Twenty concepts

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1. **LAN or Local Area Network**

LAN is a computer network, which locates in a small area. It consists of multiple computers, printers, mobile devices or other facilities. All of them are connected with cables or wifi. Within this network, each device has a unique IP address to identify itself. LAN is a closed group. One device can contact another, send or receive data. Multiple desktop computers can share a printer. The transportation speed within LAN is very quick. The performance is reliable and the communication cost is low.

1. **WAN or Wide Area Network**

Compared with LAN, WAN covers a larger area, cross the cities, countries. WAN is also a computer network, which has the same components with LAN. Most of WAN are connected with switchers. Several LANs can be combined to generate a WAN. Generally, it costs more time to transfer data from one place to another within WAN. There are more delays of data transportation in WAN than in LAN. It is more complicated to manage a WAN.

1. **WLAN or Wireless Local Area Network**

WLAN enables computers or smart devices be connected to network with wireless signals. There is no need to plug cables into devices. There are two popular approaches for connecting, one is mobile signal, and another is wifi. For wifi, there is a router provides the service. Each time a device is trying to connect, it will be assigned a temp IP address. If this device turn off the wifi and it lost connection. Router will recycle the address and assign to a new device. For device, it may be assigned with different IP address for each connection. WLAN reduce the cost to build network since no need to place cables, less limitations.

1. **VLAN or Virtual Local Area Network**

VLAN is like LAN, but it is virtual. It is built from logical view not physical view. There is no limitation of physical location for VLAN. You can build VLAN for several machines which are located in difference LANs. For example, there are two department in a company, Sale Department and Development Department. Each department has its own sub network. Sale Department owns the IP address from 192.168.1.0 to 192.168.1.127. Development department owns the IP address from 192.168.1.128 to 192.168.1.255. With VLAN, these two network segments are combined together.

1. **VPN or Virtual Private Network**

VPN is network which is built upon public network, usually is internet. The communication is encrypted, so it is secure like private network. VPN is widely used in enterprise companies. The VPN gateway implements the remote access by encrypting the data packets and transforming the destination address of packets. One example of the usage for VPN is remote access internal enterprise network. An employee travels to another city or country, he can access company’s private network via VPN, if he can access internet.

1. **MAC Address or Medium/Media Access Control**

MAC Address is a unique identifier of a node in the network. It is an address of a physical device, like network card. It is has 6 bytes(48-bit) address space. They are divided into two parts. The first 24-bits is called Organizationally Unique Identifier(OUI). This part is assigned to the manufactories to identify the device producer. The second 24-bits are determined by the manufacturers themselves. And it is called Extended Unique Identifier(EUI). We have network cards in our desktop, laptop, phone and tablet. Each network card has a global unique MAC address.

1. **DNS or Domain Name System**

DNS is used to convert host name to IP address and vice versa. In the network of internet, each server within it has a unique IP address. We can access any of them if we know its IP address. However, it is hard for people to remember such number address. Instead, it is easy for us to remember meaningful names of these servers. DNS can help us to achieve this purpose because DNS has a table which stores the mapping relationship between IP address and host name. Each server should be registered to DNS, then DNS adds the new IP address and host name to it table. Any client wants to access a server, it will first ask DNS for the IP address. DNS will search the host name in its table and return the IP address to the client. Then client navigates to the destination server with this IP address.

1. **CDN or Content Delivery Network**

CDN is another virtual network, which is built upon Internet. The purpose of CDN is to delivery web pages or data more quickly and more efficiently. The key point for CDN is to avoid any bottleneck or node which may cause latency and instability. One approach to achieve this is to setup more nodes to the places where the network is so busy. The most important technology for CDN is load balance. Whenever a request is received, CDN must find a nearest location of the resource. So the requester can get the resource quickly. Many big websites which requires high volume network throughput put their content to several CDN nodes to accelerate the access speed.

1. **SSL or Secure Sockets Layer**

SSL is a security transportation protocol. It use the encryption technology to guarantee the security of transferring data through internet. There are three main functions for SSL. Firstly, it makes sure that data can be received properly by authorized client and server. Secondly, it makes sure the encrypted data won’t be stolen during transportation. Last, make sure data won’t lost or be changed during transportation.

Before transportation occurs, both server and client will be authorized first. Client sends a ‘hello’ message to server to setup a new conversation. Server send back a message which contains the information to create a new main key. Client gets the information and generate a main key and encrypt it with public key provide by server. Server receives the main key and acknowledge the key. After above steps, client will send data encrypted by the public key to server.

1. **HTTPS or Hypertext Transfer Protocol Secure**

HTTPS is the secure version of HTTP. The basic of HTTPS is SSL. It is widely used in internet, especially for banking and online shopping stores.

1. **Distributed Computing**

Distributed Computing use multiple independent machines to do calculation. In the reality, there are some calculation cases, like in math, biology, which need enormous time to finish the calculation. It is nearly impossible to do this if using a central machine, even it is powerful. In Distributed Computing, a master node will divide the calculation task to small pieces and assign each of them to a worker node. Each worker node only works on a piece of task, which is small enough for them to afford. After finishing the calculation, the result will be send to another separate node, which will merge the results all together and output it.

1. **Cloud Computing**

Compared with Distributed Computing, Cloud Computing is a more practical, it is an implementation. Cloud Computing is a service which charges the cost by the volume of usage, eg. CPU numbers, memory size or time. The most difference or advantage of Cloud Computing is, it is configurable. All of the resources like server, storage, software application, network bandwidth and services can be changed according to the actual requirement. It is convenient for customers to use, since they don’t need to care about the hardwares, they just focus on their business calculation. They spend a little effort on maintaining the system and can buy the service as need and return back if the calculation is finished. If they need more resources, they can easily extend them.

1. **Cloud Storage**

Cloud Storage is an extension of Cloud Computing. Since after the calculation output is created by the cloud computing, there must be some locations to store these results. From technical point of view, Cloud Storage required network technologies and distributed file systems. It manages plenty of different servers, provide a uniform interface for the end user. The data may be replicated to different locations globally to provide user a stable and friendly access experience. Users can easily access their files through multiple kinds of devices at any time, at any location with internet access.

1. **SaaS or Software-as-a-Service**

Saas provides on-demand software through internet technology. The SaaS service provider install softwares in their server. Customers can buy the service according to their business needs. They will be charged based on the what service are subscribed and how long the service is used. This business mode is very popular for small and medium companies, since they don’t need to invest a lot on the hardwares and software licenses.

1. **REST or Representational State Transfer**

REST is a not real software or industry standard, but a design style for web application architecture. This kind of style is called RESTful sytle. REST reduce the complexity of development, and improve the extendibility of system. It is much simpler than traditional web services which are built upon SOAP and WSDL.   
REST defines the interface how resources are accessed. In each interface it shall contains following methods: post, put, get, delete. They are the implementation for HTTP operations.

1. **JSON or Javascript Object Notation**

JSON is a data format used for exchanging data between web applications. It is lightweight and easy for human to understand. It is independent to server side programming languages. It has becomes an actual industry standard in today’s network world. JSON defeats XML format because it is cleaner and smaller than XML. There are too many redundant tags in XML and takes more time to generate and parse. JSON overcomes these both disadvantage of XML format.

JSON has two types: JSON Object and JSON Array. The former one is used to represent a single object which may contains several attributes. For example:

{"firstName":"Rong","lastName":"Zhuang","email":"jojozhuang@gmail.com"},

The latter one represents a collection of objects. Each object is a JSON Object.

{

"students":[

{"firstName":"Rong","lastName":" Zhuang ","email":" jojozhuang@gmail.com "},

{"firstName":"Bill","lastName":"Gates","email":"gates@microsoft.com"}

]

}

1. **GFS or Google File System**

GFS is an extendable distributed file system. It is invented by Google to store huge amount data generated by search engine. It consists of millions of cheap and ordinary machines. All of these single machines are connected together and are coordinated by GFS. GFS can provide high performance calculation on extremely large original data.

GFS has a master node and several worker node. The master node is the brain of this file system. It stores the metadatas, chunk indexes and location of worker nodes. Master node dispatch task to worker nodes and associate them work properly. Worker node is responsible for storing and retrieving data. Files are actually separated into chunks, one chunk may have several small chunks. The whole GFS system is built upon these chunks, they have several layers.

1. **Big Table**

Big Table is also invented by Google. It is a distributed storage system, which is used to handle huge amount of data. Compared with traditional relational database, Big Table is non-relational database. It is actually a multi-dimension sorted map. It can be deployed to thousands of machines and can handle PT level data volume.

1. **MapReduce**

MapReduce is a programming model. It is a design style not implementation. MapReduce is used to analyze big data. It has two steps: Map and Reduce.

In the map step, all of the data will be extracted and converted to key-value pair.

In the reduce step, the key-value pairs will be merged together and generated to new key-value pair or single result directly.

In the reality application, these two steps may be composited and more steps will be created for a complex analysis.

1. **Hadoop**

Hadoop is popular distributed computing system. It is written in java and it has two core components, HDFS(Hadoop Distributed File System) and MapReduce. The responsibility for HDFS is to store huge amount files or data. And MapRedeuce provides the calculation ability on these data. Generally, Hadoop has a name node and several data node.