Computer Networking

1. **COMPUTER full form: Commonly oriented machine particularly used for training education and research**
2. Internet: Collection of computer networks

How it Started?

1. ARPA: Advanced research projects agency, created by USA
2. Communicating between buildings, ARPANET was built communicate far, 4 places where computers worked: MIT, Stanford, VC LA, University of Utah
3. Protocols: You send email to someone, it requires steps, establish connection, receive documents, you send file, you don't want anything to be altered or lost. These are simple rules to secure
4. When you click on a link it must go to that link, links in pdf to refer other references, that wasn't happening, it was not pointing, here comes WORLD WIDE WEB BY TIM BURNERS(stores these Docs)
5. Search Engines was not there in WWW, Yahoo was first search engine.
6. Rules and Regulations for working of the internet, who made it? Internet Society makes it. RFC editor, if you have any features to add submit through those, High professionals use this

Client-Server Architecture:

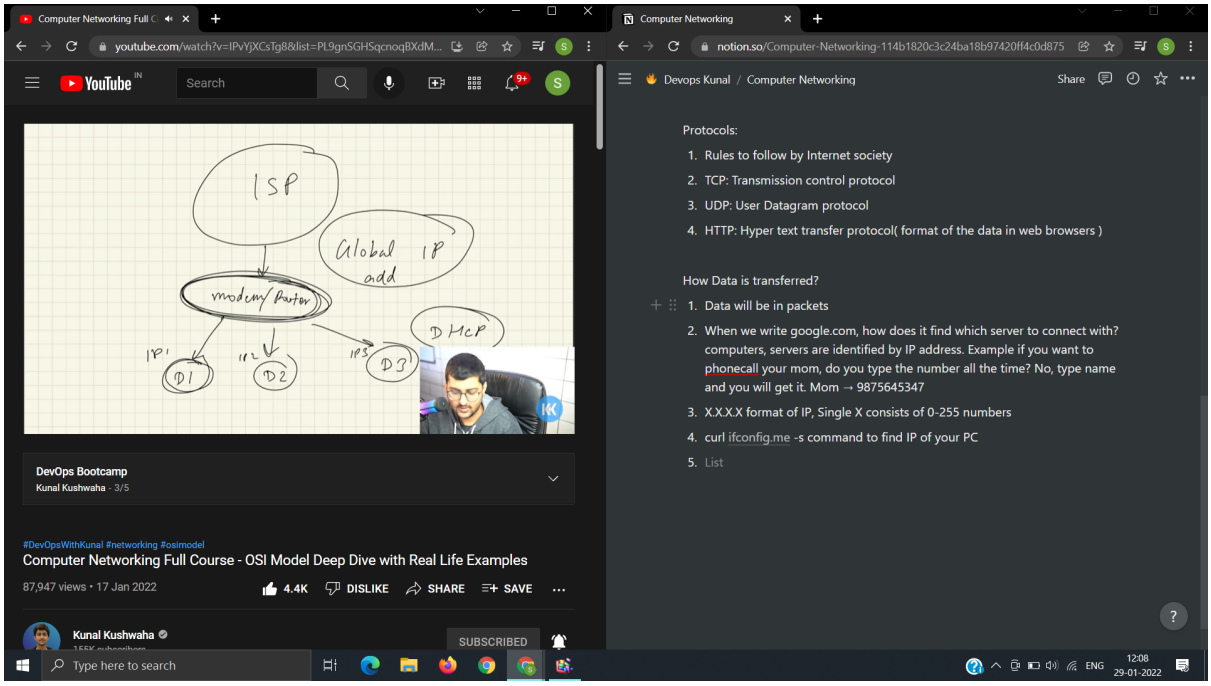
1. Internet is under the wires located in Deep Ocean
2. Client requesting something from google.com and that server response is sent to the Client
3. Client can be it's own server by yourselves by localhost, can act as server and client
4. Use inspect element of how google.com behind the scenes work

Protocols:

1. Rules to follow by Internet society
2. TCP: Transmission control protocol
3. UDP: User Datagram protocol
4. HTTP: Hyper text transfer protocol(format of the data in web browsers)

How Data is transferred?

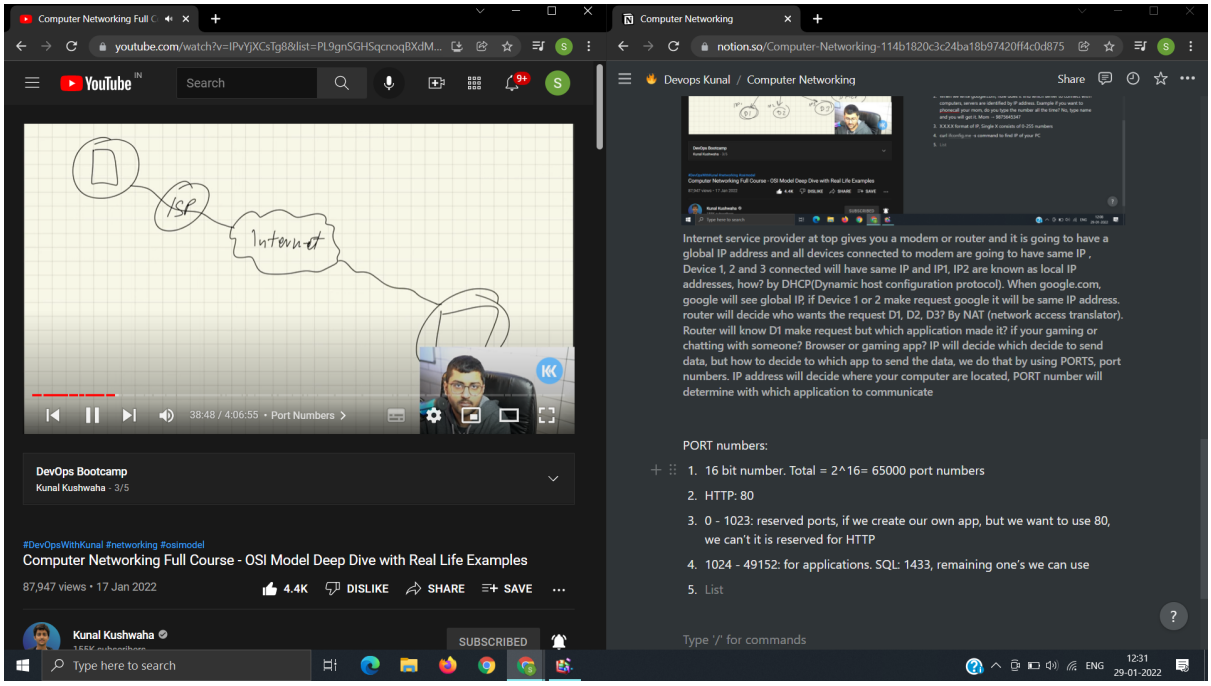
1. Data will be in packets
2. When we write google.com, how does it find which server to connect with? computers, servers are identified by IP address. Example if you want to phonecall your mom, do you type the number all the time? No, type name and you will get it. Mom → 9875645347
3. X.X.X.X format of IP, Single X consists of 0-255 numbers
4. curl ifconfig.me -s command to find IP of your PC



Internet service provider at top gives you a modem or router and it is going to have a global IP address and all devices connected to modem are going to have same IP , Device 1, 2 and 3 connected will have same IP and IP1, IP2 are known as local IP addresses, how? by DHCP(Dynamic host configuration protocol). When google.com, google will see global IP, if Device 1 or 2 make request google it will be same IP address. router will decide who wants the request D1, D2, D3? By NAT (network access translator). Router will know D1 make request but which application made it? if your gaming or chatting with someone? Browser or gaming app? IP will decide which decide to send data, but how to decide to which app to send the data, we do that by using PORTS, port numbers. IP address will decide where your computer are located, PORT number will determine with which application to communicate

PORT numbers:

1. 16 bit number. Total = 2^16= 65000 port numbers
2. HTTP: 80
3. 0 - 1023: reserved ports, if we create our own app, but we want to use 80, we can’t it is reserved for HTTP
4. 1024 - 49152: for applications. SQL: 1433, remaining one’s we can use



you and your friend want to communicate in other country, initially ISP connects you to Internet. Speed: 1 mbps(mega bits p/s) = 1000000 bits/s. 1 gbps = 10^9 bits/s. Upload and Download.

How Communication b/w two computers happen? guided and unguided way

1. Guided way: set of path defined two computers connected with WIFI
2. Unguided way: no set of path, Bluetooth

When you talk with someone in UK? how countries are connected?

1. Submarinecable.com website to check countries are connected for INTERNET
2. Computers connected, physically by Optical fiber cables, coaxial cables. By wireless by Bluetooth, by Wi-Fi. Speed: Cables > Satellite

LAN: Small house/ offices can connect 10,000 computers. Ethernet cable

1. There need to be a device to manage to how to connect via WIFI, ethernet, Bluetooth is by Network adapters(Network cards)

MAN (Metropolitan area network): across a city

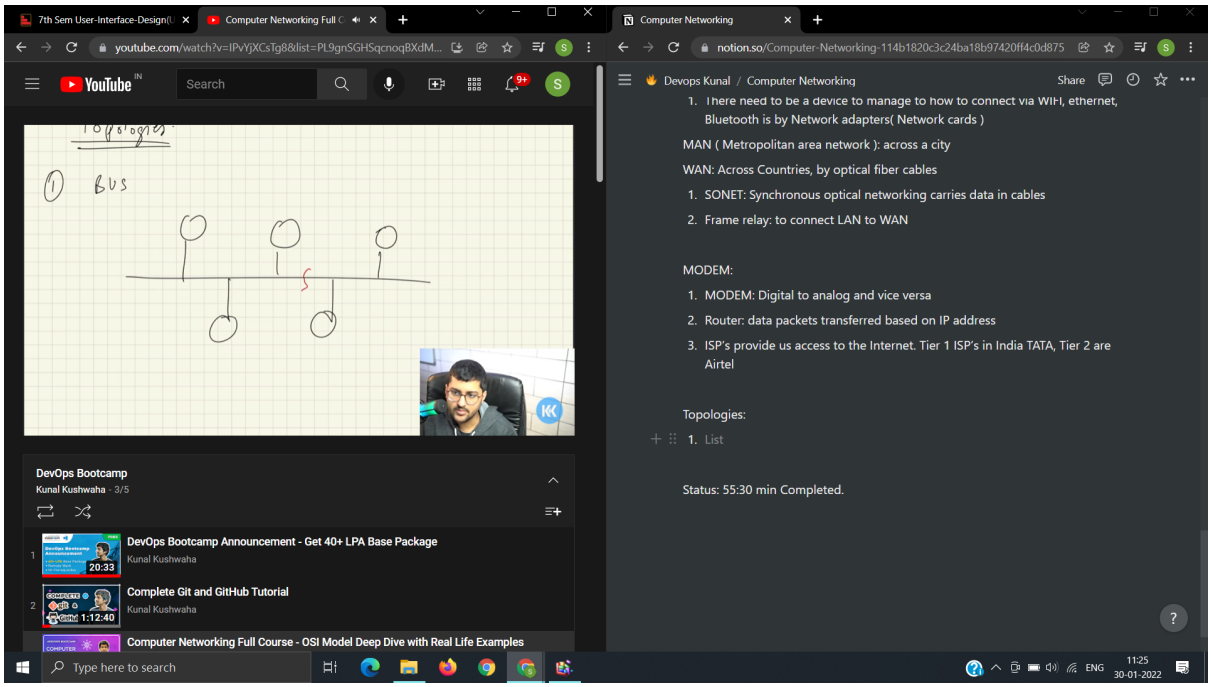
WAN: Across Countries, by optical fiber cables

1. SONET: Synchronous optical networking carries data in cables
2. Frame relay: to connect LAN to WAN

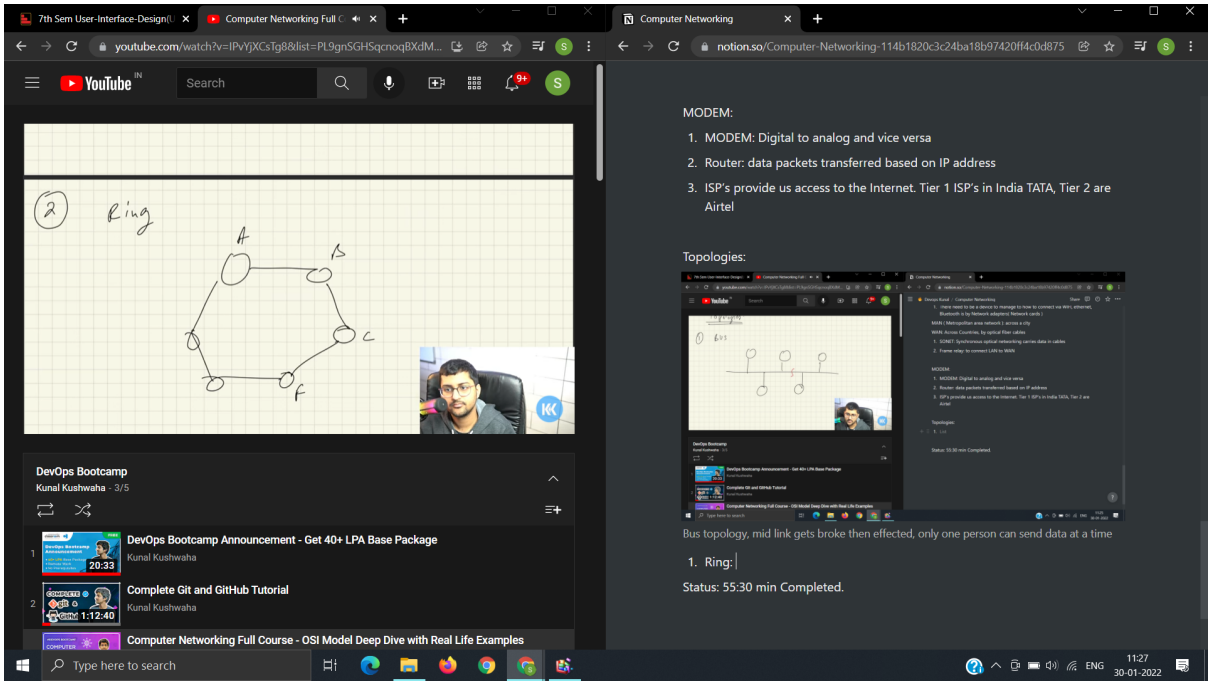
MODEM:

1. MODEM: Digital to analog and vice versa
2. Router: data packets transferred based on IP address
3. ISP’s provide us access to the Internet. Tier 1 ISP’s in India TATA, Tier 2 are Airtel

Topologies:

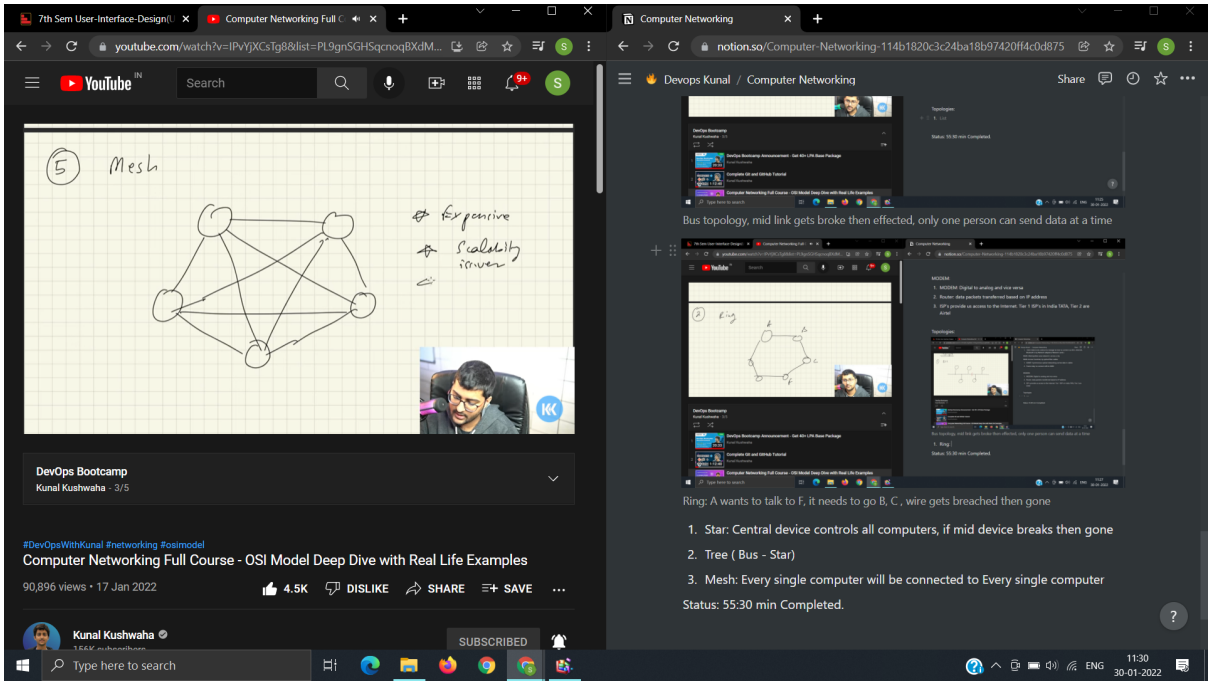


Bus topology, mid link gets broke then effected, only one person can send data at a time



Ring: A wants to talk to F, it needs to go B, C , wire gets breached then gone

1. Star: Central device controls all computers, if mid device breaks then gone
2. Tree (Bus - Star)
3. Mesh: Every single computer will be connected to Every single computer



Expensive, Scalability issues

🖥️ Computer Networks (Conti..)