



Servers & Cloud concepts



This research contains basic informations about servers side and Cloud concepts

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This research is part of a series of research that I am conducting to consolidate my knowledge on the one hand, and on the other hand to spread and help others better understand IT fields.

This research on Servers & Cloud Concepts , reviews the traditional and modern IT infrastructure in particular in terms of :

- Computing
- Networking
- Storage

I write this research based on a lot of resources like Huawei Courses and AI tools

Every person, company, government, or organization uses data in their work. In other words, anyone working in the IT field needs to have an IT infrastructure to execute development, deployment, research, processing operations, and to store data.

IT infrastructure is a collection of hardware devices and software programs that work together under the supervision of developers and professionals.

An IT infrastructure consists of several components, such as computing, networking, storage, operations, and management.

In this research, we will discuss traditional infrastructure and cloud concepts according to the three main aspects mentioned at the beginning.

As we mentioned earlier, an IT infrastructure is a collection of hardware and software components, organized according to three main aspects:

Computing:

The foundation of the infrastructure is the servers, which are computers with very high performance. These high capacities mainly come from the components of the servers: the server CPU with multiple cores, RAM, storage space, and network interfaces . All these components also exist in personal computers, but the main difference is that the server components are much more powerful. This makes them efficient and able to operate normally under heavy workloads – something that ordinary PCs cannot handle.

We must connect the server to an electrical power source to supply energy to its components and enable them to function and perform their tasks. However, this point is very costly due to the high power consumption of servers. This power consumption raises the server's temperature, which decreases its efficiency. To solve this issue, a cooling system is required, which leads to additional expenses .

Although these two aspects (power supply and cooling) are very expensive, they are also essential for the proper functioning of servers.

On this hardware, we need to install the programs and the necessary technologies to make the server operational. The first layer of software installed is the BIOS/UEFI, which initializes the hardware and prepares the system for the operating system (OS). Then, we install the OS itself; we can choose the type of OS, for example: Windows or Linux. Additionally, we may install performance management tools and virtualization software on the server.

We also need to initialize the server and configure the necessary tasks for it to run properly.

Networking:

This part of the infrastructure involves connecting the devices into a single network to enable communication and data exchange between them. This is achieved by installing hardware components such as routers, switches, load balancers, and physical cables, all managed and secured by software solutions such as security providers, IP address management, routing tables, and firewalls.

It should be noted that purchasing network devices is very expensive, and managing them is quite challenging, requiring a professional network engineer whose services can be costly. However, this remains necessary.

Storage :

The main concept of data storage in IT infrastructure is to use multiple hardware components such as disks. Some types of disks are designed to be directly attached to the server in order to store operating data, such as the OS and installed programs. In addition, there are other types of disks connected to the server through the network, providing extra storage space that can be easily shared.

To manage these storage devices, it is necessary to implement certain technologies to protect, replace (in some cases), and classify both the data and the disks. Additional services such as backup and recovery are also required.

However, when deciding to purchase the necessary storage equipment, you must perform calculations and forecasts to determine the required capacity. If you later need to scale up, the process can be difficult, as it may require replacing existing hardware with more powerful components, which leads to additional costs.

With these three aspects, IT infrastructure is able to perform the required tasks. This has been the situation for many years, with challenges such as scaling problems, high costs, cooling issues, power consumption, and utilizing only 30% to 40% of the servers' full capacity.

However, with **virtualization** and **cloud** technologies, we are now able to solve most of these problems and explore new paths of development.

The cloud is a revolutionary concept. Major companies like Huawei, Google, Amazon, and others have decided to handle the most difficult parts by maintaining large numbers of servers equipped with cooling and power supply systems, along with complex networks and storage infrastructures.

Now, when you need IT infrastructure, these providers can offer it to you as a service. You no longer have to host the hardware yourself or deal with its operational challenges. It is fantastic to be able to access as many servers as you need, whenever you want, at much lower prices. The most impressive part is the ability to scale up in just a few minutes!

This has certainly made a revolution in the IT field and in the life of enterprises.