Emerging technologies

- Big Data
- Cloud Computing

SAAS

Uses technology to deliver apps that are managed by a third party vendor.

PAAS

Provides components for developers to create custom applications.

IAAS

Self service, resources can be purchased on demand as required.

- Social media

Challenges

- Data is collected, sometimes, with no permission or any agreement of companies or individuals
- Errors are widely disseminated and hardly to correct
- Merging data creates more invasion of privacy for individuals

Network classification

When classification is on size:

- **PAN** - Personal area networks, just connect some computers in a room or maybe an AP with some devices connected
- **LAN** - Local area networks, mostly private or covering some facilities to connect and share data
- **MAN** - Metropolitan area networks, are mostly related to a city or specific region, it can include telephone services or even other kinds or emergency networks

- **WAN** - Wide area networks cover vast areas, from a country to a continent, it can include 3G or 4G of a country

When classified by topology:

- **Bus** - Machines connected to a bus line they use de protocol Carrier Sense Multiple Access (CSMA), they are so related to the bus, that if it's broken or unavailable, connection is completely lost.
- **Star** - Machines connected to a Switch

Protocols

Protocols are rules by which activities are conducted on a network.

- **CSMA/Collision detection -** Used mostly in ethernet, when two machines want to talk, both wait a random time to try again
- **CSMA/Collision avoidance -** Used in WiFi, where not all machines can hear each other (hidden terminal problem); and gives advantage to the machine that has been waiting for a certain amount of time.

Devices

- **Repeater** - Passes all messages between two buses
- **Bridge** - Passes messages that are destined for computers on the other bus
- **Switch** - Like a bridge but with the possibility to connect multiple buses
- **Router** - Connects two incompatible networks with the result of an internet.

Communication in the network

Client-Server model

- Many clients, one server (executing continuously)
- Client makes requests to process
- Server satisfies or denies request based on the way it was done

P2P peer to peer model

- Two processes communicating as equals

- Processes executing on a temporary basis

The Internet

Based on address uniqueness called the IP (Internet Protocol) that identifies all connected devices on the worldwide network

Internet Applications

- **NTTP** - Network news transfer protocol
- **FTP** - File transfer protocol
- **SSH** (Telnet former) - Secure Shell
- **HTTP** - Hypertext transfer protocol
- **SMTP** - Simple mail transfer protocol
    - Domain mail server collects incoming mail and transmits outgoing mail
    - Mail server delivers collected incoming mail to clients via POP3 or IMAP.
- **VoIP** - Voice over internet
- **Internet media streaming** - On demand streaming of video content, mostly performed on

World wide web

Componentes we use from the W3C

- **Hypertext** - combines internet technology with the concept of linked-documents. It embeds hyperlinks to other documents.
- **Browser** - The user interface of the internet, it's needed for decode hypertext in the way programers intended it to be read or seen
- **Web Server** - Service on the actual server that delivers the hypertext or other internet content ex: Apache, Nginx, IIS and even Python or Ruby.
- **URLs and HTTP**- URL is the way to reach a file or document over the internet, the HTTP is the protocol to do that, it mainly works on the port 80 of the server an is delivered by the webserver

Hypertext markup language (HTML)

Markup language that determines how a document has to be read, is based on ‘tags’ to deliver the structure of the document to a browser

Internet Layers

- Application - constructs a message with the recipient address
- Transport - Chops the message into packets
- Network - Handles routing through the Internet.
- Link - Handles actual transmission of the packets

TCP/IP protocol suite

- TCP stands for Transmission Control Protocol and Internet protocol, it’s a set of rules and procedures by which computer network establishes end to end connectivity

Cyber Security

- **Malware** -
    - **Phishing** - A common technique that sends a fake message to the recipient, stealing cookies or installing some other malware on the target computer
    - Sniffing - Commonly techniques used for Man in the middle of the attack
    - **Spoofing** - When attackers make fake websites or fake accounts to steal credentials or valuable information
    - **Trojan horses** - This programs came enter the target computer disguising as a desired program or utility that the user installs
    - **Worms** - This programs make multiple copies of themselves in different computers among the network, can be devastating, changing files or changing the system or mass storage with different attacks
    - **Spyware** - Software that installs and steals information of target computer, and then forwards this information to a third party with no agreement or knowing from the user

- **DoS** - Denial of service attack, when a computer sends several messages to the target trying to overload it
- **DDoS** - Distributed Denial of service is when the DoS

Prevention techniques

- Firewalls
- Spam filters
- Proxy servers
- Antivirus softwares