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COMPUTER APPLICATION

11. NETWORK EXAMPLES AND PROTOCOLS

Section – A

Choose the best answer **(1 Mark)**

1. The----------, "the Net," is a worldwide system of computer networks

a) Internet b) mobile c) communication d) protocol

2. Which one of the following will be easy the way to uses Internet technology and the public telecommunication system to securely share business's information with suppliers, vendors, partners and customers.

a) Extranet b) Intranet c) arpanet d) arcnet

3. Match the following and choose the correct answer

i. HTTP -The core protocol of the World Wide Web.

ii. FTP - enables a client to send and receive complete files from a server.

iii. SMTP - Provide e-mail services.

iv. DNS - Refer to other host computers by using names rather than numbers.

a) i, ii, iii, iv b) ii, iii, iv, i c) iii, iv, i, ii d) iv, iii, ii, i

4. Communication over ----------is be made up of voice, data, images and text messages.

a) Social media **b) mobile network** c) whatsapp d) software

5. Wi-Fi stands for----------

a) Wireless Fidelity b) wired fidelity c) wired optic fibre d) wireless optic fibre

6. A TCP/IP network with access restricted to members of an organization

a) LAN b) MAN c) WAN **d) Intranet**

7. RFID stands for ----------

a) Radio Free identification b) real Frequency identity

c) Radio Frequency indicators **d) Radio Frequency Identification.**

8. It guarantees the sending of data is successful and which checks error on operation at OSI layer is-------

a) Application layer b) Network layer **c) Transport Layer** d) Physical layer

9. Which one of the following will secure data on transmissions

a) HTTPS b) HTTP c) FTP d) SMTP

10. ---------- provides e-mail service

a) DNS b) TCP c) FTP **d) SMTP**

11. ---------- refer to other host computers by using names rather than numbers.

a) DNS b) TCP c) FTP d) SMTP

12. TCP/IP is a combination of two protocols:

i. Transmission Control Protocol (TCP) ii. Internet Protocol (IP)

iii. Selection Protocol (SP) iv. Captial Protocol (CP)

a) i, ii b) i, iii c) iii, iv d) ii, iii

Section-B

Answer the following questions **(2 Marks)**

1. Define Intranet.

- It is a private network using Internet technology to share part of business information with supplier's partners and customers.
- It may consist of many interlinked local area networks.

2. What is the uses of mobile networks?

- Mobile networking assign to the technology that can **support data / voice,** network connectivity using via radio transmission solution, wireless.
- Wireless communications use both data and voices are being transmitted over both circuit via switched networks and packet-switched networks.

3. List out the benefits of WiFi.

- It provides mobility.
- It provides connection to Internet.
- Flexibility of LAN.
- Ensures connectivity.
- It allows places that are remote to benefit from connectivity.
- Low cost, high benifts.

4. How many types of RFID system available and what are they?

➢ Two types of RFID tags were Active RFID and Passive RFID systems.

1. Passive RFID tag will be used the reader radio wave energy to really its stored information back to the reader.

2. Battery powered RFID tag is installed with small battery that powers the broadcast of information

5. Expand HTTP, HTTPS, FTP.

HTTP : Hypertext Transfer Protocol

HTTPS : Hyper Text Transfer Protocol Secure

FTP : File Transfer Protocol

Section-C

Answer the following questions **(3 Marks)**

1. Compare Internet, Intranet and Extranet.

Type	Definition	Example
Internet	A global network, public TCP/IP network used by over a billion people all over the world.	Sending email to a friend
Intranet	A TCP/IP network with access restricted to members of an organization.	Accessing your record in the employee personnel file
Extranet	TCP/IP network with restricted access to members.	Checking availability of inventory from an outside supplier

2. List out the components of a RFID enabled system.

- **RFID component** on the tags has two parts:
- A **microchip** which stores and processes the information, and the **antenna** to receive and transmit a signal.
- The **Tag** replies the information from its memory bank.
- The **Reader** will transmit to read the result to RFID computer program.

3. Write short notes on HTTP, HTTPS, FTP.

HTTP :

- A protocol used between a web client and a web server protects non *secure* data transmissions.
- The core protocol of the World Wide Web.

HTTPS:

- A protocol used between a web client and a web server permits *secure* data transmissions.

FTP :

- Used between computers for sending and receiving data.
- Enables a client to send and receive complete files from a server.

4. What are the layers available in TCP/IP Reference Model?

- **Network Access Layer** - Concerned with building packets.
- **Internet Layer** - Describes how packets are to be delivered.
- **Transport Layer** - Ensure the proper transmission of data.
- **Application Layer** - Application network processes.

5. Expand ARP, ICMP, SMTP and DNS.

ARP	**:**	Address Resolution Protocol
ICMP	**:**	Internet Control Message Protocol
SMTP	**:**	Simple Mail Transfer Protocol
DNS	**:**	Domain Name System

Section - D

Answer the following questions: **(5 Marks)**

1. Explain about Internet, Intranet and Extranet.

INTERNET:

- The **Internet**, "the Net," is a worldwide system of computer networks.
- A global network, public TCP/IP network used by over a billion people all over the world.
- A network of networks where the users at any one computer can, if they have permission, get information from any other computer.
- The Internet is a network of global connections – comprising private, public, business, academic and government networks – linked by guided, wireless and fiber-optic technologies.
- It was perceived by the Advanced Research Projects Agency (ARPA) of the U.S. government in 1969 and was first recognized as the ARPANet.
- **Example:** Sending email to a friend ,Download programs and files, Social media, E-Mail

INTRANET:

- It is a private network within an enterprise to share company data and computing resources between the employees.
- It may consist of many interlinked local area networks.
- It includes connections through one or more gateway (connects two networks using different protocols together known as protocol convertor) computers to outside Internet.
- **Example:** Sharing of company policies/rules and regulations, Access employee database, Distribution of circulars/Office Orders

EXTRANET:

- It is a private network that uses Internet technology and the public telecommunication system to securely share business's information with suppliers, vendors, partners, customers, or other businesses.
- **Example:** Customer communications, Online education/ training, Account status enquiry.

2. Discuss about OSI model with its layers.

- Open System Interconnection (OSI)model describes the standards for the inter-computer communication.
- OSI model enables network protocols along with software and systems to be developed based on general set of guidelines.

OSI Layers:

1. Physical Layer:

- This is the 1st layer, it defines the electrical and physical specifications for devices.

2. Data Link Layer:

- It is the 2nd layer and it guarantees that the data transmitted are free of errors.
- This layer has simple protocols like "802.3 for Ethernet" and "802.11 for Wi-Fi".

3. Network Layer:

- It is the 3rd layer determining the path of the data packets.
- At this layer, routing of data packets is found using **IP Addressing**.

4. Transport Layer:

- It is the 4th layer that guarantees the transportation/sending of data is successful.
- It includes the error checking operation.

5. Session Layer:

- It is the 5th layer, identifies the established system session between different network entities.
- It controls dialogues between computers .
- While accessing a system remotely, session is created between your computer and the remote system.

6. Presentation Layer:

- It is the 6th layer that does the translation of data to the next layer (Prepare the data to the Application Layer).
- Encryption and decryption protocols occur in this layer such as, Secure Socket Layer (SSL).

7. Application Layer:

- It is the 7th layer, which acts as the user interface platform comprising of software within the system.

3. Difference between TCP/IP and OSI Reference Model.

Sl.No	OSI Reference Model	TCP/IP Model
1.	**Open System Interconnection (OSI)**	**Transmission Control Protocol (TCP/IP)**
2.	**OSI** describes the standards for the inter-computer communication.	**TCP/IP** is a set of protocols which governs communications among all computers on the Internet.
3.	OSI has **Seven layers**	TCP/IP has **Four layers**
4.	It is a theoretical model which is used for computing system.	It is a client server model used for transmission of data over the internet.
5.	Develeloped by ISO**(International Standard Organization)**	Developed by **(Department of Defense)**
6.	OSI follows a **vertical approach**.	TCP/IP follow a **horizontal approach**.
7.	OSI is **protocol independent.**	TCP/IP is **protocol dependent.**

4. Explain about the development, merits and demerits in Mobile networks.

Development of Mobile Networks:

The generations of mobile networks are as follows.

- First Generation(1G) 1981- NMT launch
- Second Generation(2G) 1991-GSM Launch
- Second to Third Generation Bridge (2.5)2000 – GPRS launch
- Third Generation(3G) 2003- UK 3G launch
- Fourth Generation (4 G) 2007
- Fifth Generation (5G) 2019+

Merits of Mobile Networks:

- It provides both voice/data services.
- It connects both fixed and wireless telephone users.
- It is used in areas where cables cannot be laid out due to its wireless nature.
- It is easy to maintain.
- It is easy to upgrade the equipments.
- The mobile and fixed subscribers are connected immediately with cellular network as soon as mobile phones are switched on.
- All the handshake signals between mobile and base station are automatically exchanged.

Demerits of Mobile Networks:

- Cost
- Vulnerable to Security risks
- Additional training is needed to use new technology.
- Cyber Crime.

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COMPUTER APPLICATION

12. DNS (DOMAIN NAME SYSTEM)

Section – A

Choose the best answer **(1 Mark)**

1. Which of the following is used to maintain all the directory of domain names?
a) Domain name system b) Domain name space
c) Name space d) IP address

2. Which of the following notation is used to denote IPv4 addresses?
a) Binary b) Dotted-decimal c) Hexadecimal **d) a and b**

3. How many bits are used in the IPv6 addresses?
a) 32 b) 64 **c) 128** d) 16

4. Expansion of URL is
a) Uniform Resource Location b) Universal Resource Location
c) Uniform Resource Locator d) Universal Resource Locator

5. How many types are available in Relative URL?
a) 2 b) 3 c) 4 d) 5

6. Maximum characters used in the label of a node?
a) 255 b) 128 **c) 63** d) 32

7. In domain name, sequence of labels are separated by
a) ; **b) .(dot)** c) : d) NULL

8. Pick the odd one out from the following.
a) node b) label c) domain **d) server**

9. Which of the following initiates the mapping of domain name to IP address?
a) Zone b) Domain c) Resolver **d) Name servers**

10. Which is the contiguous area up to which the server has access?
a) Zone b) Domain c) Resolver d) Name servers

11. ISP stands for
a) International Service provider **b) Internet Service Provider**
c) Internet service Protocol d) Index service provider

12. TLD stands for
a) Top Level Data b) Top Logical Domain c) Term Level Data **d) Top Level Domain**

13. Which of the following statements are true?
i) Domains name is a part of URL. **ii)** URL made up of four parts
iii) The relative URL is a part of Absolute URL **iv)** URL doesn't contain any protocol
a) i & ii **b) ii** c) i, ii & iii d) i, ii & iv

14. **A**ssertion (A) : The number of addresses used in IPv6 addressing method is 128 .
Reason (R) : IPv6 address is a 128 bit unique address.
a) A is true and R is false.
b) A is false and R is true.
c) Both A and R are correct and R is the correct explanation of A.
d) Both A and R are correct and R is not the correct explanation of A.

15. Match the following

a. domain - 1. Progress that initiates translation
b. zone - 2. contains database of domain names
c. name server - 3. single node
d. resolver - 4. contiguous nodes

a. 1432 **b.3421** c. 3214 d. 3412

Section-B

Answer the following questions **(2 Marks)**

1. List any four domain names.

Domain Name	Meaning
com	Commercial Organisation
edu	Educational Institutions
gov	Government (US)
mil	Military groups

2. What is an IP address?

- Internet Protocol (IP) address is simply the logical address in the network layer.
- IP address is also used to uniquely identify a computer over the network.
- No two systems can have same IP address.

3. What are the types of IP address?

- There are two types:
- IPv4 - IPv4 address is a 32-bit unique address given to a computer system.
- IPv6 - IPv6 address is a 128-bit unique address given to a computer system.

4. What is an URL?

- URL **(Uniform Resource Locator)** is the address of a document on the Internet.
- URL is made up of four parts- protocols, hostname, folder name and file name.
- Each part has its own specific functions.

5. List out four URLs you know.

- https://www.google.com/
- https://www.yahoo.com/
- https://www.rediff.com/
- https://www.facebook.com/

6. What are the types of URL?

- URL is divided into two types:
- **Absolute URL** - Absolute URL is the complete address of a document on the Internet.
- **Relative URL** - Relative URL is the partial address of a document on the Internet.

7. What is a domain?

- **Domain** is a sub tree in domain name space tree structure.
- The domain can be further divided into **sub domains.**

8. What is a zone?

- **Zone** is the contiguous part up to which the server has access.
- The domain assigned for the server does not divide into further sub domains then zone is same as domain.

9. What is a resolver?

- The **resolver** is a program which is responsible for initiating the translation of a domain name into an IP address.
- A resolver is stored in the host.
- There is no need of any protocol to form a connection between the resolver and the user program.

10. What are the categories available in domain name space?

- The DNS hierarchy is comprised of the following elements:
  1) Root Level
  2) Top Level Domains
  3) Second Level Domains
  4) Sub-Domain
  5) Host

11. Write any four generic Top Level Domain.

Domain		Purpose
com	-	Commercial organizations
edu	-	Educational institutions
gov	-	Government institutions
mil	-	Military groups

Section-C

Answer the following questions **(3 Marks)**

1. Write a note on DNS.

- Domain Name System (DNS) maintains all the directory of domain names and help us to access the websites using the domain names.
- It translates the domain name into IP address.
- The three important components of the Domain Name System are Namespace, Name server and Zone.

2. Differentiate IPv4 and IPv6.

IPv4	IPv6
IPv4 address is a **32-bit** unique address given to a computer system.	IPv6 address is a **128-bit** unique address given to a computer system.
The number of addresses that can be formed in IPv4 is 2^{32}.	The number of addresses that can be formed in IPv6 is 2^{128}.
IP address represented by, ● Binary notation ● Dotted-decimal notation	IP address represented by, 4-digit Hexadecimal numbers separated by colon symbols.

3. Differentiate Domain name and URL.

Domain Name	URL
Domain Name is a symbolic name associated with an IP address	URL (Uniform Resource Locator) is the address of a document on the Internet.
Domain name is the sequence of labels separated by dot (.).	URL is made up four parts–protocols, hostname, folder name and file name.
Example: challenger.atc.fhda.edu.	**Example:** http://quora.com/answer

4. What are the differences between Absolute URL and Relative URL?

Absolute URL	Relative URL
Absolute URL is the complete address of a document on the Internet.	Relative URL is the partial address of a document on the Internet.
Absolute URL contains all the information that are required to find the files on the Internet.	Relative URL contains only file name or file name with folder name.
All the four parts is very important in absolute URL.	Relative URL is used when the file is on the same server related to original document.

5. Write a note on domain name.

- Domain name is the sequence of labels, which are separated by dot (.).
- The domain name is always read from the lower level to higher level i.e., from the leaf node to root node.
- Since the root node always represent NULL string, all the domain name ending with dot.

6. Differentiate web address and URL

WEB ADDRESS	URL
Web Address more commonly defines a unique name that helps people remember a URL.	URL (Uniform Resource Locator) is the address of a document on the Internet.
It is a unique string of letters or characters that identify your specific place on the internet.	URL is made up four parts–protocols, hostname, folder name and file name.

Section - D

Answer the following questions: **(5 Marks)**

1. Explain briefly the components of DNS.

- Domain Name System (DNS) maintains all the directory of domain names and help us to access the websites using the domain names.
- It translates the domain name into IP address.

DNS Components:

- There are three important components in the Domain Name System.
- They are,
  - Namespace
  - Name server
  - Zone

1) NAME SPACE:

- The domain names must be very unique and appropriate.
- The names should be selected from a namespace.
- The name space can be organized in two ways
  - Flat name space
  - Hierarchical name space

a) FLAT NAME SPACE:

- Flat name space is where the name is assigned to the IP address.
- They do not have any specific structure and they cannot be used in large system.

b) HIERARCHICAL NAME SPACE:

- Hierarchical name space is where the name is made up of several parts.
  - The first part may represent the nature of organization.
  - The second part may represent the name of organization.
  - The third part may represent the department of the organization and so on.
- To achieve hierarchical name space, Domain Name Space was designed.
- In **Domain Name Space** , the names are represented as a tree like structure with root element on the top.

2) NAME SERVER:

- Name Server is a main part in the Domain Name System (DNS).
- It translates the domain names to IP addresses.
- Name server contains the DNS database which consists of domain names and their corresponding IP Addresses.
- Large number of domain names are saved on servers and used in the hierarchical manner.
- Name servers do the important task of searching the domain names.
- **Types of Name Servers:**

1. Root Name Server - Contains entire DNS tree

2. Primary/Master Name Server - Contains a zone resource records.

3. Secondary/Slave Name Server - Contains a copy of primary server files.

3) ZONE:

- The entire name space is divided into many different zones.
- It is the area up to which the server has access.

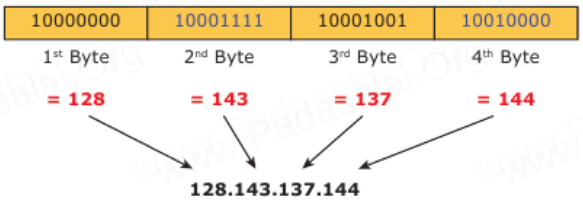
- Zone is defined as a group of contiguous domains and sub domains.
- If the zone has a single domain, then zone and domain are the same.
- Every zone has the server which contains a database called zone file.
- There are two copies of zone files available, Master file and slave file.

2. Classify and Explain the IP address.

- Internet Protocol (IP) address is simply the logical address in the network layer.
- IP address is also used to uniquely identify a computer over the network.
- Due to increase in the number of system in a network there is a need of more addresses which lead to two addressing methods i.e., IPv4 and IPv6.

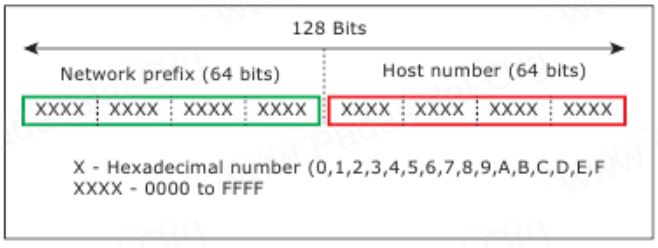
IPv4 Address:

- IPv4 address is a 32-bit unique address given to a computer system.
- No two systems can have same IP address.
- If the network has p connections then ' p' addresses should be there.
- An address space is the total number of addresses that can be made by that protocol.
- It is determined by the number of bits that the protocol use.
- If the protocol uses 'n' bits then the address space of that protocol would be '2^n ,addresses can be
- formed.
- So, the number of addresses that can be formed in IPv4 is 2^{32}.
- There are two ways to represent the IP address,
- **Binary notation:** In binary notation the address is expressed as 32-bit binary values.
- **Dotted-decimal notation:** In dotted-decimal notation the address is written in decimal format separated by dots(.).



IPv6 Address:

- IPv6 address is a 128-bit unique address given to a computer system.
- The number of addresses that can be formed in IPv6 is 2128.
- In IPv6 address, the 128 bits are divided into eight 16-bits blocks.
- Each block is then changed into 4-digit Hexadecimal numbers separated by colon symbols.
- E.g. 2001:0000:32313:DFE1:0063:0000:0000: FEFB.



3. Explain about the name server?

NAME SERVERS:

- The information which needs to be stored in **Domain name space** is quite large.
- Single system would be unreliable and inaccessible of any failure, inefficient and insufficient to store such a huge amount of requests from all over the world.
- The best way to do that is to **divide the entire space into many domains and sub domains** among many computers.
- DNS also allows domains to be further divided into sub domains and hierarchy of servers is also maintained.
- **Name servers** store the data and provide it to clients when queried by them.
- **Name Servers** are programs that run on a physical system and store all the zone data.
- **Inverse Name Server** in the Domain Name System (DNS) translates the domain names to IP addresses.
- Name server contains the DNS database which consists of domain names and their corresponding IP addresses.
- There is a need to store large number of domain names, so plenty of servers are used in the hierarchical manner.
- Name servers do the important task of searching the domain names.
- While searching, Local Name server (provided by ISP) ask the different name servers until one of them find out your answer.
- At last it returns IP address for that domain name.
- Your computer can now connect to the requested webpage stored on the web server.

TYPES OF NAME SERVERS:

There are three types of Name Servers which control the entire Domain Name System:

1. Root Name Server:

- Top level server which contains entire DNS tree, maintained by ICANN. There are 13 servers.

2. Primary/Master Name Server:

- Contains a zone resource records.
- These records are updatable by domain name holders such as organizations.

3. Secondary/Slave Name Server:

- Contains a copy of primary server files.
- This server has no authority to update, but reduce the workload of master server by sharing the queries.

4. What is domain name space? Explain.

DOMAIN NAME SPACE:

- **Domain name space** was designed to achieve **hierarchical name space.**
- In this, the names are represented as a tree like structure with **root element on the top** and this tree can have a maximum of **128 levels** starting from root element taking the **level 0 to level 127**.

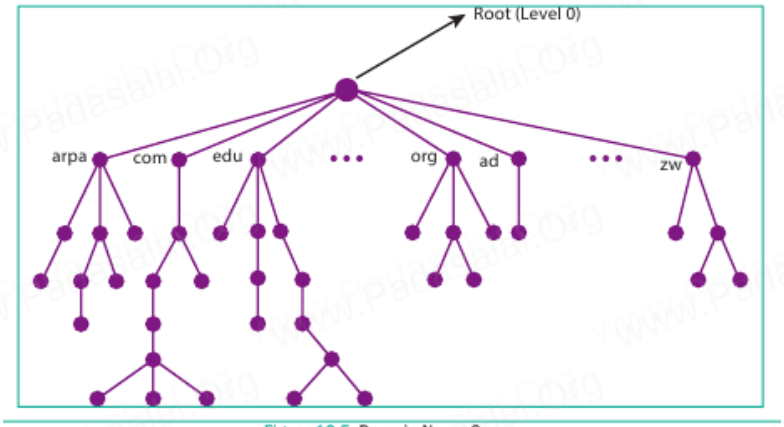


Figure 12.5 Domain Name Space

- Figure 12.5 represent the domain name space where the root element is present at the top most level i.e., level 0.
- The root element always represents the NULL string (empty string).
- The next level to the root element is node (children of root element).
- Each node in the tree has a **label** and a **domain name**.

Label:

- Labels are the names given to domains.
- It is a string which can have maximum of 63 characters.
- Each node in that level should have different labels thereby assuring the individuality of the domain name.
- **Domain** is a sub tree in domain name space tree structure.
- The domain can be further divided into **sub domains.**
- **challenger.atc.fhda.edu.** is the domain name which is obtained by reading the labels from bottom to top, separating each label by dot (.)

Domain Name:

- It is the sequence of labels.
- In domain name the sequence of labels are separated by dot (.).
- The domain name is always read from the **lower level to higher level** i.e., from the leaf node to root node.

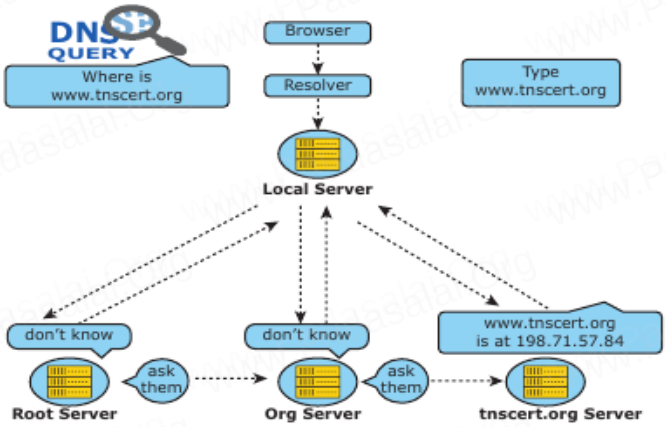
- Since the root node always represent **NULL string**, all the domain name ending with **dot.**

Basic rules of Domain Names:

- Domain can consists of Alphabets a through z, and the digits 0 through 9.
- Hyphens are allowed, but hyphens cannot be used as first character of a domain name.
- Spaces are not allowed.
- Special symbols (such as !, $, &, _ and so on) are not permitted.
- Domain names have the minimum length of 2, and the maximum length of 63 characters.
- The entire name may be at most 253 characters long.
- Domain names are not case-sensitive.

5. Explain how the DNS is working.

- When the user enters the URL in the browser, the system first checks its DNS cache for the corresponding IP address.



Workflow of DNS

- If the IP address is found in the cache then the information is retrieved from cache.
- If not, then the system needs to perform DNS query i.e., the system needs to query the resolver about the IP address from Internet Service Provider (ISP).
- Each resolver has its own cache and if it is found in that then that information is retrieved.
- If not, then the query is passed to next domain server i.e., TLD (Top Level Domain) which reviews the request and direct the query to name servers associated with that specific domain.
- Until the query is solved it is passed to next level domains.
- At last the mapping and the record are returned to the resolver who checks whether the returned value is a record or an error.
- Then the resolver returns the record back to the computer browser which is then viewed by the user.

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