CHAPTER 1

FUNDAMENTALS

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Course Objectives

- At the end of this course you will be able to:
  - Identify difference between client side and server side programming.
  - Design and implement a website.
  - Create web pages using HTML.
  - Basic understanding of how CSS affects designs.
  - Make website interactive using JavaScript.
  - Use PHP as server side programming language.

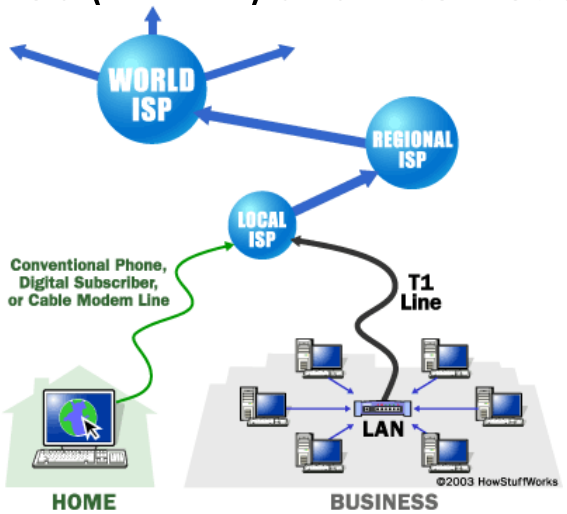
Books and References

- Text Book:
  - Programming the World Wide Web, 4th edition, Robert W. Sebesta, 2008, Pearson Addison Wesley
- References:
  - W3Schools Online Web Tutorials, www.w3school.com
  - World Wide Web Bible, Bryan Pfaffenberger, ISBN: 81-7029-781-8
  - The Complete reference to HTML and XHTML, Thomas Powell, McGraw-Hill Education; 4th edition

Contents:

1. Introduction to the Internet

- What is the internet?
  - A collection of computer networks that use a protocol to communicate and exchange data.
- Is World Wide Web (WWW) and Internet same or different?



1. Introduction to the Internet

- Is WWW and Internet same or different?
  - Internet and WWW are different things.
  - WWW is the collection of web sites and pages that can be easily accessed via Internet.
  - Internet is a means of connecting a computer and devices to any other computer anywhere in the world.

History of Internet

- Began as a US Department of Defense network called ARPAnet (1960s-70s)
- Purpose of ARPAnet:
  - Communication
  - Program Sharing
  - Remote computer access
- Used by ARPA- funded research laboratories and Universities.
- Multiple other network was developed in 1970s and early 1980s.

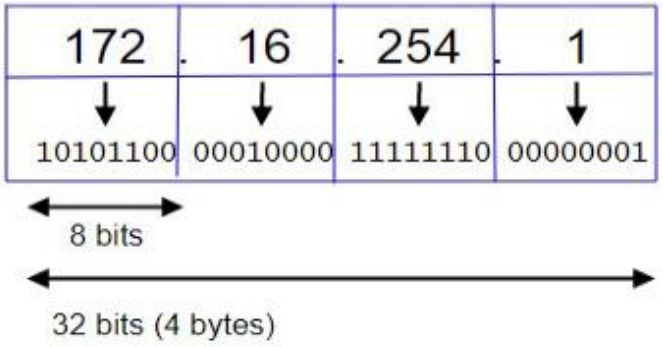
  Eg:
  - ❑ Because It's Time Network (BITNET)
  - ❑ Computer Science Network (CSNET)
- National Science Foundation internet (NSFnet) - 1986

History of Internet

- National Science Foundation internet (NSFnet) – 1986
  - Initially connected five supercomputer centres
  - By early 1990s it was the network for all
  - Became the Internet backbone

Internet Protocol (IP) Address

- Unique Identification of computers with the help of numeric address.
- Simple protocol for data exchange between computers.
- IP Addresses:
  - 32-bit for IPv4
  - 128-bit for IPv6



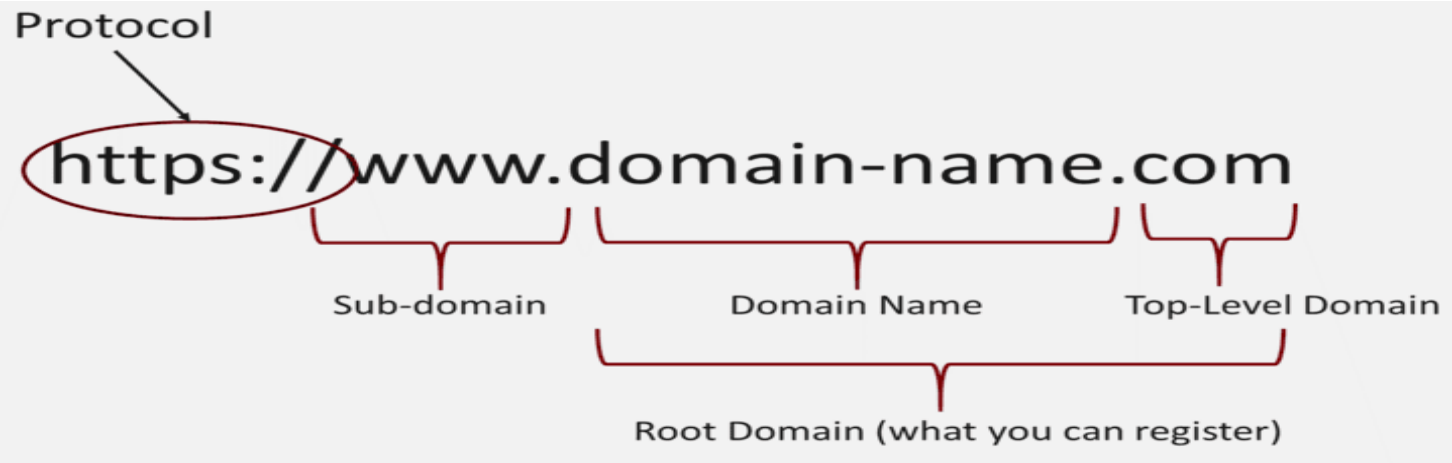
Internet Protocol (IP) Address

- Capacity:

Type	Size	No. of address
IPv4	2^32	4 billion
IPv6	2^128	3.40282367 × 10^38

Domain Names

- Human normally cannot remember all the IP address of every websites.
- Domain name is normally used in this case.
- Domain name will be resolved to IP Address.



Domain Names

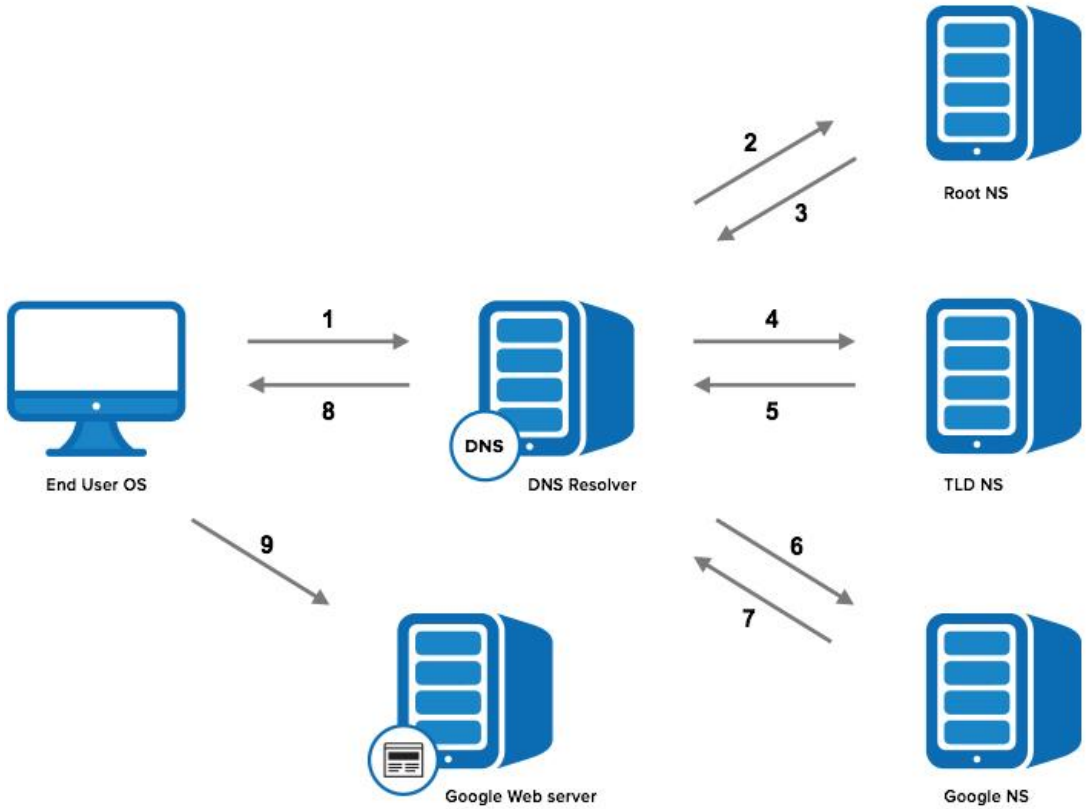
- Host name with all the domain names are called fully qualified domain name.

Fully qualified domain name	IPv4	IPV6
google.com	142.250.176.14	2607:f8b0:4007:809::200e
pu.edu.np	94.237.109.110	Not Available
gces.edu.np	18.138.195.142	Not Available
facebook.com	31.13.66.35	2a03:2880:f103:83:face:b00c::25de

Domain Name System (DNS)

- Domain name is not identified by the computer.
- Domain names are mapped to IP addresses by ***name servers***.
  - Example: google.com -----> 142.250.176.14
- Many systems maintain a local cache called a hosts file.
  - Windows: C:\Windows\system32\drivers\etc\hosts
  - Mac: /private/etc/hosts
  - Linux: /etc/hosts

Domain Name Conversion

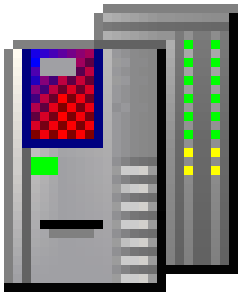


World Wide Web

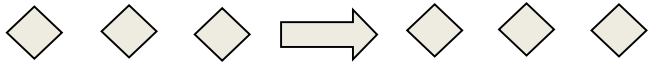
- Originally created in 1989-91 by Tim Berners-Lee.
- WWW is one service running over the Internet.
- Before WWW:
  - The Internet was used by scientists, researchers and large (usually governmental) organization's.
  - E-commerce was unknown at that point of time.
- Websites used to be only text based containing texts and hyperlinks.

World Wide Web

HTTP Server
Apache
MS IIS



HTTP



HTML data

Client
Mozilla Firefox
MS Internet Explorer

Web Browsers

- Browsers fetches and displays documents provided from web servers
  - Mozilla Firefox
  - Microsoft Edge
  - Apple Safari
  - Google Chrome

Web Servers

- Software that:
  - Listens for web page request.
  - Responds with the documents requested by web browsers..
- Commonly used web servers are:
  - Apache
  - Microsoft Internet Information Server (IIS)

5. Uniform Resource Locator (URL)

- Used to identify documents (resources) on the Internet.
  - Example: http://pu.edu.np/resources/index.html
- Upon entering this URL into the browser, it would:
  - ask the DNS server for the IP address of pu.edu.np
  - connect to that IP address at port 80
  - ask the server to GET /resources/index.html
  - display the resulting page on the screen

5. Uniform Resource Locator (URL)

- URL is generated in same format.

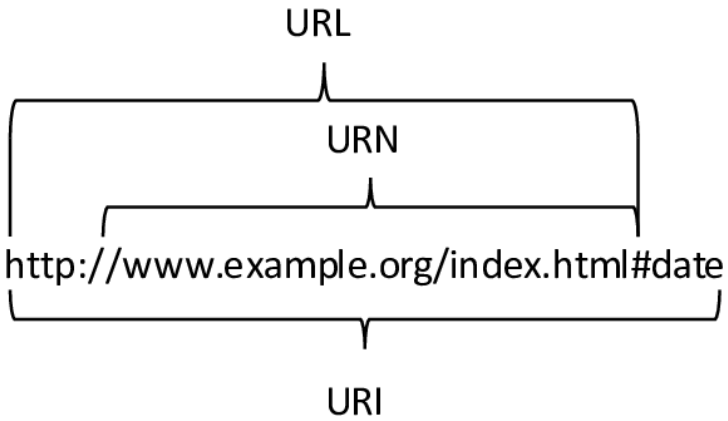
  schema::host.domain:port/path/filename

  schema::object-address

- Example:
  - mailto::admin@pu.edu.np
  - file:///C:/Users/User/logo.png
  - http://pu.edu.np:8000/images/logo.png
  - http://pu.edu.np
  - http://localhost:8000
- More info on:
  http://www.w3.org/Addressing/URL/URI_Overview.html

5. Uniform Resource Locator (URL)

- Uniform Resource Identifier (URI) identifies a resources either by location, or by name, or both.
- Uniform Resource Name (URN) identifies a resource by name in a given namespace.
- URI = URL + URN



6. Multipurpose Internet Mail Extensions (MIME)

- Determines format of the document received from Web Server.
- Used to identify the format of document.
- Browser need to identify format of document to use specific software to render.
- Most common MIME types are text, image and video.
- General structure: **type/subtype**

6. Multipurpose Internet Mail Extensions (MIME)

File Extension	MIME Type
.jpg	image/jpeg
.html	text/html
.txt	text/plain
.gif	image/gif
.mov	video/quicktime

7. Overview of different protocols

- HTTP
- POP
- SMTP
- FTP
- WAP

Hypertext Transfer Protocol (HTTP)

- Communication in web uses HTTP protocol.
- Two phases of HTTP:
  - Request
  - Response
- Phases consists of:
  - Header
  - Body
- Header consists of information about communication.
- Body consists of data of communication if exists.

HTTP Status Codes

- When something goes wrong, the web server returns a special "error code".

First Digit	Category
1	Informational
2	Success
3	Redirection
4	Client error
5	Server error

HTTP Status Codes

- Common error codes:

Code	Details
200	OK
301 – 303	Page has moved (permanently or temporarily)
403	Forbidden to access the page
404	Page not found
500	Internal server error

Assignment 1

1. Write about POP, SMTP, FTP and WAP.
2. Differences between HTTP and HTTPS.
3. Differences between Internet and WWW.

8. Web Standards

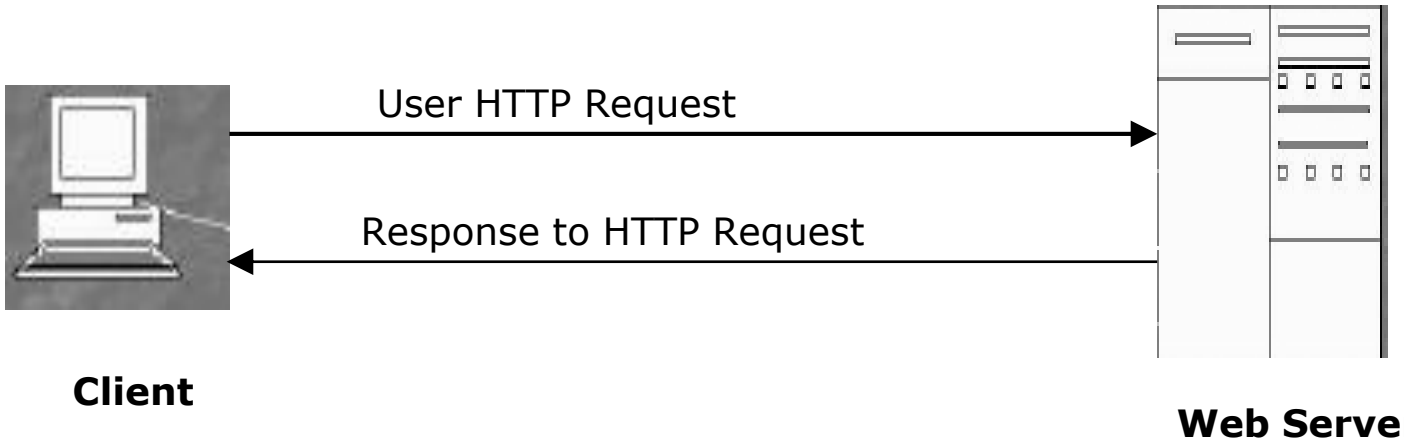
- Web standards are rules and guidelines established by the World Wide Web Consortium (W3C) developed to promote consistency in the design code which makes up a web page.
- guideline for the mark-up language which determines how a web page displays in a visitor's browser window.
- W3C is an international community where Member organizations, full-time staff and the general public work together to develop Web standards.
- The best known and widely used Web standards are: HTML (HyperText Markup Language), XML (eXtensible Markup Language) and CSS (Cascading Style Sheets).

9. Web Architecture

- conceptual structure of the internet.
- Types of web architecture include:
  - two-tier architecture
  - three-tier architecture

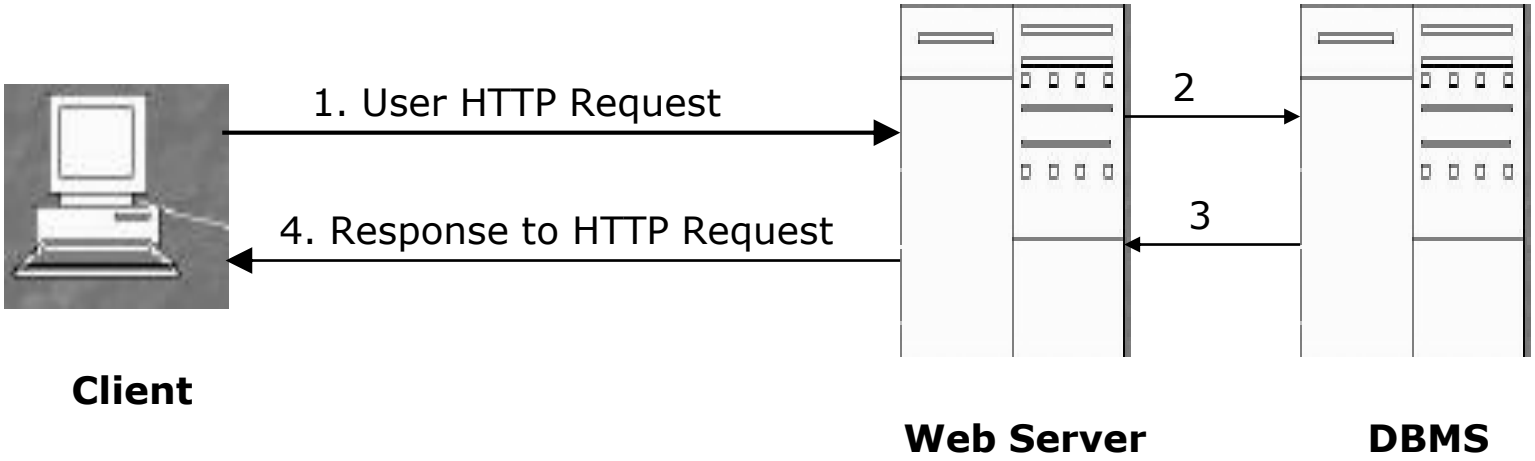
Two-tier Architecture

- Also known as “Client-Server” model/architecture.
  - First tier => client
  - Second tier => database server and web application

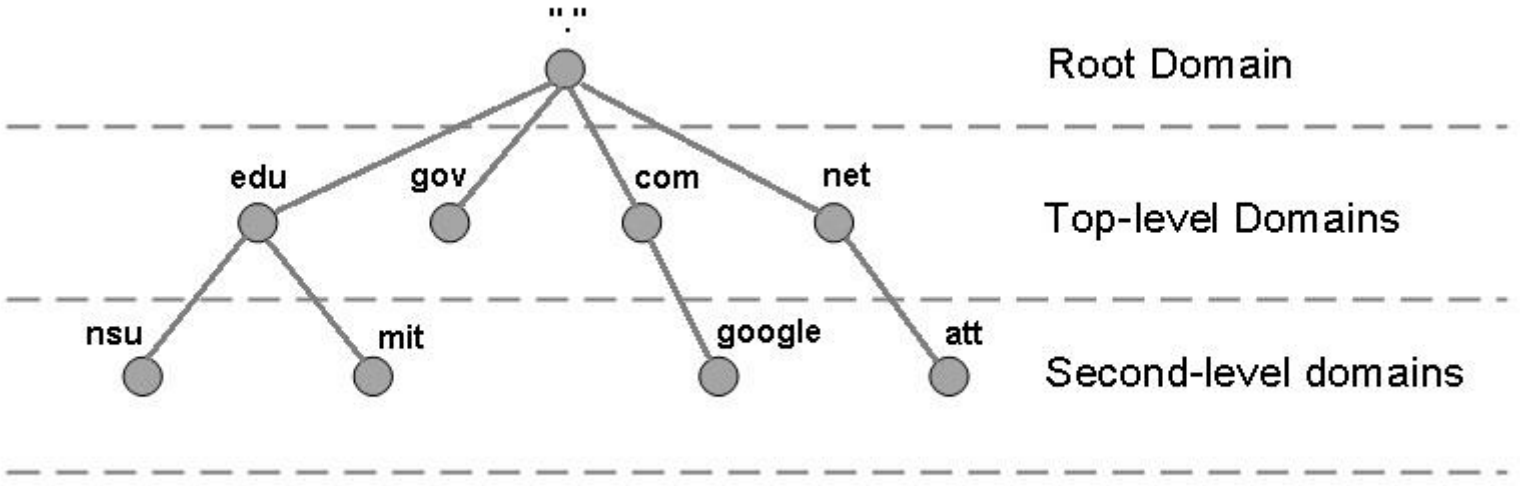


Three-tier Architecture

- First tier => client
- Second tier => web server
- Third tier => database server



10. Domain Hierarchy



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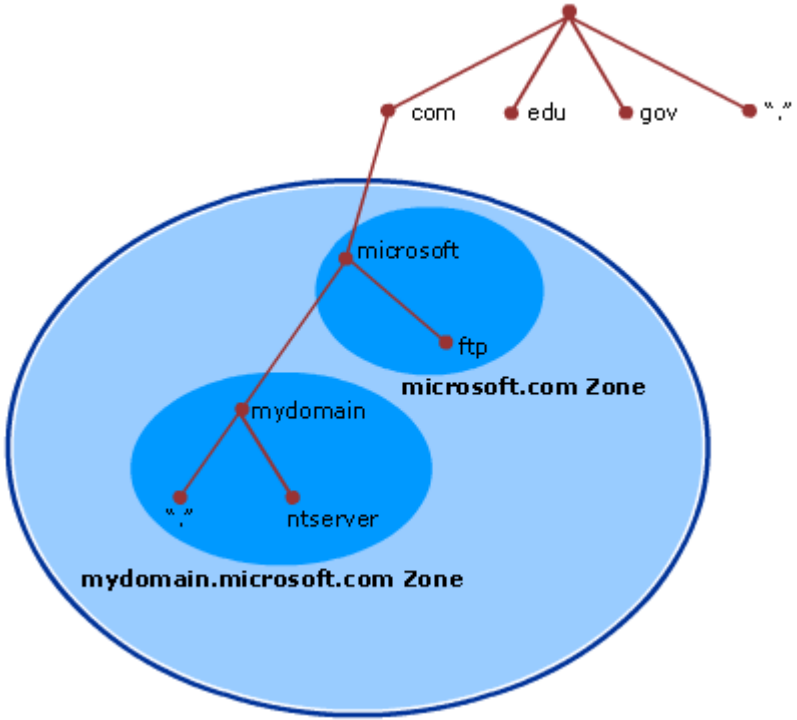
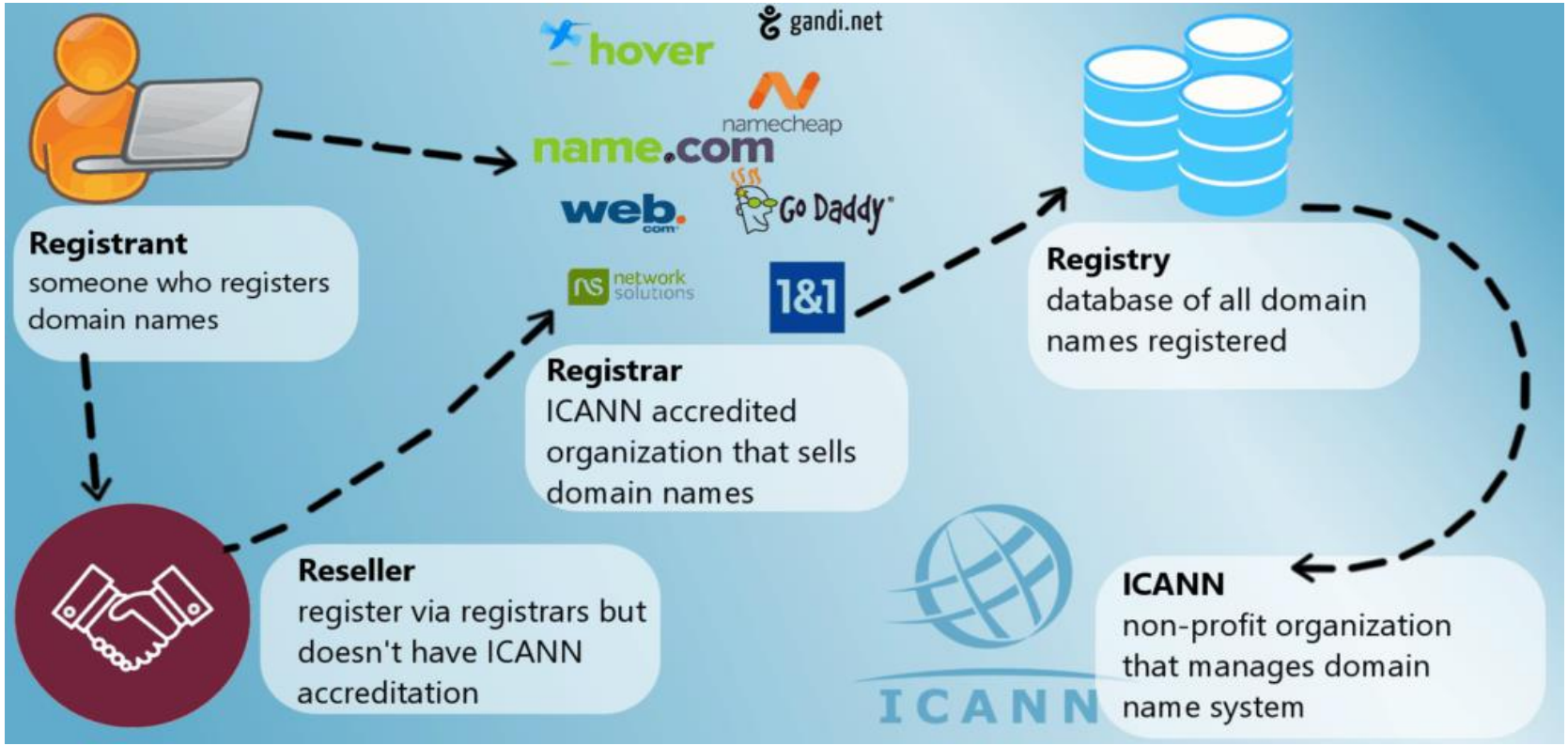


11. Domain name registration process

- Internet Corporation for Assigned Names and Numbers (ICANN) manages:
  - IP address assignment
  - domain name registration.

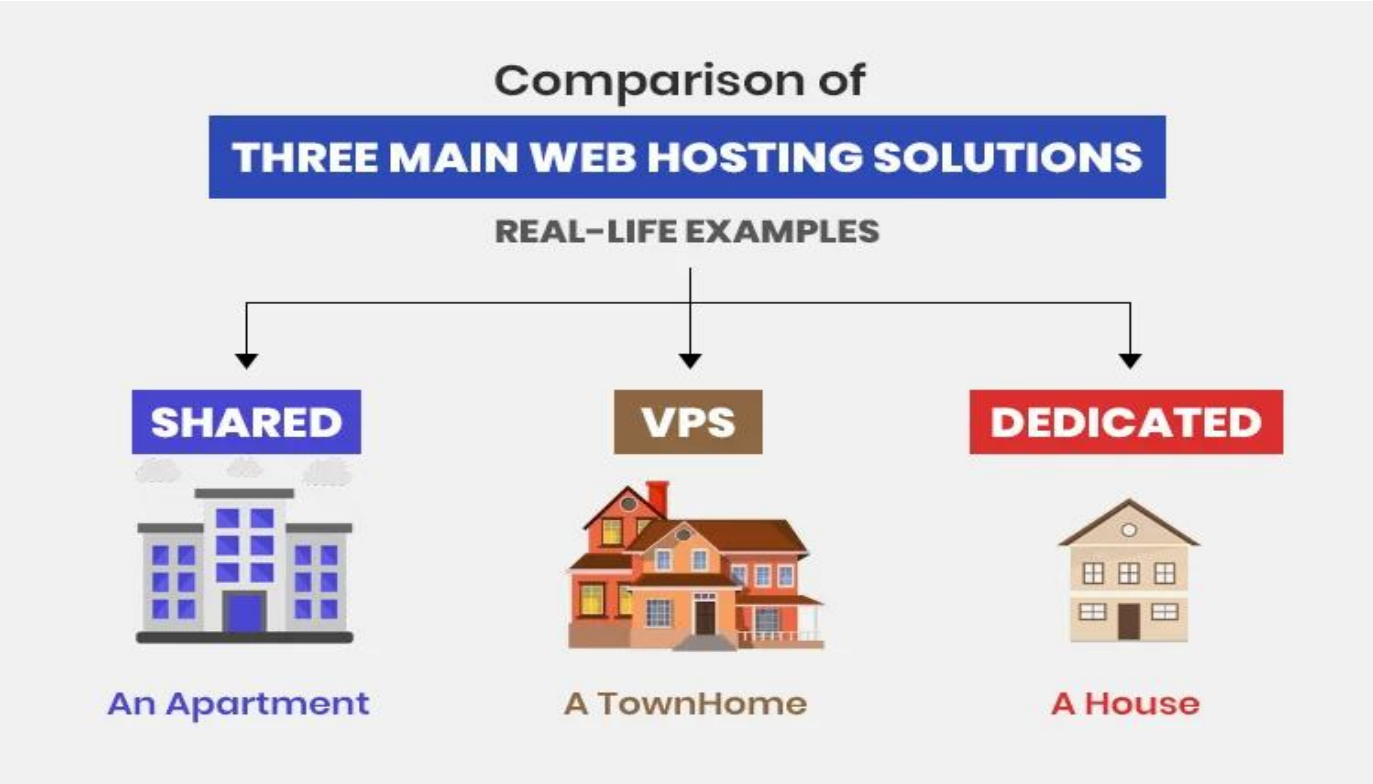
11. Domain name registration process



12. Web Hosting

- Service provided by the hosting companies to store, run and maintain your websites.
- Websites are stored in the web server and while being accessible on the larger web.
- Types of web hosting services provided:
  - Shared Hosting - Resources are shared across multiple websites
  - VPS Hosting – Separate resources is allocated to each websites
  - Dedicated Hosting – No resource sharing

12. Web Hosting



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