Virtualization Types:

- Server virtualization
  - multiple virtualization servers run on a single physical server. (full control like Ram, HDD, CPU, IP)
- Desktop virtualization
  - virtual desktop are provided to users, allowing them to access their work environment from any device (control only on the application like, Google chrome, Notepad++ Vscode, VLC)
- Network virtualization:
  - Abstracts physical network resources to create virtual networks, improving network management and flexibility
- Storage virtualization.
  Pools physical storage resources into a virtual storage environment, simplifying storage management.

Virtualization is overtaken by Containerization:

- Docker

Power on vm: 2 min.
Containerization: 2-3 sec

Introduction to cloud:

-> Cloud computing can be called a technology through which things like software, processing, and data storage are outsourced.

- On demand
- Pay as you go.
-

-> There is only need for an internet connection, an updated web browser, and compatible device.

-> Cloud is Renting the services over the ~~network~~. Internet.

Cloud computing:

- Central data center for providing services.
- on demand, scalable, unlimited computation & stora
- It is basically a data center

- 4 Characteristics of cloud:
  - Everything is a service (backup, firewall, network...)
  - Elasticity is nature
  - HA - 99.99% SLA (High accessibility) [SLA = Service Level Agreement]
  - unlimited computation power.

→ Any Datacenter is follows Above step is Cloud.

Services provided

- SAAS
- PAAS
- IAAS

Deployment models in cloud.

1. Public cloud. - anyone can access
2. Private cloud. - People with organization.
3. Hybrid cloud. - Combo Public + Private.
4. Gov cloud - cloud service for government official.

1. Public Cloud (multi cloud)
   1. AWS
   2. microsoft azure → Portal.Azure.com
   3. Google cloud Platform

Microsoft Azure:-

Accessing Azure

- GUI - new (ARM)
- GUI - old (ASM)
- Powershell
- Azure cloud shell
- REST API (for developer)

old (deprecated)
- ASM - Azure service manager
  - is a portal.
  - A.k.A classic portal

new (current)
- ARM - Azure Resource manager
  - Azure cloudshell
  - Azure Powershell

Azure subscription:-

- Azure free account
- Trial subscription
- Pay As you go...

BYOL - Bring your own Licence ↓
Pricing will fall very low

Networking:

Intro

- The main purpose of network is to share the data and can be used to enhance the overall performance of some application by distributing the computation tasks to various computers on the network.
- The networking process also involves designing, implementation, upgrading, managing & working

Computer Networking:

-> connect numerous comp in order to share info & Resou

To achieve multiple comp connection we use software for networking.

- Ex:
- Cisco Packet Tracer(
- GNS3 (Graphical Network simulator)

->CN is collection of two or more computer.

-> connect using either cable(wired) or wireless media

- end system is called Node (Any System, Comp, Lap, Mob)

What Do computer Networks Do?

- CN help in operating virtually (enable CC, collabo
- CN integrate on a large scale
- CN respond very quickly in case of condition Change.
- Provide Data security:.

Criteria of a good network:

- Performance
- Reliability. (minimal down time, quick recover, consistent data transfer without error)
- Security.

Goals of CN:

- Load sharing (load balancer to distribute requests)
- Reduce cost.
- Reliability (not easily breakable)
- Scalability (add other system to network). { ACU - Auto scali MA - VMSS
- Communication and mail
- Information access
- Entertainment
- Social networking.

Types of Network - Based on communication medium

1. wired Network:
   - unshielded twisted pair (UTP)
   - Shielded Twisted Pair (STP)
   - Optical Fibre cable. (OFC)
   - copper wire.
2. wireless Network
   - wifi electromagnetic waves (em waves)

Types of Network - Based on Area covered:

- Local Area network (LAN):
  - covers area around 10 km.
  - single office, building, campus
- Metropolitan Area Network (MAN)
  - cover entire city
  - Ex: cable TV network
- wide area network (WAN) (Internet)
  - wan refers to a network that connects countries or continents
  - Ex: Internet. (www)

Types of Network - Based on Types of Architecture

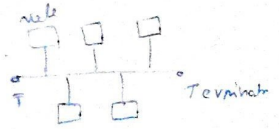
- P2P networks
  - Peer-to-Peer: one system connected to another Directly with internet.
- Client-Server network.
- Hybrid networks

  Ex: Torrent
  - uses a combination of client-server and peer-to-peer architecture.

Network Topologies

- Bus topology.

  use single cable as a core line to connect all the system and device on a network together.



- Star topology.

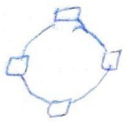
  connected to an central device called a hub or a switch or concentra

- mesh

- Mesh Topology:

even if one of the connection is goes down

- Ring topology
- uni direction



- Dual Ring

multi direction

Networking Protocol: - Network communications:

- HTTP -> Port no 80
- HTTPS -> 443
- FTP - 21, 20
- SSS -22-
- DNS - 53 -
- DHCP - 67, 68 -
- SMTP - 25 -

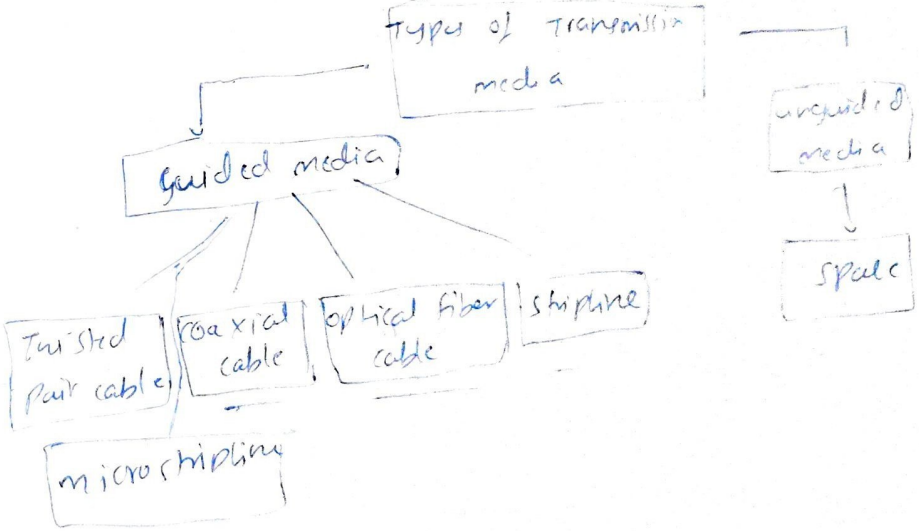
Port NO - Entry point

1 - 65536

Networking Protocol - Network security

- Secure Socket Layer (SSL)
- HTTPS
- Transport layer security (TLS)
  - TLS 1.0 (deprecated)
  - TLS 1.5 (old application)
  - TLS 2.0 (latest)

Network media / Transmission media.



Crimping of Twisted Pair cable

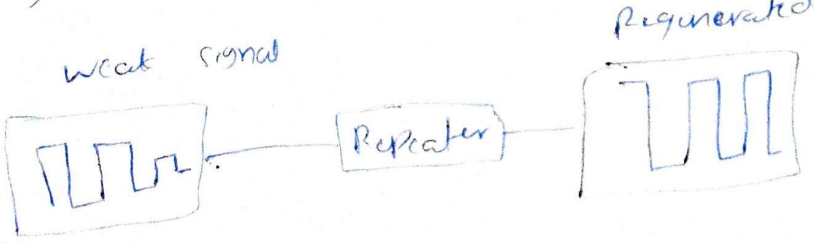
- RJ45 connector
- cable stripper
- RJ45 crimping tool.

Networking Devices

- NIC (network interface card) → NIC card is computer hardware that enables computers to communicate via network
- Repeater
- Hub
- Bridges
- :

Repeater

A repeater is an electrical device that recives a signal, cleans it of unwanted noise, regenerates it, and retransmits it at a higher power level.



Hub

- Switches → Broadcast ARP (Address Resolution Protocol) to all the connected devices (and their send mac)
- Routers → maintains mac table / cam, Info of device, telling where to go
- have Routing table.

Routing protocol (within manual routes)
- OSPS = unlimited.
- RIP = 15+1 = 16

IP Addressing :-

Q. How IP is assigned to a computer?

= 3 ways:

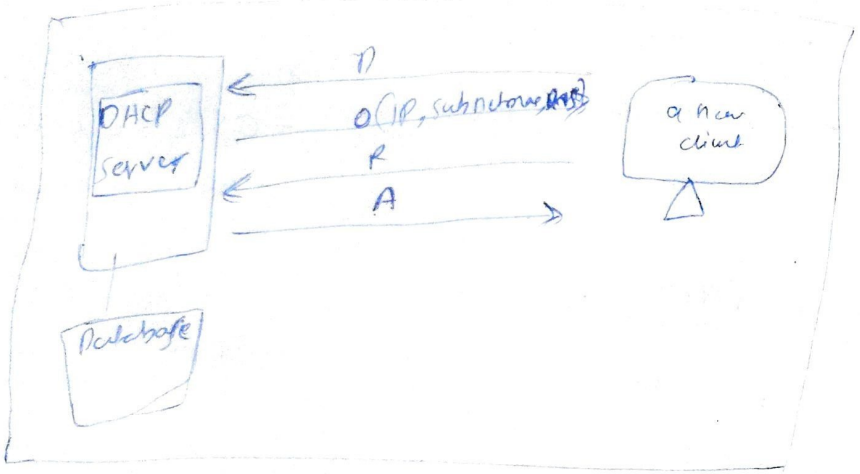
1. manually (static IP)
   - good for limited devices
   - Admin needs to assign manually.
2. Automatic
   - no manual it required
   - automatically IP will given
   - It is possible because DHCP (Dynamic Host configuration Protocol)
   - DHCP Port - 67, 68. (listen / reply)
   - DHCP works on client-server arch
   - DHCP uses DORA Process

- DORA
  D - Discover
  O - offer
  R - Request
  A - Acknowledgement

ipconfig /release → i) change IP
                    ii) Give new IP

ipconfig /renew

Corporate example.



3). APIPA -> Interesting method.

- Automatic Private IP Addressing
- when DHCP server is unable to give IP addr
  may because
  1) DHCP server is inactive
  2) DHCP scope ip address in scope is full.
- in this case client automatically allocate "specific IP" range to itself called APIPA

- specific IP range (169.254.x.x) - 169.254.0.1 to 169.254.255.255
- with APIPA addres you cannot communicate with any machine within the network.
- with this APIPA addres, You cannot ping another
- you cannot share any data on the network
- APIPA can be resolved
  1. ensure DHCP server is working fine
  2. ensure DHCP server has enough IP addreses in scope
  3. release the IP -> ipconfig/release
  4. renew the IP -> ipconfig /renew.
  5. If nothing works out set IP manually.

to do this ncpa.cpl

right click

change <- IPV4

IPV4 Addres

8 bit (octet)

- oldest, & most used.

IPV4 Address: 192.168.0.1
Binary format: 11000000.10101000.00000000.00000001

X.X.X.X
8 8 8 8 = 8x4 = 32 bit

$2^7\ 2^6\ 2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$ = 255