Domain Name System (DNS)

* A system or way of naming resources on a network (resources can be any kind of information on the network, for example some resources are, websites, files, things that can be shared online like media)
  + Used to provide a systematic and human friendly substitute for IP addresses – a normal person normally wouldn’t memorise the IP of every website they need to use many times its way too inefficient and much harder to do.
  + Resources on TCP/IP networks can be named with this system so they all have unique names.
    - E.g classoos.com, there wont be another page with this same name.
* Levels in a domain name – essentially the parts of a domain name
  + Top Level (TLD – top level domains)
  + 2nd level (2LD)
  + 3rd level (3LD)
  + Resource name’s domains go from top to bottom (3LD), starting from the right side of a name
  + Each level is separated by a dot/period (.)
  + Name further on left is the host name/name of computer where resource originates
* The system is hierarchical

A diagram of a network

AI-generated content may be incorrect.

* E.g ocr.org.uk where “ocr” is the 3LD, “org” is the 2LD, “uk” is the TLD
* Or bbc.co.uk, where “bbc” is 3LD and so on.
  + TLDs like edu, com, org, are generic types while de, fr, uk, are country TLDs, for Germany, France, and United Kingdom respectively
* Overall the system is part of TCP/IP protocol, hence resources with this protocol are named with this system.
  + Each domain name has one or more equivalent IP addresses
* DNS catalogues – classifies all domain names and IP addresses in a series of global directories that global domain name servers can access in order to find the correct IP address location for a resource.
  + Global directories refer to the hierarchical structure of DNS servers, so into which DNSs different domain names go into, the larger or smaller
* (\*) when a web page is requested using URL that is entered, browser requests corresponding IP address from a local DNS (caches for example). If it doesn’t have the correct IP address, the search is extended up the hierarchy to a larger DNS database
  + Once located, the user’s computer sends a data request to that location to find the web page data
  + If you happen to know the IP address of the website, you can put that in too and it will take you straight to the IP address without needing to do all this, but that depends on if you even know the IP address.

Uniform Resource Locator (URL)

* Process for finding a website and opening it (from \*):

1. Request resource by typing its URL into browser
2. Resource name sent to DNS server
3. Server tries to look up the IP address associated with the human-readable name in it’s database
4. If server has relevant data, it will make the substitution by putting IP into the browser, and allow connection, bringing user to resource, otherwise, forwards the request to other DNS servers to try to resolve name.

* URL is the full address of an internet resource, specifying the location of a resource on the internet, including it’s name and usually file type so browser can request it from website server.
  + E.g https:// [www.domainname.com/folder/subfolder/webpage.html#element](http://www.domainname.com/folder/subfolder/webpage.html#element)
  + Where:
    - https – method
    - www – host
    - domainname – website
    - com – generic TLD used
    - webpage.html – location
    - element – resource

Fully qualified domain name (FQDN)

* One that includes the host server name, e.g www, mail, ftp depending on whether the resource being requested is hosted on web, mail, or ftp servers.
  + e.g www. Websitename.co.uk is a fully qualified domain name

Internet registries and registrars

* Registrars hold records of all existing website names and the details of those domains that are currently available to purchase.
  + Basically, they are companies that act as resellers for domain names and allow people and companies to purchase them
    - All registrars must be recognised as offical by their governing registry.
* Internet registries are five global organisations governed by the Internet Corporation for Assigned Names and Numbers (ICANN)
  + They have worldwide databases that hold records of all domain names currently issued to individuals and companies, and their details.
    - Details include registrant’s name, type (company or individual), registered mailing address, registrar that sold the domain name and date of registry.
  + Also allocate IP addresses and keep track of which address(es) a domain name is associated with as part of the DNS
  + Include
    - African Network Information Centre (AFRINIC)
      * Based in Ebene, Mauritius
      * Serves all of Africa
    - American Registry for Internet Numbers (ARIN)
      * Based in Chantilly, VA, United States of America
      * Serves Antarctica, Canada, US, some Caribbean countries and territories
    - Asia Pacific Network Information Centre (APNIC)
      * Based in Brisbane, Australia
      * Serves East Asia, South Asia, Southeast Asia, Oceania
    - Latin America and Caribbean Network Information Centre (LACNIC)
      * Based in Montevideo, Uruguay
      * Serves Latin America, some Caribbean countries and territories
    - Réseaux Européens Network Coordination Centre (RIPE NCC)
      * Based in Amsterdam, Netherlands
      * Serves Central Asia, West Asia, Europe, Russia
* Registrars are the ones that sell the domain names, registries are the organisations managing these registrars essentially

IP addresses

* IP – “Internet Protocol” address
* An IP is a unique address assigned to a network device
  + They are binary numbers but are displaced as a series of human readable numbers
* IP addresses perform a similar function to a home mailing address.
* Some examples of IP addresses for IPv4:
  + 109.94.218.221
  + 128.64.11.109
  + 175.174.208.54
  + 87.186.113.134
  + 20.161.71.100
  + 149.84.82.50
  + 5.186.168.42
  + 141.223.130.58
  + 89.200.71.225
  + 230.94.148.179
* Some examples of IPv6 addresses:
  + 88e3:bfd9:c55a:55a5:2366:8d3f:d311:b613
  + 515d:369e:898f:d54e:d9bf:6219:a98b:e474
  + 200a:0d50:901e:53c2:2854:bec2:7429:7bb4
  + c919:3944:a8c1:73ae:279e:e2a3:7d3b:57dd
  + d967:17d3:7d4d:9320:0037:2cb2:043f:18fc
  + ea67:b301:f801:538d:0679:dd99:977d:012d
  + 51f0:e866:beca:d6c1:aae7:5a0f:ea03:aa61
  + 62c2:36ca:b8a5:75e1:ea11:e44e:b729:1931
  + dc6d:b42d:a3a0:2366:2dc8:65d1:938d:5bbe
  + be4d:0c2a:298c:02ba:11d9:cef3:2d6d:7618
* The IP address indicates where a packet of data is to be sent or has been sent from. Routers can use this address to direct the data packet accordingly. If a domain name is associated with a specific IP address, the IP is the address of the server that the website resides on.
* IPv4 or Internet protocol version 4 is a system that makes use of a 32 bit number to identify a device on the network.
  + However, since there are only so many combinations of 32 bit numbers; which are running out, other IP version have been introduced, one example is IPv6
* IPv6 uses 128 bit identifiers, which allows for much more combinations of numbers than IPv6.