DOMAIN NAME SYSTEM (DNS)

IP address are tough for human to remember and impossible to guess. Domain Name System are usually used to translate a hostname or Domain name (eg. nec.edu.np) into an IP address (eg. 202.37.94.177). Domain name comprise a hierarchy so that names are unique, yet easy to remember.

DNS makes its possible to refer to the Internet protocol(IP) based system(hosts) by human friendly names (domain names). Name resolution is that act of determining the IP address of a given hostname. The benefits of DNS are two folds. First Domain Name can be logical and easily remembered. Secondly, should an IP address for a host change, the domain name can still resolve transparently to the users or application. DNS name resolution is a critical Internet service. Many network services require functional name service for correct operation.

Domain names are separated by dots with the topmost element on the right. Each element may be up to 63 characters long; the entire name may be at most 255 characters long. Letters, numbers or dashes may be used in an element.
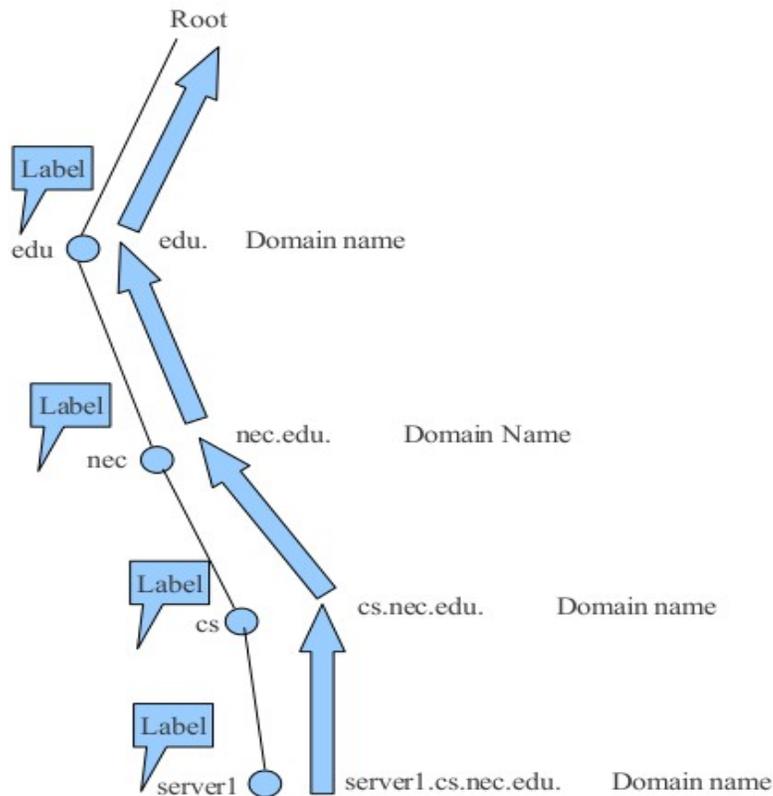

Fig: Domain Name and Labels

Domain Name Space:

To have a hierarchical name space, a domain name space was designed. In this design the names are defined in an inverted-tree structure with the root at the top. The tree can have only 128 levels: level 0 (root) to level 127 .
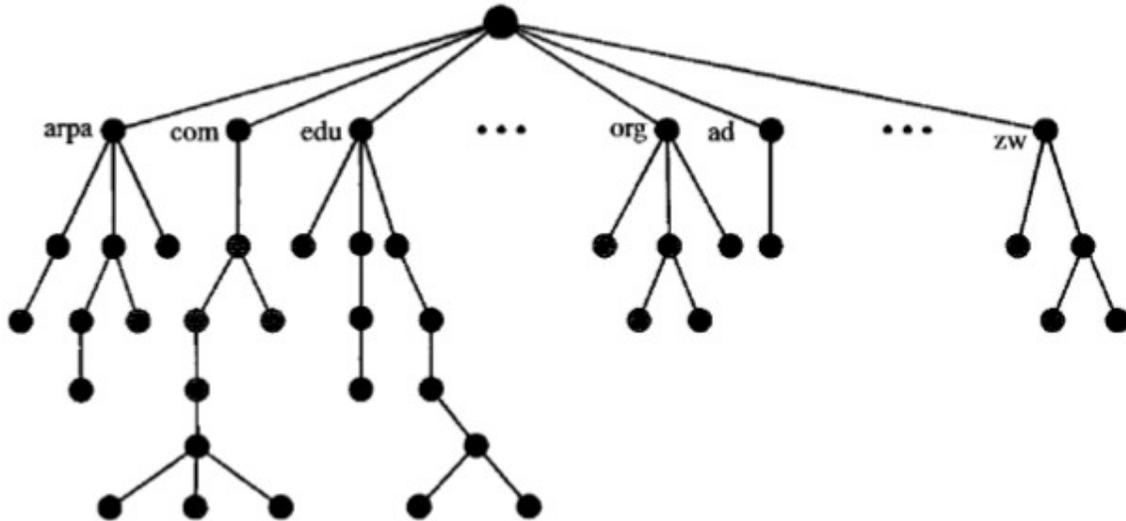

Fig: Domain Name Space

Domain Name
Each node in the tree has a domain name. A full domain name is a sequence of labels separated by dots (.). The domain names are always read from the node up to the root. The last label is the label of the root (null). This means that a full domain name always ends in a null label, which means the last character is a dot because the null string is nothing. Figure shows some domain names.

Fully Qualified Domain Name
If a label is terminated by a null string, it is called a fully qualified domain name (FQDN). An FQDN is a domain name that contains the full name of a host. It contains all labels, from the most specific to the most general, that uniquely define the name of the host. For example, the domain name server1.cs.nec.edu. is the FQDN of a computer named server1 installed at the NEC Collete. A DNS server can only match an FQDN to an address. Note that the name must end with a null label, but because null means nothing, the label ends with a dot (.).

Partially Qualified Domain Name
If a label is not terminated by a null string, it is called a partially qualified domain name (PQDN). A PQDN starts from a node, but it does not reach the root. It is used when the name to be resolved belongs to the same site as the client. Here the resolver can supply the missing part, called the suffix, to create an FQDN. For example, if a user at the nec.edu. site wants to get the IP address of the challenger computer, he or she can define the partial name server1.
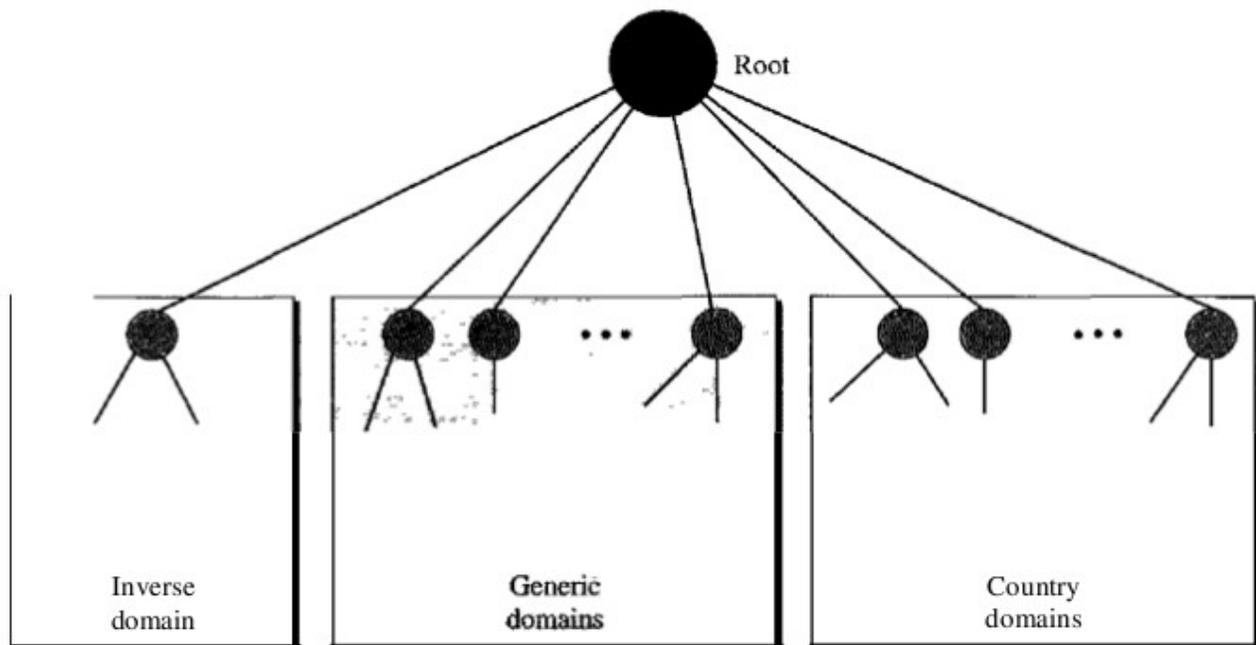The DNS client adds the suffix cs.nec.edu before passing the address to the DNS server. The DNS client normally holds a list of suffixes. The following can be the list of suffixes at NEC College. The null suffix defines nothing. This suffix is added when the user defines an FQDN.
cs.nec.edu
nec.edu
null

DNS in the Internet:

Generic Domains

The generic domains define registered hosts according to their generic behavior. Each node in the tree defines a domain, which is an index to the domain name space database

Label	Description
aero	Airlines and aerospace companies
biz	Businesses or firms (similar to "com")
com	Commercial organizations
coop	Cooperative business organizations
edu	Educational institutions
gov	Government institutions
info	Information service providers
int	International organizations
mil	Military groups
museum	Museums and other nonprofit organizations
name	Personal names (individuals)
net	Network support centers
org	Nonprofit organizations
pro	Professional individual organizations

Fig: Generic Domain Labels

Country Domains

The country domains section uses two-character country abbreviations (e.g., np for Nepal and us for United States). Second labels can be organizational, or they can be more specific, national designations. The United States, for example, uses state abbreviations as a subdivision of us (e.g., ca.us.).

Inverse Domain

The inverse domain is used to map an address to a name. This may happen, for example, when a server has received a request from a client to do a task. This type of query is called an inverse or pointer (PTR) query. To handle a pointer query, the inverse domain is added to the domain name space with the first-level node called arpa (for historical reasons). The second level is also one single node named in-addr (for inverse address). The rest of the domain defines IP addresses.