WEB TECHNOLOGY

Chapter 1: WEB ESSENTIALS

Lecture Two

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Quick Lookback of Previous Class:

- DARPA creates ARPANET – 1968
- • First set of nodes connecting universities among UCLA, Stanford, and University of Utah – 1970
- • First E-Mail sent – 1972
- • Development on TCP/IP – 1973
- • USENET – decentralized news group
- • NSF creates CSFNET which is a 56-kbps network within institute
- • TCP/IP made used in ARPANET

- • IPv4 formal introduction – 1980
- • IBM PC – 1981
- • DNS – 1983
- • Internet, WWW – 1992
- • 1000s of new hosts added to internet – 1994
- • the Federal Networking Council (FNC) defines the term ‘Internet’ – 1995

RESOLUTION:
"The Federal Networking Council (FNC) agrees that the following language reflects our definition of the term "Internet".:

"Internet" refers to the global information system that

- (i) is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions/follow-ons;
- (ii) is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/follow-ons, and/or other IP-compatible protocols; and
- (iii) provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described herein."

Reference: https://www.nitrd.gov/historical-documents/fnc-material/

Basic Internet Protocols: TCP/IP

- TCP/IP stands for Transmission Control Protocol/Internet Protocol and is a suite of communication protocols used to interconnect network devices on the internet. TCP/IP is also used as a communications protocol in a private computer network (an intranet or extranet).

- **(Quick Refresher)** - TCP/IP Protocol suite on next page,
  before that what are the layers in OSI model? & TCP/IP?

(Quick Refresher) TCP/IP Protocol suite:

- Network Interface Layer / Link Layer / Physical Layer: The network interface layer / datalink layer defines how data should be sent, handles the physical act of sending and receiving data, and is responsible for transmitting data between applications or devices on a network.
- This includes defining how data should be signaled by hardware and other transmission devices on a network, such as a computer's device driver, an Ethernet cable, a network interface card (NIC), or a wireless network. It is also referred to as the link layer, network access layer, network interface layer, or physical layer and is the combination of the physical and data link layers of the Open Systems Interconnection (OSI) model, which standardizes communications functions on computing and telecommunications systems.

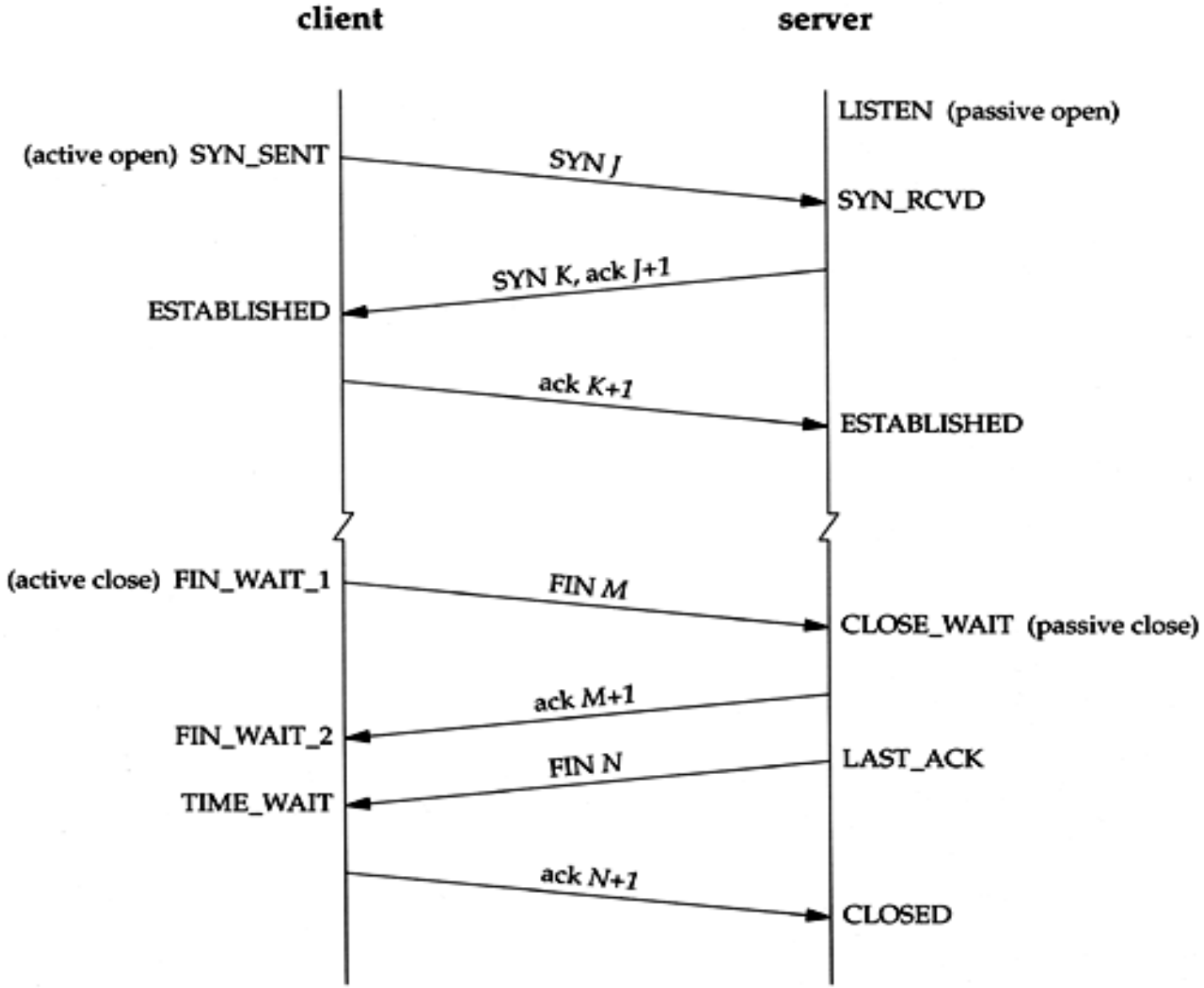
Reference: https://www.fortinet.com/resources/cyberglossary/tcp-ip

- Internet layer: The internet layer is responsible for sending packets from a network and controlling their movement across a network to ensure they reach their destination. It provides the functions and procedures for transferring data sequences between applications and devices across networks.

- Transport layer: The transport layer is responsible for providing a solid and reliable data connection between the original application or device and its intended destination. This is the level where data is divided into packets and numbered to create a sequence.
- The transport layer then determines how much data must be sent, where it should be sent to, and at what rate. It ensures that data packets are sent without errors and in sequence and obtains the acknowledgment that the destination device has received the data packets.

- Application layer: The application layer refers to programs that need TCP/IP to help them communicate with each other. This is the level that users typically interact with, such as email systems and messaging platforms. It combines the session, presentation, and application layers of the OSI model.

TCP/IP 3-way handshake protocol



Reference: https://flylib.com/books/en/3.223.1.188/1/

Client/Server Architecture:

- client-server architecture, architecture of a computer network in which many clients (remote processors) request and receive service from a centralized server (host computer).
- Client computers provide an interface to allow a computer user to request services of the server and to display the results the server returns. Servers wait for requests to arrive from clients and then respond to them.
- Ideally, a server provides a standardized transparent interface to clients so that clients need not be aware of the specifics of the system (i.e., the hardware and software) that is providing the service.

Reference: https://www.britannica.com/technology/client-server-architecture

- Clients are often situated at workstations or on personal computers, while servers are located elsewhere on the network, usually on more powerful machines. This computing model is especially effective when clients and the server each have distinct tasks that they routinely perform.
- What are the examples of Client/Server Architectures?

Components of client server architecture:

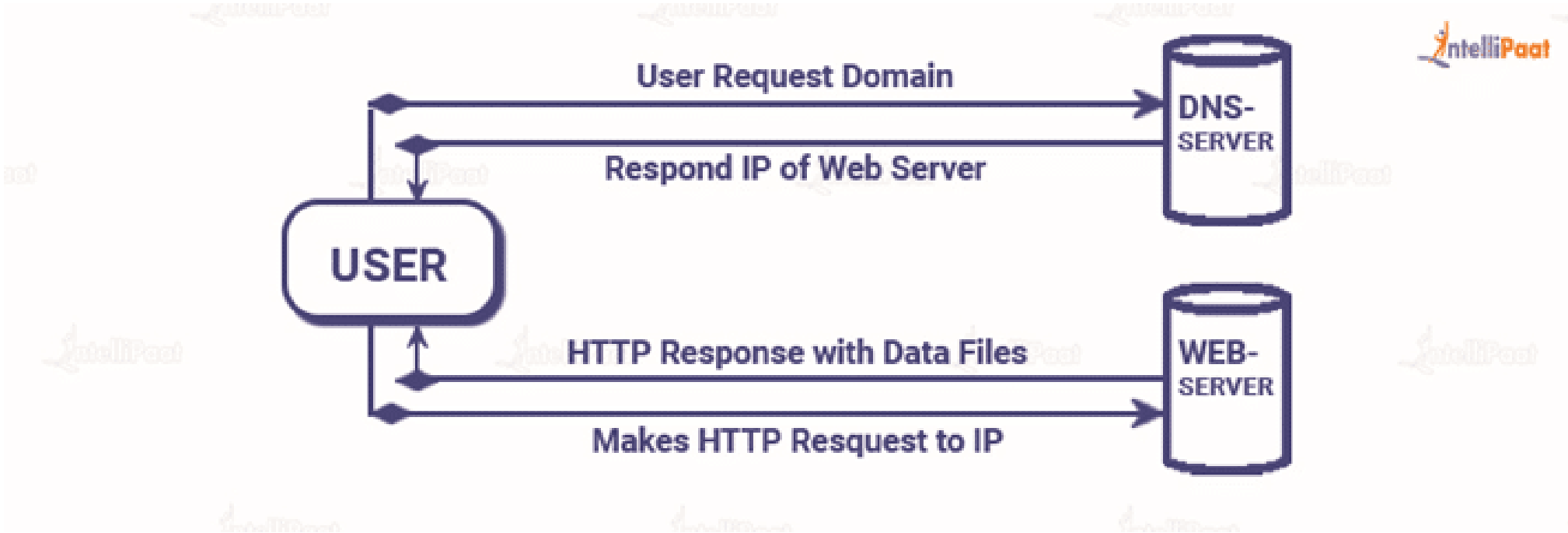
- Essentially, three components are required to make client server architecture work. The three components are workstations, servers, and networking devices. Let us, now, discuss them in detail:
- Workstations
- Workstations are also called client computers. Workstations work as subordinates to servers and send them requests to access shared files and databases. A server requests information from the workstation and performs several functions as a central repository of files, programs, databases, and management policies. Workstations are governed by server-defined policies.

Reference: https://intellipaat.com/blog/what-is-client-server-architecture/

- Servers
- Servers are defined as fast processing devices that act as centralized repositories of network files, programs, databases, and policies. Servers have huge storage space and robust memory to deal with multiple requests, approaching simultaneously from various workstations. Servers can perform many roles, such as mail server, database server, file server, and domain controller, in client server architecture at the same time.

- Networking devices
- Now that we know about the roles that workstations and servers play, let us learn about what connects them, networking devices. Networking devices are a medium that connects workstations and servers in client server architecture. Many networking devices are used to perform various operations across the network. For example, a hub is used for connecting a server to various workstations . Repeaters are used to effectively transfer data between two devices. Bridges are used to isolate network segmentation.

How does client server architecture work?



It works like this: (in a quick preview look):

- The user enters the uniform resource locator (URL) of the website or file and the browser sends a request to the domain name system (DNS) server.
- The DNS server looks for the address of the web server and the DNS server responds with the IP address of the web server.
- After the DNS server responds, the browser sends over an HTTP or HTTPS request to the web server's IP, which was provided by the DNS server.
- The server then sends over the necessary files of the website.
- Finally, the browser renders the files and the website is displayed.