

Data Storage Infrastructure – Part 1

This lesson introduces data storage infrastructure.

We'll cover the following



- Overview
- Direct Attached Storage (DAS)
- Network Attached Storage
- Storage Area Network

Overview

In this lesson, we will go through following three primary ways of setting up the infrastructure to store data:

- *Direct Attached Storage - DAS*
- *Network Attached Storage - NAS*
- *Storage Area Network - SAN*

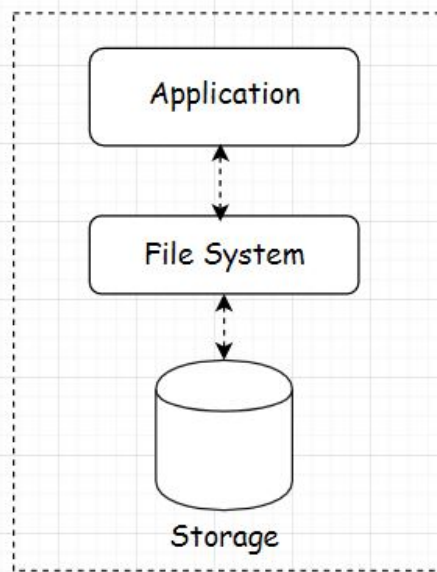
By the end of the lesson, you will have a step-by-step understanding of what these methods are and their use cases, beginning with *DAS*. Having an understanding of these data storage techniques will give you a more holistic insight into the process of storing data.

Direct Attached Storage (DAS)

Direct Attached Storage, or *DAS* means the physical storage is directly attached to the computer. Our desktops and laptops are examples of this, where the hard drives are directly attached to the *CPU* in the same machine.

Besides the hard drives, we also directly attach external storage, such as pen drives, external hard drives, optical disk drives, etc., onto our laptops.

Anything that can be directly attached to the computer is known as *Direct Attached Storage*.



Direct Attached Storage DAS

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DAS offers data that is quick to access and secure because it is not transmitted over the network. There is no possibility of eavesdropping and so on. The data storage capacity it offers may suffice for an individual user, but businesses with much larger data storage requirements will struggle with the *DAS* approach.

One more thing: what if the business has data that needs to be shared across multiple machines in the network? How do we achieve this with *DAS*?

We can't. For this use case, we need *Network Attached Storage*, or *NAS*. Let's discuss what *NAS* is?

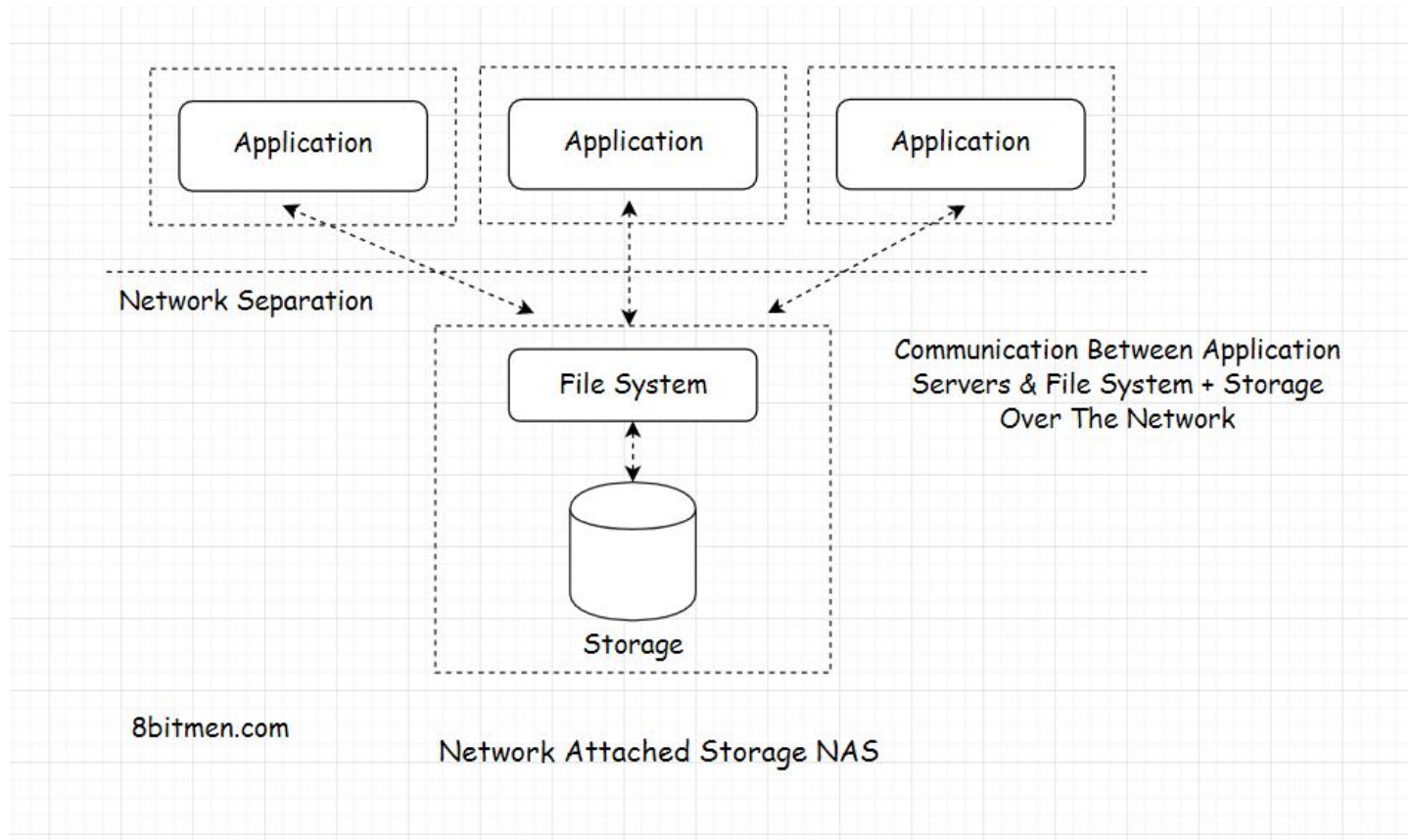
Network Attached Storage

In a *Network Attached Data Storage* setup, the data is accessed over a network as opposed to residing locally in the machine along with the compute. Additionally, the file system and the physical storage are coupled together and are accessed over the network.

NAS is pretty useful when the data is to be accessed by a number of machines in the network. We can centrally store the data of the business, and the employees can access that data over a secure network. *NAS* also offers more storage capacity than an individual machine can offer.

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In this setup, we can arrange multiple hard drives in *RAID* for redundancy. *NAS* works best for the small storage needs typically required by small-scale businesses.



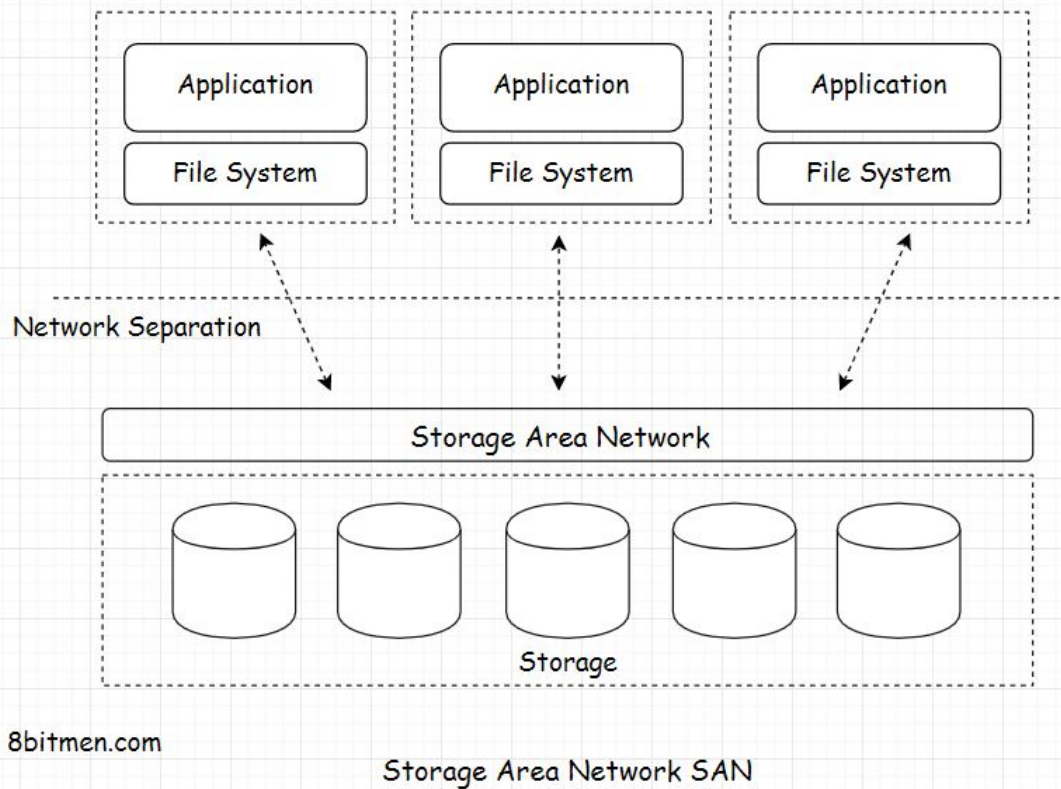
However, there is one downside of *NAS*: since the data is stored in a centralized location, the setup has a single point of failure. If the storage component fails, no devices in the network can access the data.

Here is an interesting [YouTube video](#) on the network-attached storage.

Storage Area Network

Storage Area Network, or *SAN*, is set up to store and access large amounts of data, typically required by big businesses, over the network.

SAN has the capacity to store a lot more data than what can usually be stored with *NAS*. The file system in *SAN* stays with the application and only raw blocks of data are fetched over the network.



The *SAN* setup is *fault-tolerant* since multiple storage servers are set up in the network. Data is shared among different storage servers, and it's also made redundant to avoid data loss due to machine failure. This makes the setup highly available. If a server goes down, the data can still be accessed from the redundant storage servers.

SAN also facilitates automatic data backup and storage monitoring. However, it is expensive to set up, due to its complexity, and it is primarily used by large organizations.

So, this pretty much covers *DAS*, *NAS*, and *SAN*. In the next lesson, let's discuss what *DAS* means from a cloud data center standpoint and more.