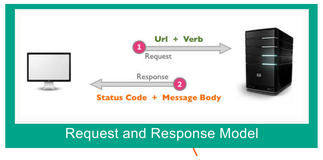
How Does Internet Work?

1 What is the Internet?



Request and Response Model

1 Networking

- The Internet is like a global phone system for computers
- computers call each other and agree with conditions then transfer information.
- you typed "https://clarusway.com" at your browser and sends a request for the main web page ,The clarusway.com computer sends back response which is the web page and ends the call
- Endpoints
  - Desktops ,Laptops, Smartphones etc.

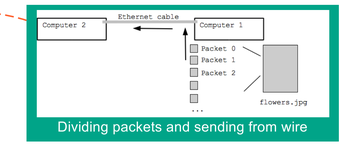
2 Internet

- The internet is the network of networks
- This is not a centralized system
- Nobody controls the internet
- Instead, it's a fully distributed, end-to-end communication system.
- computer has access to any computer
- web sites have unique IP addresses
  - Most of the time, the internet is explained with an analogy to Postal Services
- It ships the binary information which are bits and bytes
- with light
  - the medium for the light is the fiber optic cables


Fibre optic cables run along the bottom of earths oceans

3 Ethernet - Local Area Network (LAN)

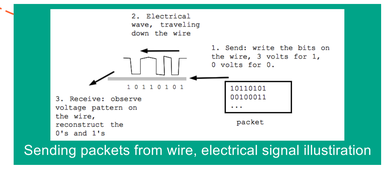
- small scale networks.
- two popular LAN; Ethernet and WiFi.
- Ethernet is a wired LAN
- Mega/Giga bits per second
- Bandwidth means the speed of an internet connection
- use packets for data transfer
  - receiver will take these packets and join this packet as one part
  - We will divide to packets and send them
- We will send each bit go through left to right and for each 1, put 3 volts on the wire, for each 0, put 0 volt on the wire
  - This process called digital transmission (just 1's and 0's)



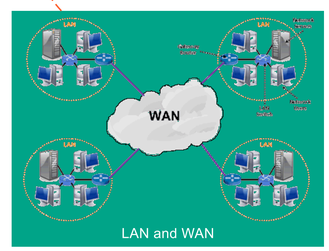
Dividing packets and sending from wire

4 WiFi - Local Area Networks (LAN)

- It uses radio channels for data transfer
- every computer listens to the shared channel
- WiFi broadcasts data packets
- Ethernet-Wifi Scenarios
  - 1 Busy LAN
    - Radio channel can be busy with many packets (e.g. many users exist on LAN). Radio channel packet size decreases as the number of users increases. But it doesn't break.
  - 2 Corruption
    - When the packet was corrupted in transit, the receiver will request the re-send of that packet.
  - 3 Bad Guy
    - Bad guy intercepts packets that are intended for others, for this reason, we are using encryption
- Wide Area Network
  - is a geographically distributed private telecommunications network
  - interconnects multiple local area networks (LANs).



Sending packets from wire, electrical signal illustration



LAN and WAN

2 TCP/IP Protocol

1 Introduction

- Transmission Control Protocol/Internet Protocol
- It describes how the data will get transmitted and routed from end to end communication.
- separate and individual protocols
- fundamental protocols for the internet
- main goal for these protocols is to provide an end-to-end data transfer model
- it is based on the client-server structure
- A protocol is a method of communication between two devices

2 Internet Layer

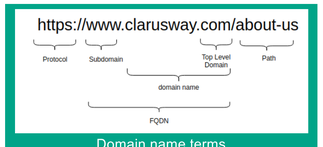
- is responsible for finding the best route to the destination address for the data packets
  - it's controlled by the routers
- (Internet Service Provider (ISP)) providing the internet service.
- every participant computer has a unique number known as their IP address
- The routers examine the data packets and look for the destination addresses and guide the data packets to their destinations.
- IP number system has two versions
  - IPv4
    - 32bit
    - 4.3 billion unique addresses
  - IPv6
    - 128bit
    - 340 undecillion (10*36) unique addresses
- Due to the scarcity, a dynamic IP allocating process is administered by the Internet Service Providers and a new IP version,

Internet Protocol (IP)

3 Domain Name System(DNS)

1 Domain Name Terminology

- Human readable names are domain names
- computer-readable names are IP addresses
- For example "google.com" is a domain name and 216.58.206.174 is an example of an IP address
- Domain names can have subdomain for different purposes
- Every domain name has domain suffix such as com, org, gov, net
- This domain suffix's name is Top Level Domain (TLD)
- Fully Qualified Domain Name (FQDN) is the most complete domain name that contain subdomain, domain name and TLD
- The longest web addresses are URLs. URL stands for "Uniform Resource Locator."



Domain name terms

2 Domain Name System

- People prefer names but computers prefer numbers for addresses
- computers access Internet devices by their IP addresses
- A name server translates domain names into IP addresses
- DNS records are used for translating domain names to IP addresses
- We can see DNS records with some terminal commands.

DNS

- Practice
  - 1 you should open your terminal/command prompt
  - 2 Second write to the command prompt: ping google.com
  - 3 Now you obtained IP address of google.com, go to your browser's address bar and type IP address then press enter

4 Application Programming Interface(API)

When you use an application on your mobile phone, the application connects to the Internet and sends data to a server. The server then retrieves that data, interprets it, performs the necessary actions and sends it back to your phone. The application then interprets that data and presents you with the information you wanted in a readable way. This is what an API is - all of this happens via API.