Computer Fundamentals

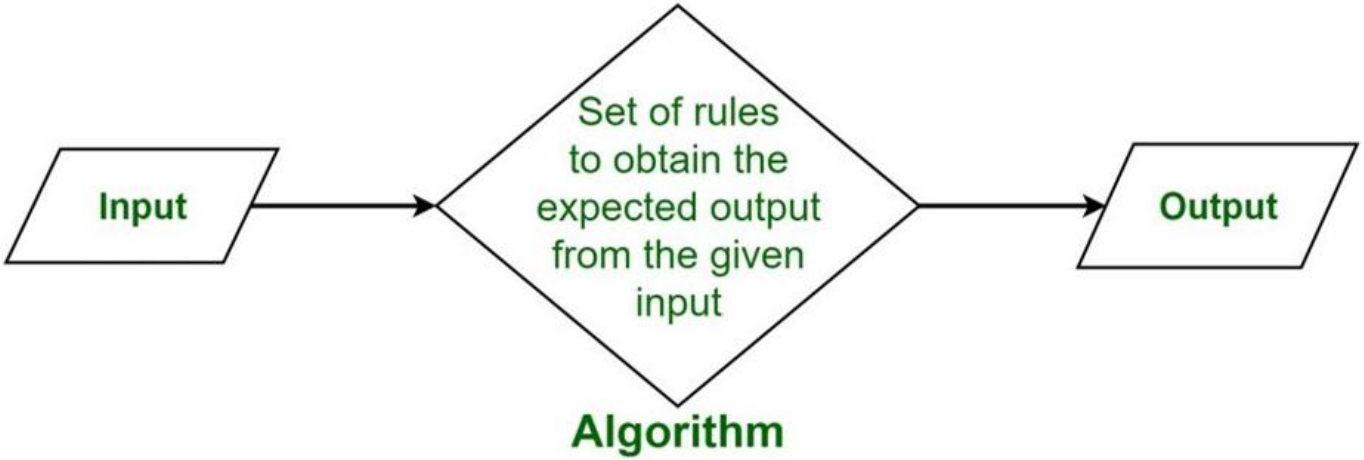
“Software”

Agenda

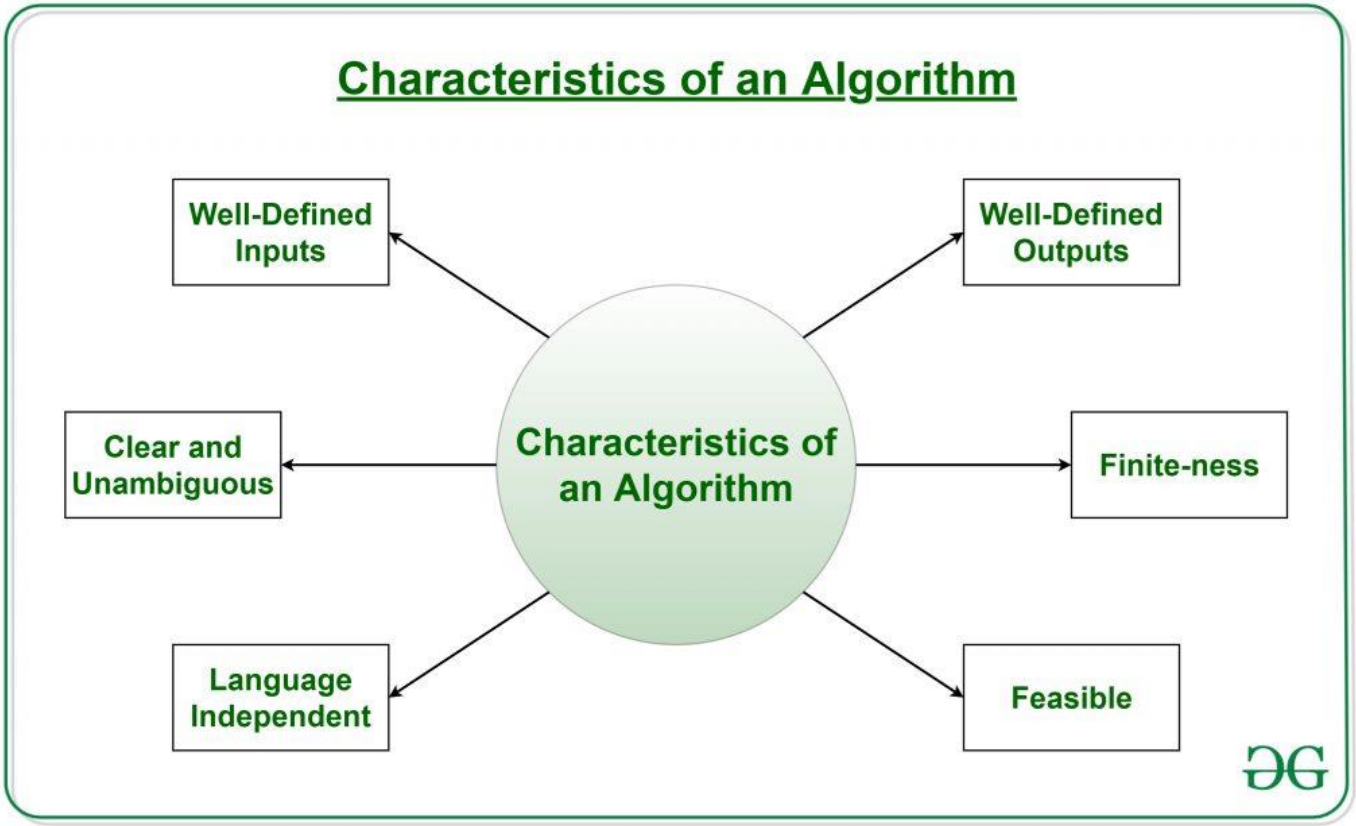
- What is Algorithm
- Software
- Machine Language
- Assembly Language
- High Level Languages
- Libraries/Packages/Frameworks
- Backend/Frontend


Kahoot!

What is Algorithm



What is Algorithm

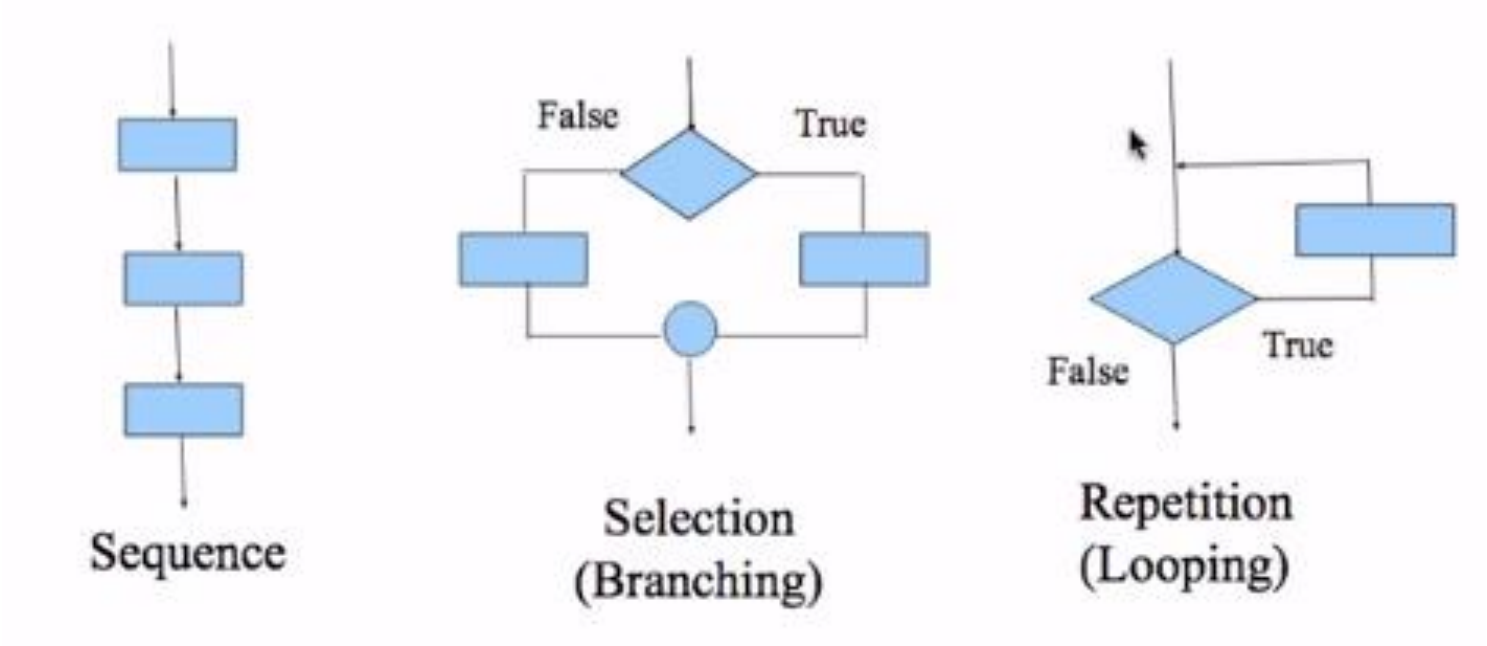


What is Algorithm

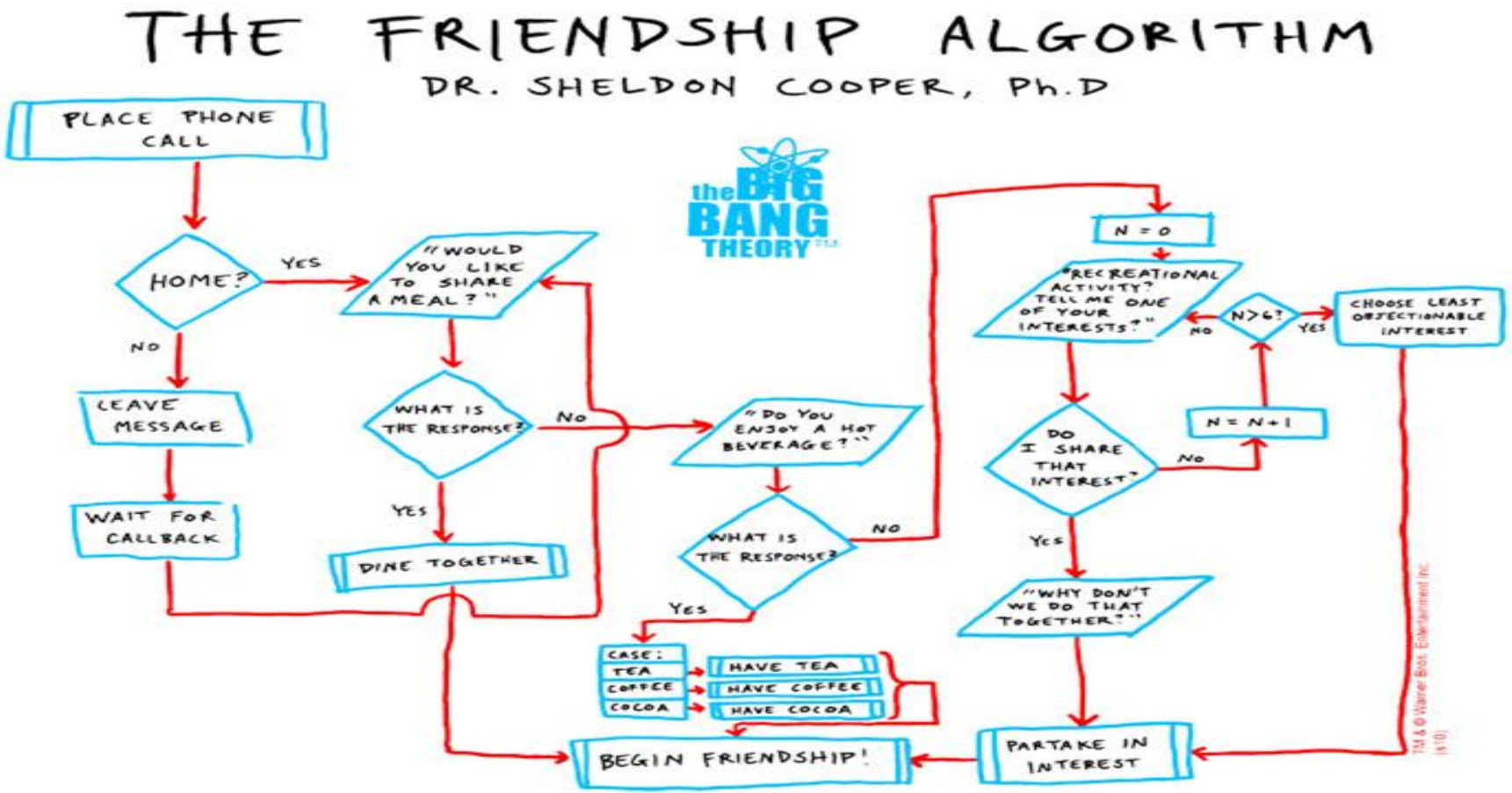
Tea Brewing Algorithm:

Put the teabag in a cup.
Fill the kettle with water.
Boil the water in the kettle.
Pour some of the boiled water into the cup.
Add milk to the cup.
Add sugar to the cup.
Stir the tea.
Drink the tea.

What is Algorithm



What is Algorithm



What is Algorithm

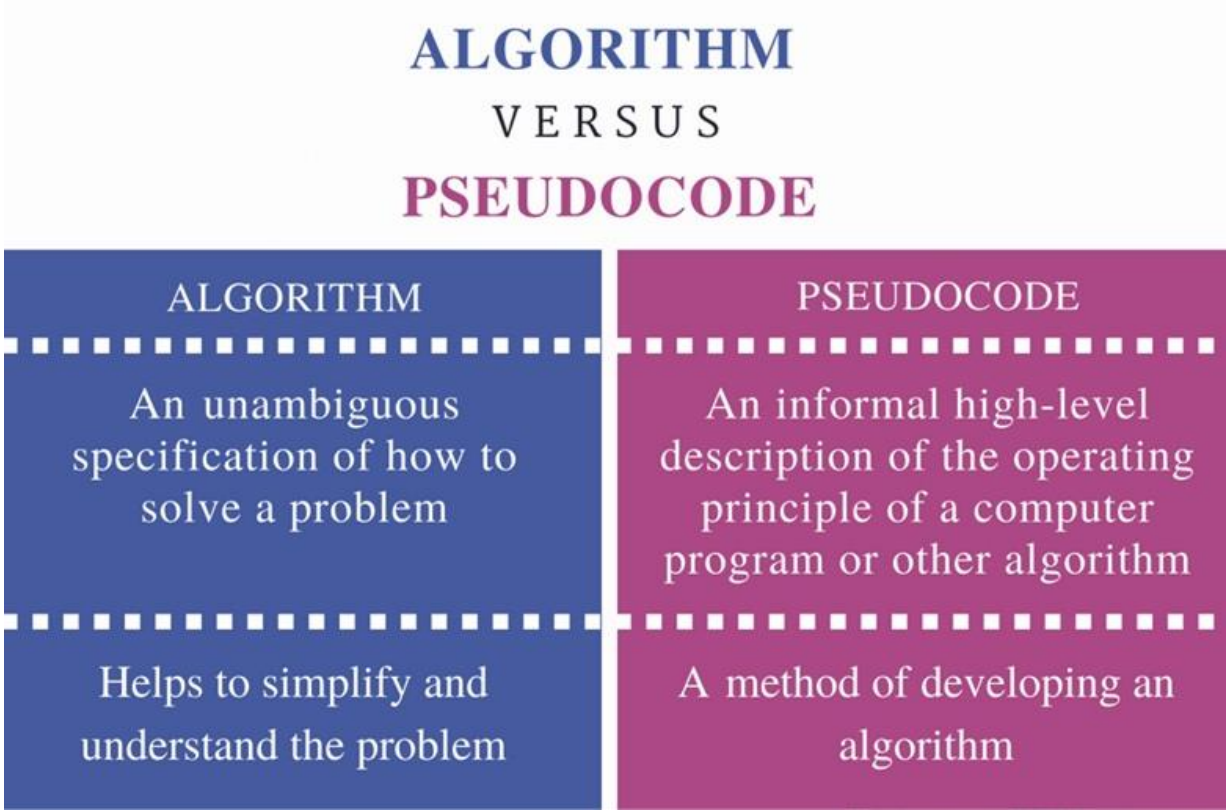
What is Algorithm

PSEUDOCODE

```
set total to zero

get list of numbers

loop through each number in the list
   add each number to total
end loop

if number more than zero
   print "it's positive" message
else
   print "it's zero or less" message
end if
```

What is algorithm?
What is pseudocode?

What is Algorithm



Software

What is software?

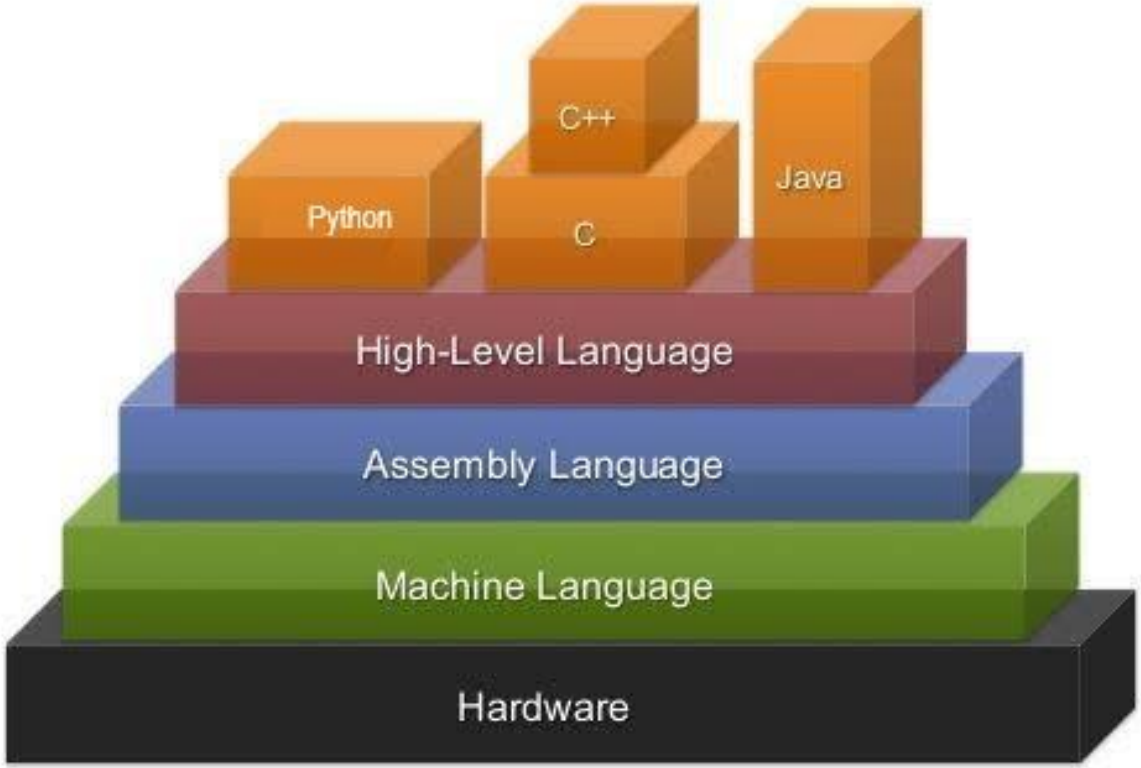
- unlike hardware it can't be physically touched
- it's the missing link between the computer hardware and the data which it is processing
- has to be "loaded" into the computer's RAM before it can be "run"
- a set of pre-written instructions which the computer executes in order to perform a particular task
- typically written using programming languages such as C, C++, BASIC, Java etc.

Software


SIMPLY CODING
Software
YouTube
Application Software
I/O
Zip
Operating System
Device Drivers
Utilities
System Software
Hardware

Have you heard of any of Programming Languages?

Software


C++
Java
Python
C
High-Level Language
Assembly Language
Machine Language
Hardware

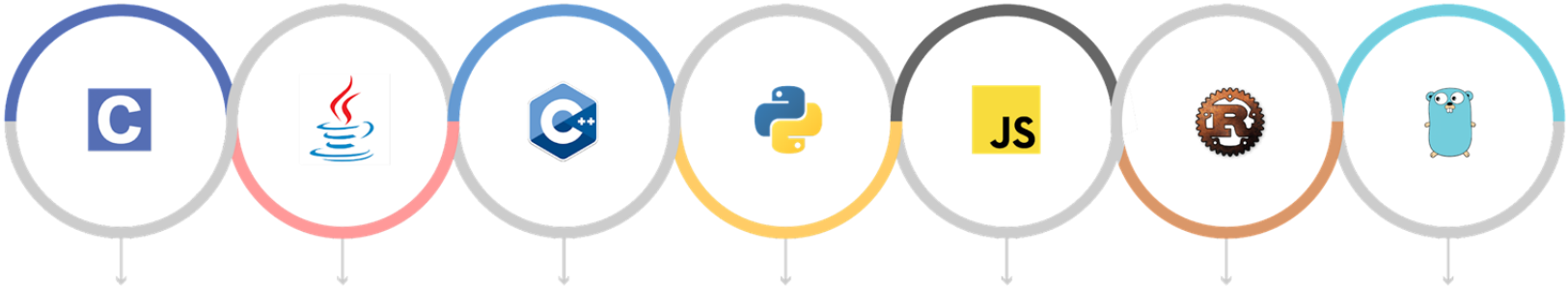
Software

Low Level Languages:

- Assembly Language
- Machine Language

Software

High Level Languages:



Software

High Level Language	Low Level Language
These are Interpreted	Direct memory management
They have open classes and message-style methods which are known as Dynamic constructs	Hardware has extremely little abstraction which is actually close to having none.
Poor performance	Much fast than high level
Codes are Concise	Statements correspond directly to clock cycles
Flexible syntax and easy to read	Superb performance but hard to write
Is object oriented and functional	Few support and hard to learn
Large community	

What does highlevel/ lowlevel mean?

Students, write your response!

Machine Language

Example of machine-language

Here's what a program-fragment looks like:

```
10100001 10111100 10010011 00000100
00001000 00000011 00000101 11000000
10010011 00000100 00001000 10100011
11000000 10010100 00000100 00001000
```

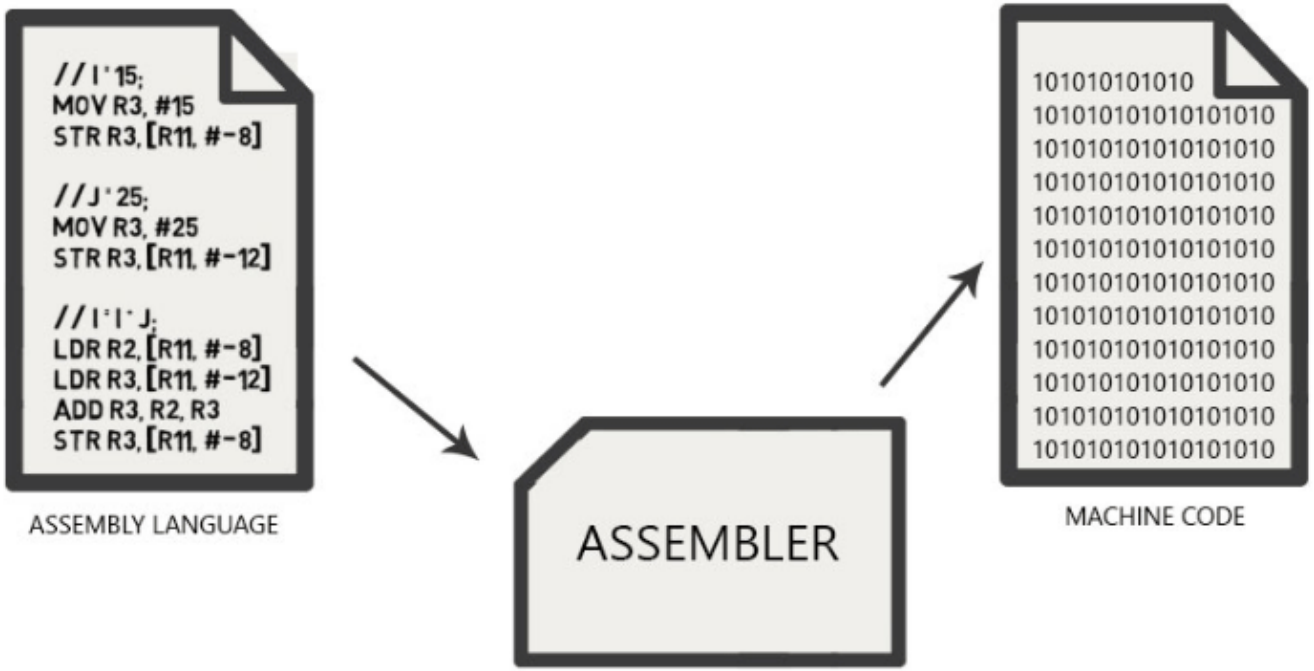
It means: z = x + y;

Assembly Language

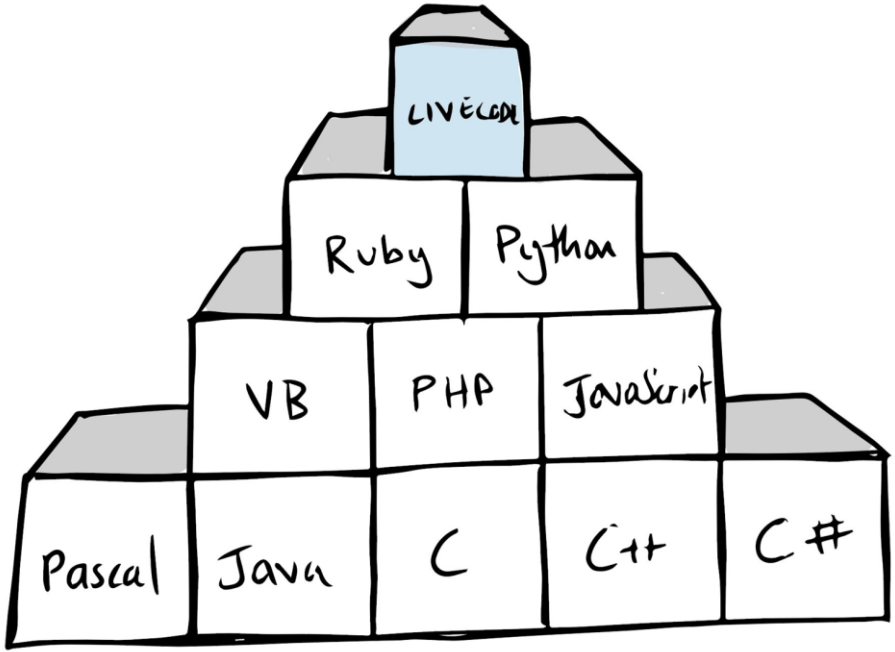
- Assembly is converted to machine code

```
mov     %esp,%ebp
sub     $0x28,%esp
mov     0x804d300,%eax
add     $0x1,%eax
mov     %eax,0x804d300
mov     0x804d300,%eax
cmp     0x8(%ebp),%eax
```

Assembly Language



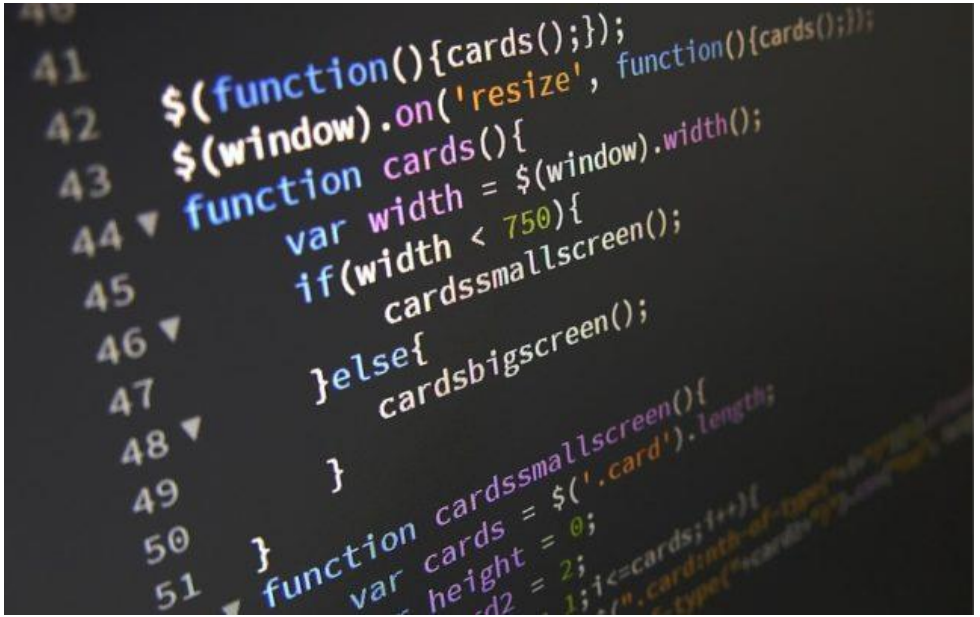
High Level Languages



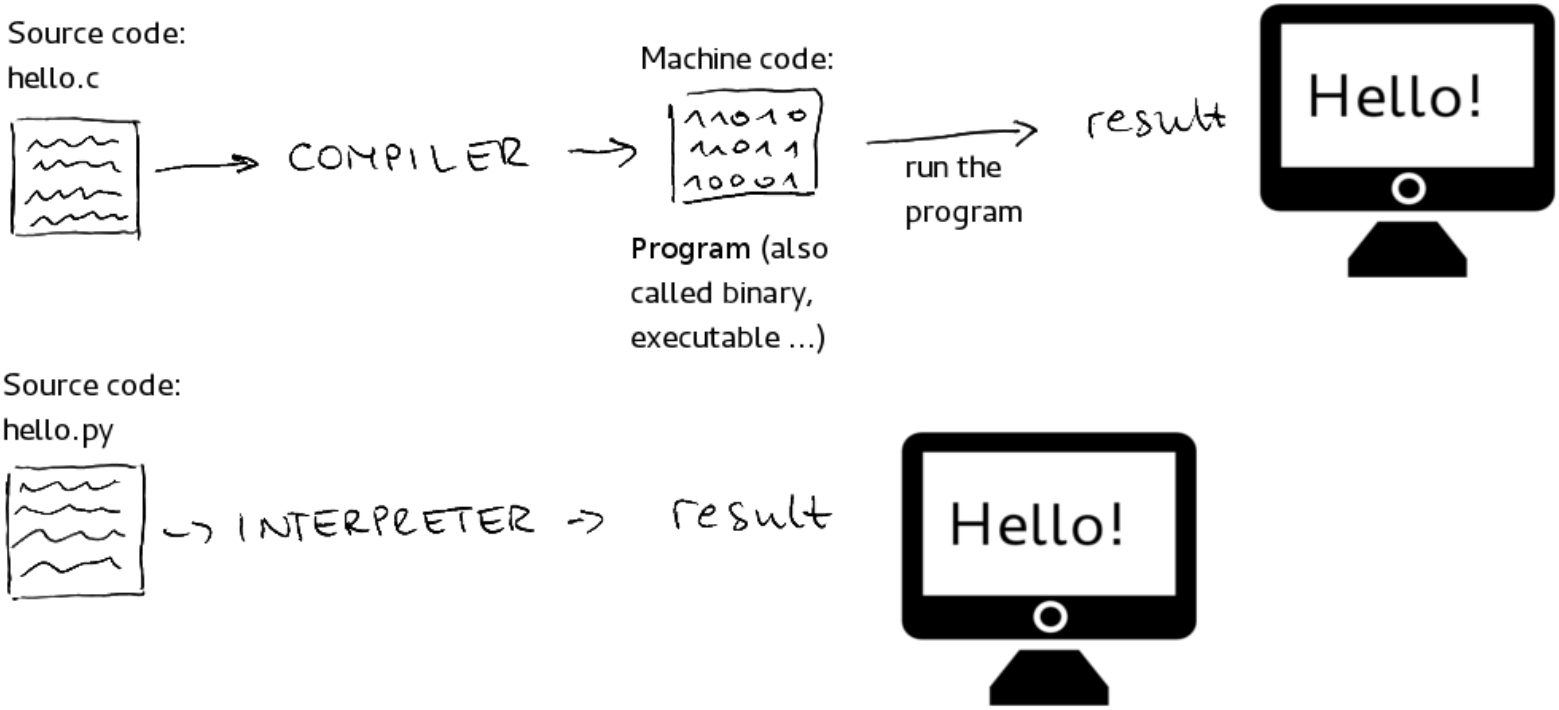
High Level Languages

Source Code:

Source code is a human-readable text written in a specific programming language.

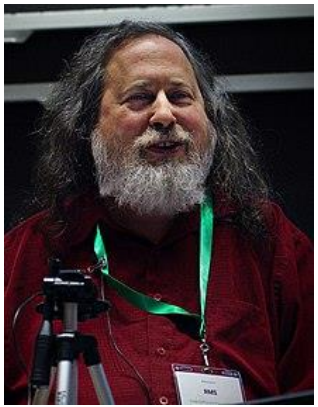


High Level Languages

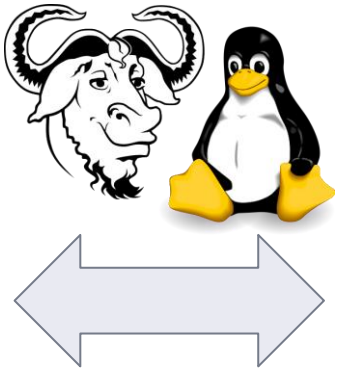


High Level Languages

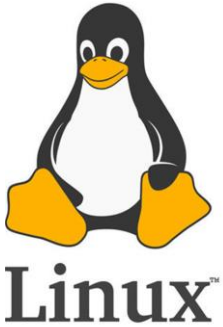
Free Software vs. Open Source Software



Richard Stallman



Linus Torvalds



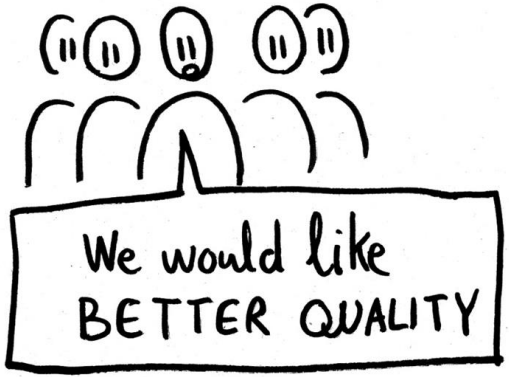
FREE SOFTWARE FOUNDATION

High Level Languages

Free software activists

ethical approach

Open source boosters



technical approach

High Level Languages

Bug:

- Story: named after a moth
- Two types: syntax and logic errors
  - prnt("I could forgotten something.")

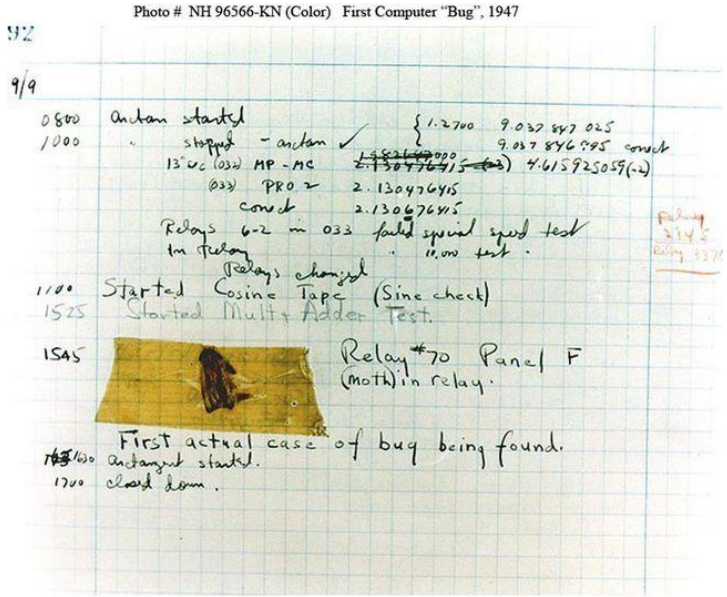


Photo # NH 96566-KN (Color) First Computer "Bug", 1947

9/9

0800 Arctan started

1000 " stopped - arctan ✓

1100 Started Cosine Tape (Sine check)

1525 Started Mult + Adder Test.

1545 Relay #70 Panel F (moth) in relay.

First actual case of bug being found.

1700 closed down.

High Level Languages

print(”Clarusway Rocks”)

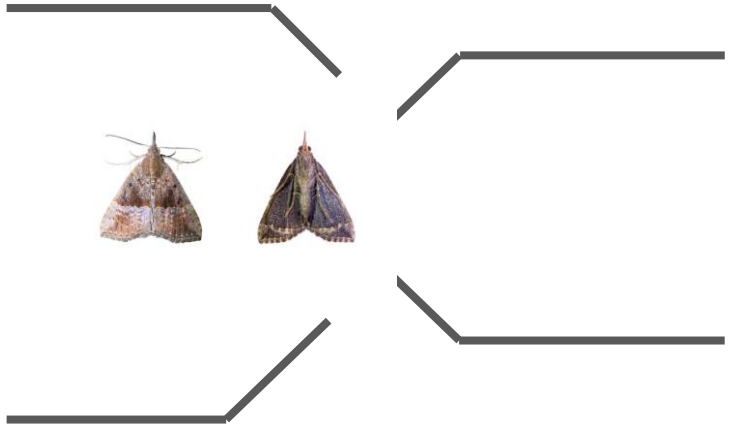
Find bugs and write the correct ones to right hand side:

Instructions

print(5, 7;

prnt(1, 2);

print("hello world);

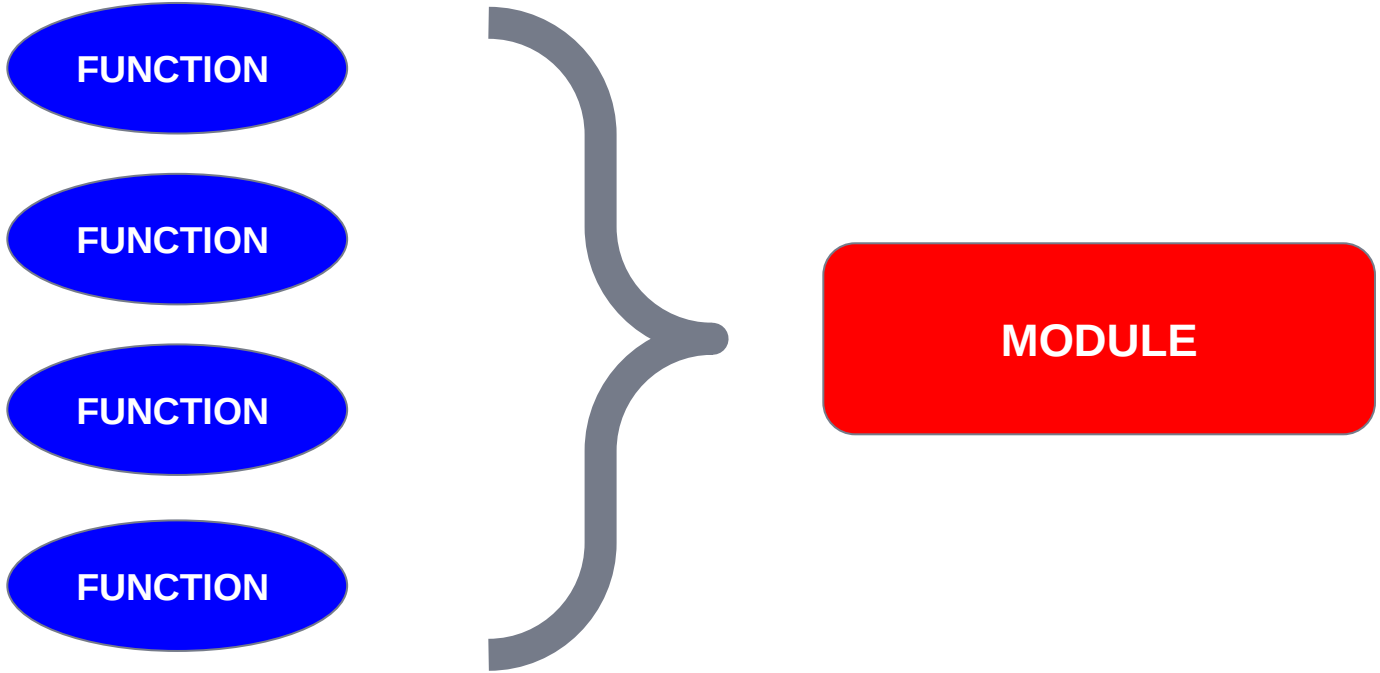


Libraries/Packages/Frameworks

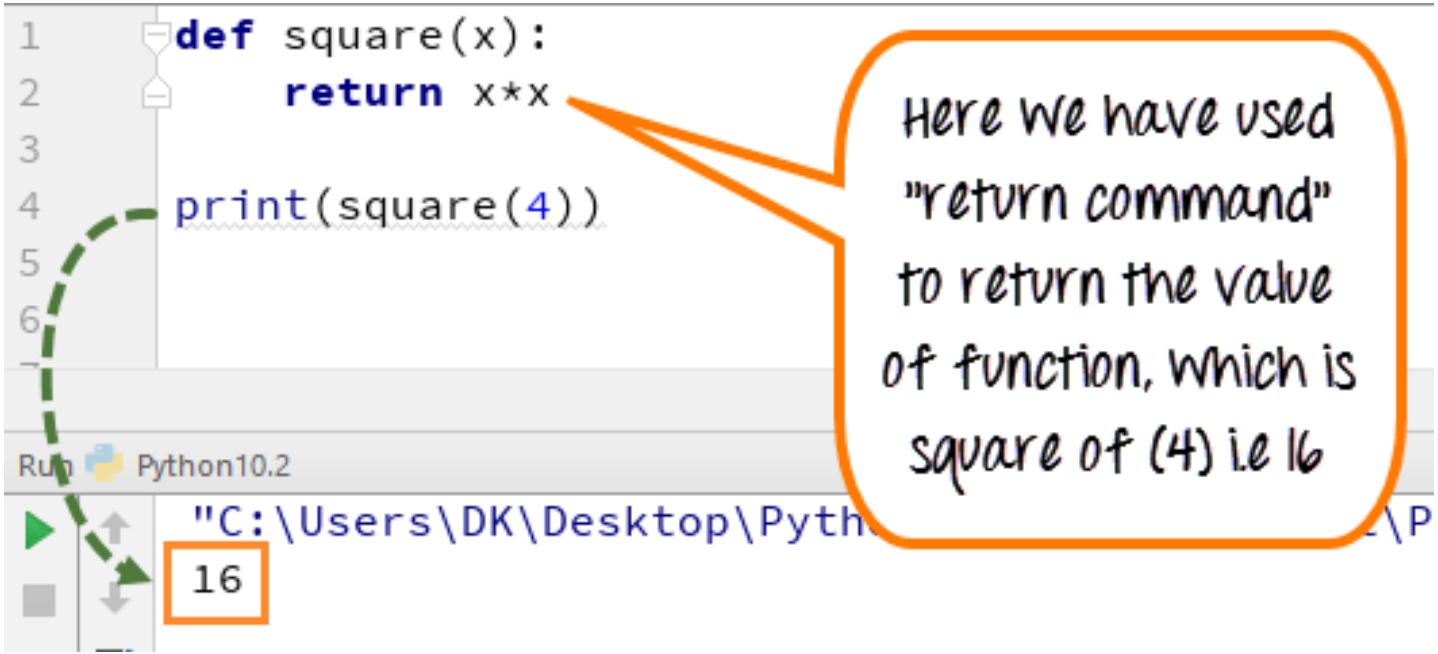
Library:

A software library generally consists of pre-written code, classes, procedures, scripts, configuration data and more. Typically, a developer might manually add a software library to a program to achieve more functionality or to automate a process without writing code for it.

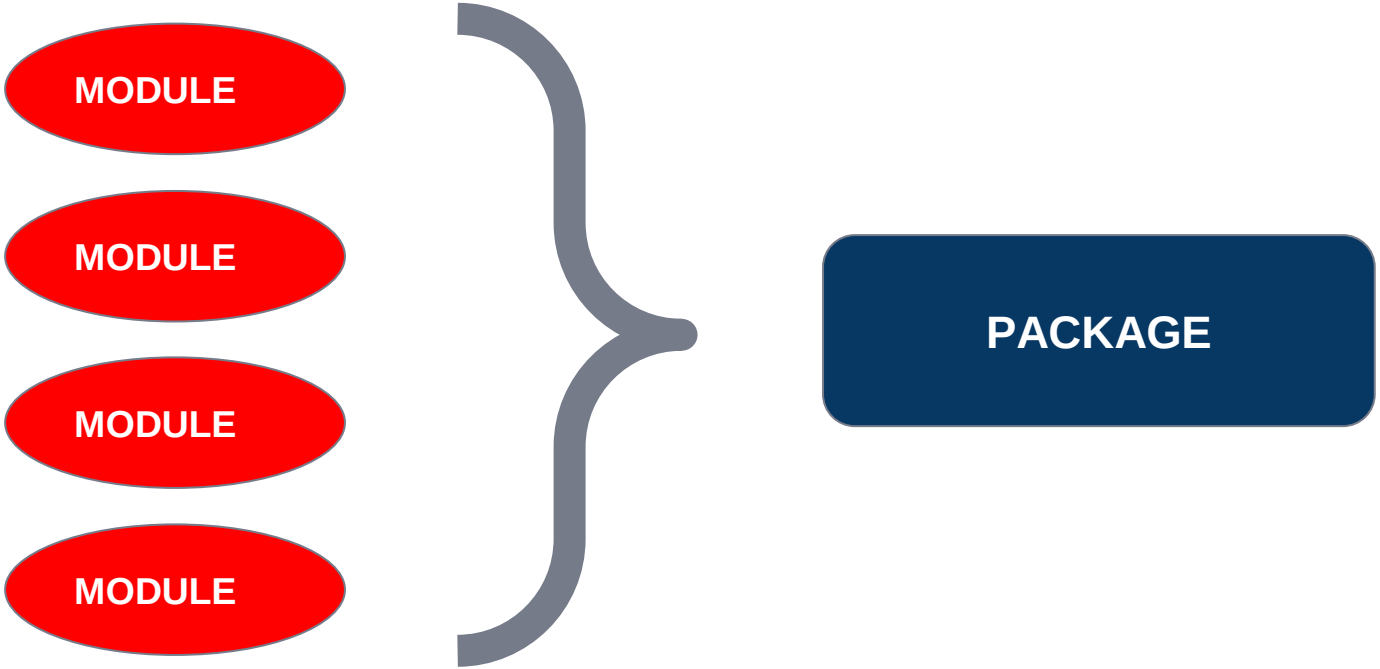
Libraries/Packages/Frameworks



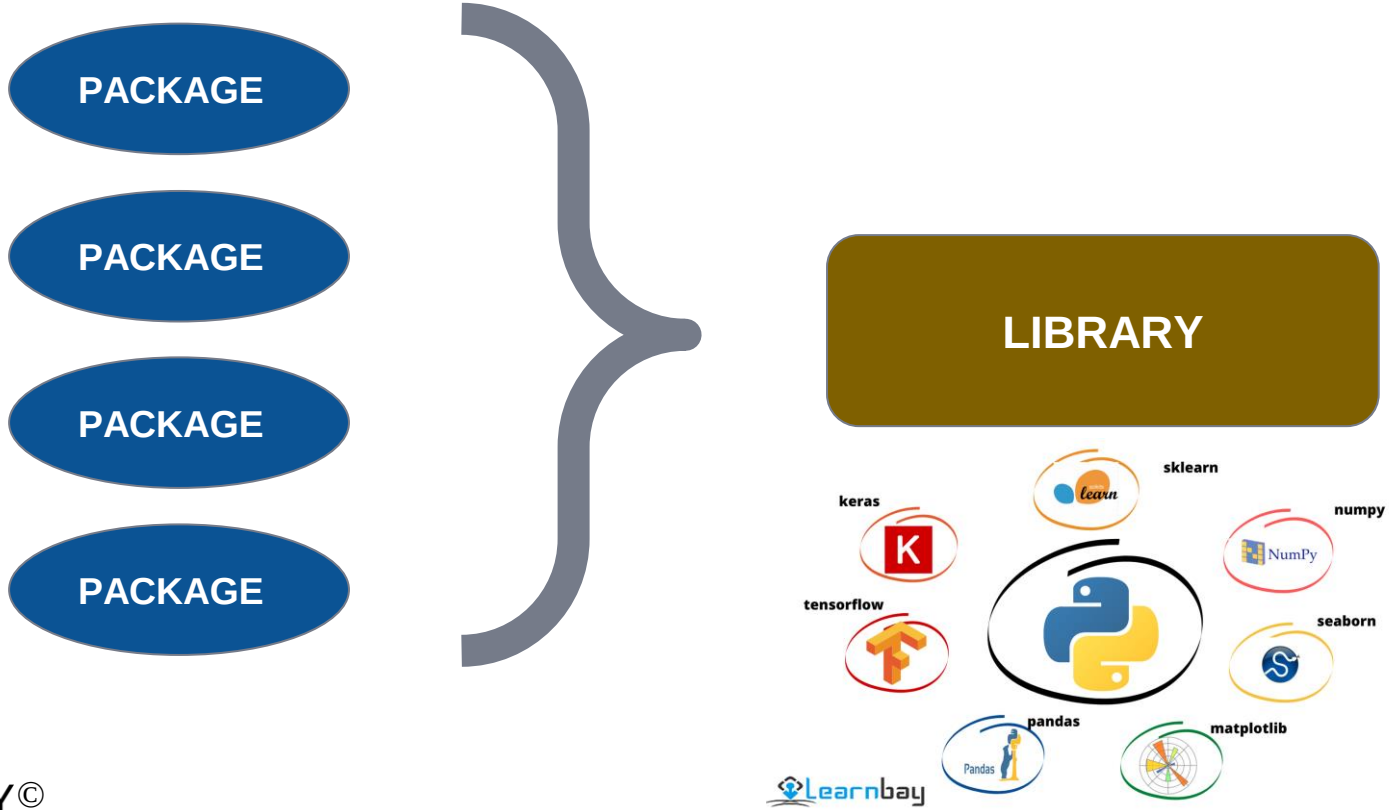
Libraries/Packages/Frameworks



Libraries/Packages/Frameworks



Libraries/Packages/Frameworks



Libraries/Packages/Frameworks

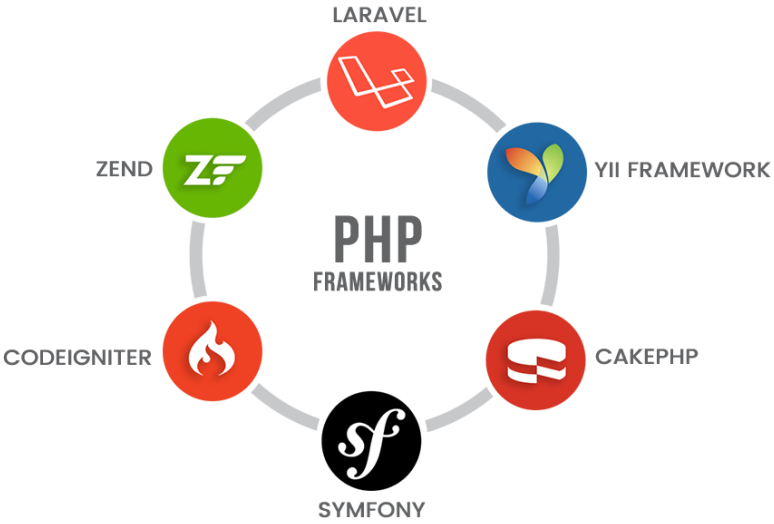
Framework:

Frameworks are software that is developed and used by developers to build applications.

Libraries/Packages/Frameworks

Framework:

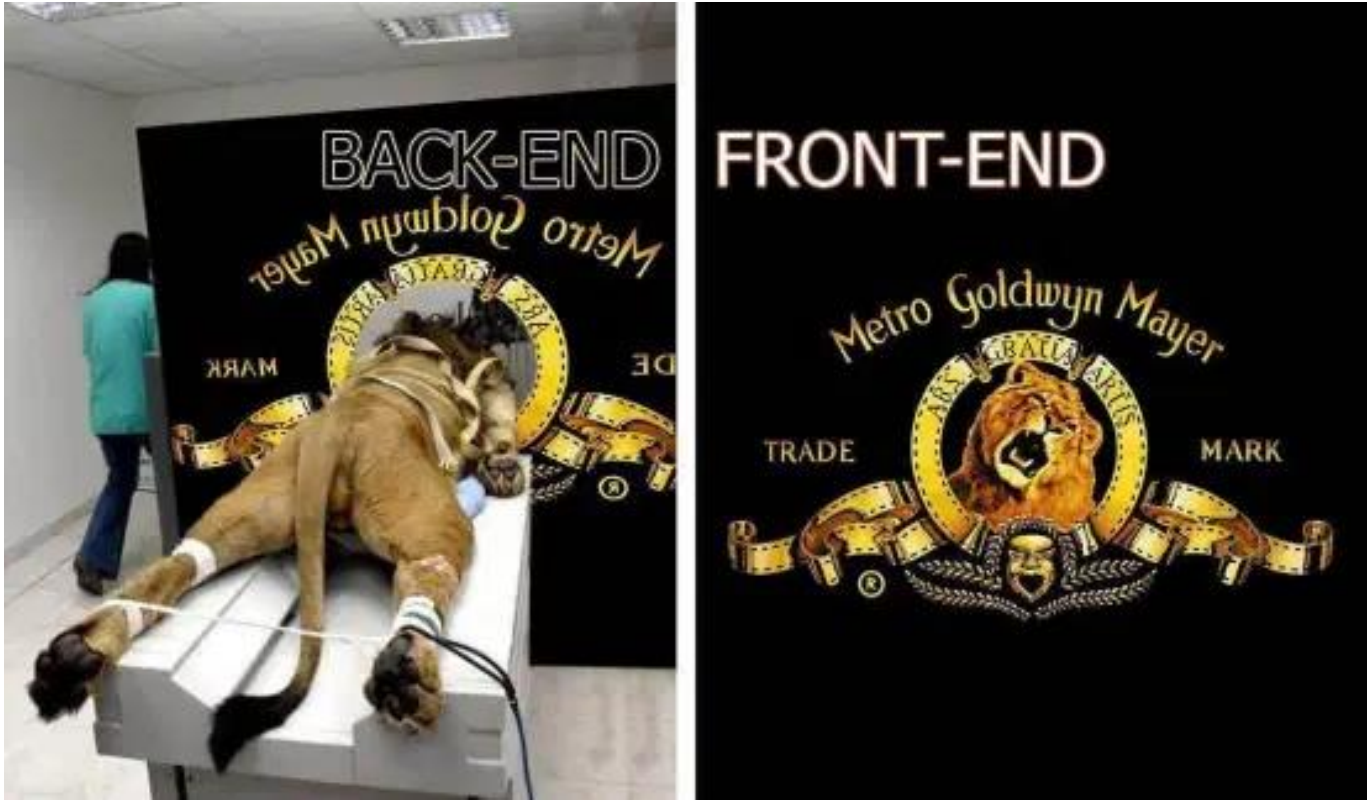
- Web Application Framework
- Mobile Development Frameworks
- DataScience Frameworks



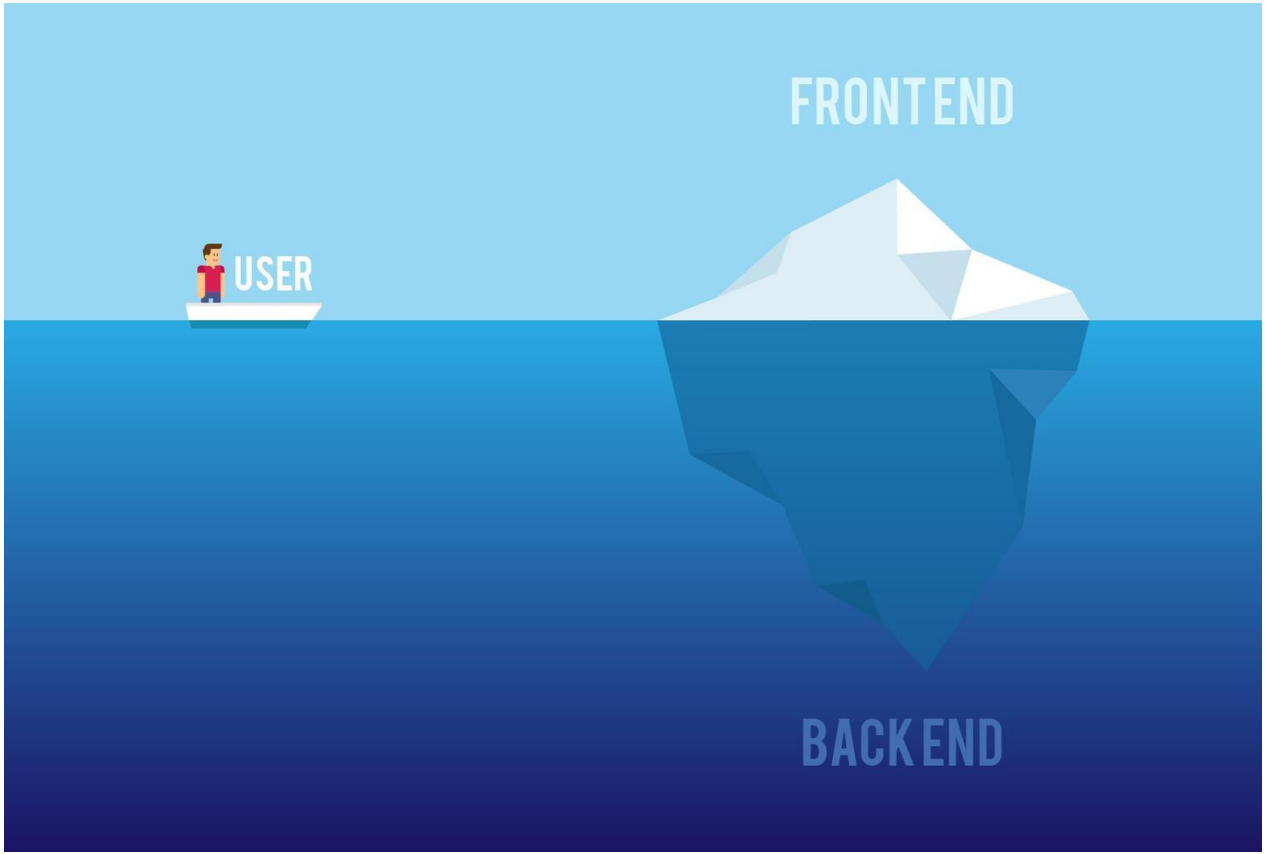
Libraries/Packages/Frameworks

Web Framework

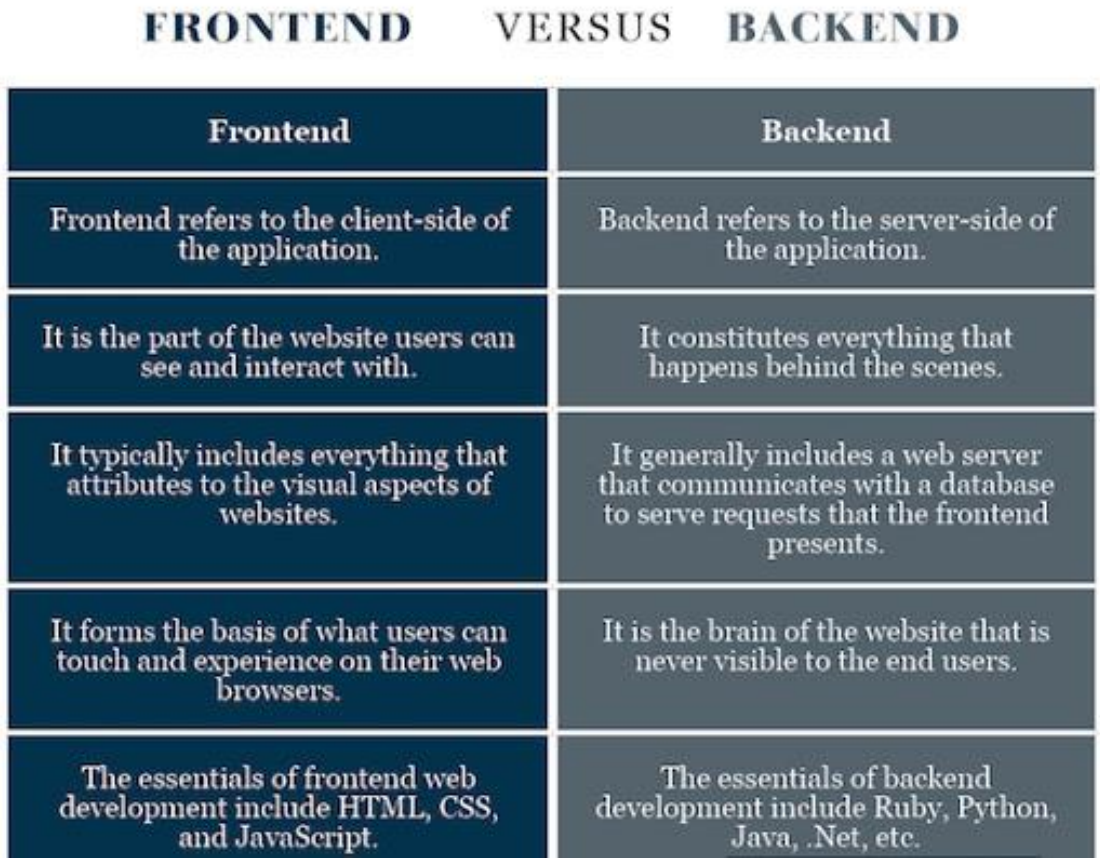
Backend/Frontend



Backend/Frontend



Backend/Frontend



In one minute, write the most important thing from Software's topic.

Students, write your response!

Computer Fundamentals

“Internet”

Agenda

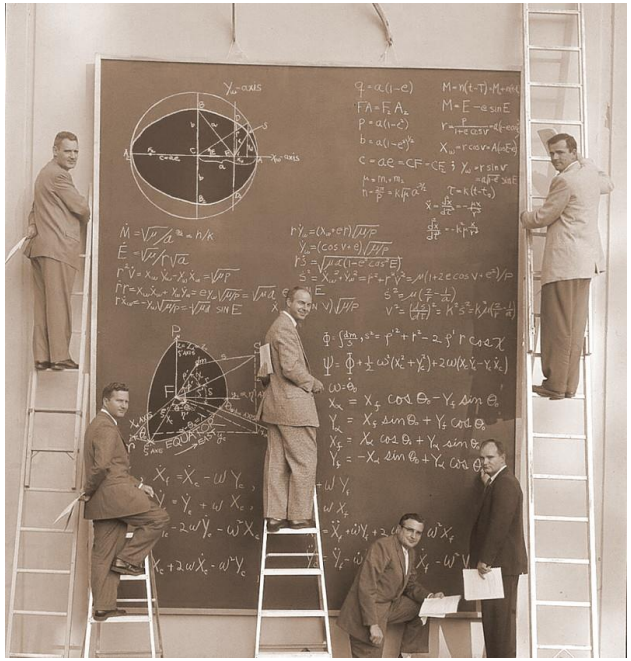
- Internet
- TCP/IP Protocol
- DNS
- LAN/WAN

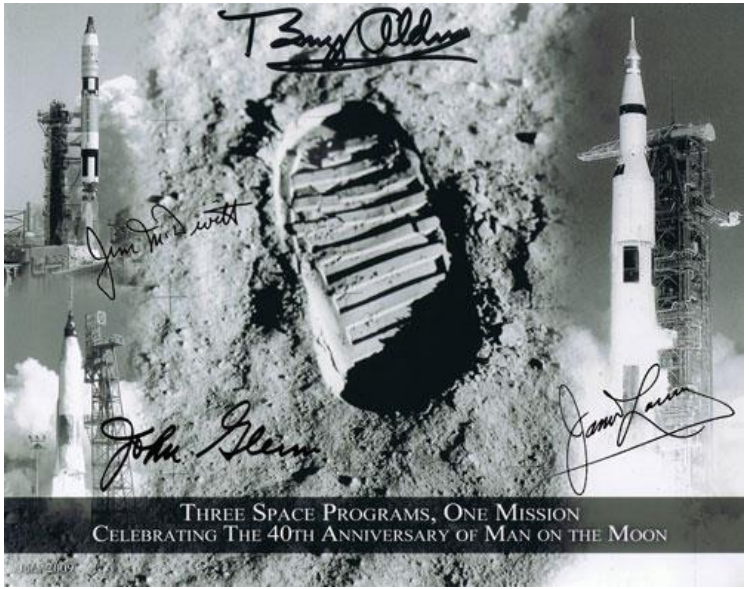

Kahoot!

Internet

- **Network of networks!**

Internet

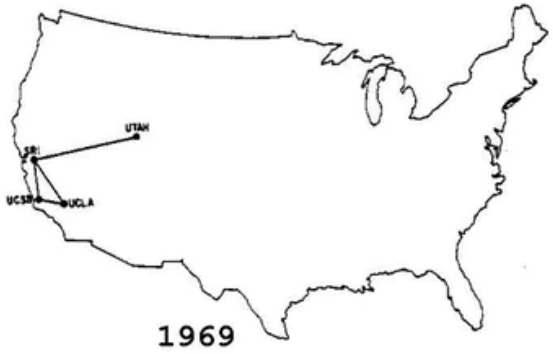




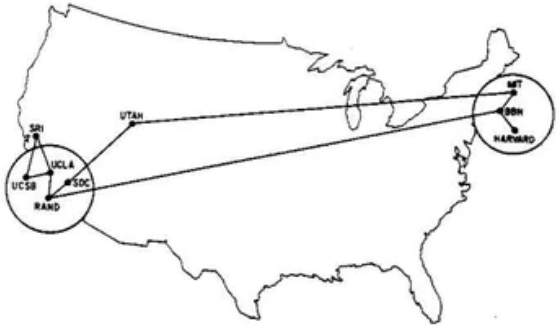
Common Sense

Internet

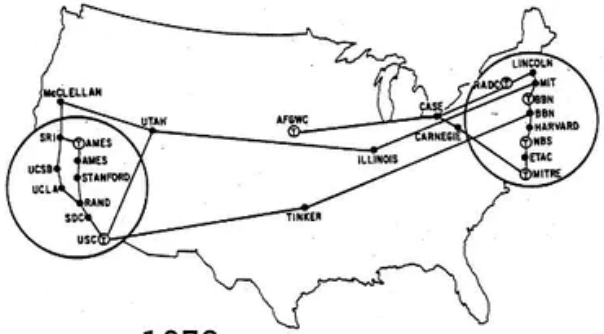
- **ARPANET (The Advanced Research Projects Agency Network)**



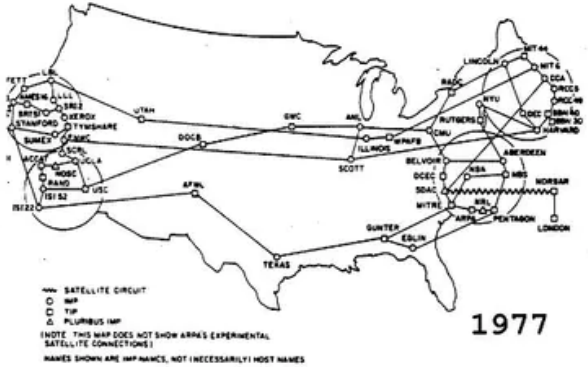
1969



1970

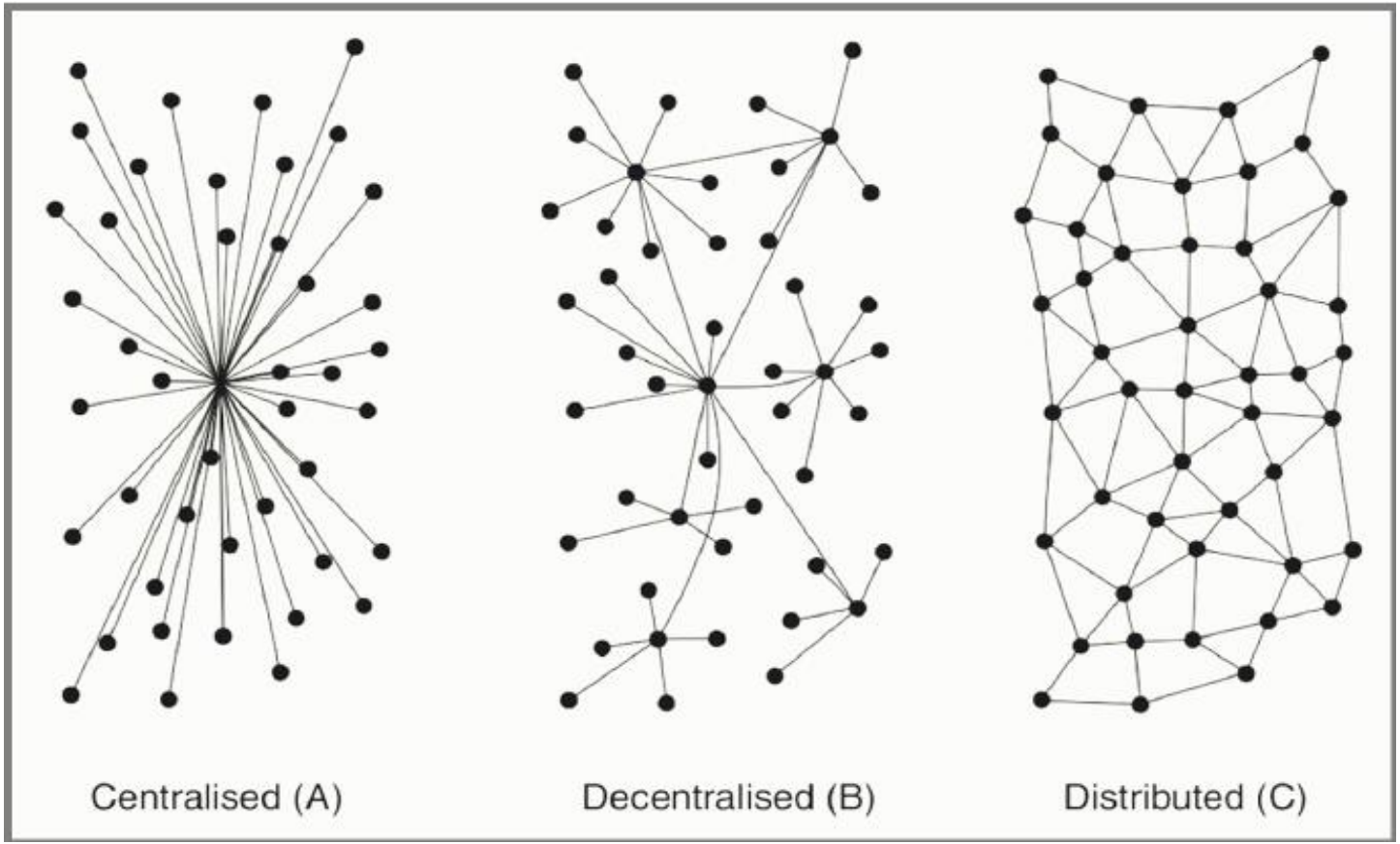


1972

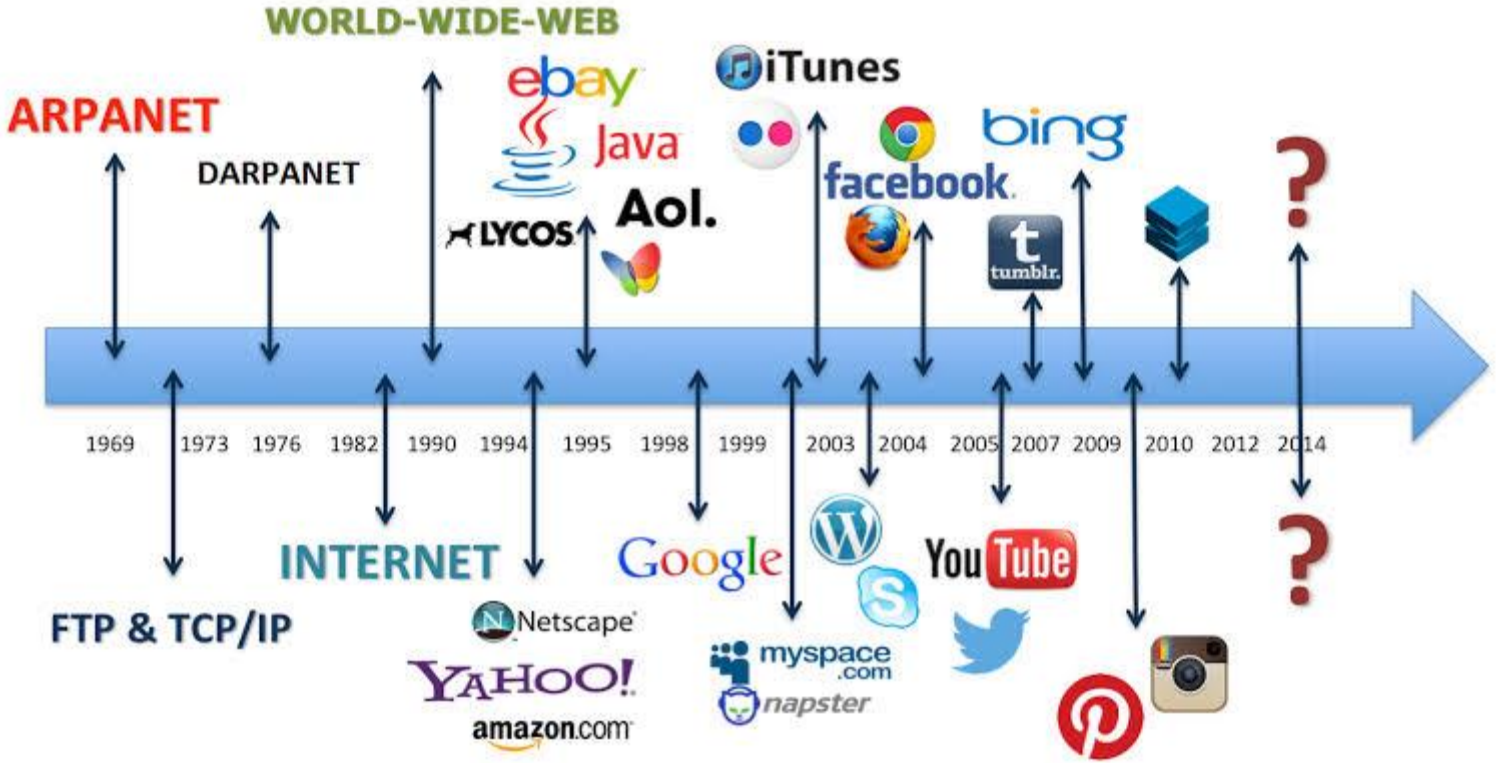


1977

Internet

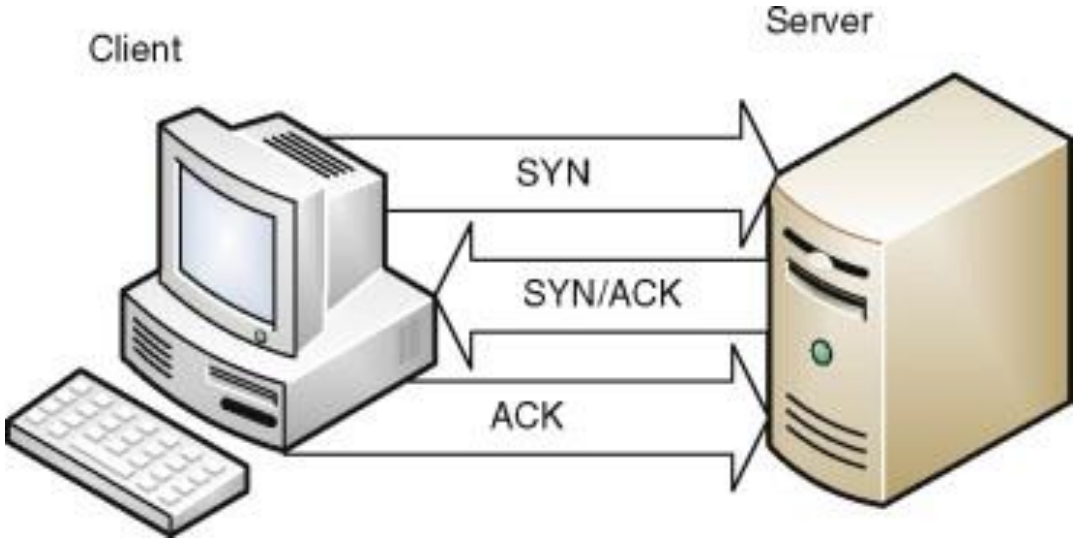


Internet


WORLD-WIDE-WEB
ARPANET
DARPANET
ebay
Java
LYCOS
Aol.
iTunes
facebook
bing
tumblr.
?
1969
1973
1976
1982
1990
1994
1995
1998
1999
2003
2004
2005
2007
2009
2010
2012
2014
INTERNET
FTP & TCP/IP
Google
YouTube
Netscape
YAHOO!
amazon.com
myspace.com
napster
?

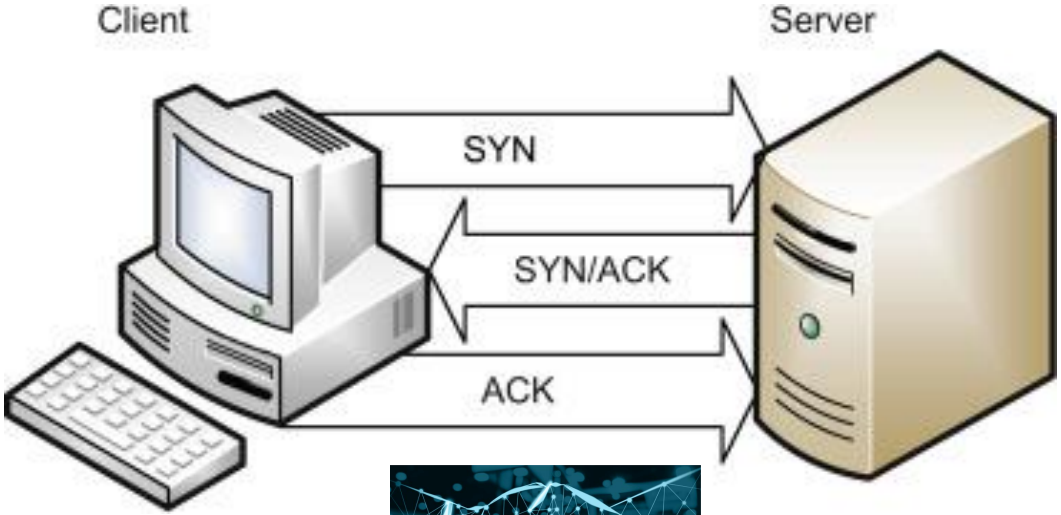
TCP/IP Protocol

- IP: Internet Protocol
- TCP: Transmission Control Protocol
- Rules for sending information between computers
- Followed by both clients and servers



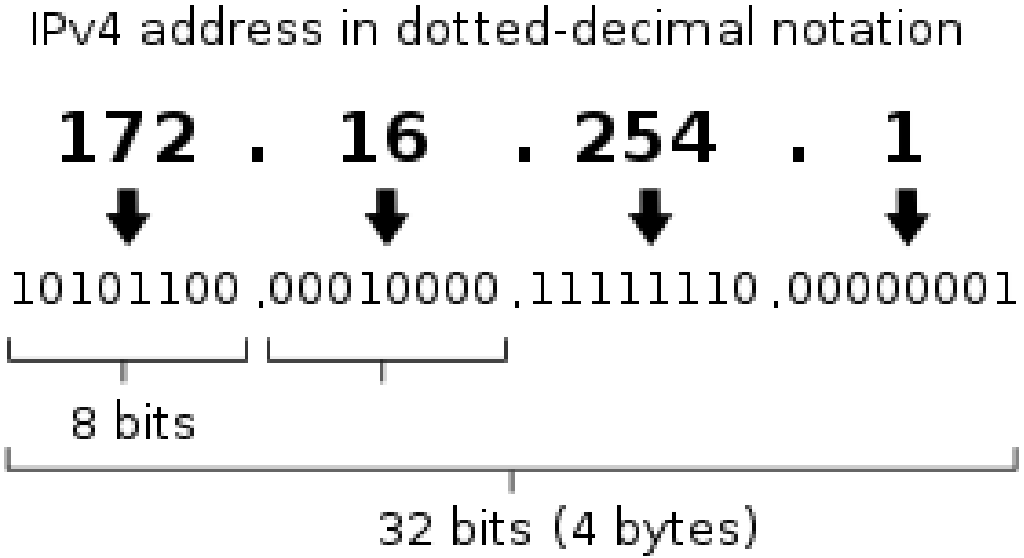
TCP/IP Protocol

- Before connection, server and client should shake their hands three times!
    - Three hand shake:



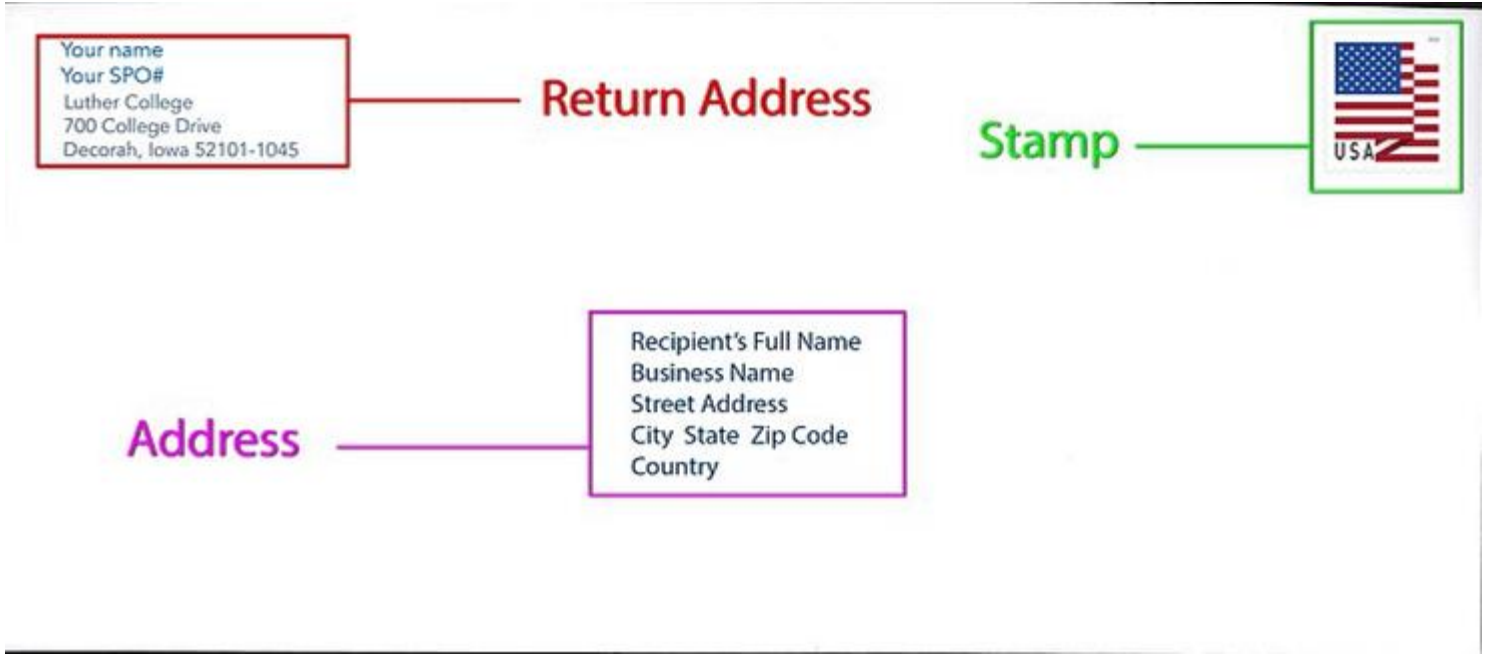
TCP/IP Protocol

- **IP Number:**

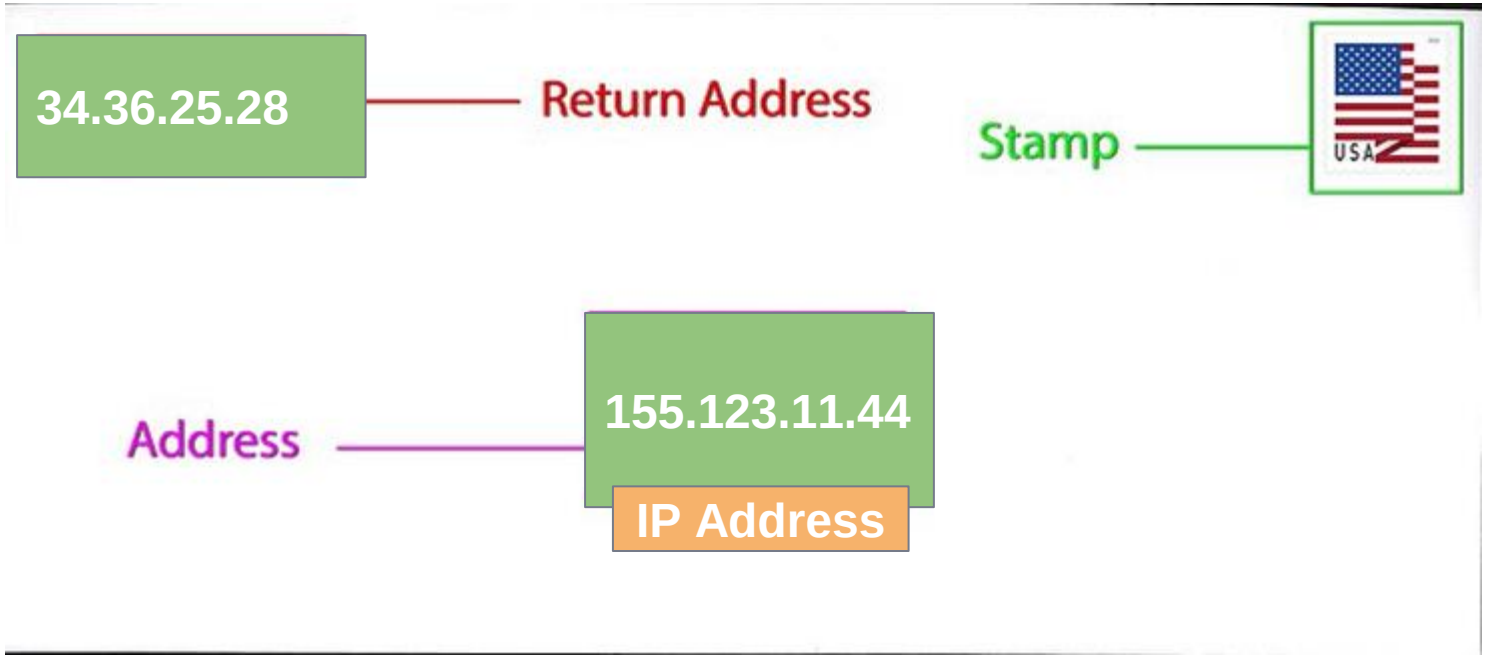


4,294,967,296

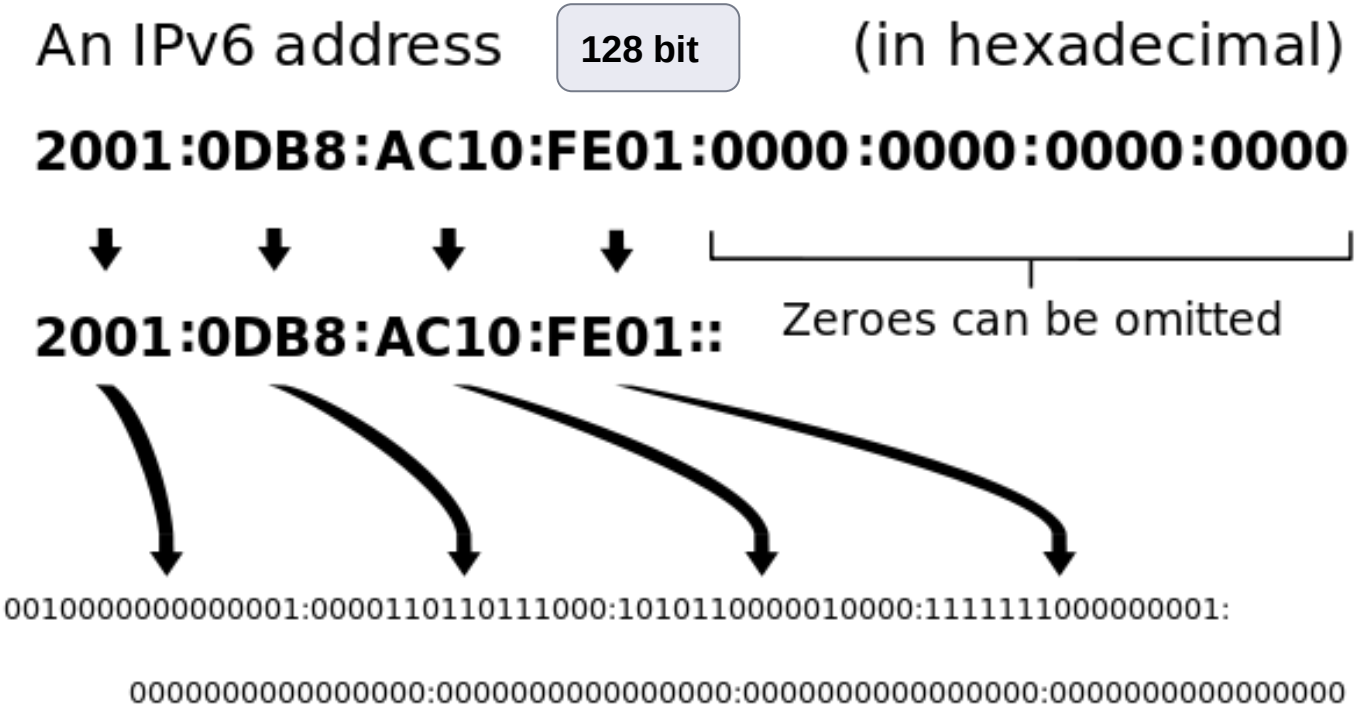
TCP/IP Protocol



TCP/IP Protocol



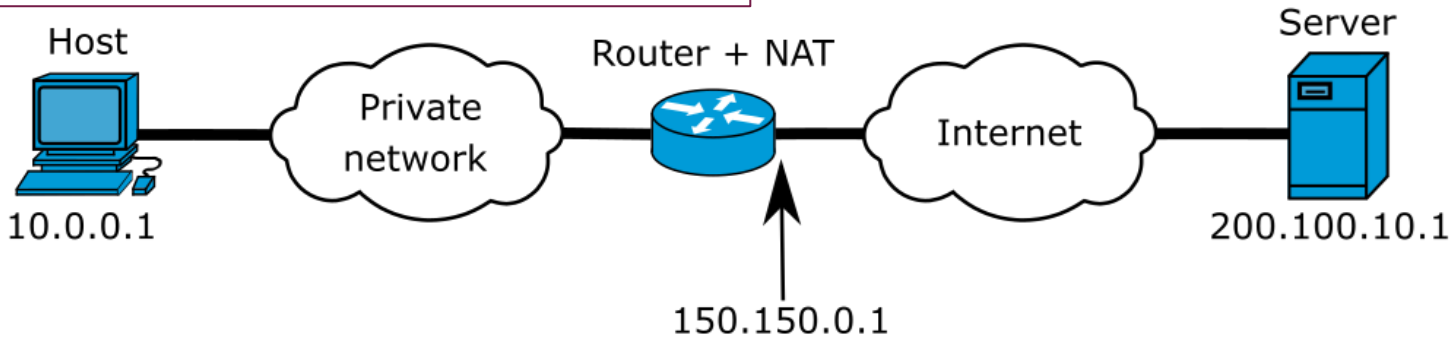
TCP/IP Protocol

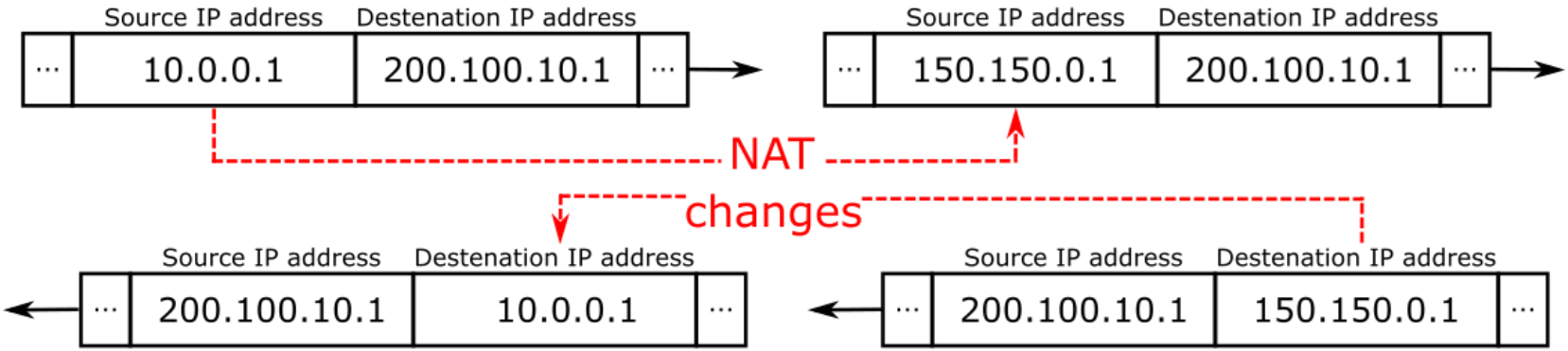


TCP/IP Protocol

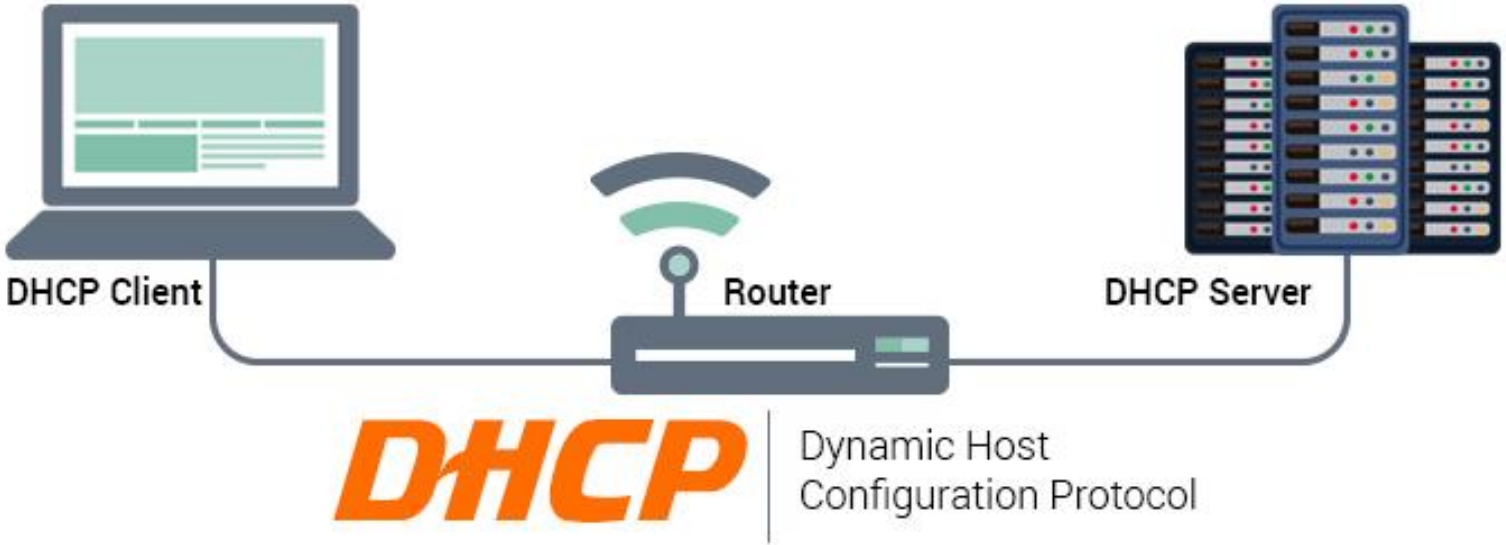
TCP/IP Protocol

- **NAT : Network Address Translation**



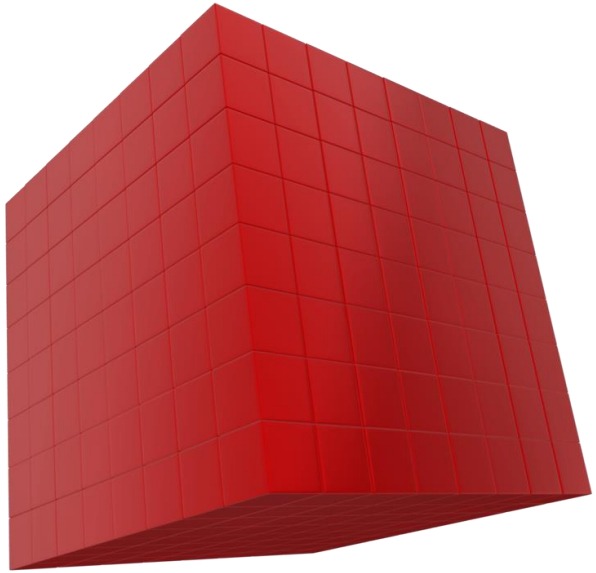


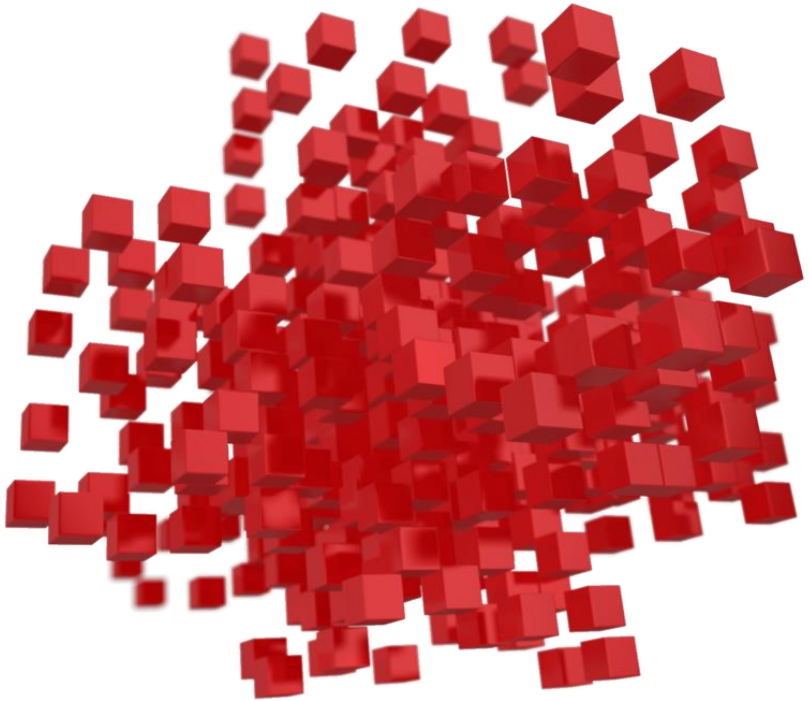
TCP/IP Protocol



TCP/IP Protocol

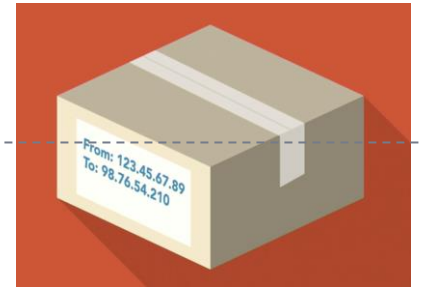
- **Packages**





TCP/IP Protocol

COMPUTER-1
(132.45.67.89)



COMPUTER-2
(98.76.54.210)

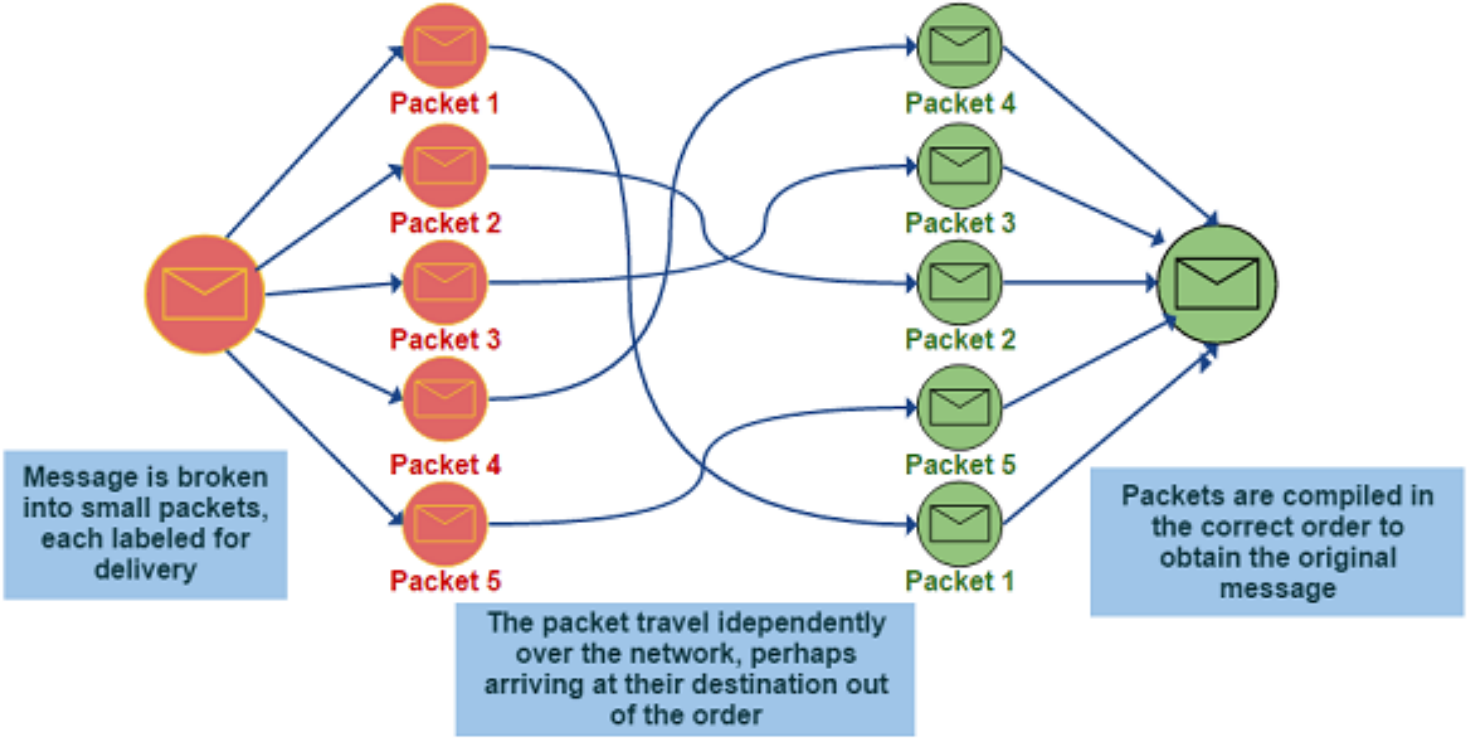
FROM 132.45.67.89 TO 98.76.54.210 2KB PACKET#1

FROM 132.45.67.89 TO 98.76.54.210 2KB PACKET#2

FROM 132.45.67.89 TO 98.76.54.210 2KB PACKET#3

FROM 132.45.67.89 TO 98.76.54.210 2KB PACKET#4

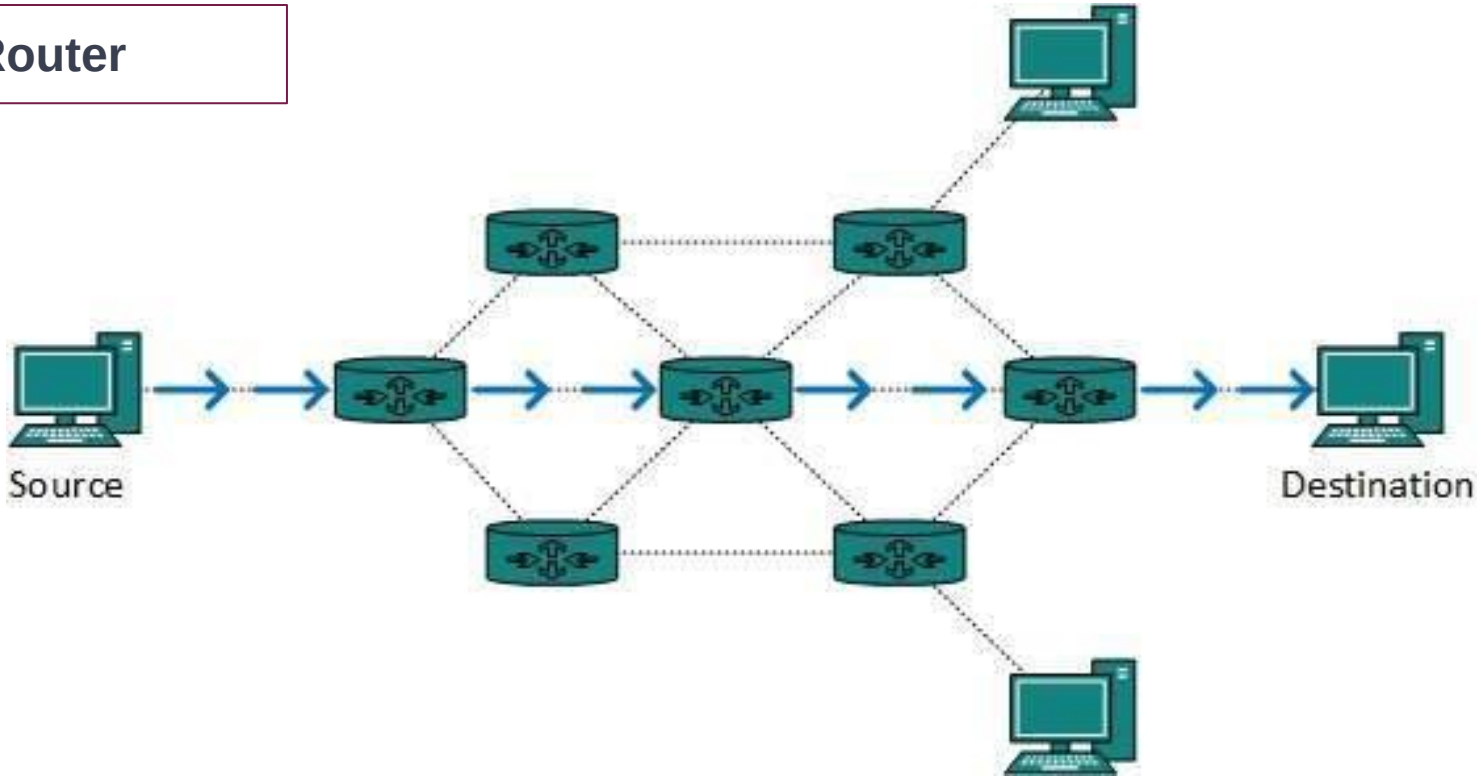
TCP/IP Protocol



Internet Packets Transmission

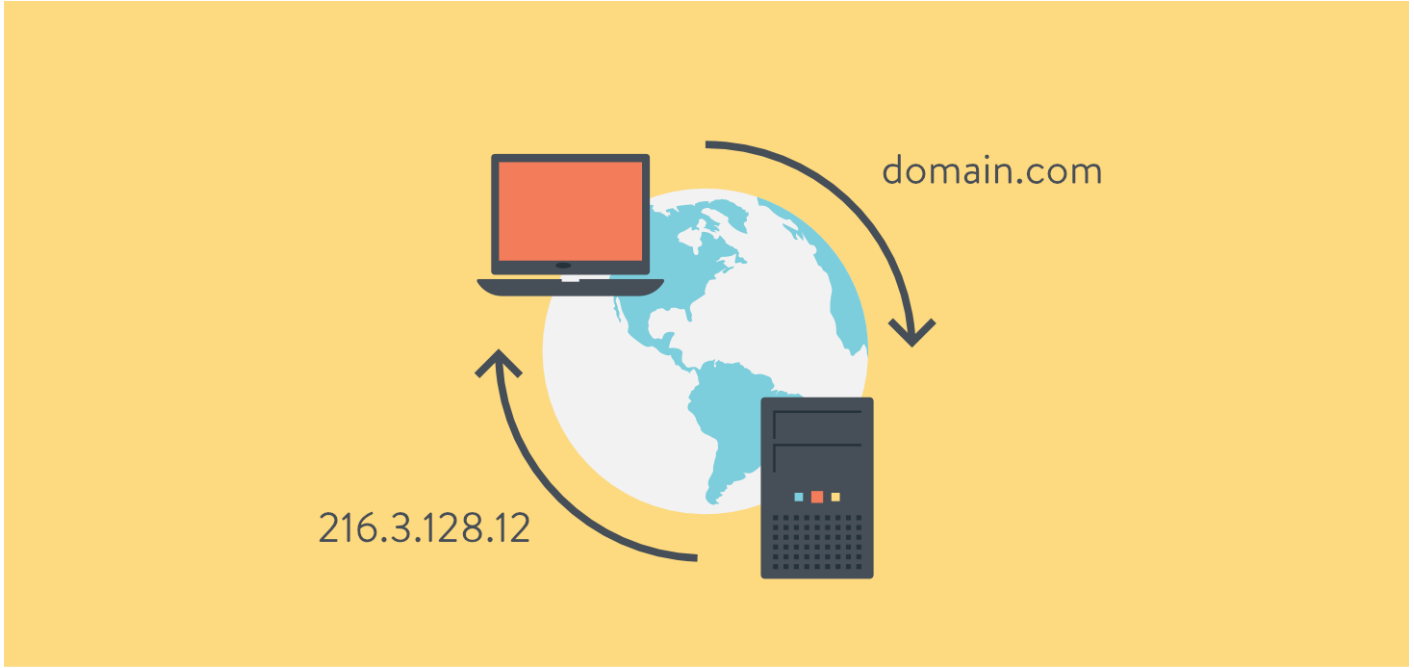
TCP/IP Protocol

- **Router**



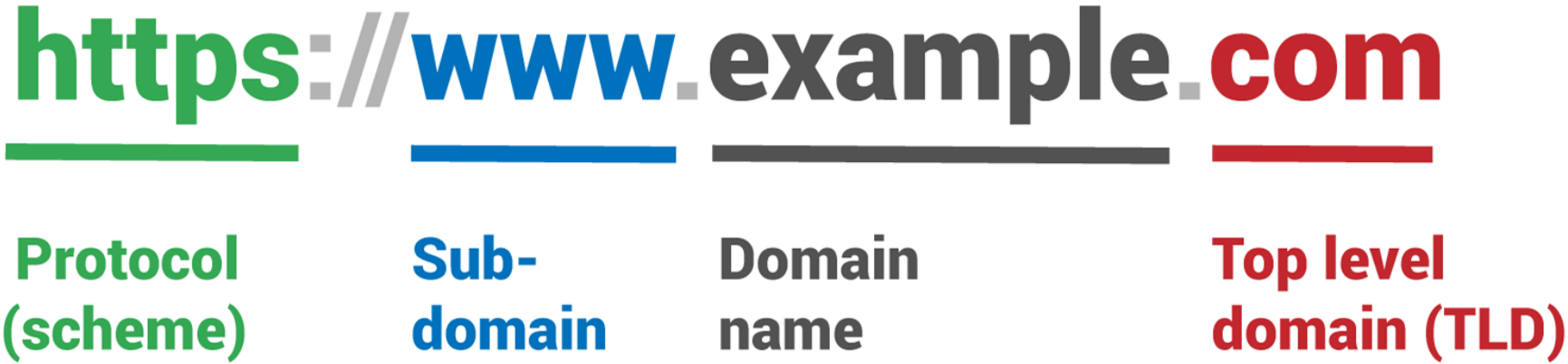
DNS

- **Domain Name Server**



DNS

- URL: Uniform Resource Locator

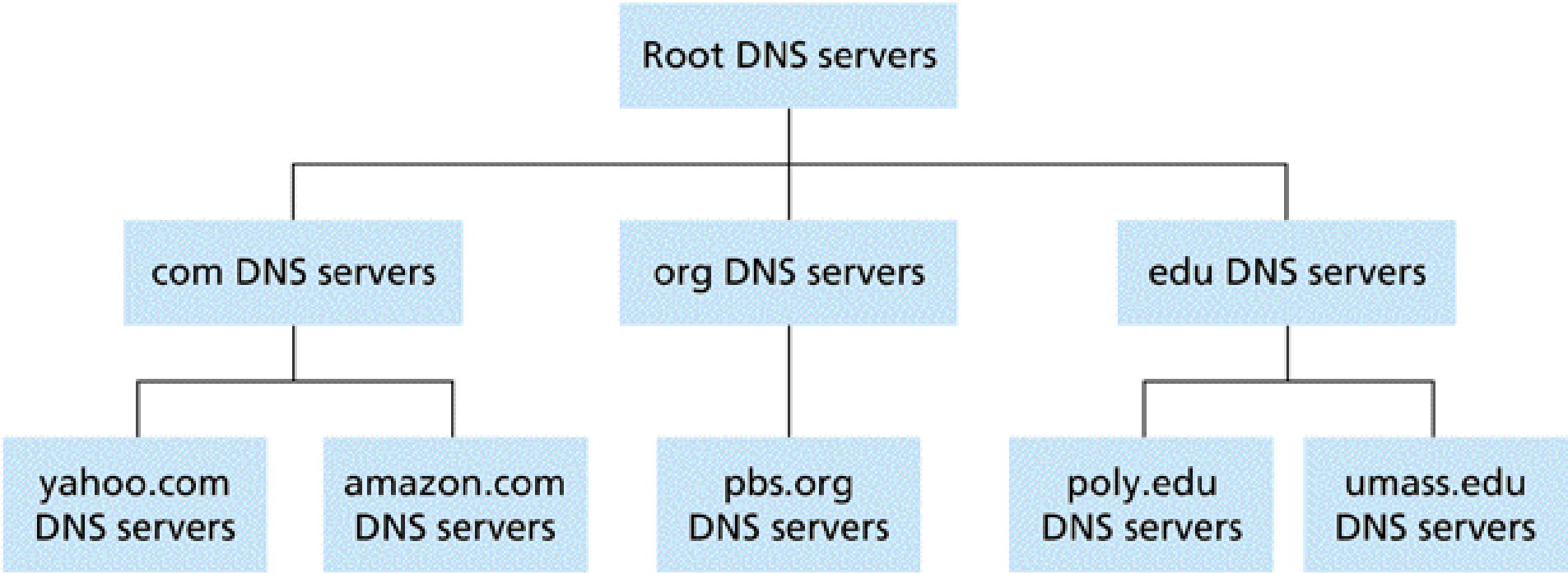


DNS

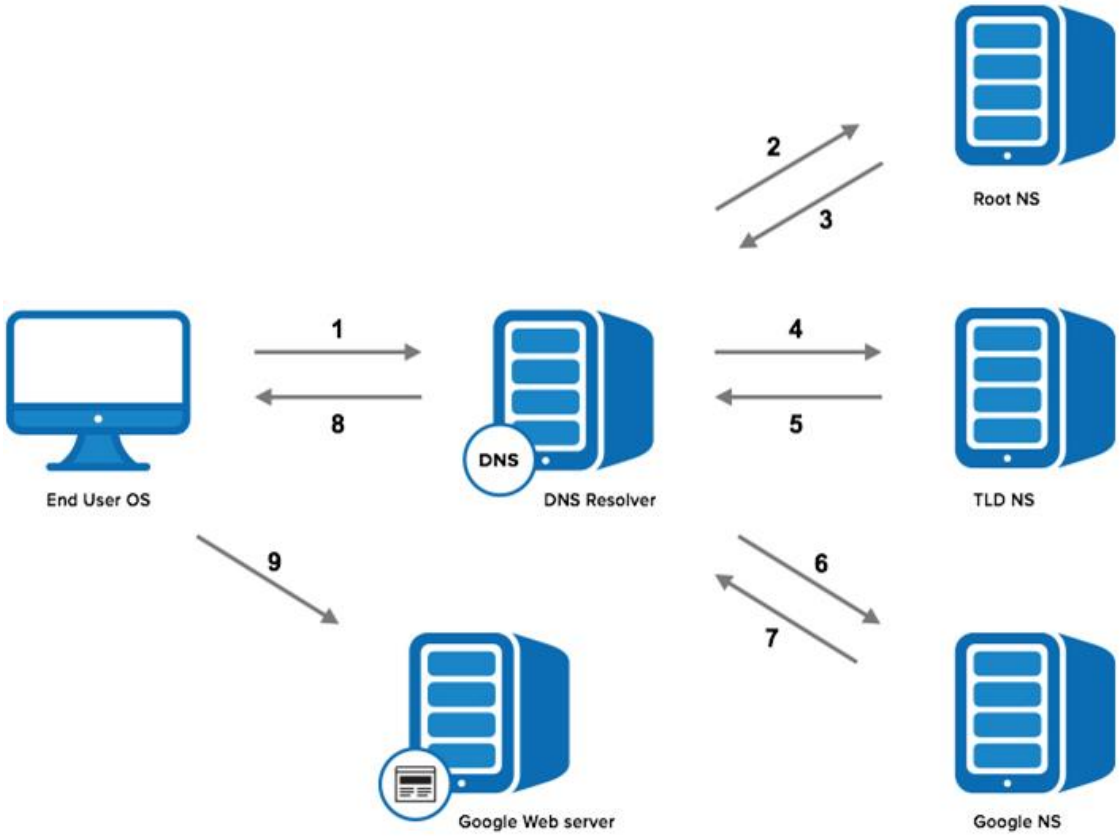
- **Root DNS**


STOCKHOLM, SWEDEN
LONDON, UK
AMSTERDAM, NETHERLANDS
TOKYO, JAPAN
HONG KONG, CHINA
ASHBURN, VA
DULLES, VA
STERLING, VA
ATLANTA, GA
SEATTLE, WA
MTN VIEW, CA
SUNNYVALE, CA
LOS ANGELES, CA

DNS

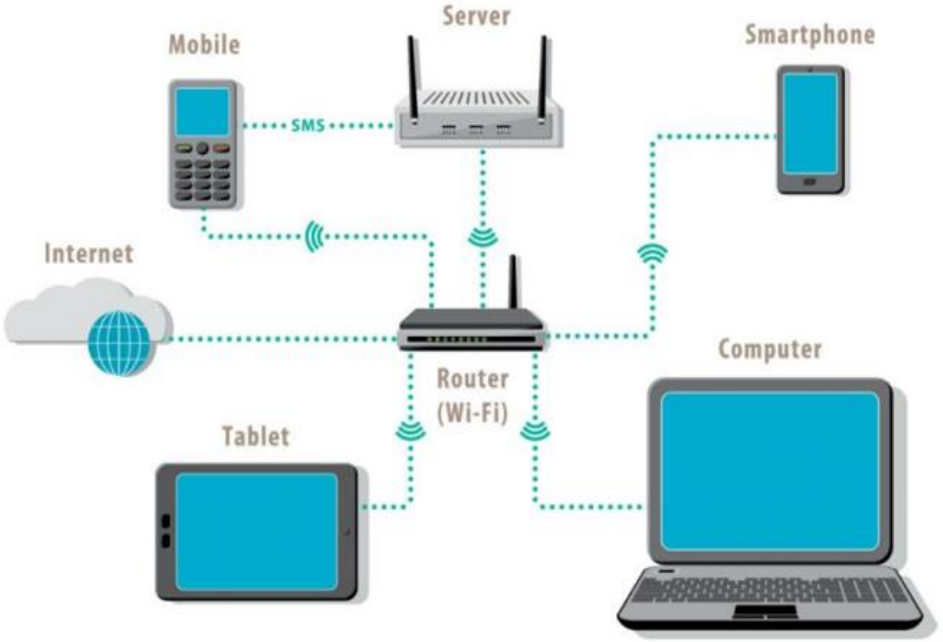

Root DNS servers
com DNS servers
org DNS servers
edu DNS servers
yahoo.com DNS servers
amazon.com DNS servers
pbs.org DNS servers
poly.edu DNS servers
umass.edu DNS servers

DNS


Root NS
2
3
1
8
End User OS
DNS
DNS Resolver
4
5
TLD NS
9
6
7
Google Web server
Google NS

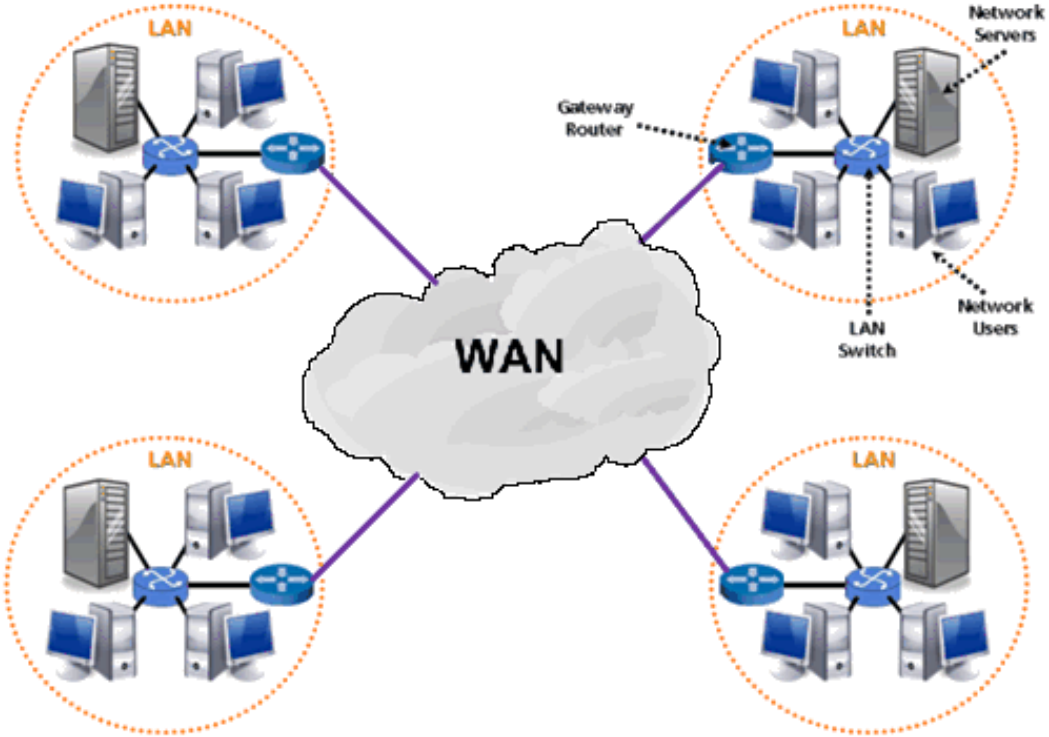
LAN/WAN

- **LAN: Local Area Network**

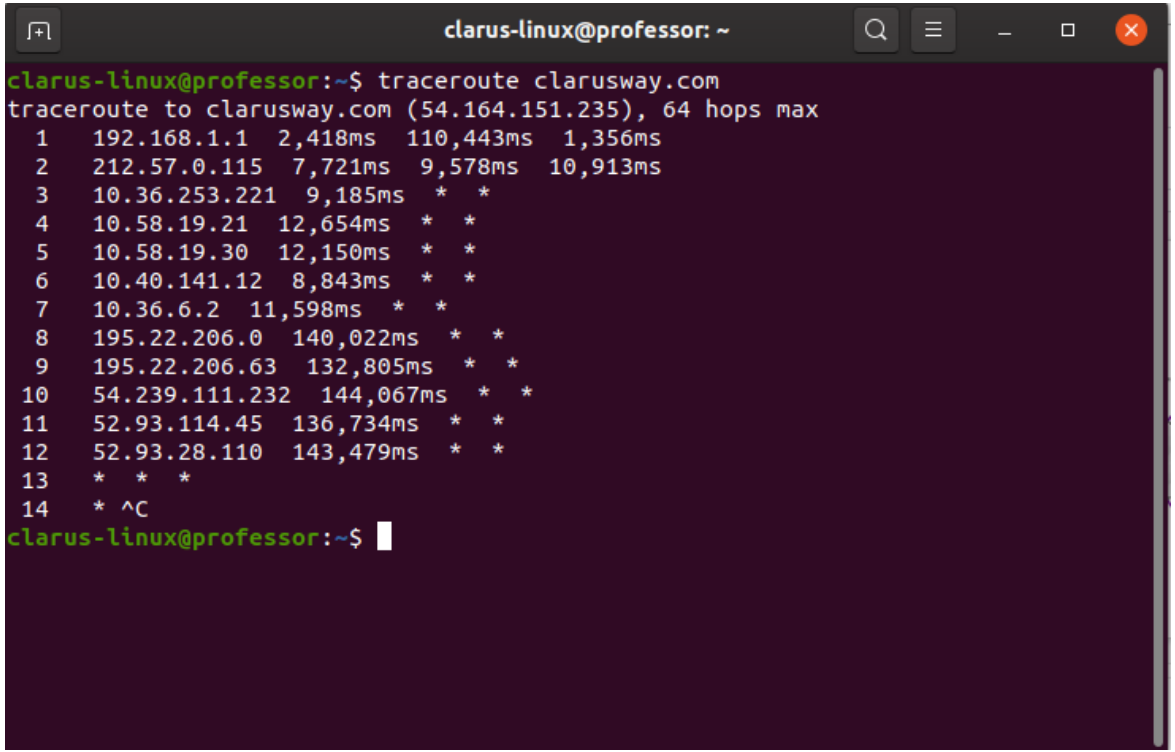


LAN/WAN

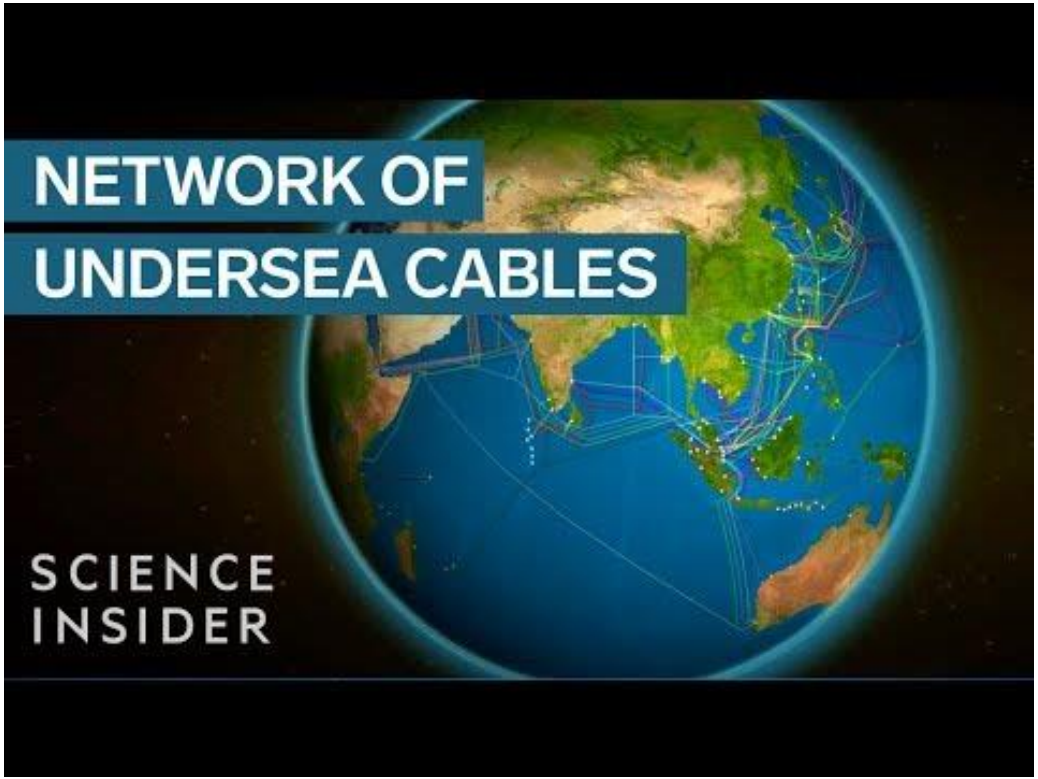
- **WAN: Wide Area Network**



Let's Practice



LAN/WAN



Please write what is

- Internet
- IP address
- TCP/IP
- DNS

Students, write your response!

Circle how you are feeling:

Students, draw anywhere on this slide!

THANKS!

Any questions?

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- tomy@clarusway.com