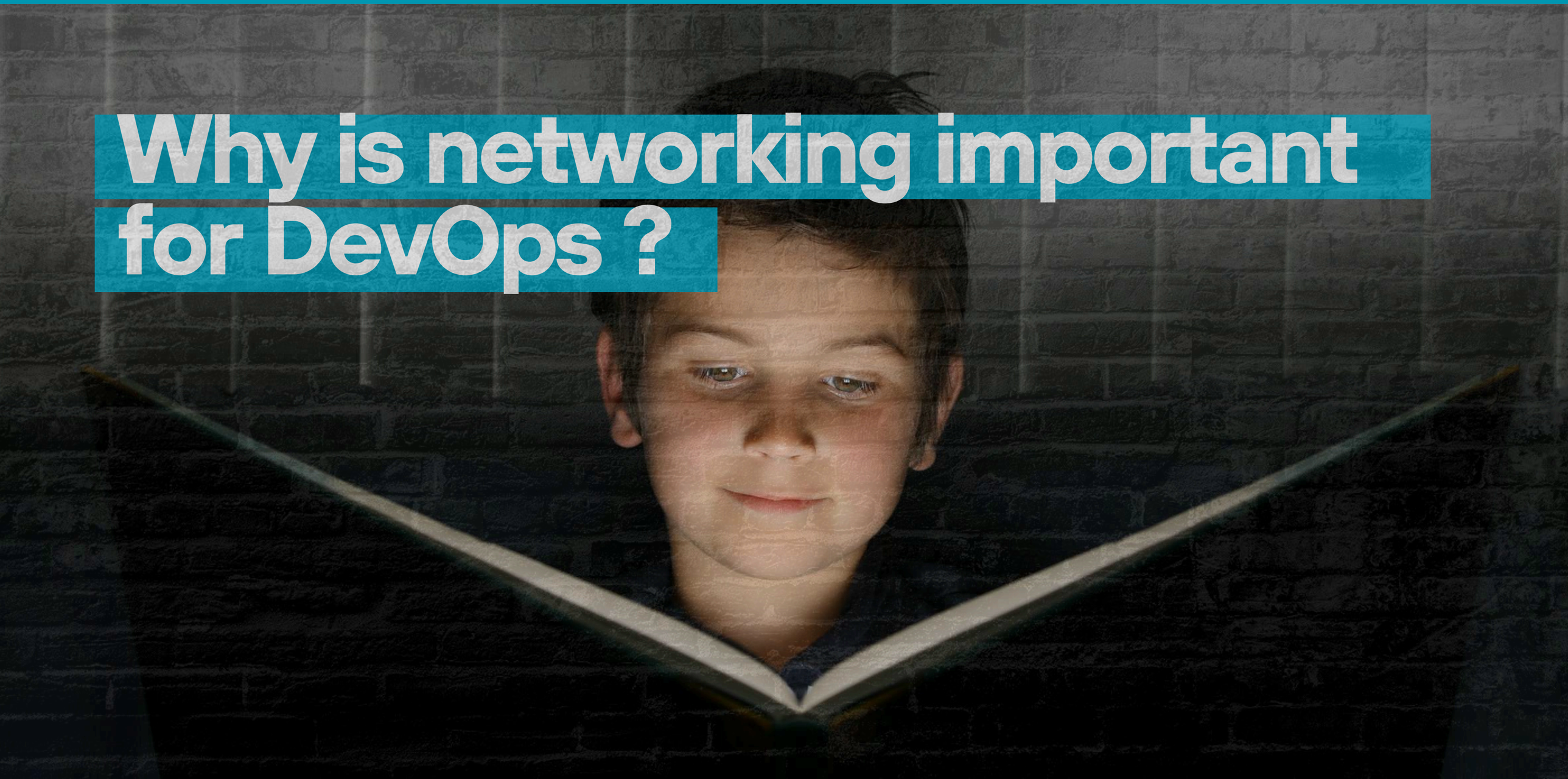
Club Informatique
& Télécom

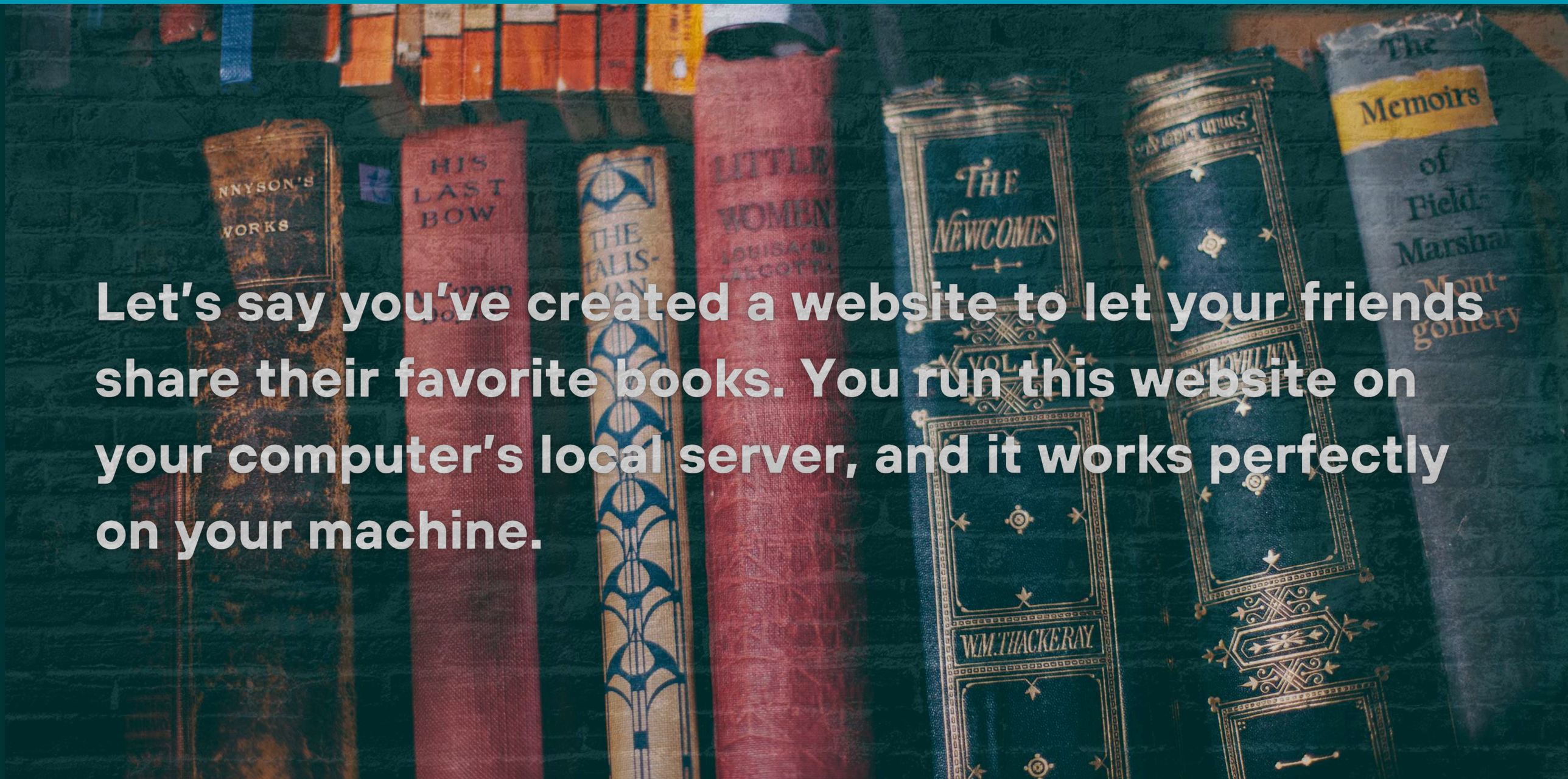
Networking

What we'll learn

- Introduction
- OSI Model
- Networks & IP
- Protocols & Ports
- Networking Commands

Why is networking important for DevOps ?





Let's say you've created a website to let your friends share their favorite books. You run this website on your computer's local server, and it works perfectly on your machine.

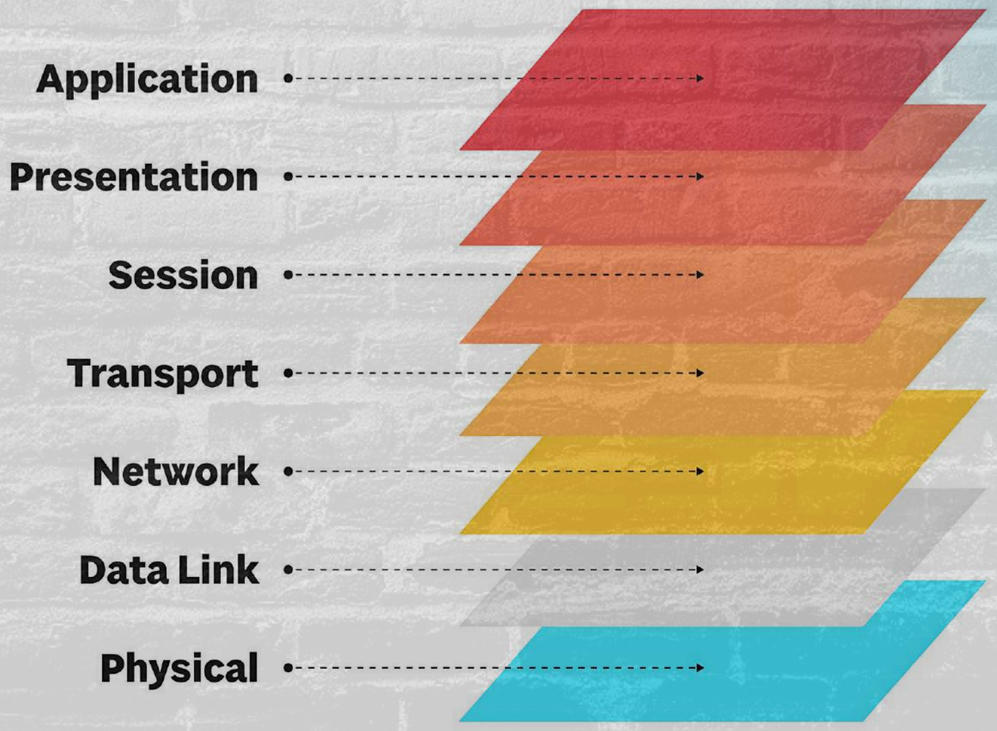
HIS LAST BOW
A. Conan Doyle
THE FALIS-MAN
LITTLE WOMEN
THE NEWCOMES
VOL. I.
The Memoirs
of
Field-
Mont-
gomery

But.....

- What if you want others to access your website?
- What if you need to deploy it on the cloud (like AWS, Azure, or Google Cloud)?
- What if you want to make sure your website handles many users without crashing?

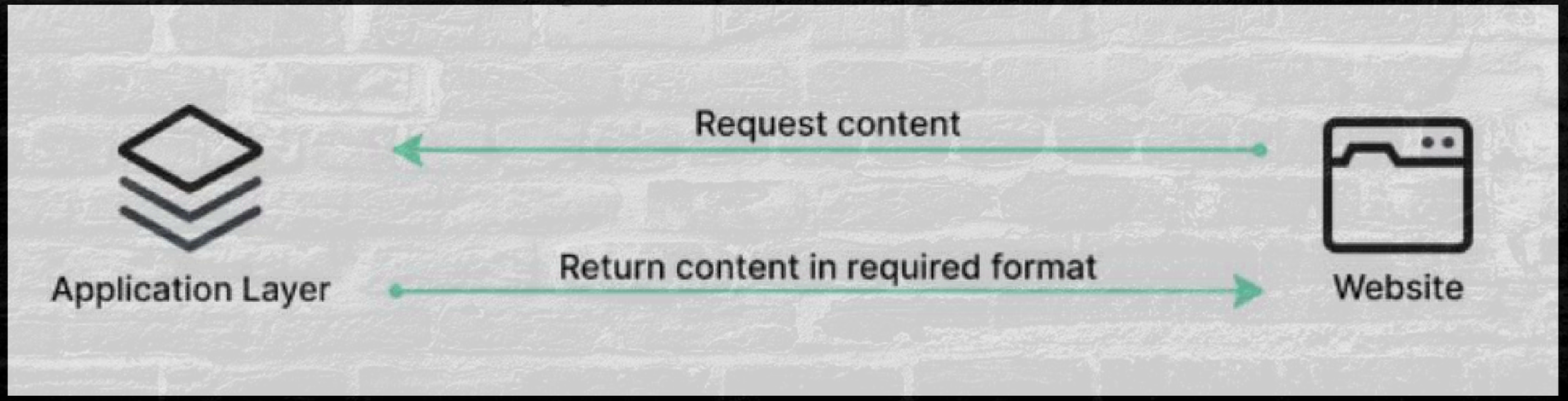
OSI Model

Imagine you want to send a letter (or a text message) to your friend. Each layer of the OSI Model is like a step in the process, from writing your message to delivering it safely.



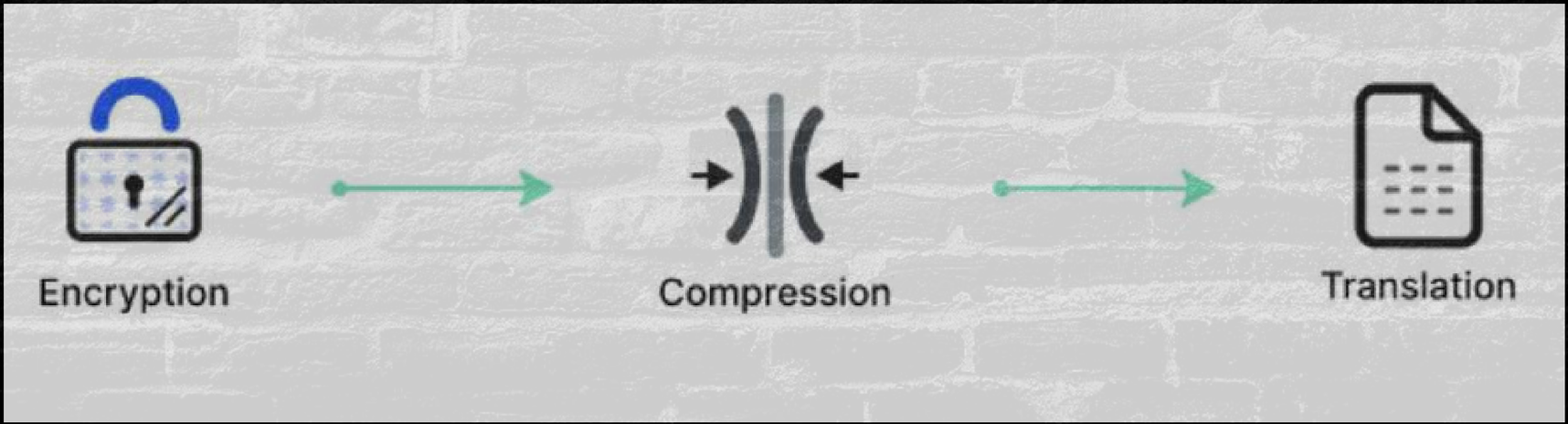
Application layer

The intermediate beetwen the end-user and the network.



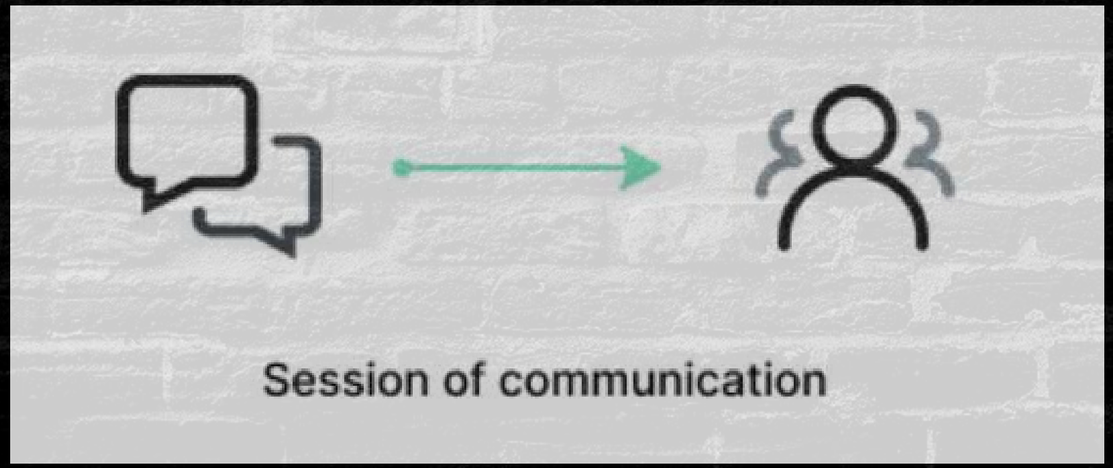
Presentation layer

It ensures that data sent from the application layer of one system is readable by the application layer of another system.



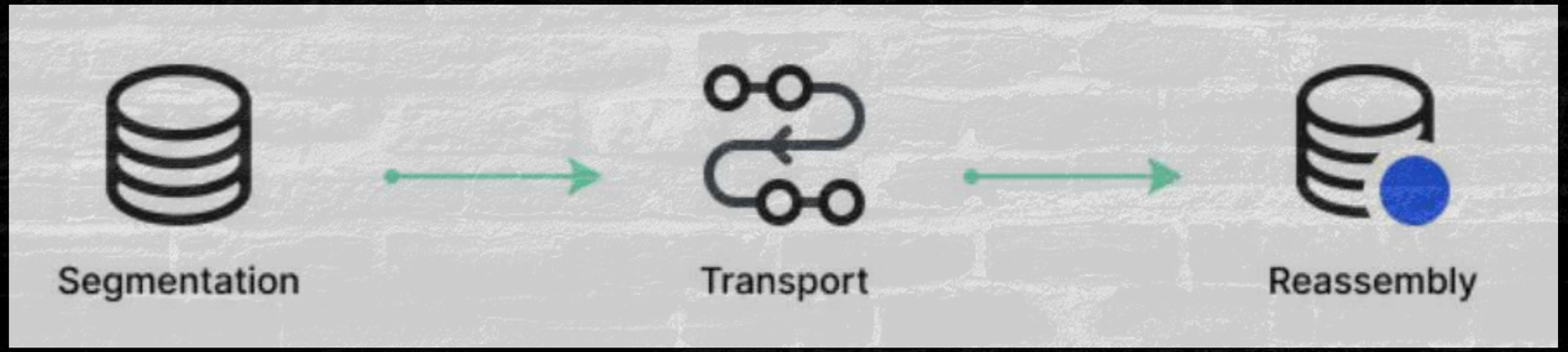
Session layer

The Session Layer manages and controls the connections between computers.



Transport layer

The Transport Layer provides end-to-end communication services for applications. It ensures complete data transfer, error recovery, and flow control between hosts.

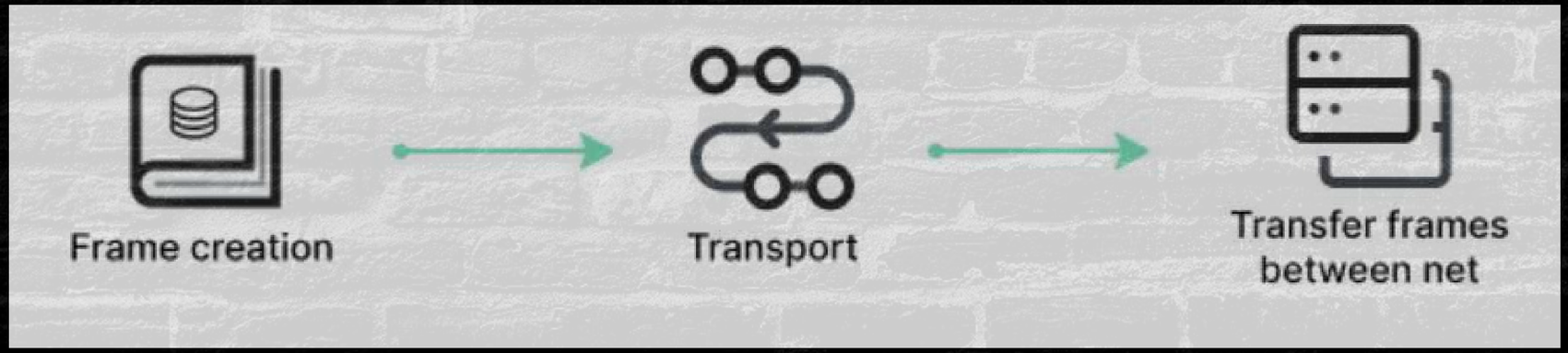


Network layer

The Network Layer is responsible for data routing, forwarding, and addressing. It determines the best physical path for data to reach its destination based on network conditions, the priority of service, and other factors.

Data link layer

The Data Link Layer is responsible for node-to-node data transfer and error detection and correction.

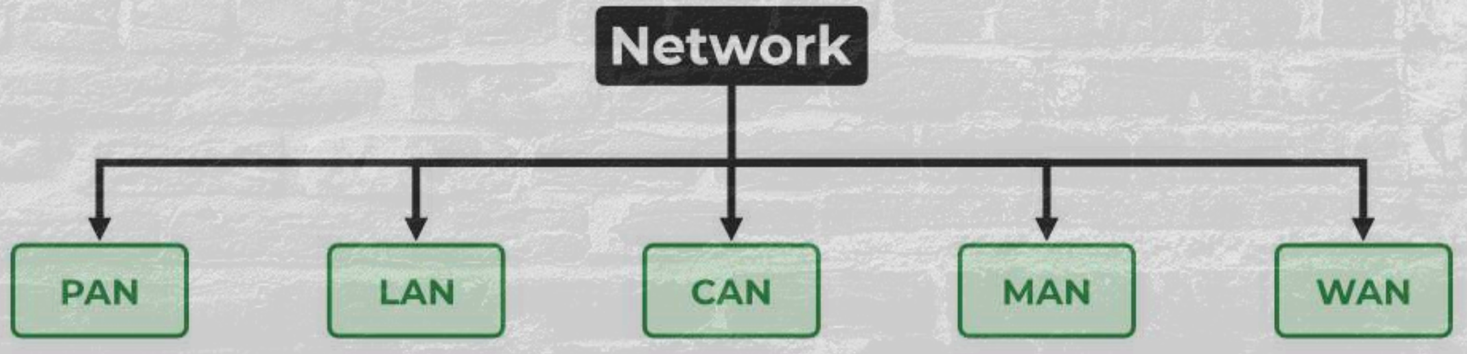


Physical layer

The Physical Layer is responsible for the physical connection between devices.

Networks & IP

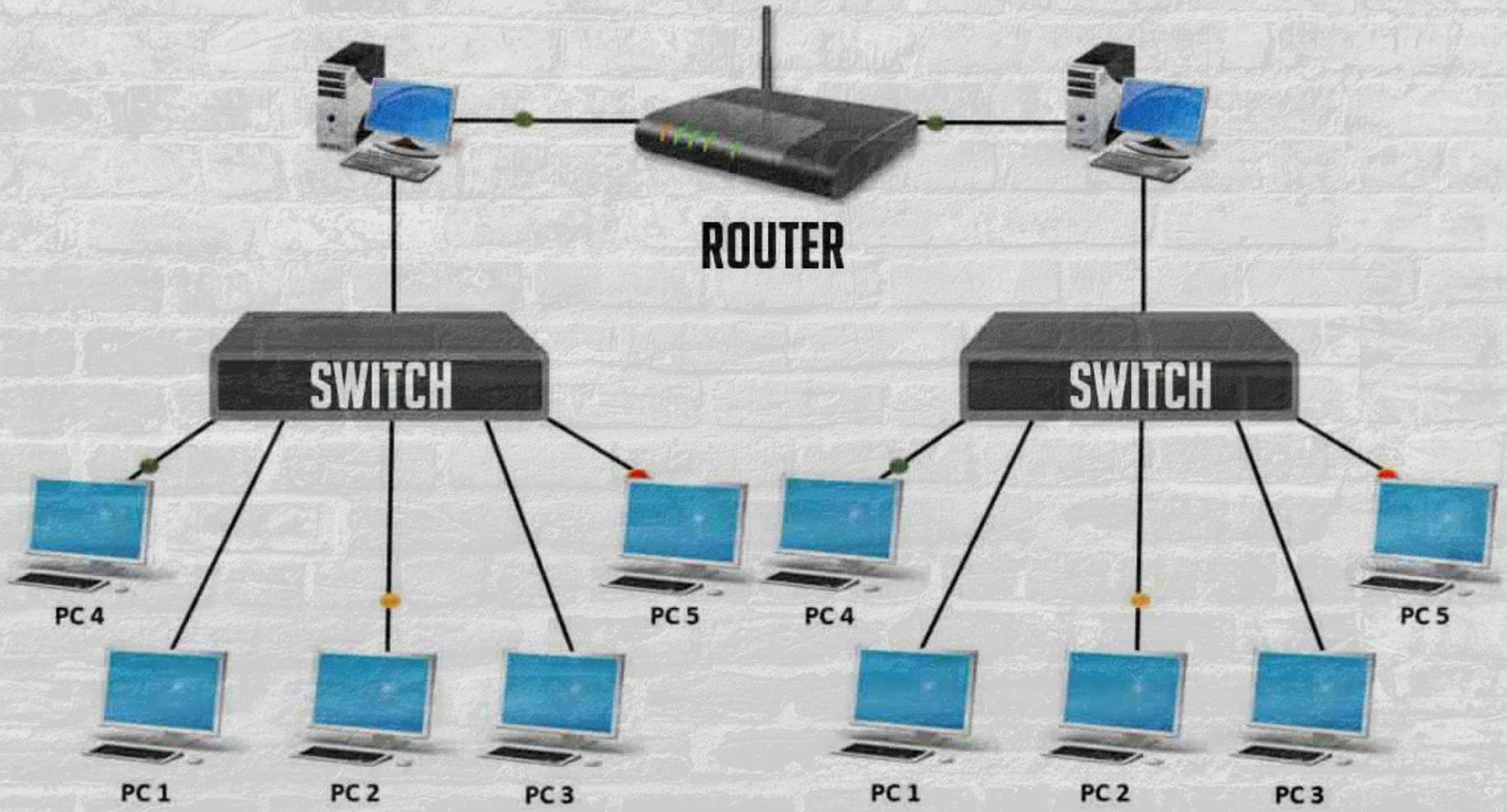
Classification of networks by Geography



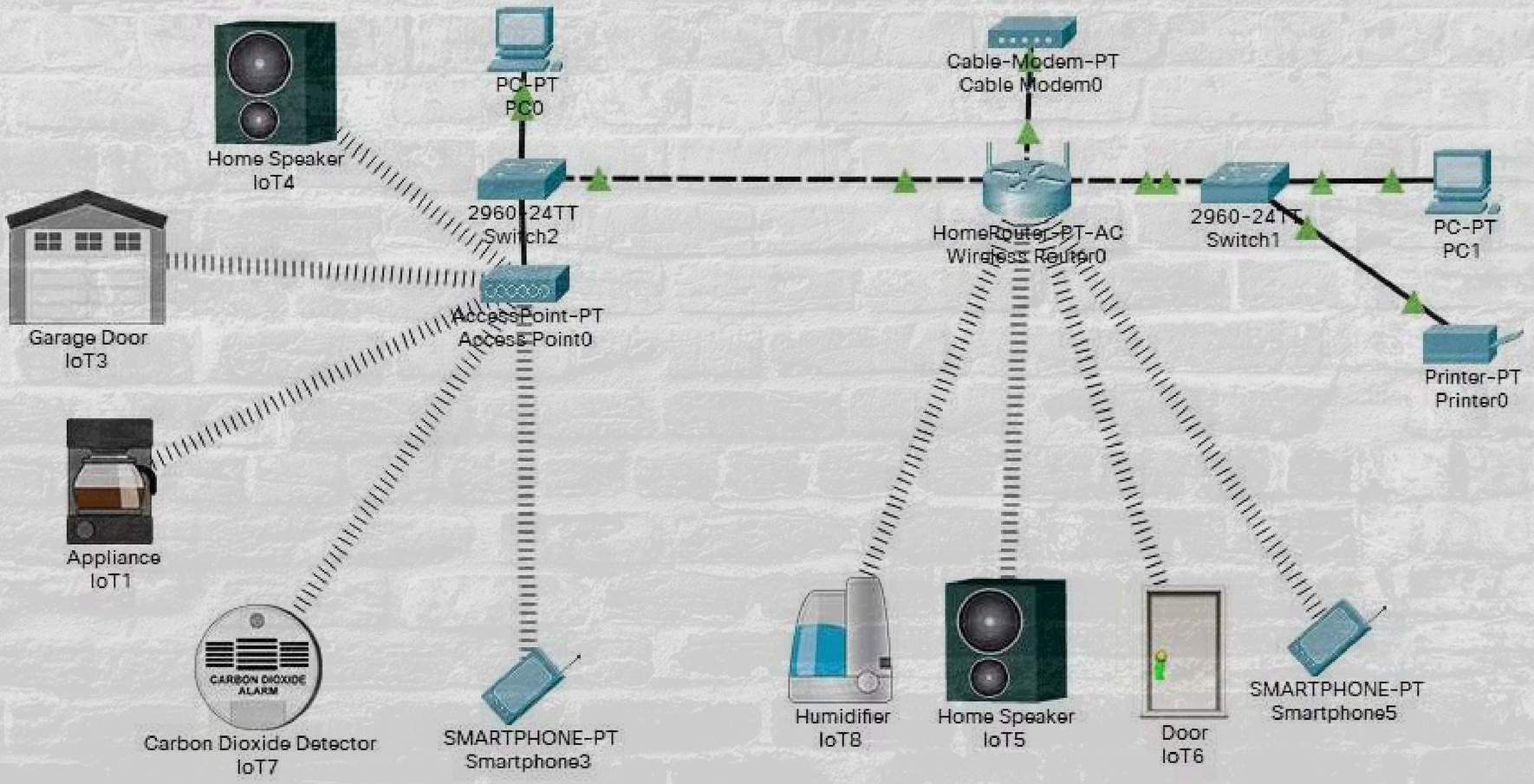
Networking devices

Switches Connect multiple devices together

Routers Connect multiple networks together

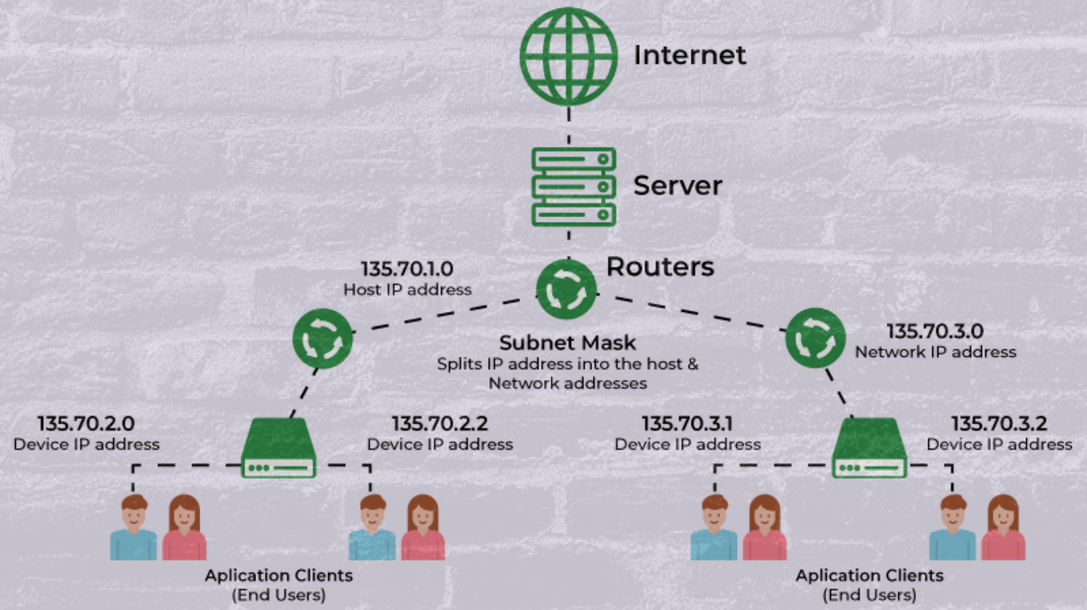

ROUTER
SWITCH
SWITCH
PC 4
PC 5
PC 4
PC 5
PC 1
PC 2
PC 3
PC 1
PC 2
PC 3

Home Network



Subnetting

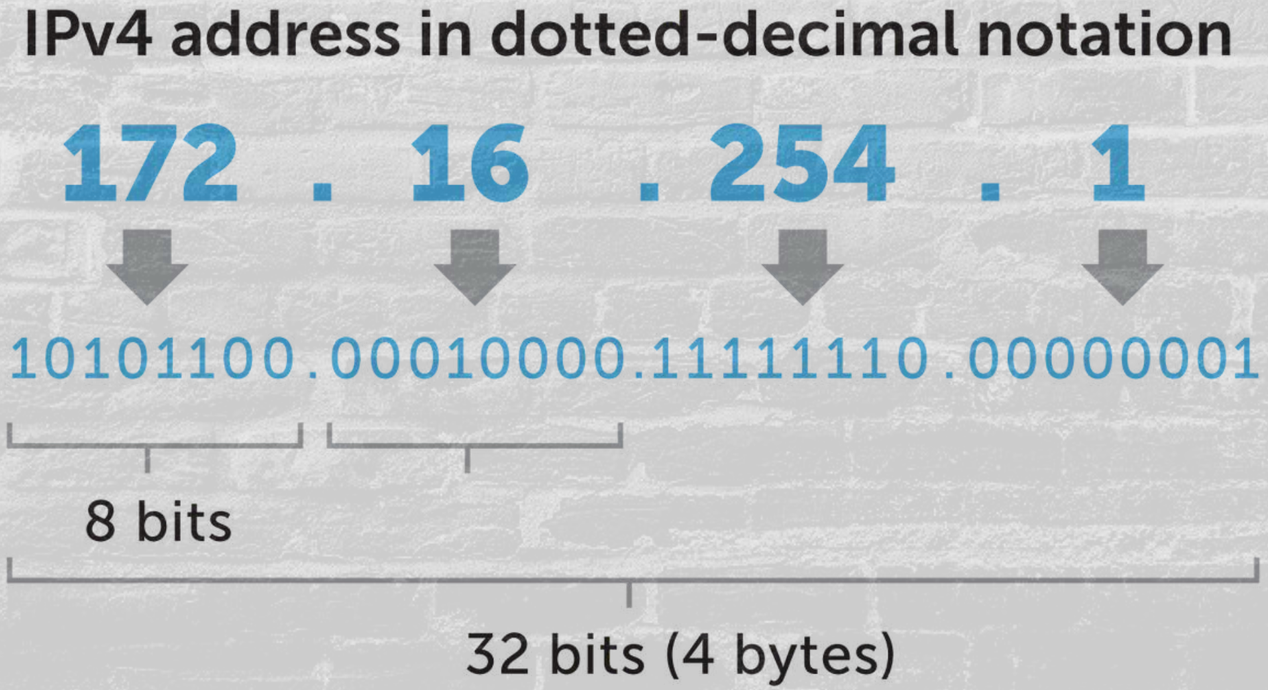
Dividing the network into two or more networks.



IP addresses

An IP address (Internet Protocol address) is a unique number assigned to every device on a network, such as a computer, smartphone, or printer. It helps devices identify and communicate with each other over the internet or a local network.

IPv4


IPv4 address in dotted-decimal notation
172 . 16 . 254 . 1
10101100.00010000.11111110.00000001
8 bits
32 bits (4 bytes)

Public Vs Private

Public IP Address	Private IP Address
❖ The Public IP address is used for Internet Communication or when we must communicate over the Internet	❖ The Private IP address is used for Intranet Communication, and we can't use these IP addresses for Internet communication
❖ These IP addresses are Paid (that's why we used them for WAN communication)	❖ These IP addresses are Free (mostly used in LAN communication)
❖ Except for all the private IP addresses, all are public IP addresses.	❖ Ranges are Class A= 10.0.0.0 to 10.255.255.255 Class B= 172.16.0.0 to 172.31.255.255 Class C= 192.168.0.0 to 192.168.255.255

IPv4 Address Classes

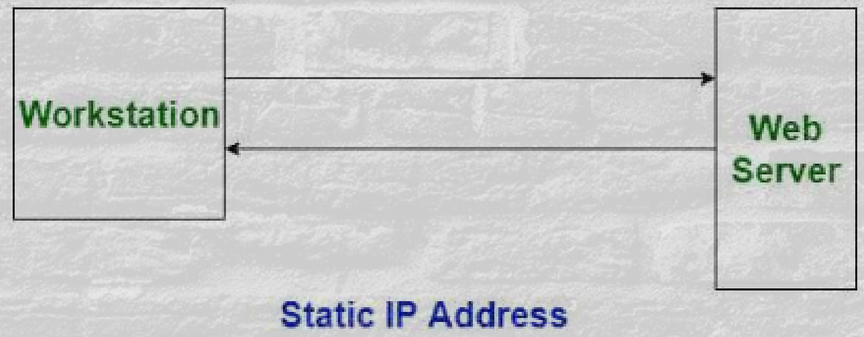
IPv4 addresses are divided into 5 classes (A, B, C, D, E).

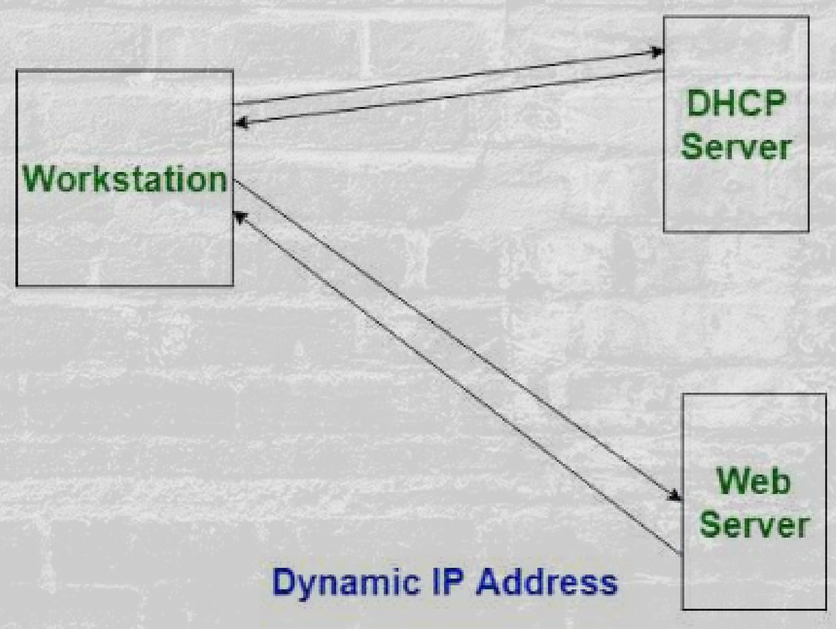
Each class is designed to address different sized networks, accommodate specific entities, and ultimately simplify the routing process through a structured address assignment and management approach.

IPv4 Address Classes (A, B & C)

From	To
10.0.0.0	10.255.255.255
172.16.0.0	172.31.255.255
192.168.0.0	192.168.255.255

Static Vs Dynamic





Protocols & Ports

What is a protocol?

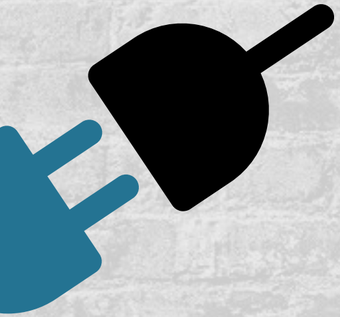
A network protocol is a set of established rules that specify how to format, send and receive data so that computer network endpoints, including computers, servers, routers and virtual machines, can communicate despite differences in their underlying infrastructures, designs or standards.

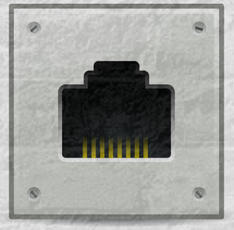
TCP

Connection-oriented protocol
The data delivery is guaranteed and hence it's reliable
Data sequencing takes place
It is comparatively slower
The header length is 20-80 bytes
Offers congestion control solution
Error checking and error recovery takes place
Heavier compared to UDP and requires three data packets before setting up a connection for data transmission

UDP

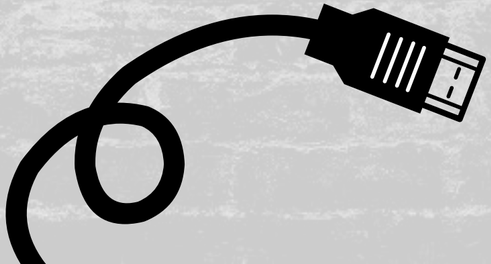
Datagram oriented protocol
The data delivery is not guaranteed and hence not completely reliable
No data sequencing
RTSP (Real-Time Streaming Protocol)
The fixed length header is of 8 Bytes
Doesn't offer congestion control solution
Basic error checking is done, but no error recovery process takes place
It is lightweight



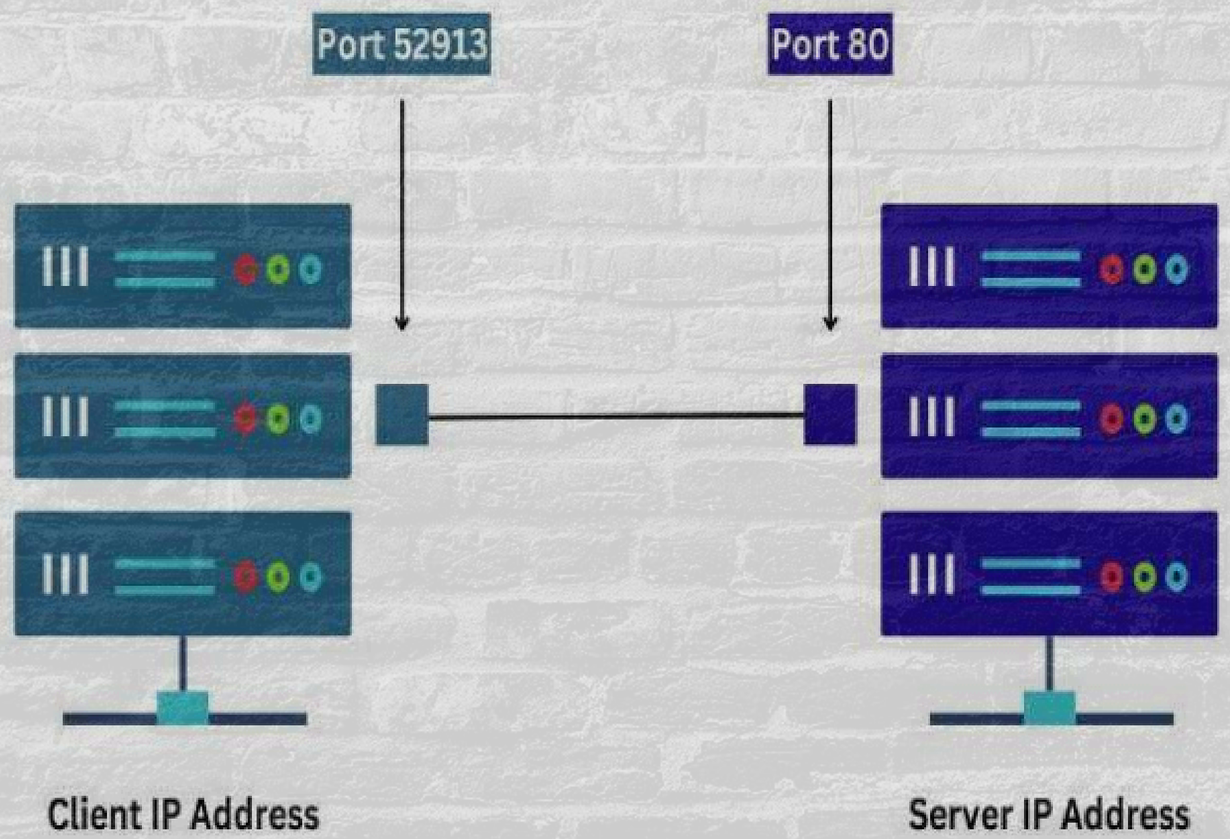


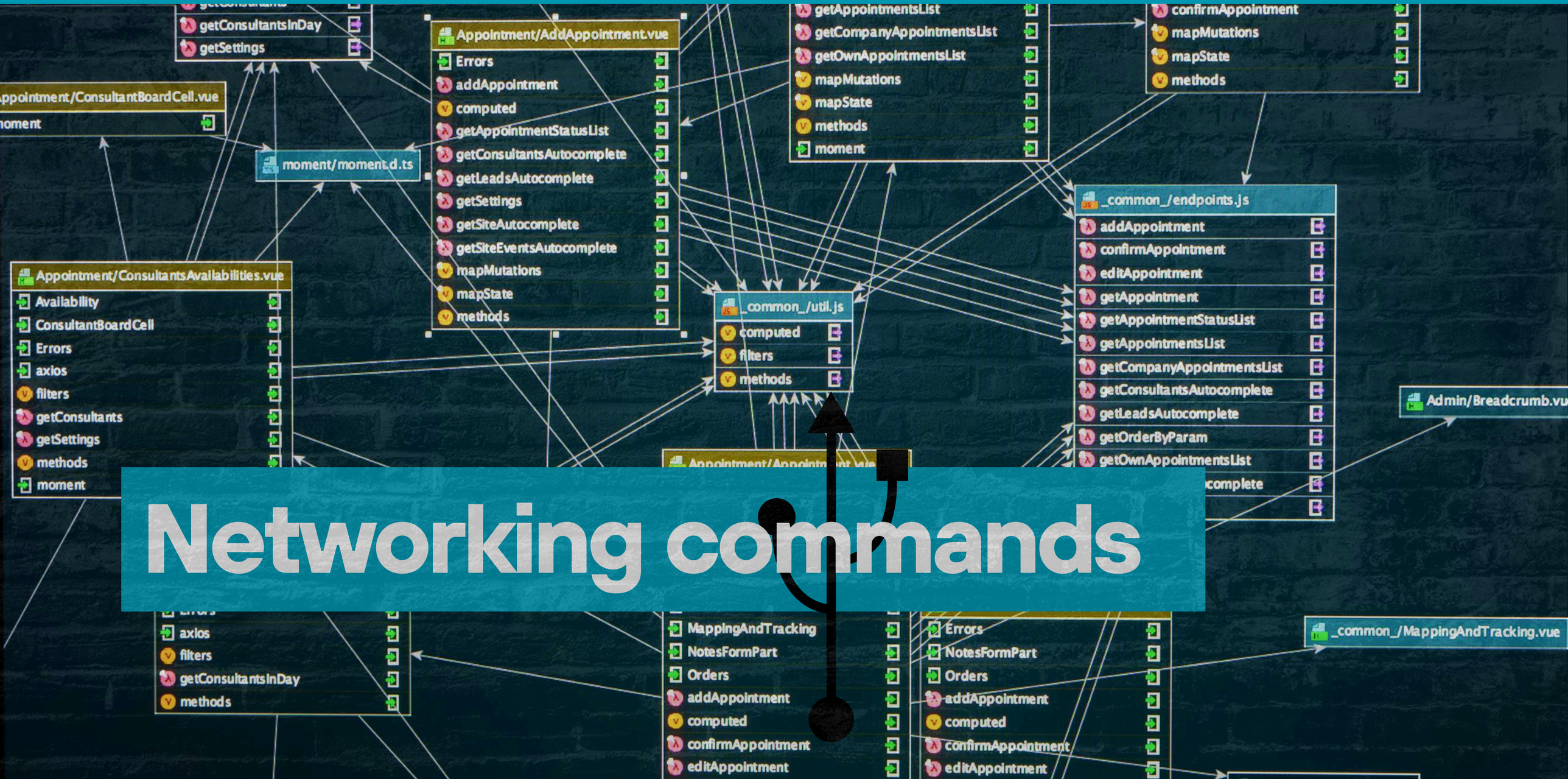
Ports

A port is a virtual point where network connections start and end. Ports are software-based and managed by a computer's operating system. Each port is associated with a specific process or service. Ports allow computers to easily differentiate between different kinds of traffic: emails go to a different port than webpages, for instance, even though both reach a computer over the same Internet connection.



Ports





Networking commands