

COMPUTER NETWORKING INTRODUCTION

Computer Networking I

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UNIVERSIDAD DISTRITAL
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Outline

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



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Internet and World Wide Web

- **Internet** is a global network of networks that connects millions of computers and other devices. **Here** you could check the origin of the internet.
- World Wide Web is a system of interlinked hypertext documents accessed via the Internet.



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billions

90s only

~~HTTP~~

HyperText
Transfer
Protocol



<html>
~>

· <p> ~ ~ ~ </p>

<a> ~ ~ ~
link
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Software and Hardware

- **Software** is the set of **instructions** that **tell** the computer what to do.

- Hardware is the physical components of a computing system.

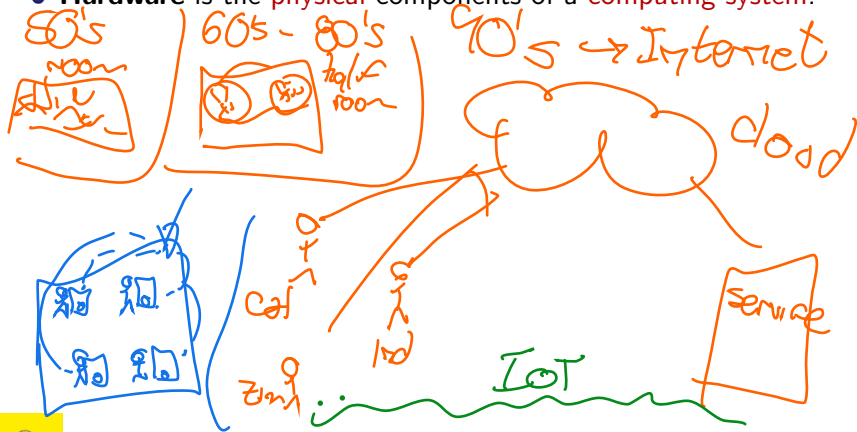
Condon

Pre-enrollment



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Applications Development

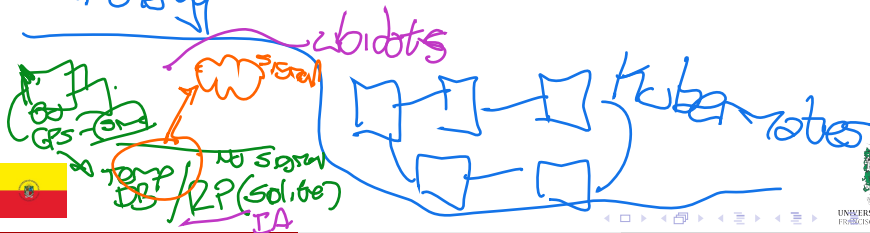
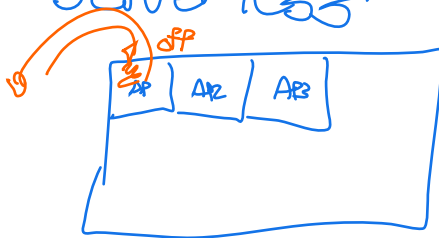
- Applications** are the programs that run on a computer.

- Software Development is the process of creating a new application that will be deployed.



+ more
+ org

serverless

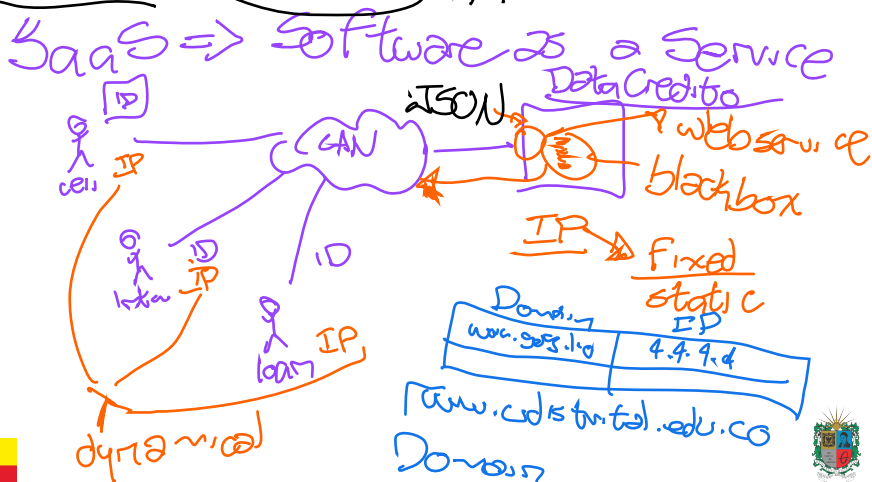


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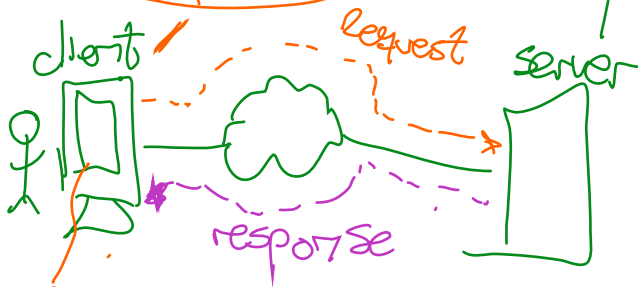
Network Services and Shared Resources

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



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.



JavaScript

name validations



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Wired Networks

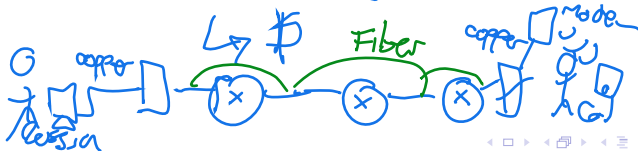
- **Wired Networks** are the **networks** that use **cables** to **connect** devices.
- **Fiber Optics** is a technology that uses **glass** or plastic threads to **transmit data**.
- **Copper Wires** are the **traditional** technology to **transmit data**.

light \Rightarrow 300 000 km/s
 \hookrightarrow \$\$\$\$...\$

Ethernet

bits

bps



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 uses **radio waves** to both **transmit data** and **connect devices**.

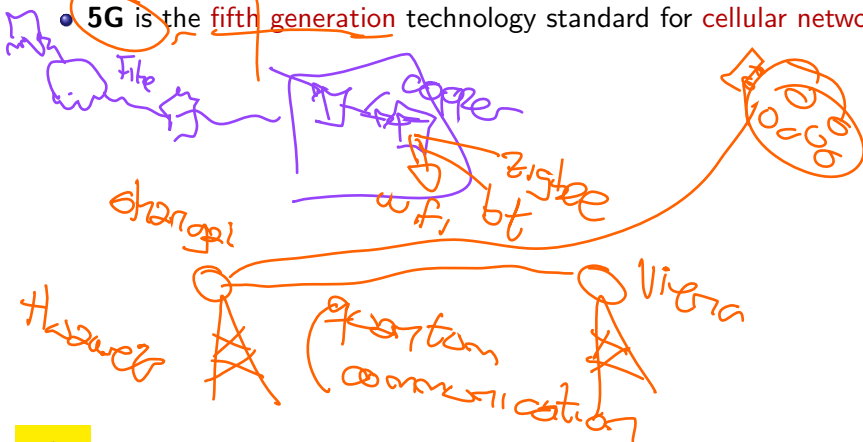
Wi-Fi \Rightarrow long distance \Rightarrow 10-15 m. ✓

Bluetooth \Rightarrow 3-5 mt. ✓



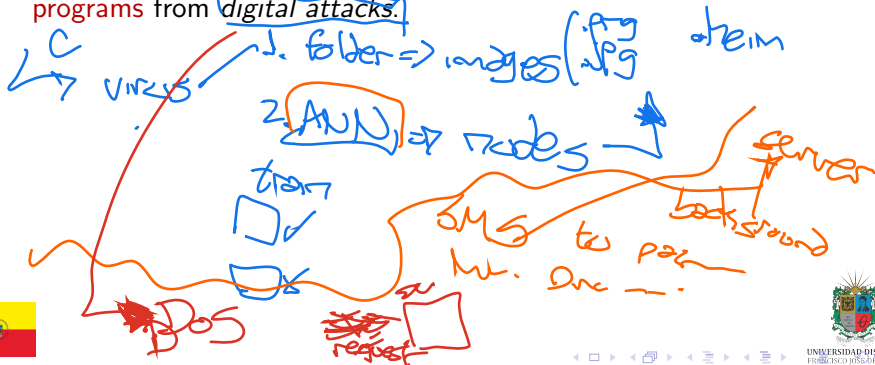
Modern Networks

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



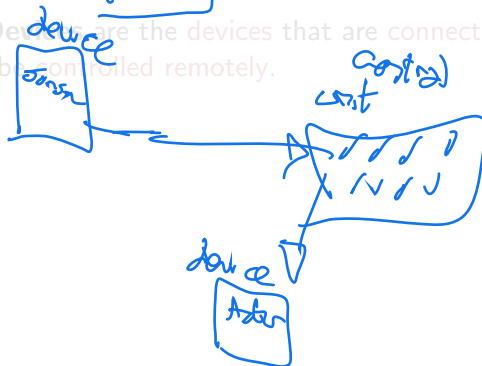
Security and Privacy

- **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.



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 controlled remotely.



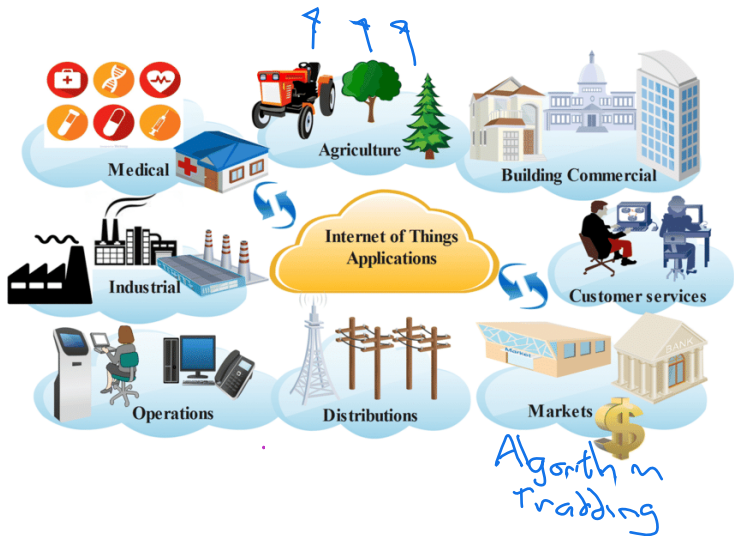
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not

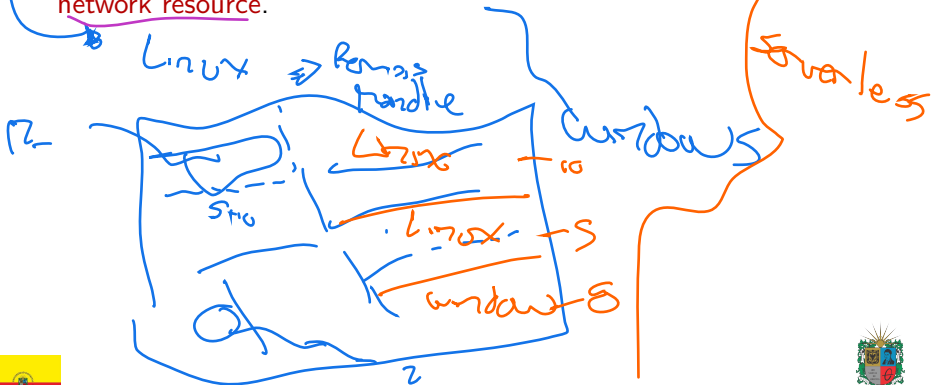


IoT Applications



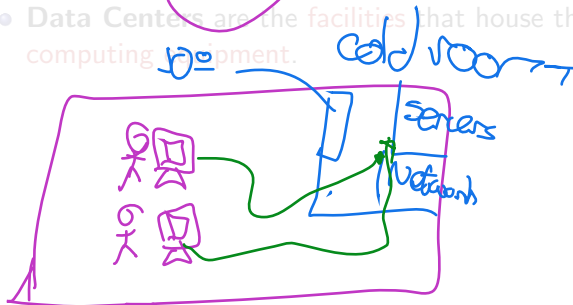
Linux Commands

- **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**.



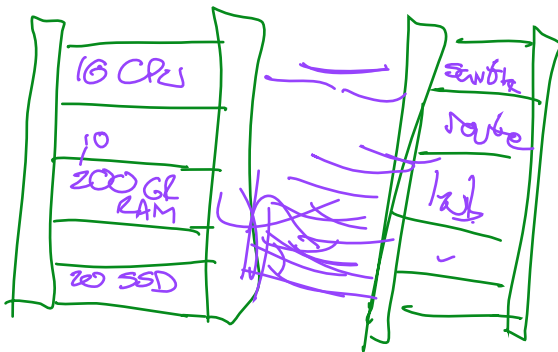
On-premises Computing

- **On-premises 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.

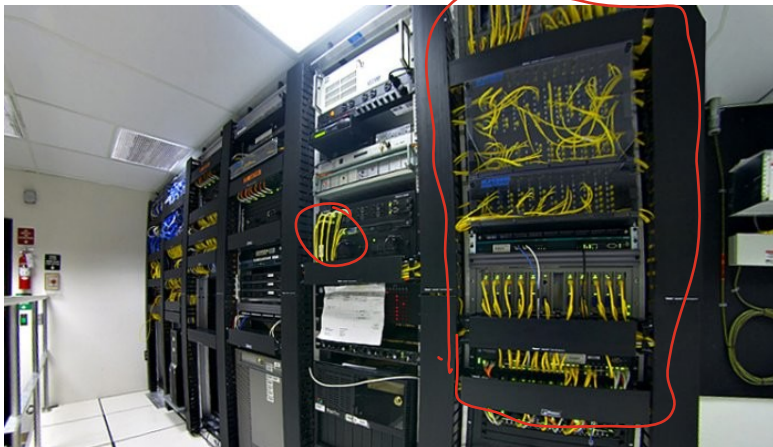


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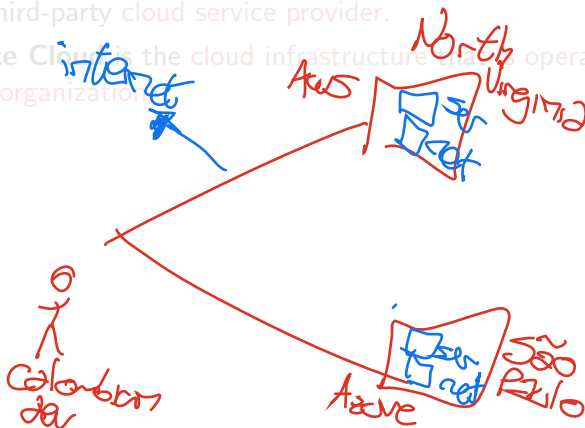


Typical On-Premises Infrastructure



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.

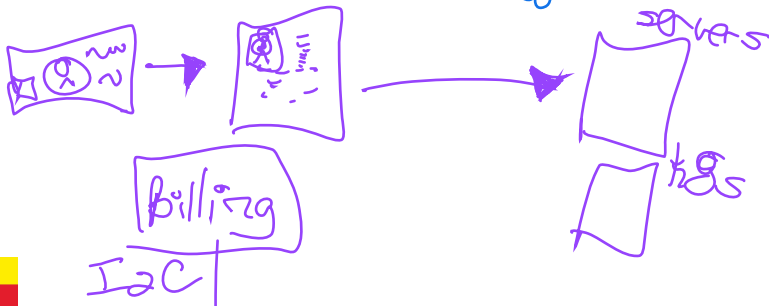


Cloud Computing

on demand

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IBM AWS GCP Oracle Cloud Azure Digital Ocean



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VPN \rightarrow IP / (user password)



Typical Public Cloud Infrastructure

Region Data Center



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*.



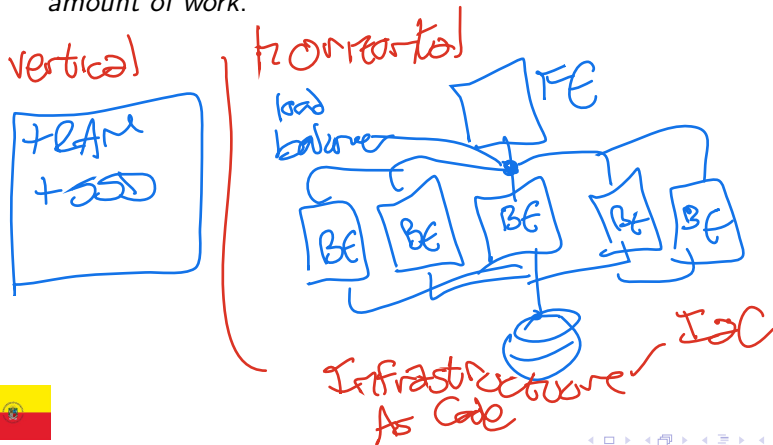
Software
 threads
 opt. code
 erzeuge

Hardware
 cloud
 clusters
 ;



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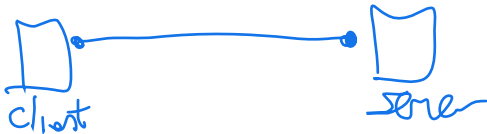
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Web Protocols

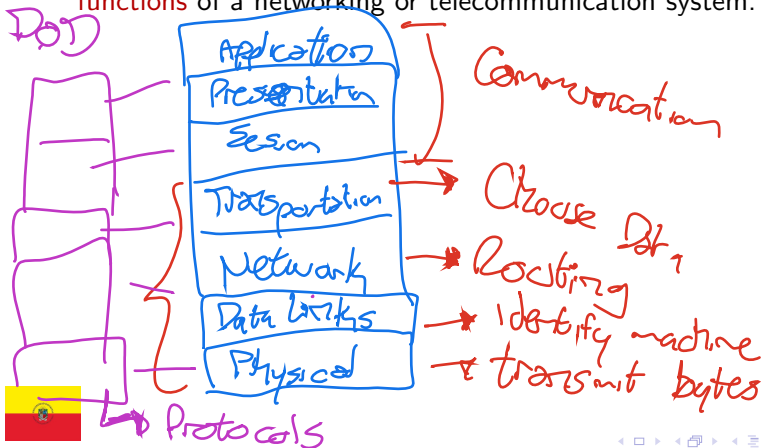
- **Web Protocols** are the **protocols** that are used to **communicate** over the **Internet**.
- **HTTP** is the **protocol** that is used to **transfer hypertext** documents over the **Internet**.
- **HTTPS** is the **protocol** that is used to **transfer hypertext** documents over the **Internet**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

FTP



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.

WiFi,
Bluetooth,
Zigbee

IEEE

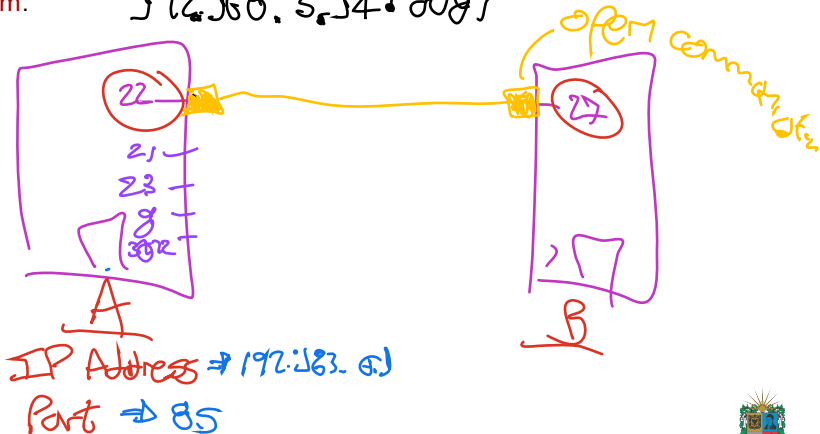
HTTP, W3C
FTP
SSH



Sockets and Ports

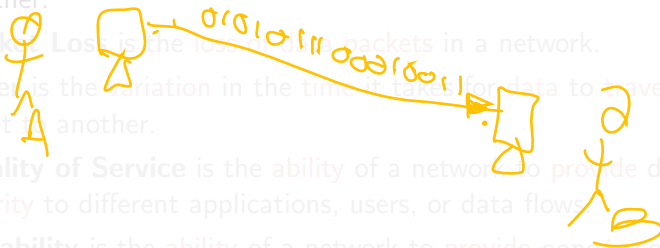
- **Sockets** are the endpoints of a **bidirectional** communication channel.
- **Ports** are the communication endpoints in a computer's operating system.

192.168.3.14:8081



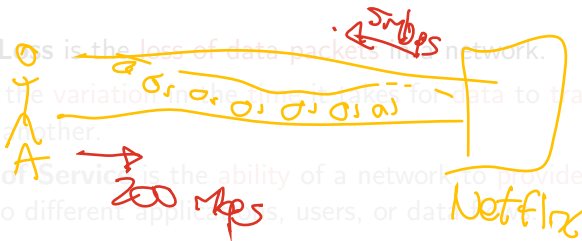
Data Transmission

- **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.
- **Packets** are small units of data that are sent in a network.
- **Jitter** is the variation in the time it takes 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, users, or data flows.
- **Reliability** is the ability of a network to provide consistent and dependable service.



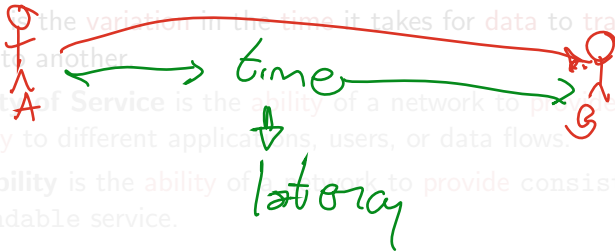
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Thanks!

Questions?



Repo: <https://github.com/EngAndres/ud-public/tree/main/courses/computer-networking>

