

# COMPUTER NETWORKS INTRODUCTION

## Computer Networks

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2024-I



# Outline

- 1 The Internet
- 2 The Infrastructure
- 3 The Protocols and Communications



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# Internet and World Wide Web

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# Software and Hardware

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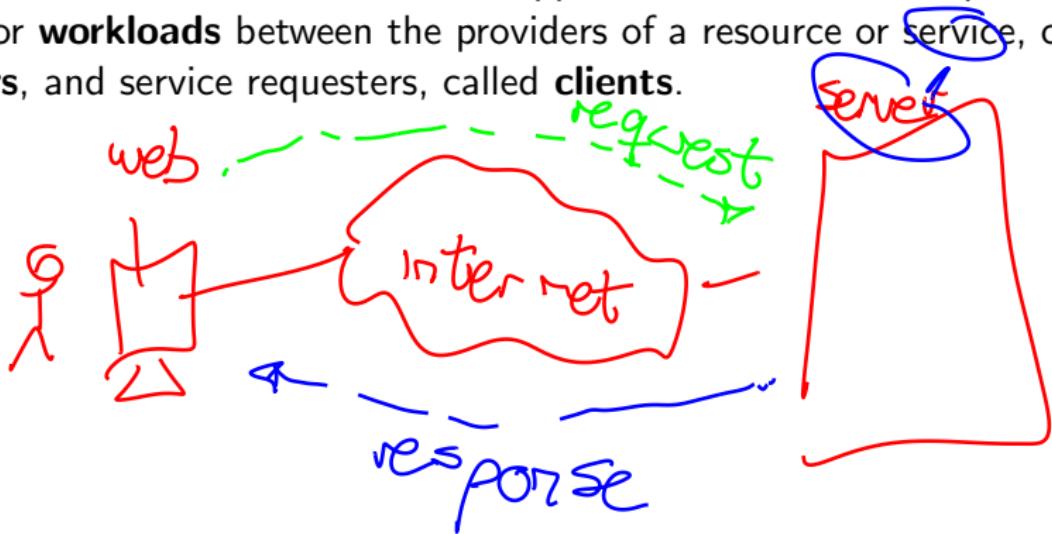
# Network Services and Shared Resources

**Network Services** are the services that are provided by a network, like programs execution or shared resources.



# Client-Server Model

**Client-Server Model** is a distributed application structure that partitions tasks or **workloads** between the providers of a resource or service, called **servers**, and service requesters, called **clients**.



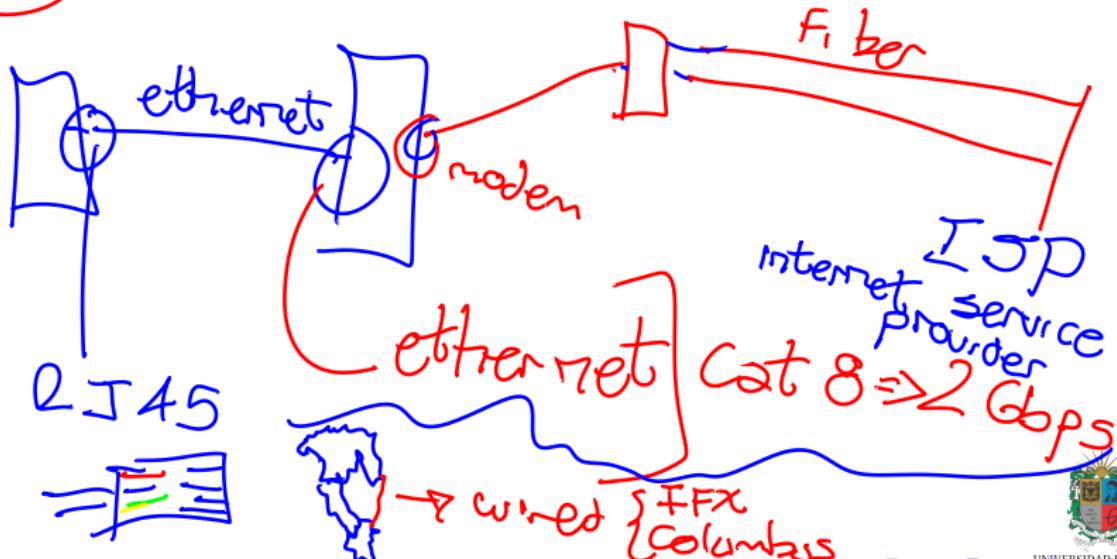
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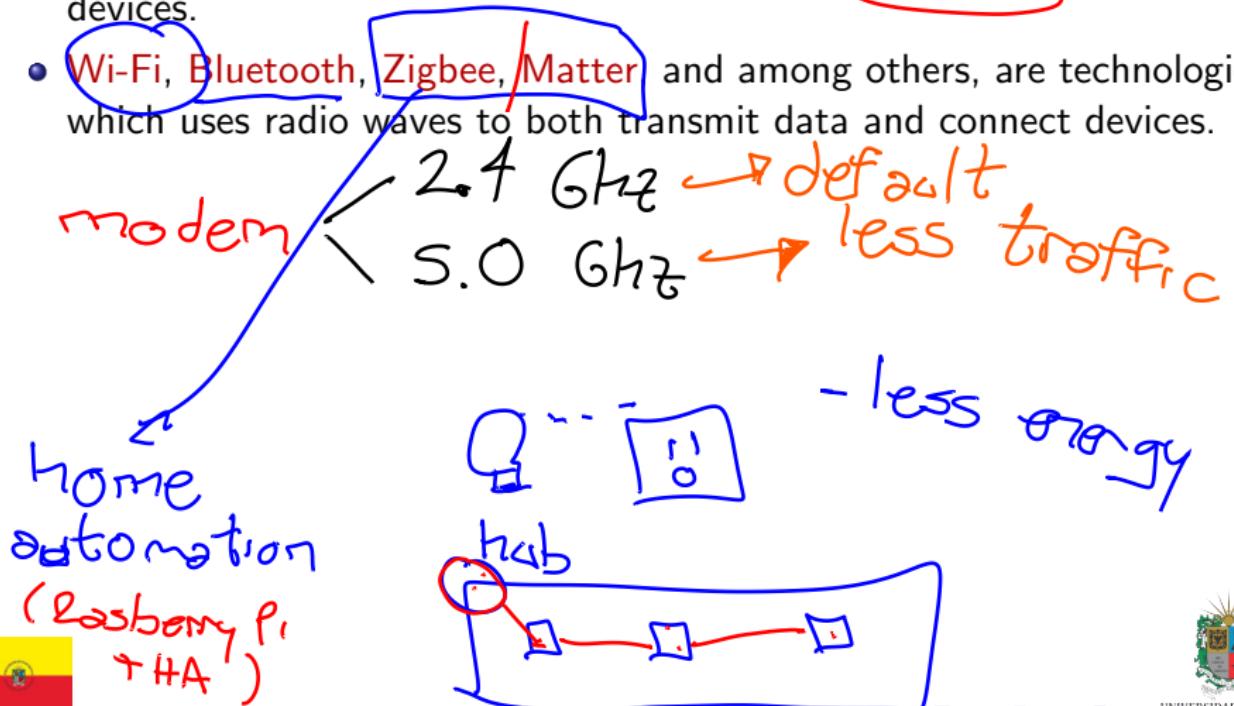
# Wired Networks

- **Wired Networks** are the networks that use cables to connect devices.
- **Fiber Optics** is a technology that uses glass or plastic threads to transmit data.
- **Copper Wires** are the traditional technology to transmit data.



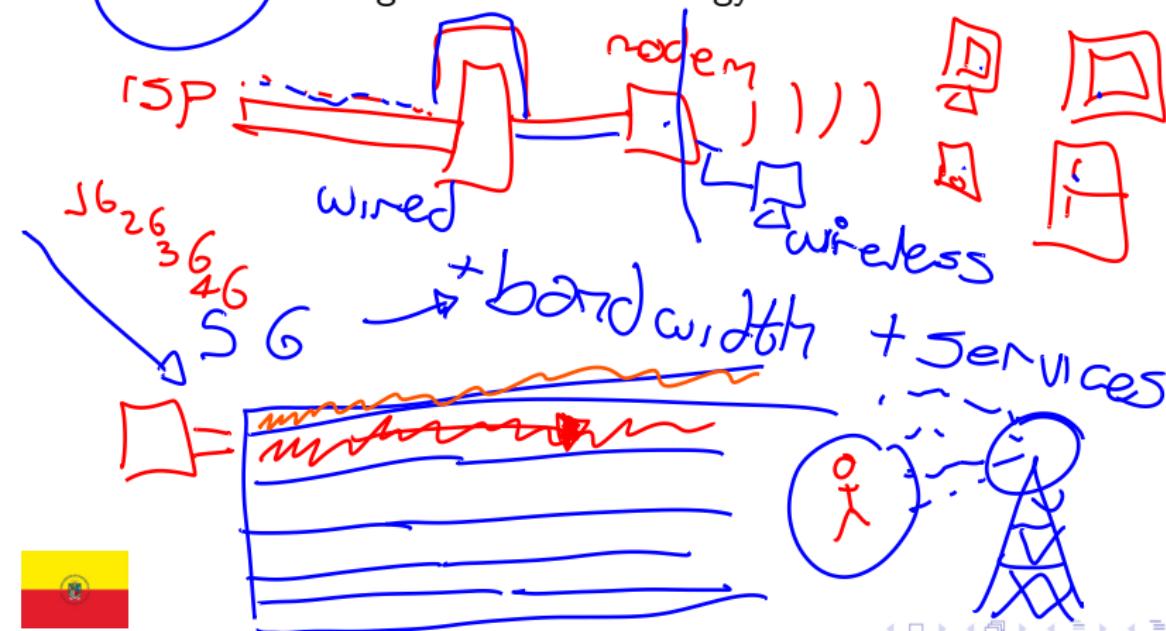
# Wireless Networks

- Wireless Networks are the networks that use radio waves to connect devices.
- Wi-Fi, Bluetooth, Zigbee, Matter and among others, are technologies which use radio waves to both transmit data and connect devices.



# Modern Networks

- **Modern Networks** are the networks that use a combination of wired and wireless technologies.
- **5G** is the fifth generation technology standard for cellular networks.



# Security and Privacy

Security is the protection of data and resources from unauthorized access.

Privacy is the right of an individual to be free from intrusion or interference.

Cybersecurity is the practice of protecting systems, networks, and programs from digital attacks.

Resources → shared in  
↓  
Credentials  
key access  
VPN → virtual private network

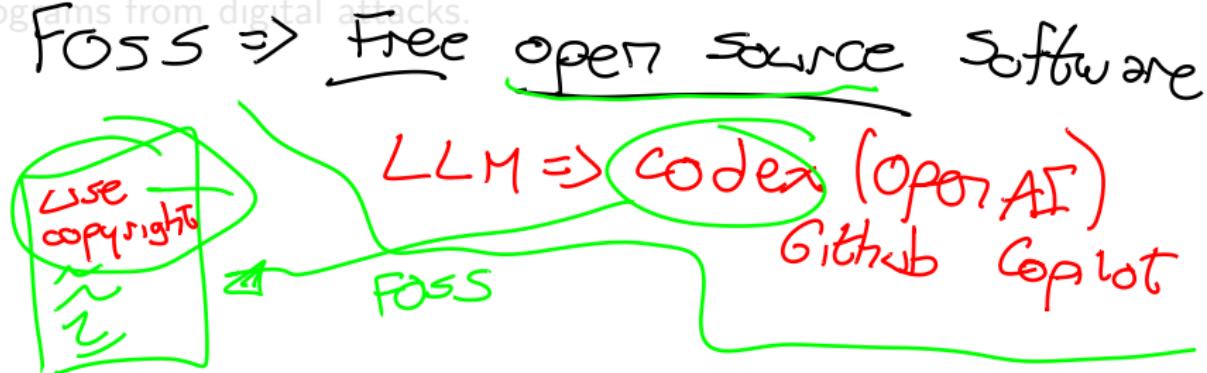


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- Phishing
- 

DDoS  
while (true):



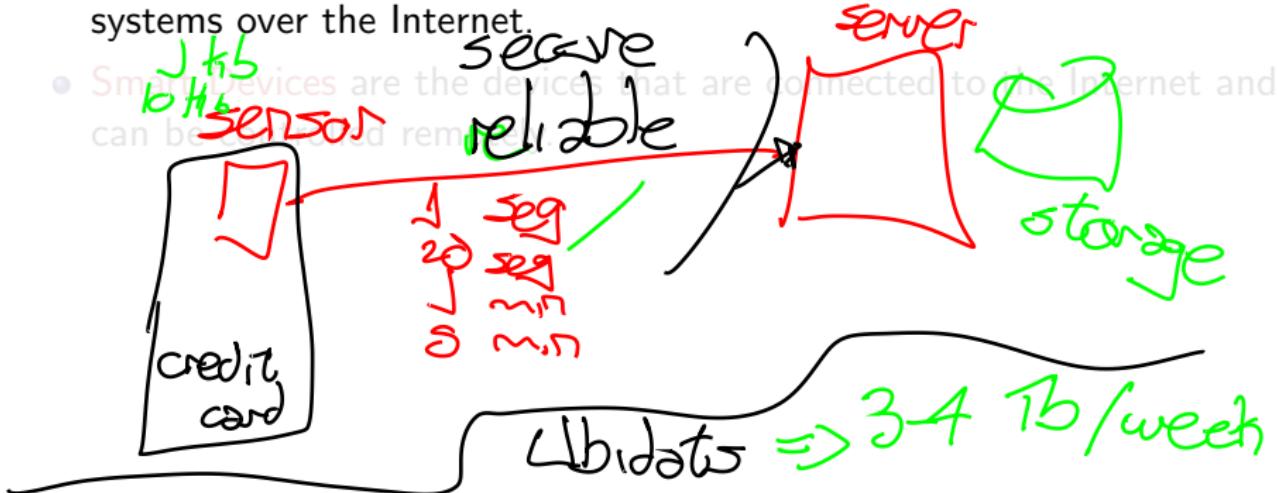
Proxy  
Firewall  
IPTables  
CHMOD

- Antivirus
- Antimalware
- Malware Bytes



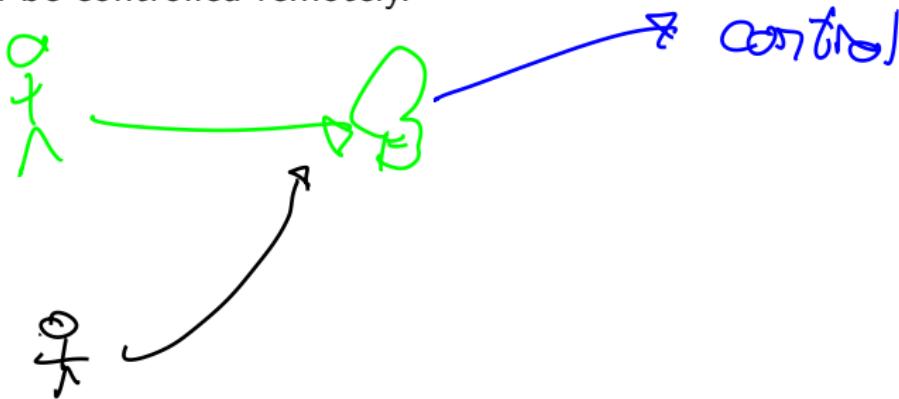
# The Internet of Things

- The Internet of Things is the network of physical objects that are embedded with sensors, software, and other technologies, for the purpose of connecting and exchanging data with other devices and systems over the Internet.
- Smart devices are the devices that are connected to the Internet and can be used remotely.



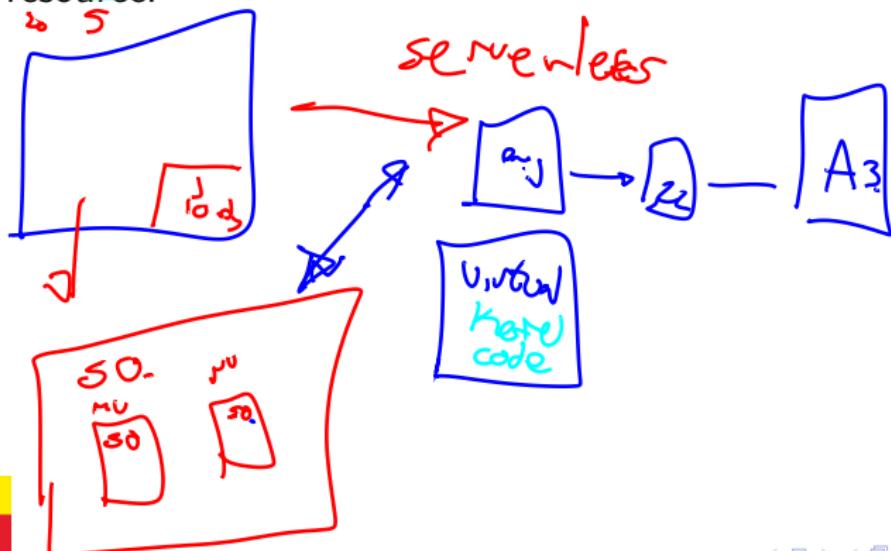
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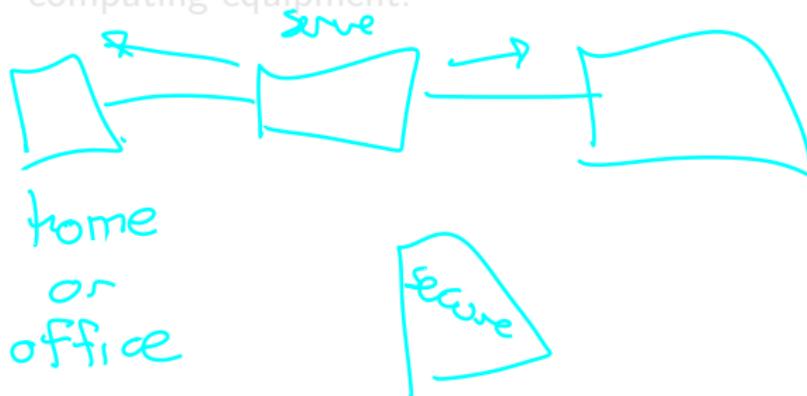
# Operative Systems and Virtualization

- Operative Systems are the software that manages the hardware and software resources of a computer.
- Virtualization is the process of creating a virtual version of something, like an operative system, a server, a storage device, or a network resource.



# On-premise Computing

- **On-premise Computing** is the traditional computing model where the software and hardware are located in the same physical location.
- Data Centers are the facilities that house the servers and other computing equipment.



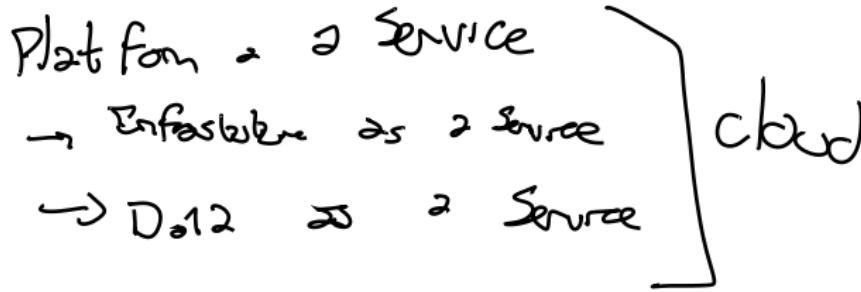
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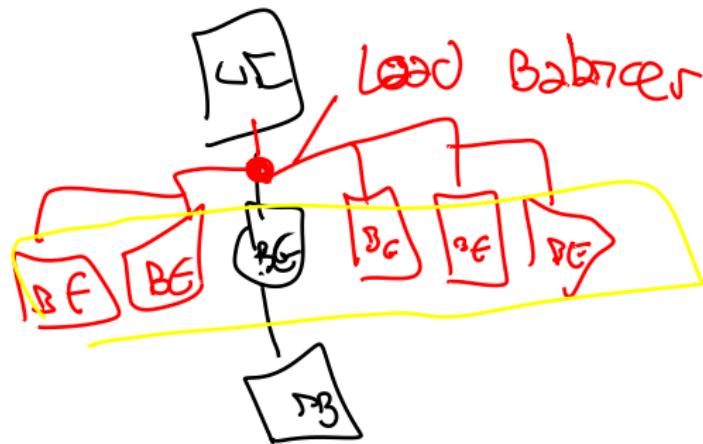
# Cloud Computing

- **Cloud Computing** is the model where the software and hardware are located in different physical locations.
- **Public Cloud** is the cloud infrastructure that is owned and operated by a third-party cloud service provider.
- **Private Cloud** is the cloud infrastructure that is operated solely for a single organization.



# Scalability and High-Performance

- **Scalability** is the ability of a system to handle a growing amount of work.
- **High-Performance** is the ability of a system to handle a large amount of work.



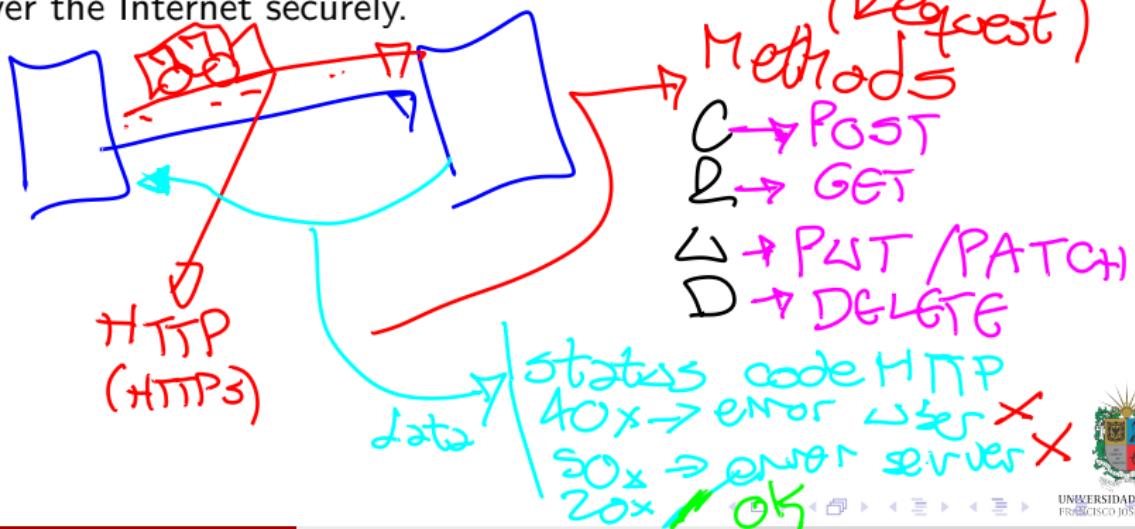
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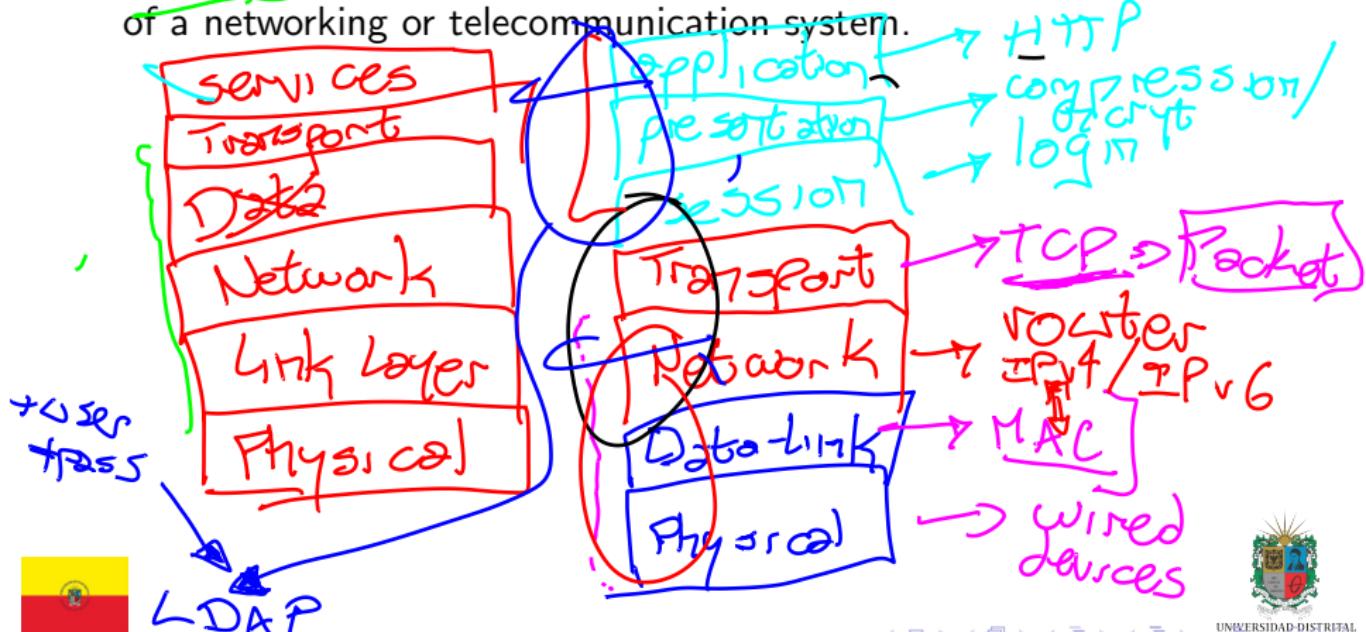
# Web Protocols

- Web Protocols are the protocols that are used to communicate over the Internet.
- **HTTP** is the protocol that is used to transfer hypertext documents over the Internet.
- **HTTPS** is the protocol that is used to transfer hypertext documents over the Internet securely.



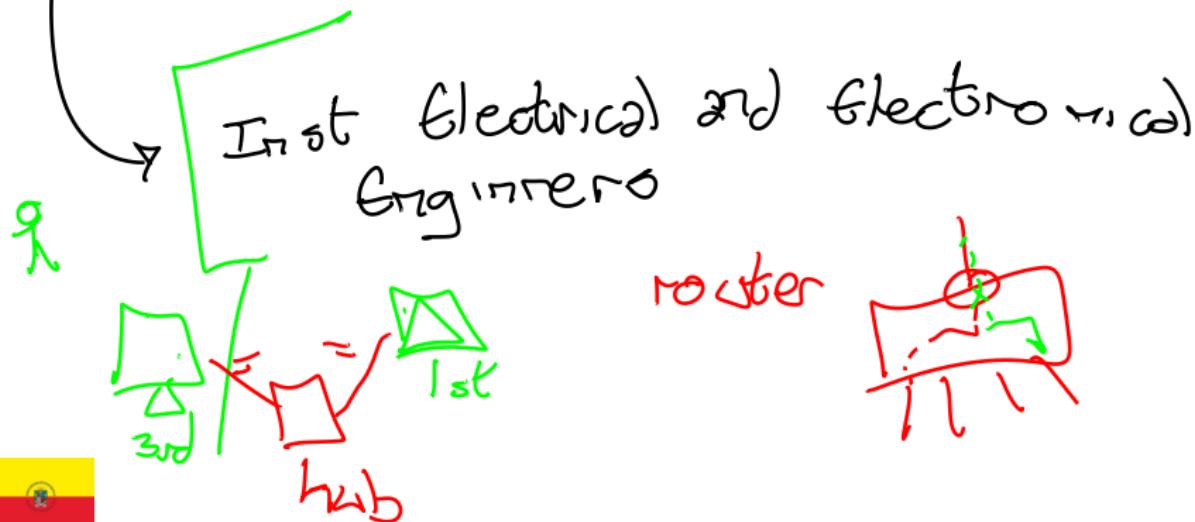
# Layer Model

- Layer Model is a conceptual framework that describes the functions of a networking or telecommunication system.
- OSI Model is a conceptual framework that standardizes the functions of a networking or telecommunication system.



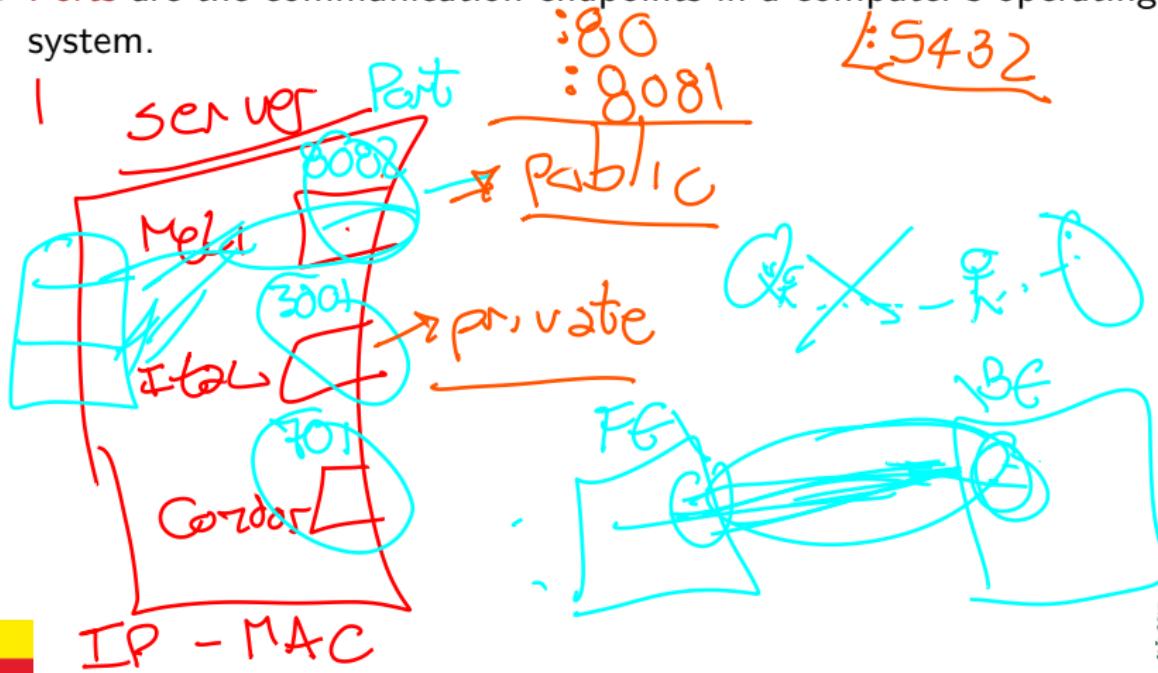
# Networking Standards and Organizations

- Networking Standards are the standards that are used to define the functions of a networking or telecommunication system.
- IEEE, IETF, ISO, ITU, and W3C are some of the organizations that are responsible for the development and maintenance of the networking standards.



# Sockets and Ports

- **Sockets** are the endpoints of a bidirectional communication channel.
- **Ports** are the communication endpoints in a computer's operating system.



# Data Transmission

- Data Transmission is the process of sending data from one place to another.

- Bandwidth is the maximum rate of data transfer across a given path.

- Latency is the time it takes for data to travel from one point to another.

Packet loss is the number of data packets lost in a network.

Jitter is the variation in the time taken for data to travel from one point to another.

- Quality of Service is the ability of a network to provide different priority to different applications or data traffic.

- Reliability is the ability of a network to provide consistent and dependable service.



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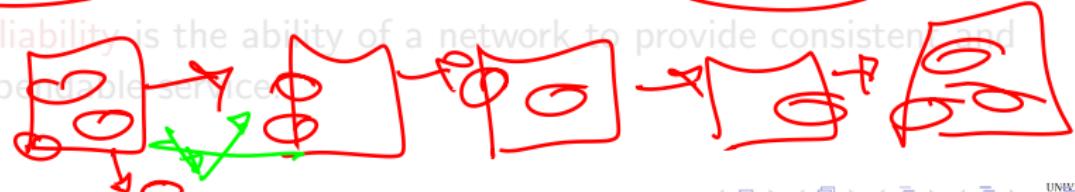
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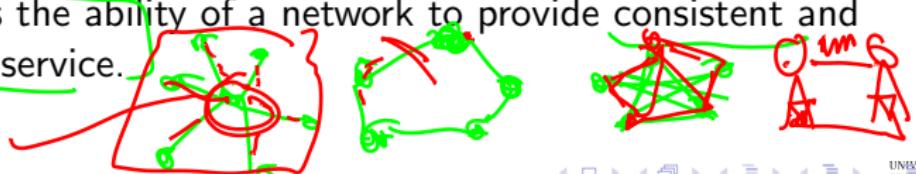
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# Thanks!

# Questions?



Repo: [github.com/ud-public/courses/computer-networks](https://github.com/ud-public/courses/computer-networks)

