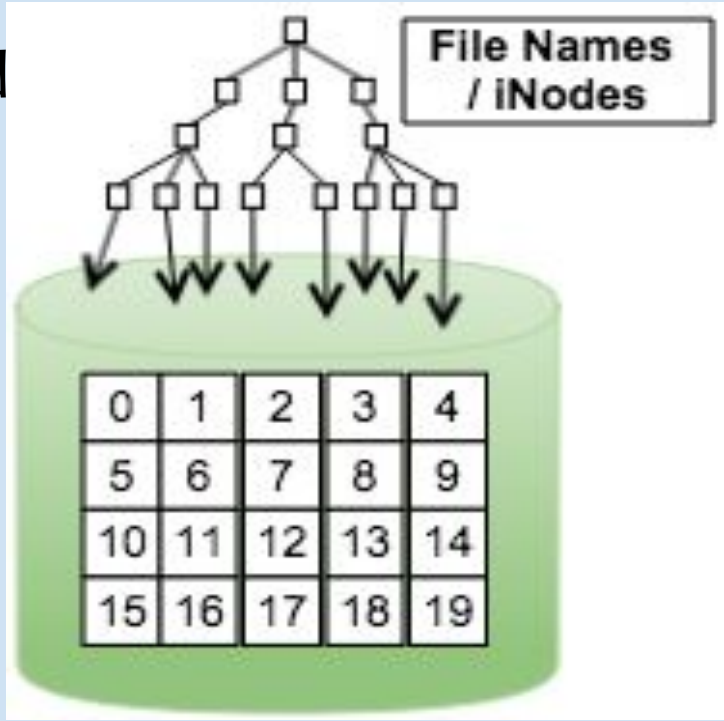
Block Storage

- Data organized as an array of unrelated blocks
- When appropriate blocks are combined, it creates a file
- No metadata
- Strongly Consistent
- Used for performance-centric applications, mostly transactional and database-oriented
- Followed **SAN**

Available Storage System

File Storage

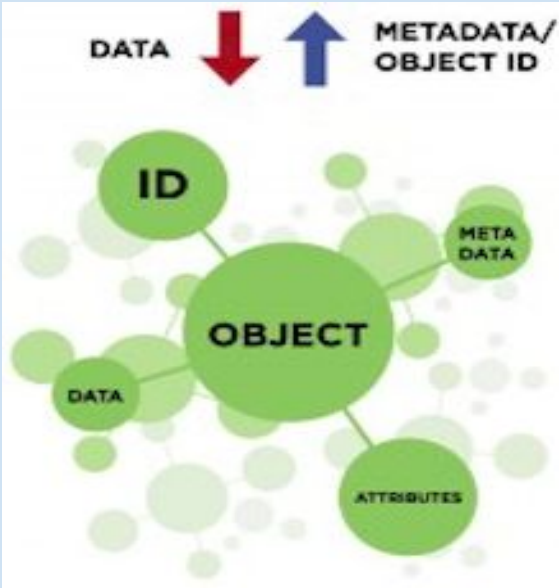
- A hierarchical way of organizing files so that an individual file can be located by describing the path to that file
- **NAS** is the best way to share files securely among users on a LAN but not so well if the users are across a WAN
- File Systems work well with hundreds of thousands, and perhaps millions, of files but are not designed to handle billions of files



Available Storage System cont.

Object Storage

- A new data access, data storage and data management model
  - API access to data
  - Metadata-driven, Policy based, Self Managing storage
  - No host overhead for storage functions
- A system that stores virtual containers that encapsulate the data, data attributes, metadata and Object IDs
- Easily Scalable
- Eventual Consistency
- Fault-tolerant



References:

https://www.youtube.com/watch?v=ecebDjOfE4I

https://www.youtube.com/watch?v=KduoinBNru4

https://www.networkworld.com/article/3256312/what-is-a-san-and-how-does-it-differ-from-nas.html

https://www.snia.org/sites/default/files/ESF/SNIA-Block-File-Object-Storage-Webcast-Final.pdf