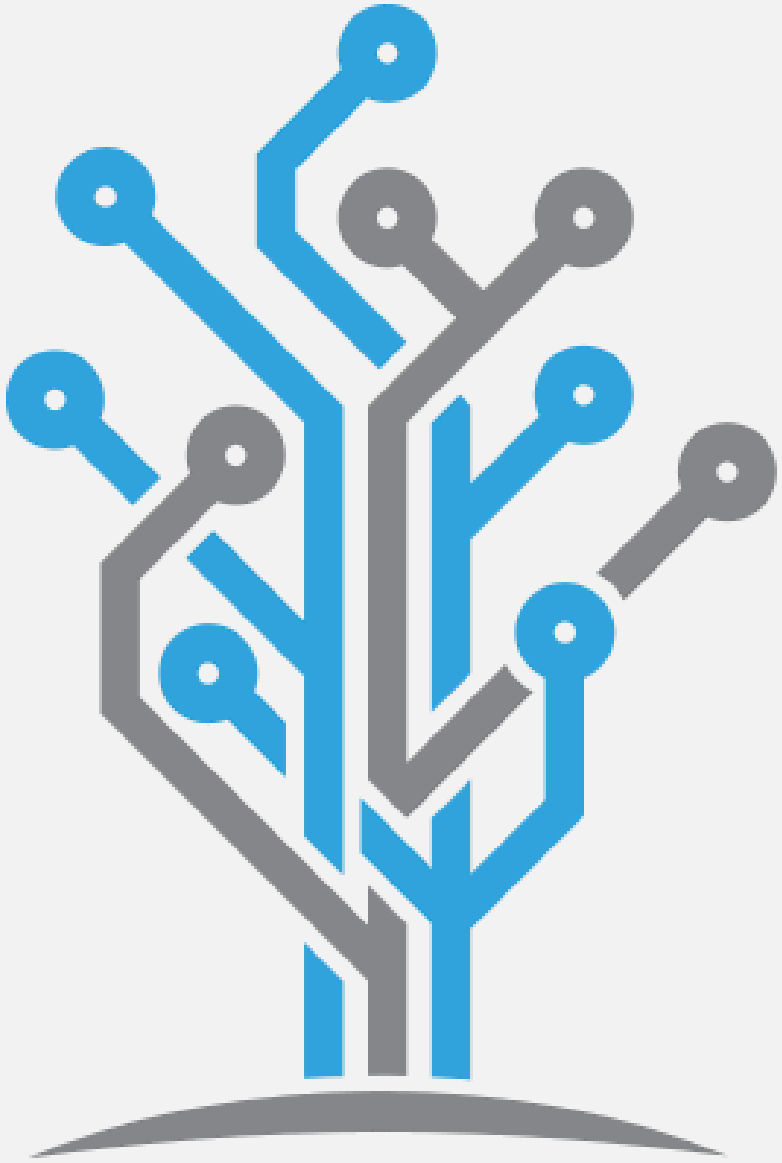
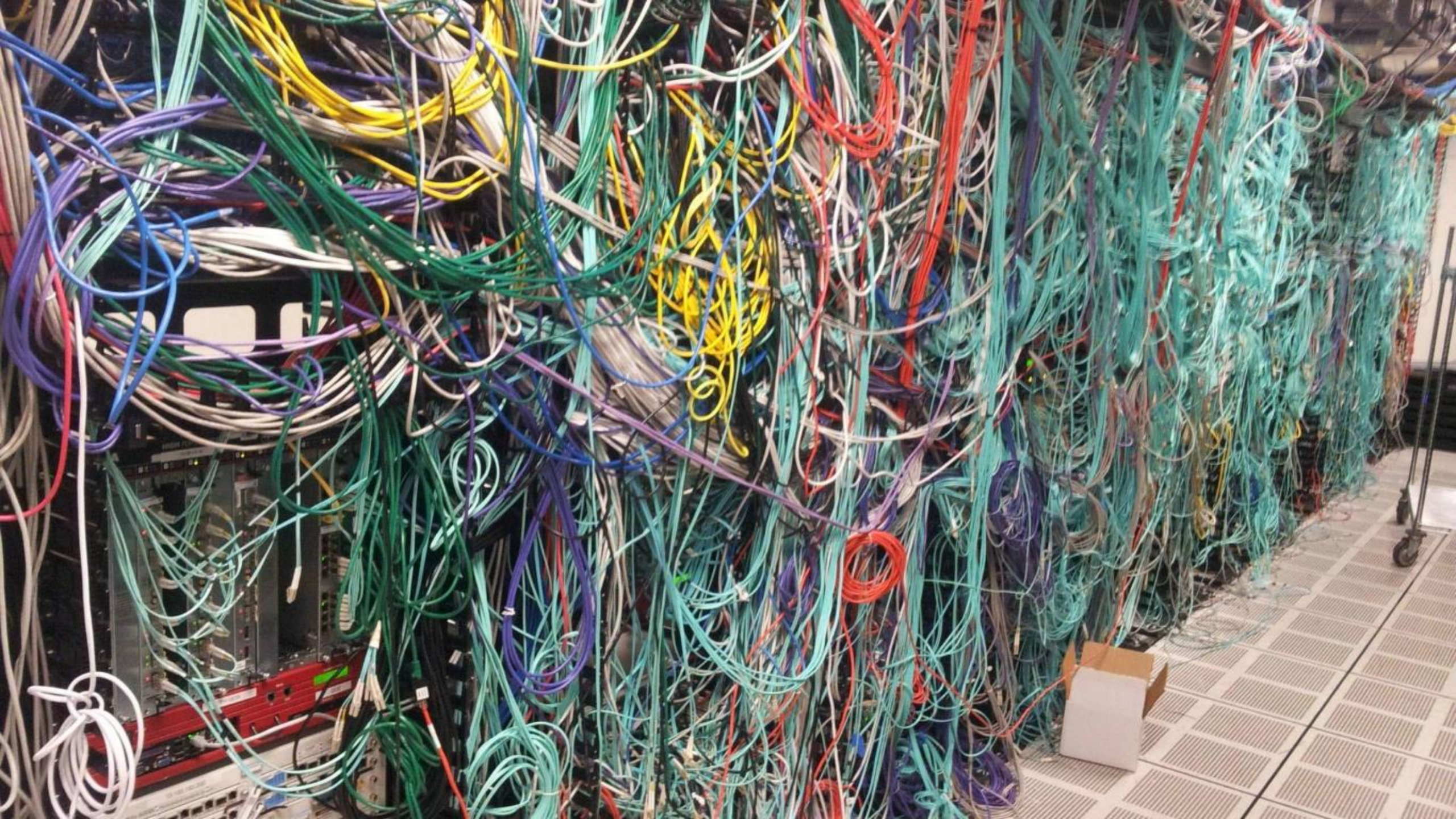
NodeJS

środowisko i technologia ServerSide

PAWEŁ ŁUKASZUK

Rok akademicki: 2021/2022, Semestr: 1, Wykład: 5





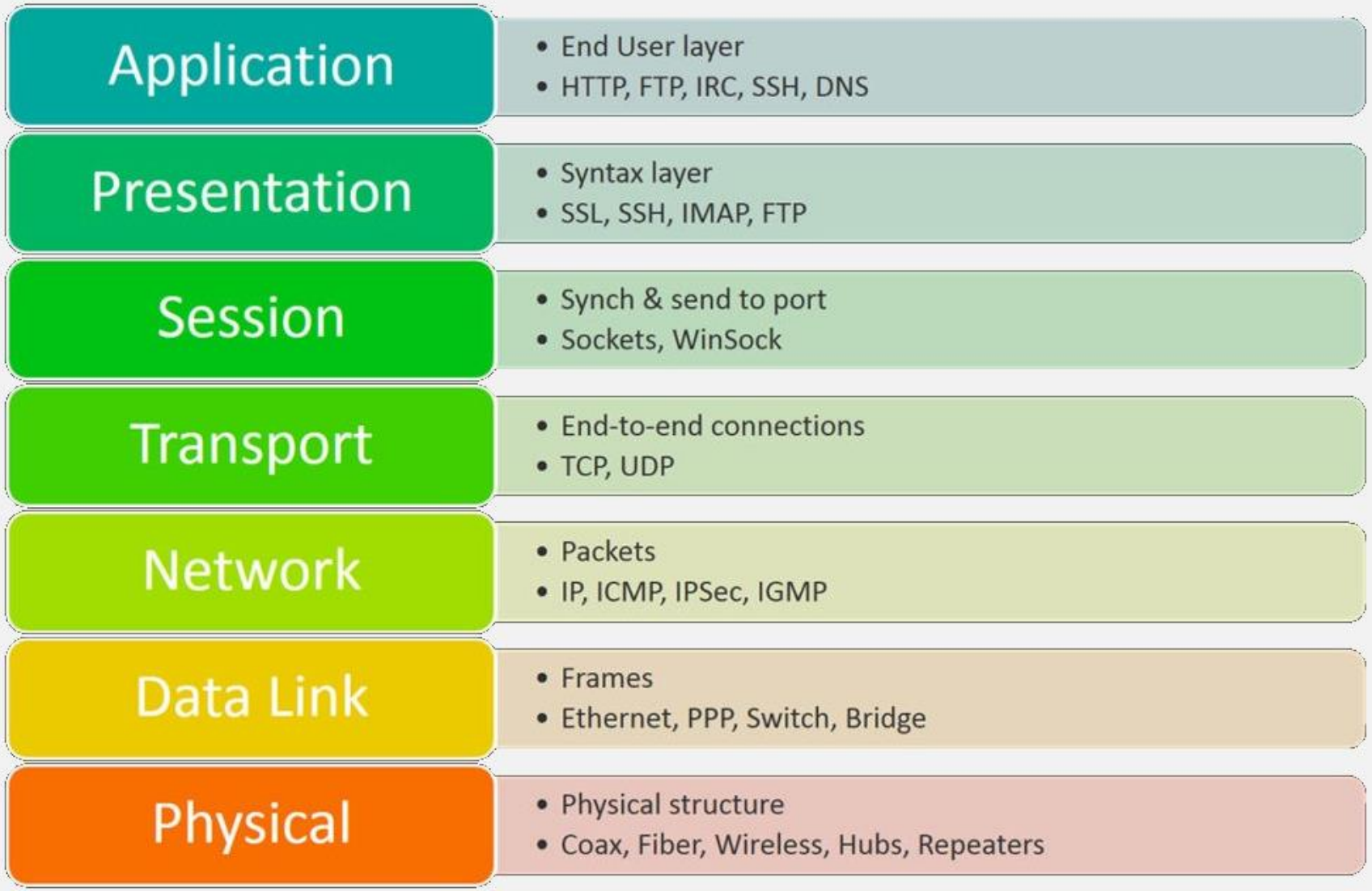
Protocol

Protocol is set of rules

A communication protocol is a group of guidelines that allows for efficient and effective data transfer…

when followed by all parties to the communication

OSI Model


Application
• End User layer
• HTTP, FTP, IRC, SSH, DNS
Presentation
• Syntax layer
• SSL, SSH, IMAP, FTP
Session
• Synch & send to port
• Sockets, WinSock
Transport
• End-to-end connections
• TCP, UDP
Network
• Packets
• IP, ICMP, IPSec, IGMP
Data Link
• Frames
• Ethernet, PPP, Switch, Bridge
Physical
• Physical structure
• Coax, Fiber, Wireless, Hubs, Repeaters

Communication protocols

Types of protocols:

By connection type:
- connection-oriented
- connectionless

By reliability:
- reliable
- unreliable

Transmission Control Protocol

TCP - Transmission Control Protocol – connection-based, reliable, communication protocol used to exchange data between processes running on different machines.

Over 85% of total Internet traffic is TCP traffic.

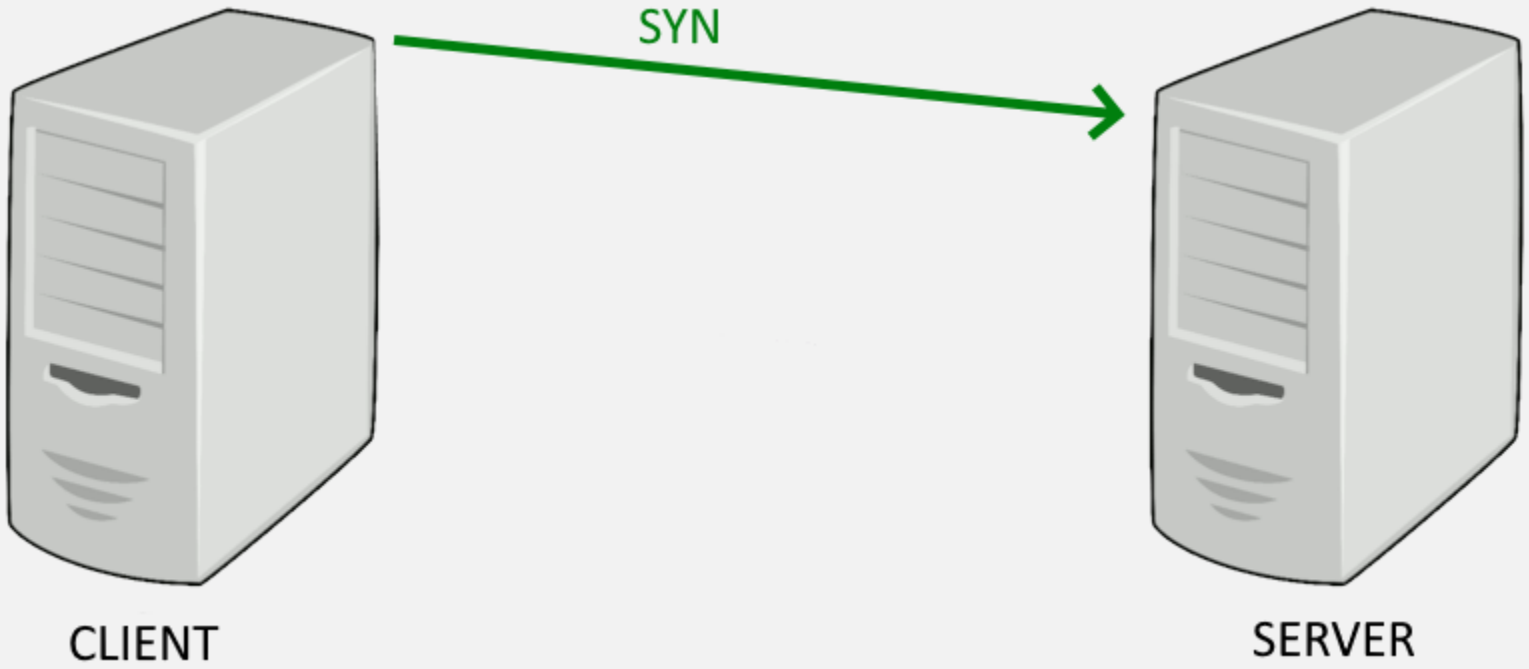
Connection establishment

CLIENT

SERVER

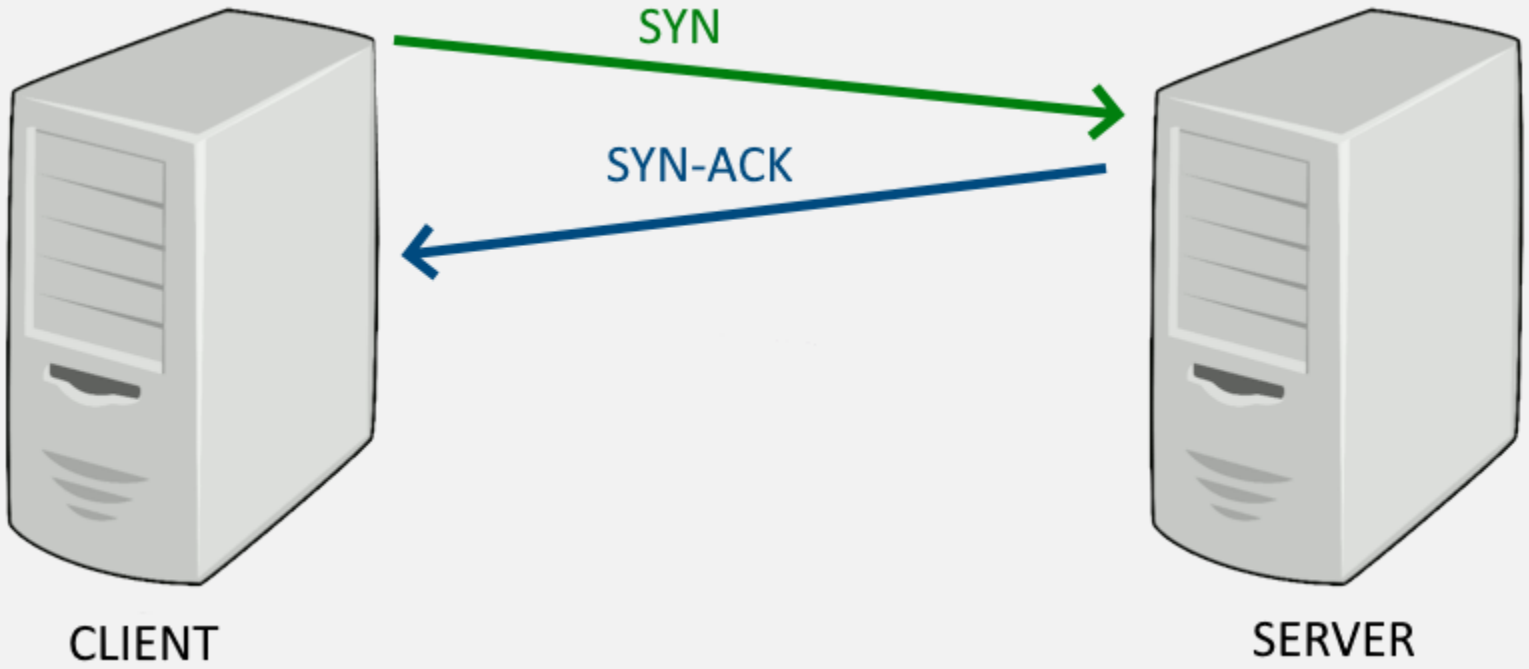
Connection establishment

Synchronize



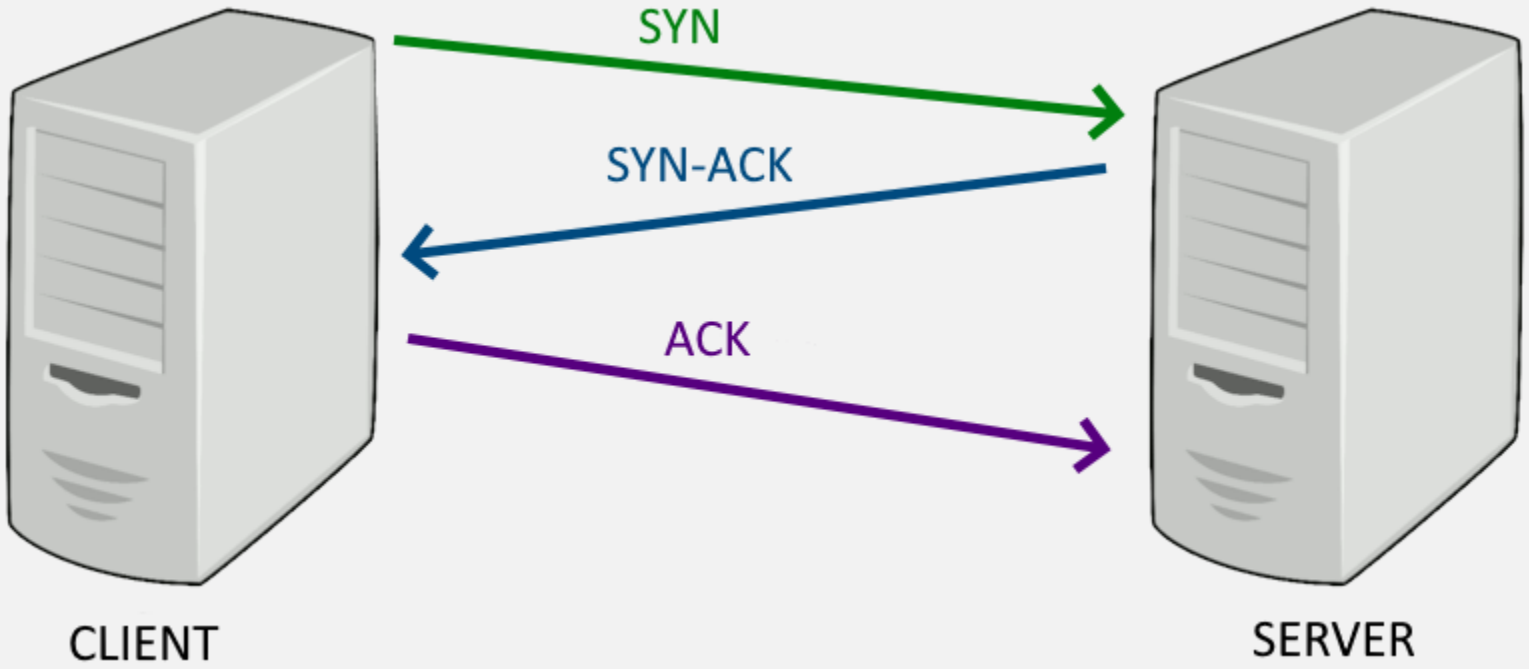
Connection establishment

Synchronize + Acknowledgement



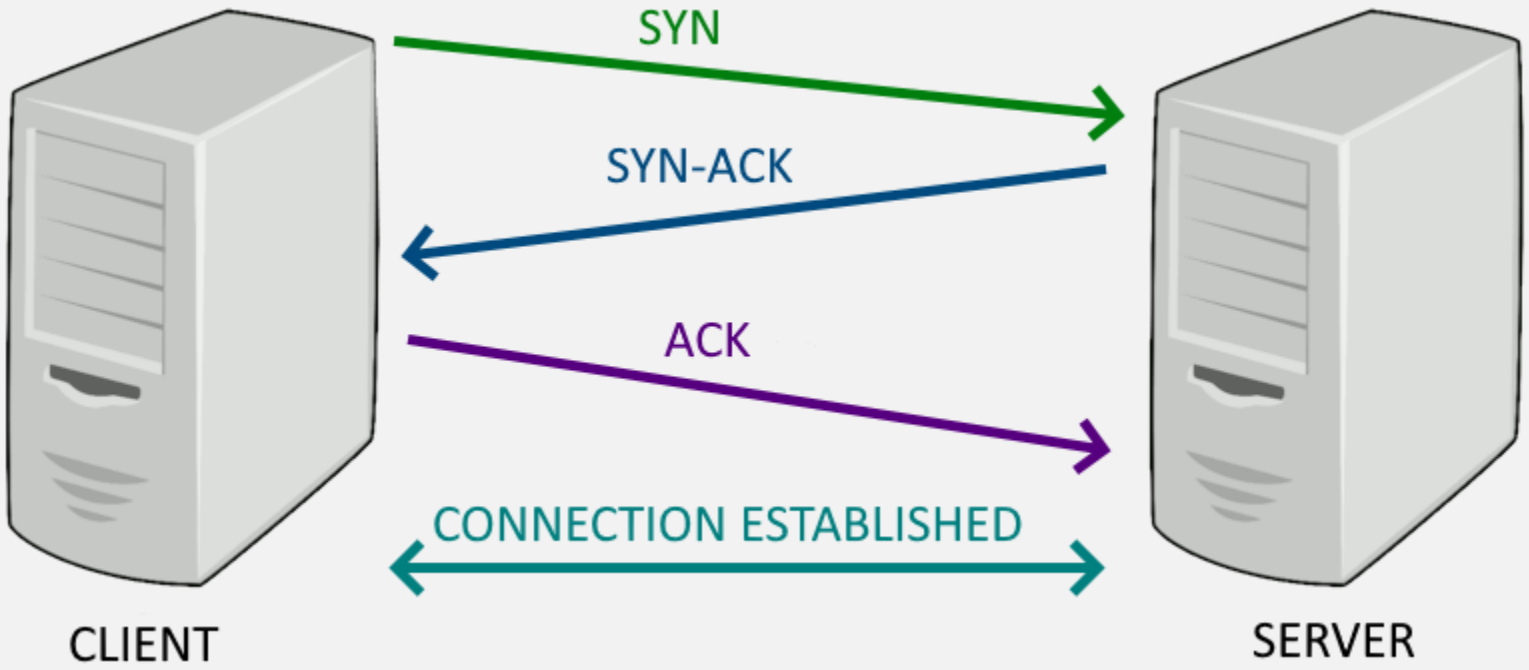
Connection establishment

Acknowledgement

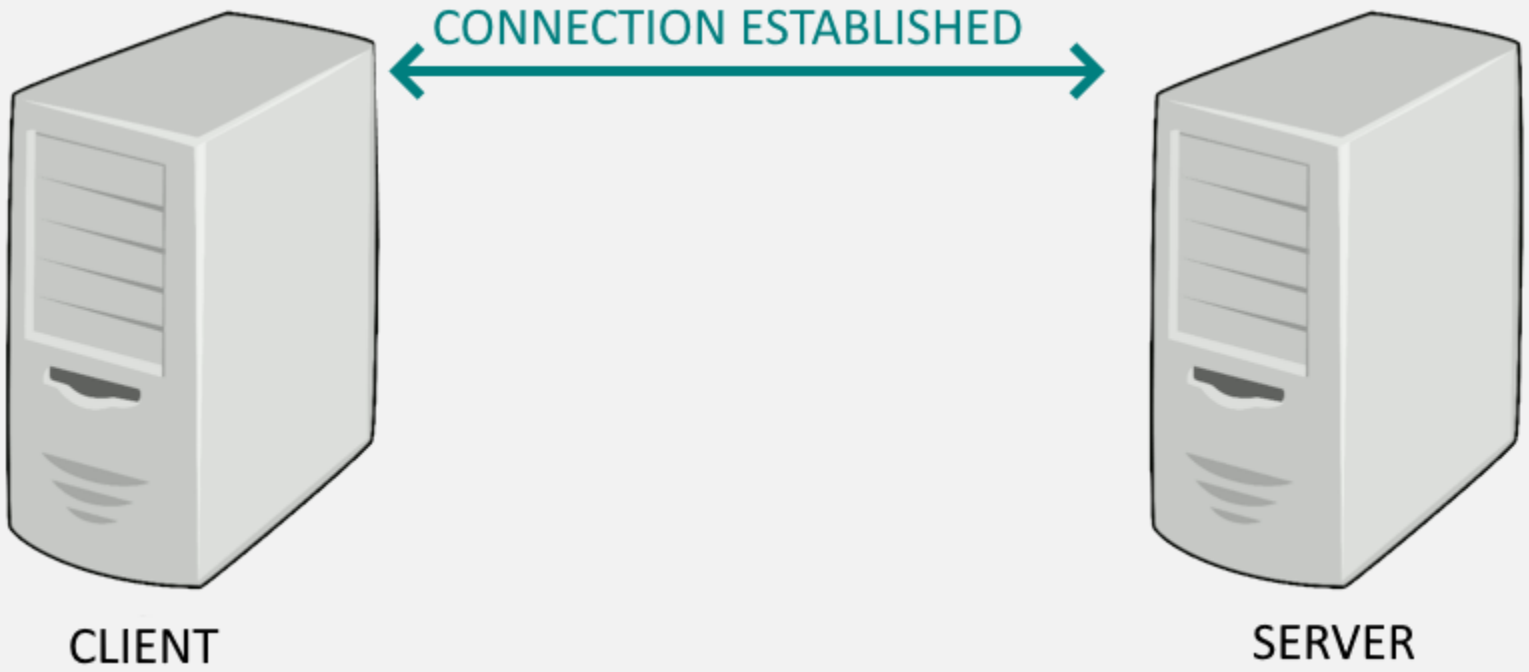


Connection establishment

Three-way handshake

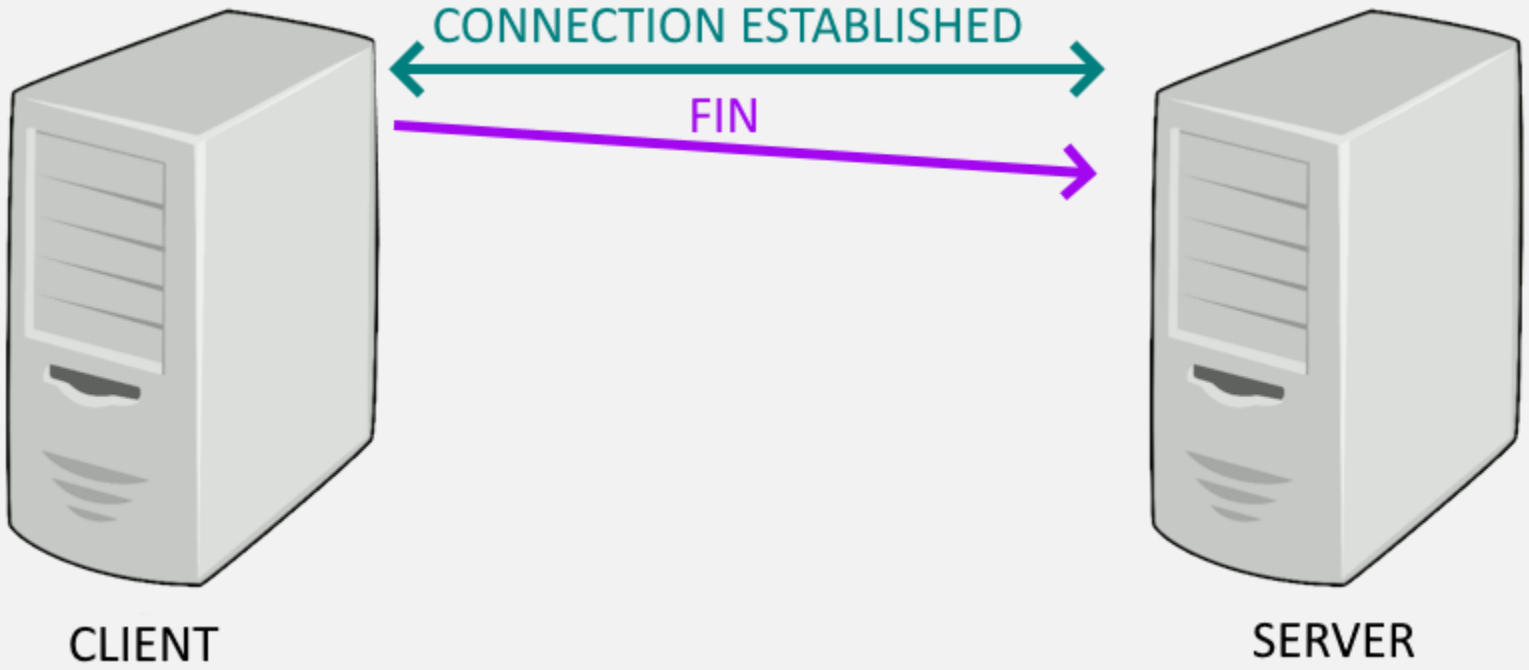


Connection termination



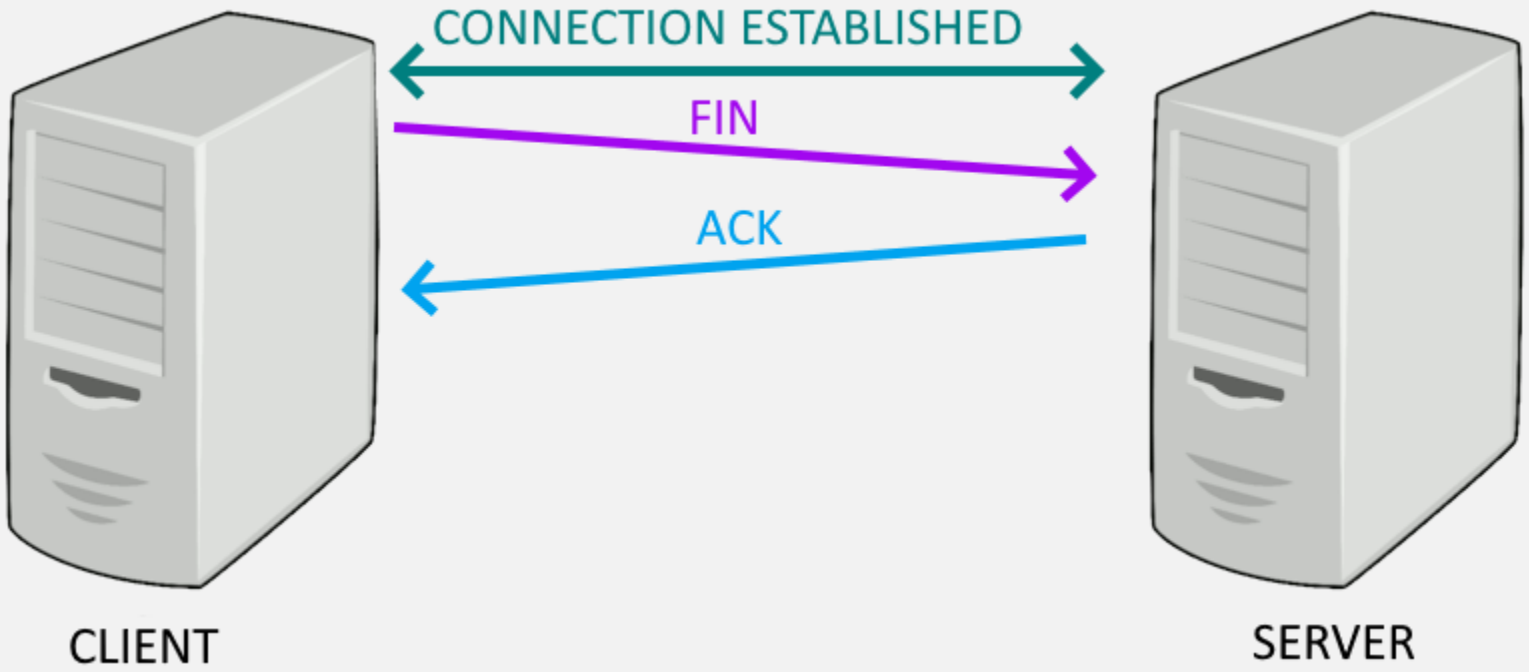
Connection termination

Finished



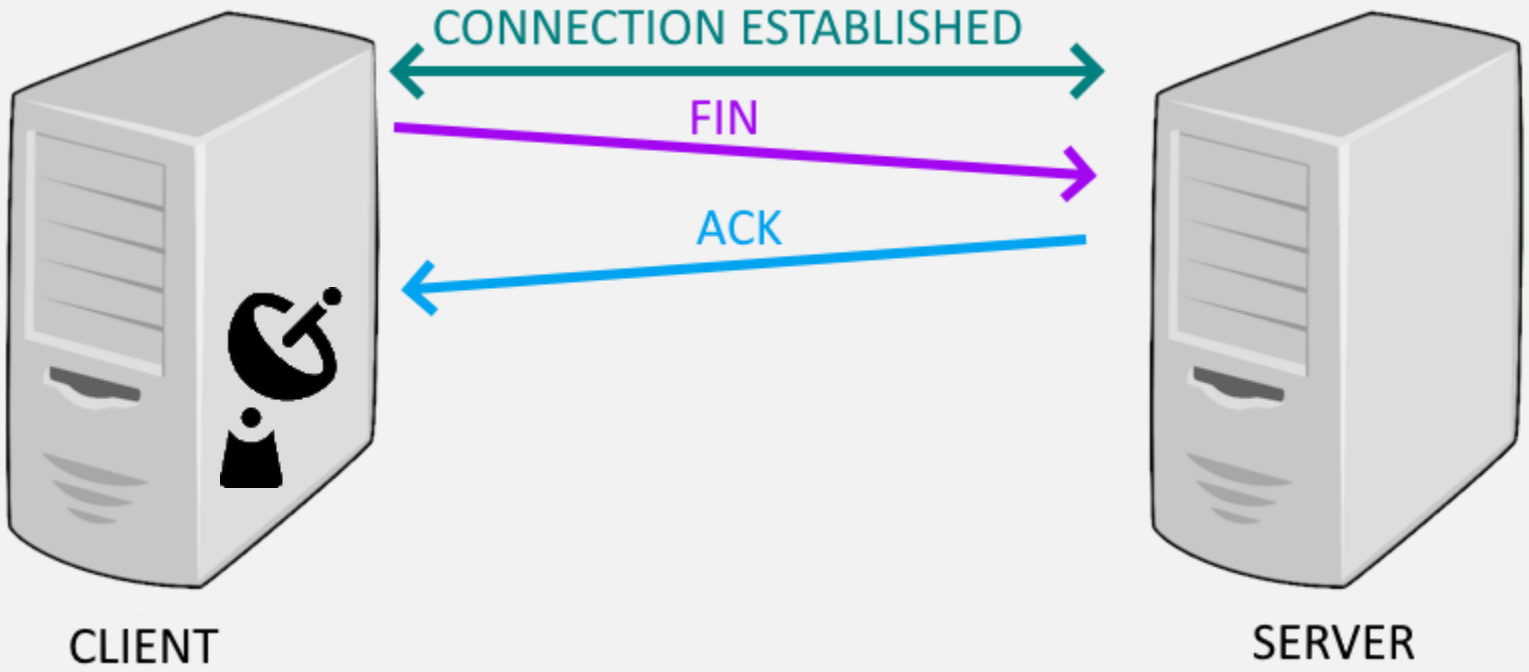
Connection termination

Acknowledgement



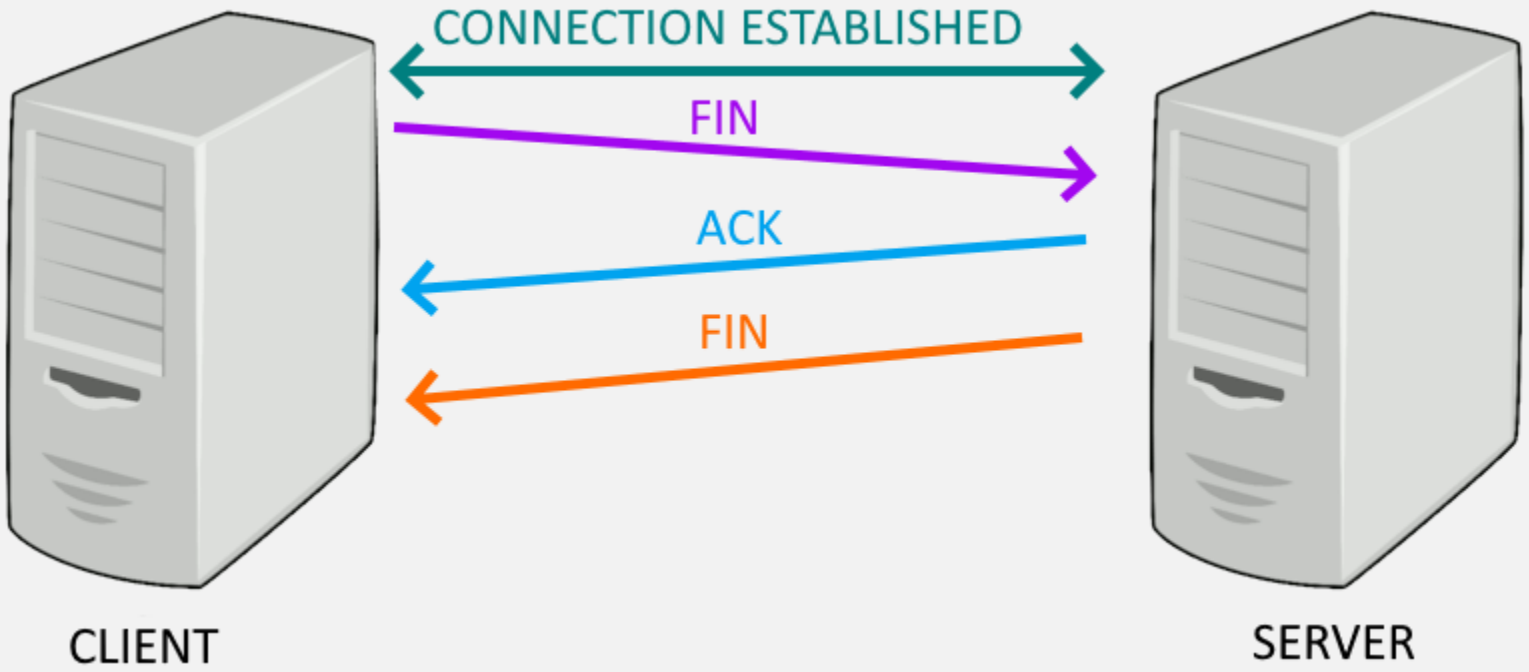
Connection termination

Acknowledgement



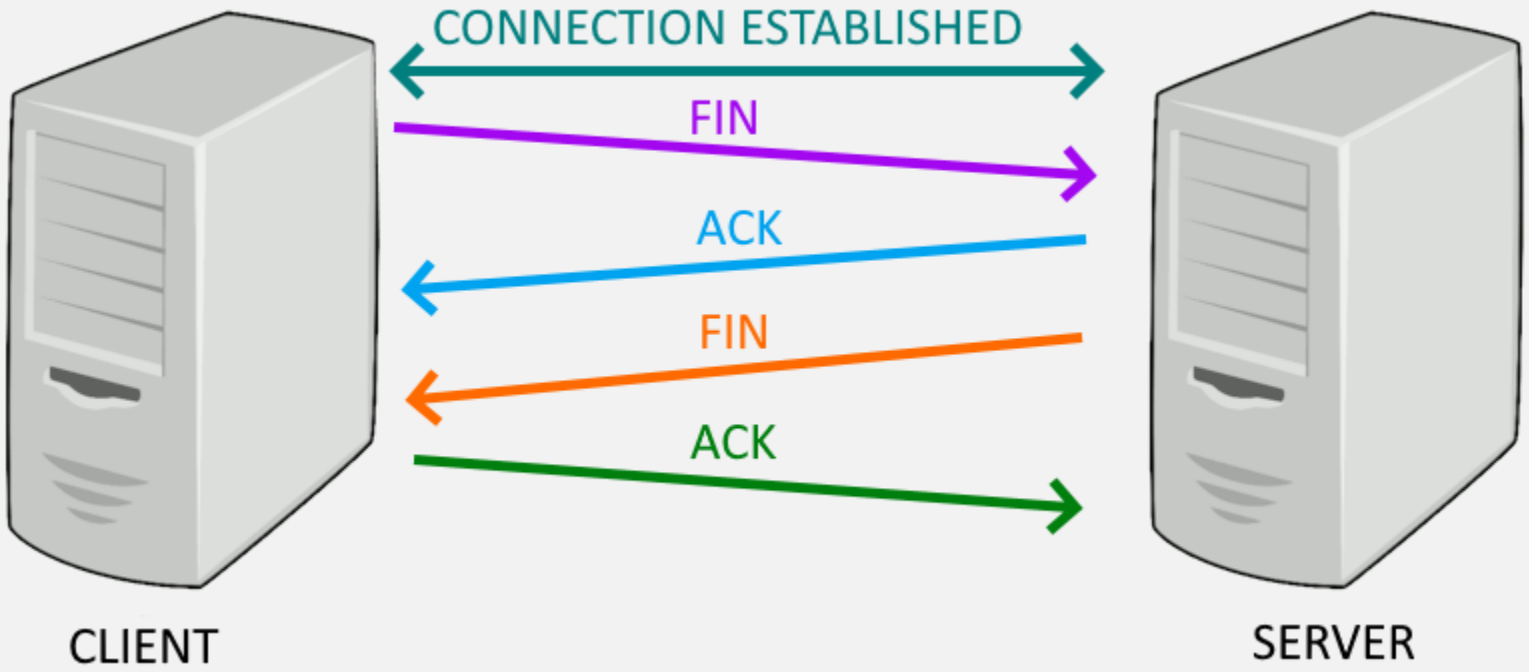
Connection termination

Finished



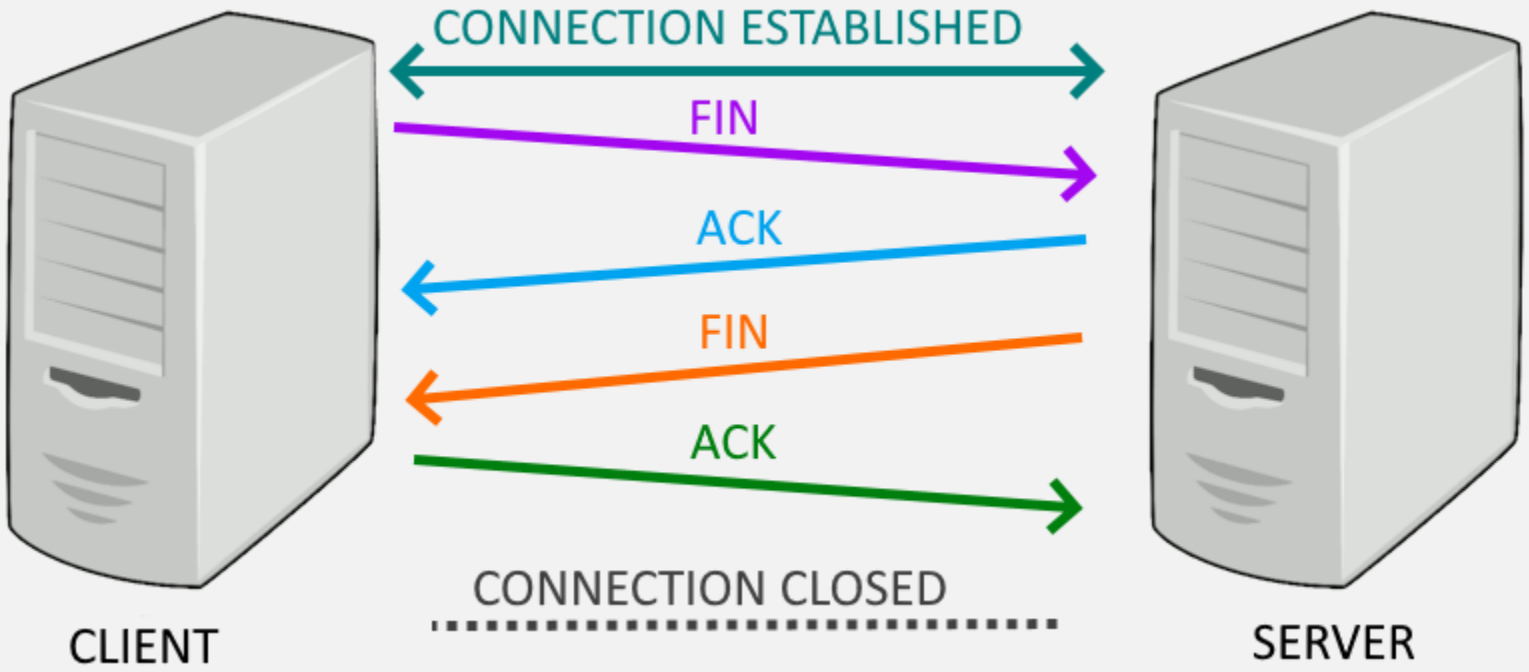
Connection termination

Acknowledgement



Connection termination

four-way handshakes or pair of two-way handshakes



TCP/IP

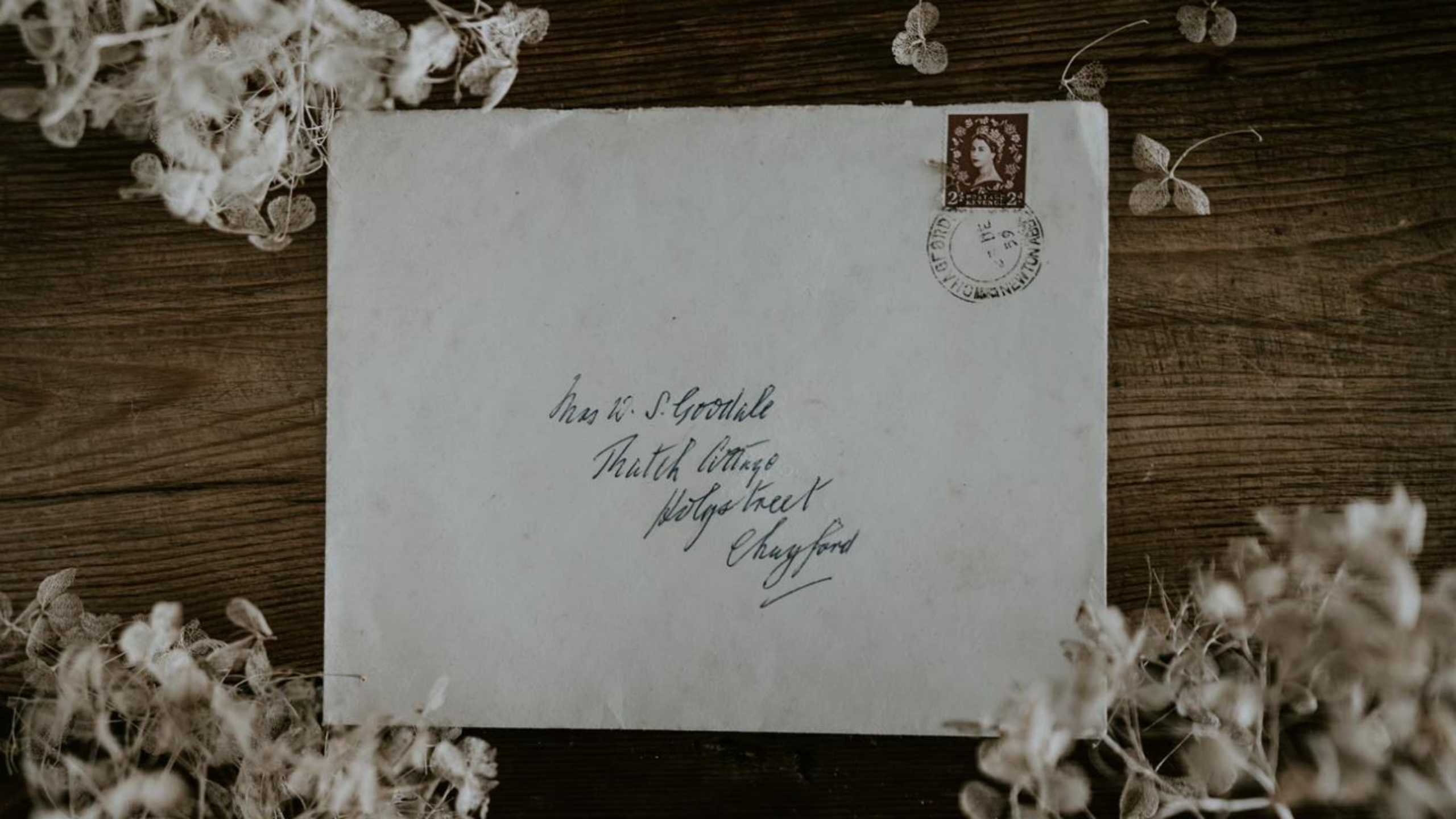
The term TCIP/IP protocol stack is commonly used to refer to the Internet protocol suite since the TCP protocol is almost always based on the Internet protocol (IP).

Internet Protocol was designed explicitly as addressing protocol. The IP addresses in packets help in routing them through different nodes in a network until it reaches the destination system.

This connection is the foundation for the majority of public and local networks and network services.

Other protocols

- User Datagram Protocol (UDP): substitute communication protocol to TCP implemented primarily for creating loss-tolerating and low-latency linking between different applications.
- Post office Protocol (POP): POP3 is designed for receiving incoming emails.
- Simple mail transport Protocol (SMTP): designed to send and distribute outgoing E-Mail.
- File Transfer Protocol (FTP): allows users to transfer files from one machine to another. Types of files may include program files, multimedia files, text files, and documents, etc.
- Hyper Text Transfer Protocol (HTTP): designed for transferring a hypertext among two or more systems.
- Hyper Text Transfer Protocol Secure (HTTPS): standard protocol to secure the communication among two computers one using the browser and other fetching data from web server.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URI, URL, URN

Uniform Resource Identifier - an Internet standard for identifying resources on the Web.

Uniform Resource Locator - an Internet standard for addressing resources on the Web.

Uniform Resource Name - globally unique persistent identifiers assigned within defined namespaces so they will be available for a long period of time, even after the resource which they identify ceases to exist or becomes unavailable

URI, URL, URN

URI – a resource identifier is specified but there is no information how to access it

anotherexample.org/absolute/URI/with/absolute/path/to/resource.txt

URL – defines the identifier of the resource and where and how to retrieve it (http server, HTTP protocol)

https://example.org/absolute/URI/with/absolute/path/to/resource.txt

URN – namespace identifier and resource identifier

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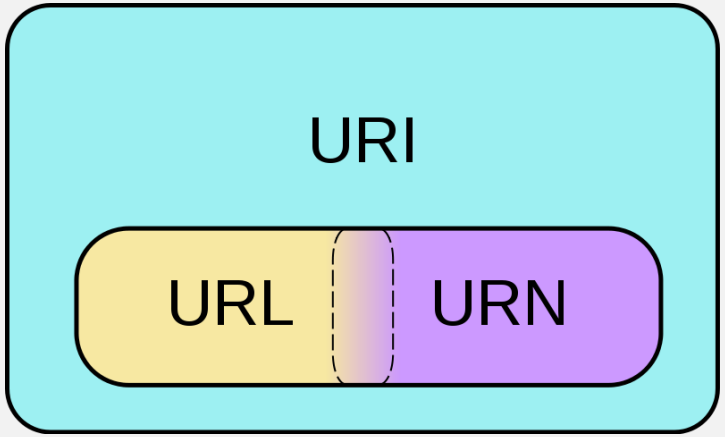


URL

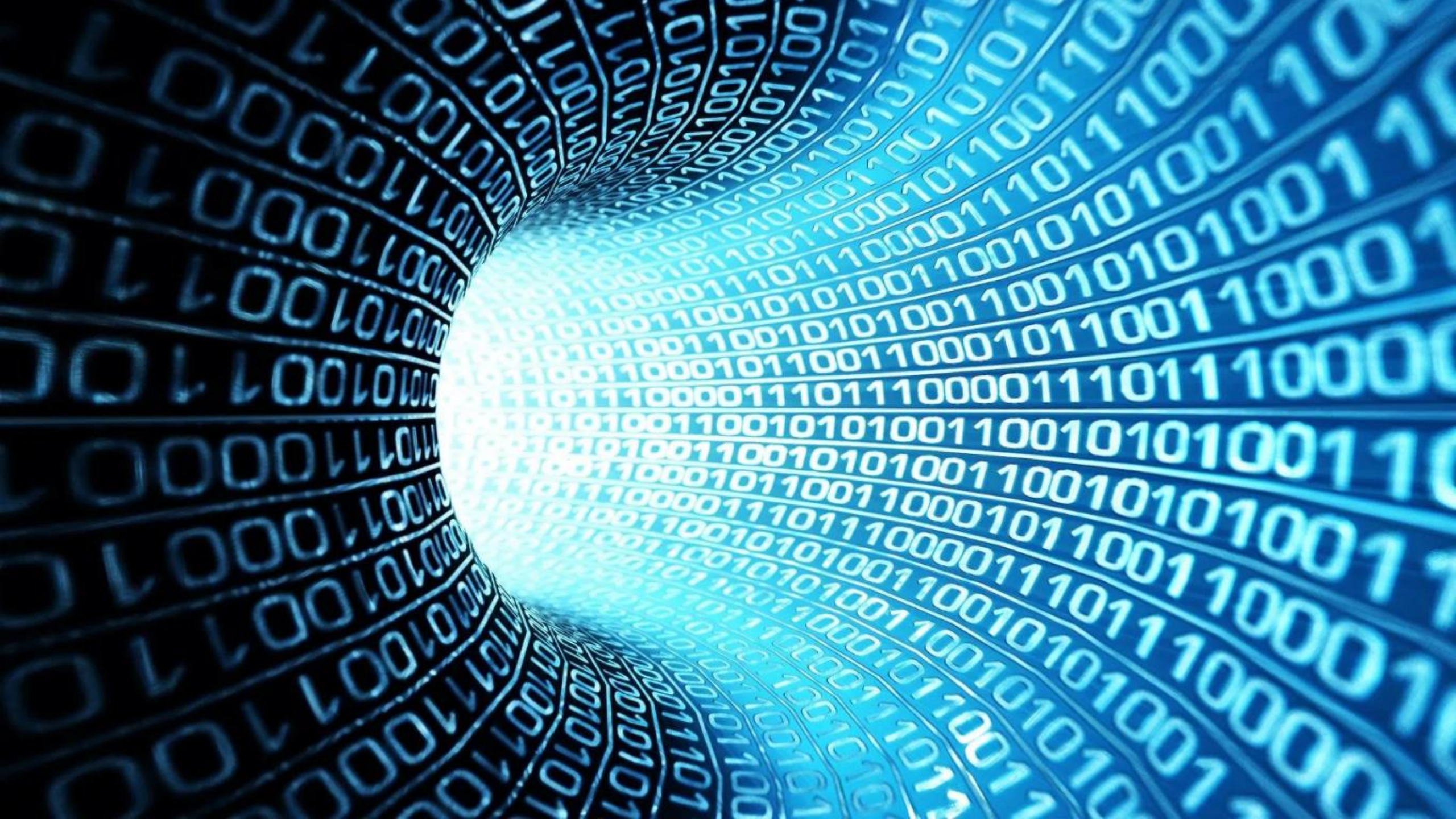
http://john:pswd@www.example.org:8080/dir1/dir2/file.html?parametr1=value1&parametr2=value2#document_part

- http – protocol
- john – login
- pswd - password
- www.example.org – host (server address)
- 8080 – port (for HTTP default is 80, for HTTPS: 443)
- dir1/dir2/file.html – resource
- parametr1=value1&parametr2=value2 – query parameters / query string
- #document_part – document part

URL – more common example

http://www.example.org/dir1/dir2/file.html?parametr1=value1&parametr2=value2#document_part

- http – protocol
- www.example.org – host (server address)
- dir1/dir2/file.html – resource
- parametr1=value1&parametr2=value2 – query parameters / query string
- #document_part – document part

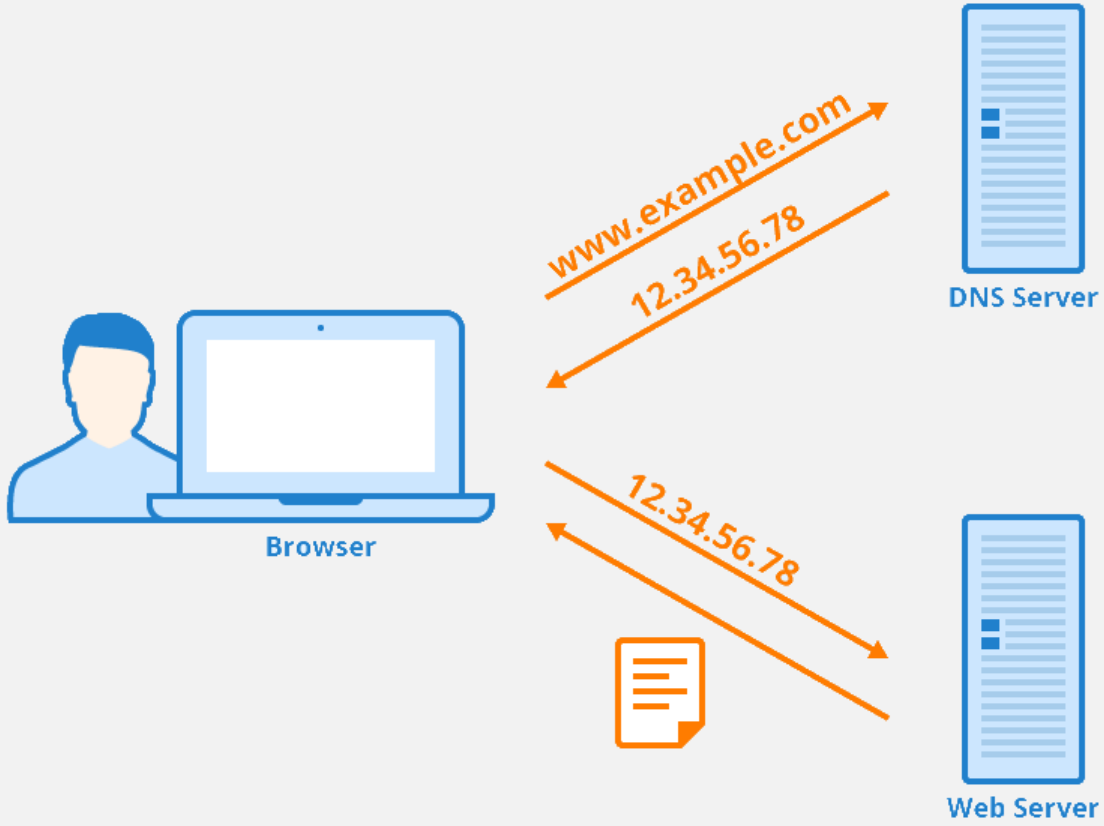


Domain Name System

DNS is the phonebook of the Internet.

The process of DNS resolution involves converting a hostname (such as www.example.com) into a computer-friendly IP address (such as 192.168.1.1).

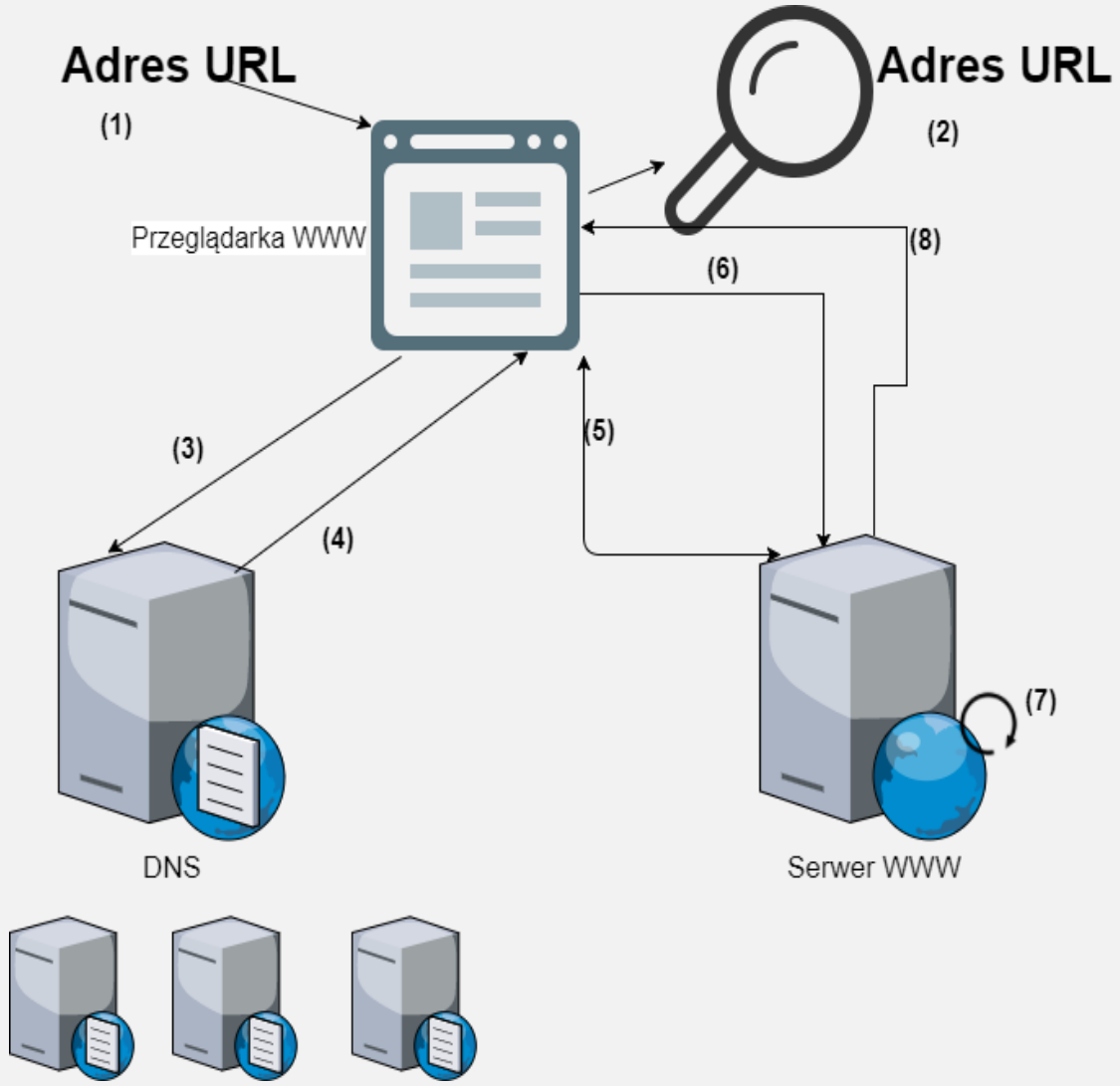
An IP address is given to each device on the Internet, and that address is necessary to find the appropriate Internet device - like a street address is used to find a particular home. When a user wants to load a webpage, a translation must occur between what a user types into their web browser (example.com) and the machine-friendly address necessary to locate the example.com webpage.



How web works

Steps to display a webpage:

1. user types URL in the browser
2. browser processes it
3. queries the IP address
4. the DNS server returns the IP
5. browser establishes a TCP connection with the web server
6. **browser sends a request**
7. **web server processes the request**
8. **web server sends response**
9. **browser displays response**



Important names and tools

- localhost - hostname that refers to the current device
- 127.0.0.1 - IP address of localhost
- > ping – command tool to check connection
  - ping google.com
  - ping 91.198.174.192
- > tracert – traceroute, command tool to trace TCP connection
  - tracert google.com
  - tracert 91.198.174.192
- > ipconfig – command tool in Windows to display network interface configuration
  - ipconfig /displaydns
  - ipconfig /flushdns
- C:\Windows\System32\drivers\etc\hosts
  – file used to override hostnames to IP mapping (hidden file!)