\*\*Dito natin lagay mga notes natin :)\*\*

**Internet** - global network of networks(google)

- hierarcy, infrastructure

INTER NETWORKING

**inter** - outside

**intra** - within the border

**Network** - interconnected devices ('nodes')

- share data

**Interconnected technologies** – Wired /Wireless.

**Protocols** –rules to interact to each other.

**Store and Forward (S &F)-**  send message without establishing connection.

characterized by

1**.Hardware**

a. nodes - the actual devices i.e computers

IoT - Internet of Things

b.Interconnected Technologies - Wired - utp, fiber; Wireless - infrared,bluetooth

2.**software**

a.protocols

b.device drivers -software that run active (something missing here)

computer to computer - serial communication

- one cable, send data with 1s and 0s

Problems of wired and wireless - susceptible to noise

**LAN** - Local Area Network

interconnection of networks with the use of ISPs

different ISPs can connect with each other

connection between countries - underwater(preferred)/ satellite

**1969 - modern internet was born**

circuit switch network -- used by old telephones

store and forward - cellphones (texting)

**IPv4 - 32-bit**

**IPv6 - 64-bit**

**Early 1960's -->** DARPA (Defense Advanced Research Project Agency) --> packet switch

circuit switch - relaying and keeping the connection

packet switching

send and forward --> send-->store-->send-->...until it reaches the destination

**ARPANET** (Advanced Research Project Agency NETwork) --> 4 computers communicate

**First popular app --> email - 1972**

**World Wide Web** - information system that uses Hypertext links

- information system on the internet

- allows documents to be connected to other documents by hyperlinks

- was created for researchers and scientist to share their findings and research

- back then it is more textual

**Wide Area Information Service (WAIS)** - multiple server locations

- early information service

**Gopher (protocol)** - application layer protocol

- similar to WAIS

- hierarchical in nature

- distibuting, seraching, retrieving

- a TCP/IP application layer protocol designed for distributing searches and retrieving documents over the internet

**USETNET** - worldwide distributed discussion system

- similar to discussion groups

**Semantic Web** – analyzes the meaning of the searches.

**1989 (Sir Tim Berners-Lee) --> HTTP, HTML, URL**

HTML – HyperText Markup Languge

URL – Uniform Resource Locator

**HTTP FUNDAMENTALS**

HTTP - jointly developed by the 23c and the IETF

- standard way of communicating

ITCF – Internet Engineering Task Force

Version history

HTTP 0.9 (1991)

HTTP 1.0 (RFC 1945, edited may 1996)

HTTP 1.1 (RFC 2068 Rewritten specifications on Jan 1997)

HTTP 2 (RFC 7540 May 2015)

* Patterned by SPDY
* Backwards compatible with HTTP 1.1

-HTTP runs on top of TCP/IP, port 80 by default. Port 443 for HTTPS (HTTP over SSL/TLS)

-Socket is the combination of IP address and a port

-Port numbers range from 0-1024

-IANA

-HTTP is based on client-server architecture

* Clients AKA user agents

-web browsers, web crawlers/spiders (google bot), other end user tools

* Servers

-engine servers, proxy servers, gateways, tunnels

-HTTP uses a request-response standard protocol

* The client sends an HTTP request message to the server
* The server processes the request and replies with an HTTP response message
* Pull push poll

-HTTP is a stateless communications protocol

* Servers do not keep info about clients in between requests

-HTTP provides support for other functionalities such as

* Cache control
* Content media type (MIME – multipurpose internet mail extension) specification
* Language and character specification
* Context/transfer codings
* Content negotiation
* Client server protocol negotiations
* Persistent connection
* Request pipelining
* Authentication/autorization

web Server

Web Client

Semantic web - next step

- uses natural language

**HTTP RESOURCE ADDRESSING**

Http resources are identified doing URI’s (RFC 3986) or more specifically HTTP URIs

* Scheme (http/https)
* Authority
  + User information or authentication credentials (deprecated).
* host
* domain name (resolved to an IP address using DNS) of the server where the resource resides (or will be created).
* Port number
* Path – path to resource (resolved relative to the document root on the server)
  + May refer to a static/dynamic resource
* Query
  + Typically provided as key value pair with (&) separators between key/value pairs
  + May be URL – encoded.
* Fragment identifier (bookmark) - #

**HTTP REQUEST MESSAGE**

* Request Line
  + Method
  + Request URI
  + HTTP Protocol Version
* Message Headers (general, request, and/or entity headers)
  + HTTP 1.1 requres at least the host request header to be provided
* Empty line (CRLF)
* Message Body

**HTTP RESPONSE MESSAGE**

* Status Line
  + HTTP Protocol Version
  + Status Code
  + Reason Phrase
* Message Headers (general, request, and/or entity headers)
* Empty Line
* Message Body

Status Code:

* Informational (1xx) – 100(Continue), 101(Switching protocol)
* Success (2xx) -
* Redirection (3xx) -304(Not modified)
* Client Error (4xx)- 400(Bad Request), 401(Client Error)
* Server Error (5xx)

**HTTP REQUEST METHODS**

* Put
  + Store the enclosed entity in the message body under the specified request URI
* Delete
  + Delete a data in a server
* Options
  + To know what the option request type that is allowed to the client
* Trace
  + Request a loopback of the request (request the server to echo back to the client the received request message)
* Connect
  + Request the establishment of a tunnel
* Safe methods
  + Not affecting any data
* Idempoted methods
  + Repeatedf execution, same result
* Cacheable methods
* Extension Methods
  + WEBDAV RFC 4918
  + Propfind, proppicthc,mkcol,copy,move,lock,unlock.

**HTTP Message Headers**

**General Header fields**

Cache-Control no cache

| Connection-keep alive

| Date tue, nov 1, 1001

| Pragma

| Trailer

| Transfer-Encoding

| Upgrade switch protocols

| Via

| Warning

**Request Header Fields**

* Accept text/plain
* Accept-charset Unicode-8859
* Accept encoding gzip
* Accept language en,fil
* Authorization basic [hash]
* Proxy-authorization credentials
* If match etag
* If non-match
* If range etag+date
* If modified since http-date
* If unmodified since
* Referrer http://www.tutorialspoint.org/http/index.htm

**Response Header Fields**

* + - Used by servers
    - Response messages
* Accept Ranges bytes
* Age delta-seconds
* Etag
* Location http://www.tutorialspoint.org/http/index.htm
  + used for redirection
* Proxy Authenticate challenge
* Retry-after HTTP-date | delta-seconds
* Server
* Vary(depende sa request) Accept-Language, Accept-Enconding
* WWW Authenticate challenge

**Entity Header Fields**

* Allow HTTP METHOD
* Content Encoding gzip
* Content Language fil, en
* Content Length bytes
* Content Location URI
* Content-MD5(checking the integrity of the message) parang etag yung syntax
* Content Range(depende sa gusto mong range) first 500 bytes(0-499)
* Content Type text/html
* Expires date
* Last Modifier date

**HTTP STATUS CODE**

Informational

* 100 continue
* 101 switching protocols

Success

* 200 OK
* 201 Created
* 202 Accepted
* 203 Non-Authorized Info
* 204 No Content
* 205 Reset Content
* 206 Partial Content

Redirection

* 300 Multiple Choices
* 301 Moved Permanently
* 302 Found
* 303 See Other
* 304 Not Modified
* 305 Use Proxy
* 306 Switch Proxy
* 307 Temporary Redirect

Client Error

* 400 Bad Request
* 401 Unauthorized
* 402 Payment Required
* 403 Forbidden
* 404 Not Found
* 405 Method not Allowed
* 406 Not Acceptable
* 407 Proxy Authentication Required
* 408 Request Timeout
* 409 Conflict
* 410 Gone
* 411 Length Required
* 412 Precondition failed
* 413 Request Entity Too Large
* 414 Request-URI too large
* 415 Unsupported Media Type
* 416 Request Range not satisfied
* 417 Expectation Failed
* 426 Upgrade Required

Server Error

* 500 Internal Server Error
* 502 Bad Gateway
* 503 Service Unavailable
* 504 Gateway Time-out
* 505 Http Variation not supported

The Internet

Internet is global network of networks, means it is a global network that millions or billions of computers are connecting to each other to exchange data, information and many more. Internet is decentralized or it’s independent, because each computer or host that is linked to the network is independently working as its own. It operates specific local services that will be available globally and others may connect to it.

There are many theories and claims about the origin of the internet. One of the theories said that the very first packet switching exchange was on October 29, 1969 of the ARPANET which led by professor Leonard Kleinrock. It was said that there are 4 computers that were linked together in different places. The Second theory was creation of the TCP/IP which is a backbone protocol that was developed by Vinton Cerf and other members of a networking group in 1970’s in California. It was developed to solve problems of ARPANET on the linking of computers. This theory states that the beginning of the internet was the meeting and development of the TCP and the discussion of the problems about the interconnecting multiple packet networks. The third theory was originated to the origins of Telco. Kim Veltman said that the very first digital transmission and switching was made by the AT&T Bell Labs in 1962 (nethistory.info, 2004). There are many more claims of theories on the origin of the Internet and it is still on examination.

Reference: http://www.nethistory.info/History%20of%20the%20Internet/origins.html

The World Wide Web

The World Wide Web is a global information medium on the internet that allows documents to be connected to the other documents by linking hyperlinks and identified using Uniform Resource Locator. Hypertext was influenced by the Memex of Vannevar Bush, Markup Language of IBM and the Project Xanadu of Ted Nelson. The World Wide Web uses protocols; Hypertext Markup Language (HTML), Hypertext Transfer Protocol (HTTP) and Uniform Resource Locator (URL). The Web is unidirectional which making someone link to another sources without action by the source.

Tim Berners Lee was working in CERN with the project named ‘Enrique.’ It was him who created the WWW on 1989 in Switzerland. Availability of web server software and browser on 1991. CERN declared on April 30, 1993 that the web is free to everyone. World Wide Web Consortium was founded by Tim Berners Lee to administer the improvement of the web. Another mentionable man, Robert Cailliau makes a great impact on the creation of the web. It was very popular for billions people and access it for fact-finding. Many search engines such as Yahoo and Google takes in action, as well as commercial sites like Amazon.

Many misunderstood and mistakenly think that the Internet and the World Wide Web are the same. Internet is a larger scale which is a global system of network of networks while the Web is just a part of the internet and one of the global information medium that is a global collection of documents that uses hyperlinks, URL and HTTP.

Reference: http://www.nethistory.info/History%20of%20the%20Internet/web.html

**WORLD WIDE WEB**

*WORLD WIDE WEB Definition*

According to LifeWire, “The term World Wide Web (WWW) refers to the collection of public Web sites connected to the Internet worldwide, together with the client devices such as computers and cellphones that access its content. For many years it has become known simply as the Web”.

Reference:

Mitchell, B. (n.d.). The World Wide Web is not the Internet. Retrieved from

https://www.lifewire.com/history-of-world-wide-web-816583

*History*

Sir Tim Berners-Lee after graduating from Oxford University, he became a software engineer at CERN, an European Particle Physics Laboratory and scientist goes there and uses its accelerators but Sir Tim noticed something that they were having a hard time to share information with each other.Therefore, Sir Tim created a solution that he thought it can solved the problem. And by the use of the internet many computer were connected together and Berners-Lee thought he can use it to share information with the use of hypertext.

In 1989, Berners-Lee has his proposal titled “Information Management: A Proposal”. At first his initial proposal was not accepted and at that time his boss was Mike Sendall and he noted at the cover “Vague but exciting”.Even web is not an official project of CERN, Mike given Berners-Lee time to work on it in 1990 and Berners-Lee began to work using a NeXT computer.

In 1990, Berners-Lee written the three fundamental technologies that is still the basic or the foundation of the web which is HTML or HyperText Markup Protocol, URI or Uniform Resource Identifier and HTTP or HyperText Transfer Protocol. He also wrote the first web page editor/browser (“WorldWideWeb.app”) and the first web server (“httpd”) and by the end of the year, the first website was served on the open internet and in 1991 people outside the CERN were invited  to part the web community.

In 1994, Berners-Lee moved to MIT (Massachusetts Institute of Technology) to found the W3C (World Wide Web Consortium), a community who develops open web standards. And Berners-Lee is still the director of W3C up to this time.

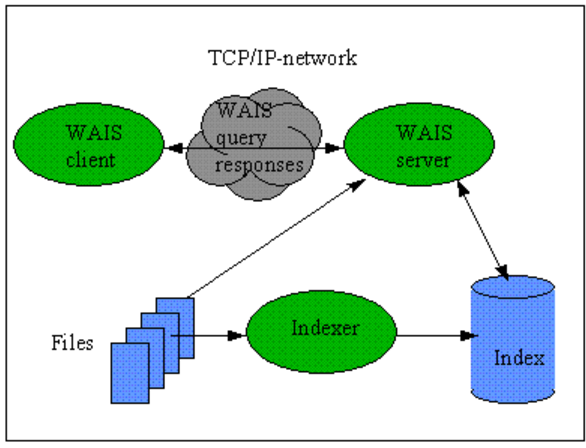
Reference:

History of the Web. (n.d.). Retrieved from

http://webfoundation.org/about/vision/history-of-the-web/

***Applications before WWW***

**WAIS**



        WAIS DIAGRAM

*What is WAIS?*

It stands for Wide Area Information Server. It’s where it can index large amount of information and make it searchable across the network. And it is divided by three parts: client, server and protocol.

Reference

Image: Lesson 11. (n.d.). Retrieved from

http://www.aitel.hist.no/prosjekter/ekstern/mecpol/poi/lessons/11/

Christensson, P. (2006). WAIS Definition. Retrieved from https://techterms.com

**Gopher(protocol)**

It is designed as distributed document delivery system and while the documents is stored in many servers, its client software it shows to the users the hierarchy of items and directories like file system.

Reference

RFC 1436 - The Internet Gopher Protocol (a distributed document search and retrieval

protocol). (n.d.). Retrieved from https://tools.ietf.org/search/rfc1436

**Usenet**

It a collection of newsgroups where users can post messages and the messages are distributed via usenet servers. The messages that are stored in the server stays in a certain period of time. It can be compared as internet forum like reddit but difference is the posted messages is not stored in only one server and as said the messages only retain in a certain period.

Reference

What is Usenet? (n.d.). Retrieved from http://www.usenet.org/

**HTTP**

**HTTP FUNDAMENTALS**

*HTTP*

It is an application layer protocol that allows user of the World Wide Web to share information found in web pages. Its standard port connection is port 80 and  and for HTTPS its port 443.

What is HTTP (HyperText Transfer Protocol)? (n.d.). Retrieved from

http://www.computerhope.com/jargon/h/http.htm

*OVERVIEW*

The standards development of HTTP was coordinated by the Internet Engineering Task Force (IETF) and the World Wide Web Consortium (W3C), culminating in the publication of a series of Requests for Comments (RFCs) RFC 2616 (June 1999) defined in HTTP/1.1, the version of HTTP most commonly used today. In June 2014, RFC 2616 was retired and HTTP/1.1 was redefined by new RFCs 7230-7235. HTTP/2 is currently in draft form.

Krishnan, K. (2014). An Introduction to HTTP. Retrieved from

https://www.slideshare.net/Keerthana17/an-introduction-to-http?next\_slideshow=1

VERSION HISTORY  
 HTTP/0.9 was the first version of the HTTP, and was introduced in 1991.

HTTP/1.0 is specified in RFC 1945, and was introduced in 1996.

HTTP/1.1 is specified in RFC 2616, and was officially released in January 1997

HTTP 2.0 - became an approved standard in 2015. It maintains backward compatibility with HTTP 1.1 but offers additional performance enhancements.

What is HTTP (HyperText Transfer Protocol)? (n.d.). Retrieved from

http://www.computerhope.com/jargon/h/http.htm

Mitchell, B. (n.d.). Explaining HTTP: The protocol that makes the Internet work. Retrieved from

https://www.lifewire.com/hypertext-transfer-protocol-817944

*Characteristics of HTTP*

Request-response mechanism

The client sends a request to the server then the server generates a response for each request of the client.

Resource Identification

Every http request includes a URI.

Statelessness

In a session the server doesn’t store any information of the client.

Metadata support

It is about information can be exchanged in the messages.ita

Sanjoysanyal. (2008). HTTP Basics. Retrieved from

https://www.slideshare.net/sanjoysanyal/http-basics

*HTTP provides support for other functionalities such as:*

Cache control

It allows a client or a server to transmit a variety of directives in either requests or responses. These directives typically override the default caching algorithm.

Content media type (MIME – multipurpose internet mail extension) specification

HTTP uses Internet Media Types in the Content-Type and Accept header fields in order to provide open and extensible data typing and type negotiation.  
Language and character specification

HTTP uses the same definition of the term “character set” as described for MIME. Fot language is composed of 1 or more parts: A primary language tag and a possibly explicitly excluded.

Context/transfer codings

Content codings allows a document to be compressed or otherwise usefully transformed without losing the identity of its underlying media type and without loss of information. And Transfer Codings value is used to determine an encoding transformation that has been or may need to be applied to an entity-body in order to ensure “safe transport” through the network

Content negotiation

HTTP responses includes an entity which contains information for interpretation by a human user.

Client server protocol negotiations

advantageous when the algorithm for selecting from among the available representations is difficult to describe to the user agent, or when the server desires to send its "best guess" to the client along with the first response

Persistent connection

Keeping the connection open and connection can be closed by the server or the client

Request pipelining

It allows the client to send request without waiting for response because server responds at the same order.

Authentication/authorization

It provides several optional challenge-response authentication mechanisms which the server can challenge the client request by the client providing the authentication information.

**HTTP Request Message**

A HTTP request message from an HTTP client sends to a server. It includes the method to be applied to the resource, the identifier of the resource, and the protocol version in use ([www.w3.org](http://www.w3.org), 2014). It includes the following, Request-Line, Message Headers, Empty Lines and Message Body.

Example:

**Request Line:** Get http://www.org/ HTTP/1.1

**Header:** Host: [www.webtek.org](http://www.webtek.org)

**Extension Header:** Upgrade-Insecure-Request: 1

**Message Body:** licenseID=string&content=string&/paramsXML=string

**Request-Line** (CRFL-terminated line consisting of three space - separated values)

It starts with the method token that is either standard or extended. Next is the Request-URI with the HTTP Protocol version. It ends with CRFL-terminated. It is separated by three SP values.

Request Method

* Identified by the Request-URI, it shows the method that is to be used on the resource. The method should always be in uppercase because it is case-sensitive.

Request-URI

* Request-Uniform Resource Identifier, the resource which will be pertain the request will be identified. It has four options that is dependent on the request.

**HTTP Response Message**

After the HTTP client sent the request message, the server will receive and interpret the request message.

* Status-Line (CRLF –terminated line consisting of three space-separated values)
  + HTTP Protocol Version
  + Status Code
  + Reason Phrase
* Message Headers (general, response, and/or entity headers)
* Empty Line ( nothing preciding CRLF)
* Message Body (optional)

**Status-Line**

- Compose of the version of the protocol, next to it is the HTTP status code and the meaning of the code.

**Response Message Header**

- Each field is compose of name, separated by a colon and a field value. These field names are case-sensitive. Message Header makes the server able to exceed additional information of the response that is not included in the Status-Line. It also gives information about the server, and the identified resource access of the Request-URI.

Example:

HTTP/1.1 404 Not Found

Date: Fri, 10 Mar 2017 8:16:36 GMT

Server: Apache/2.2.14 (Win32)

Content-Length: 320

Connection: Closed

Content-Type: text/html

<!DOCTYPE HTML>

<html>

<head> <title>404 Not Found</title>

</head>

<body>

<h1>Not Found</h1>

<p>The requested URL /t.html was not found on this server.</p>

</body>

</html>