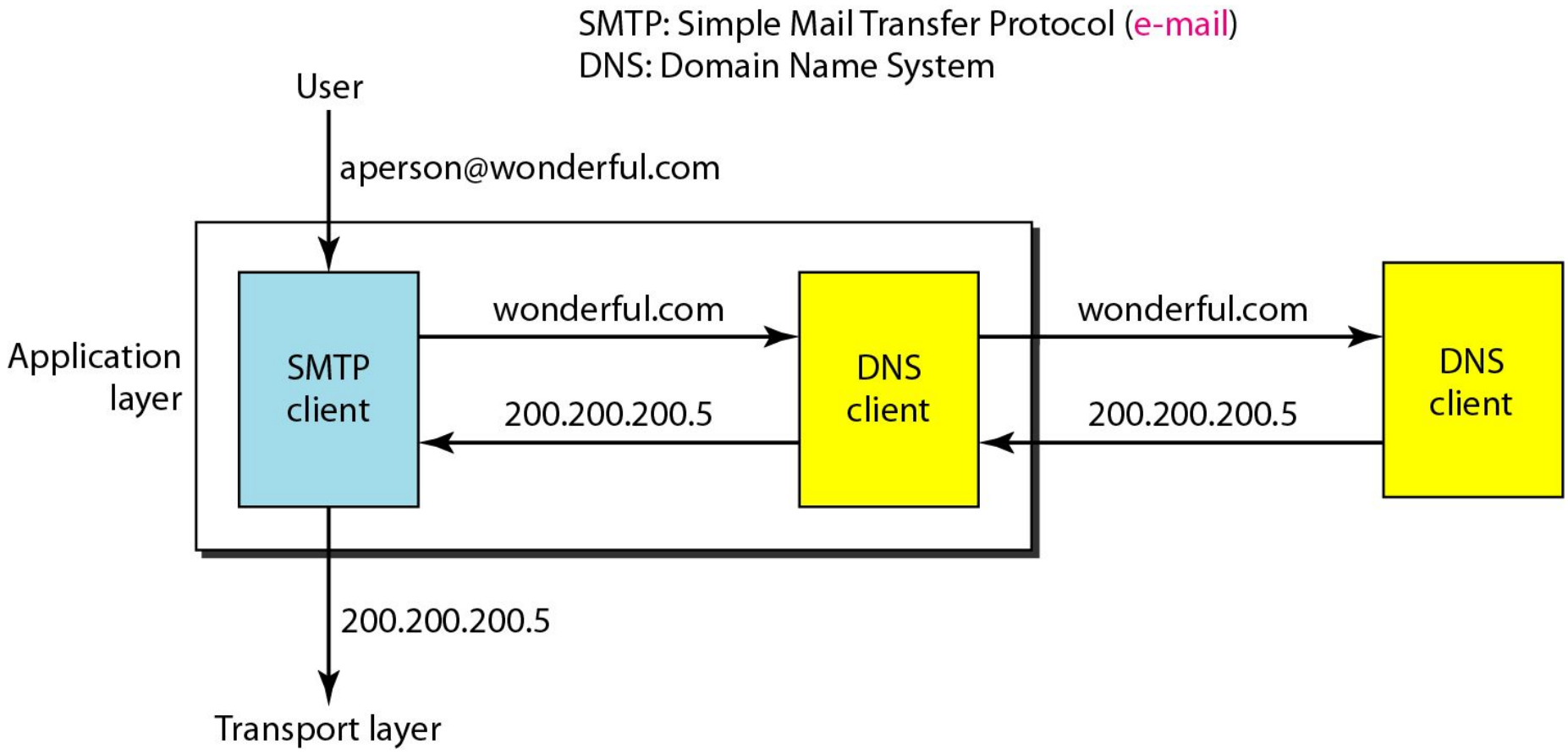
Domain Name System

Example of using the DNS service



Name Space

To be unambiguous, the names assigned to machines must be carefully selected from a namespace with complete control over the binding between the names and IP addresses.

Topics discussed in this section:

- Flat Name Space
- Hierarchical Name Space

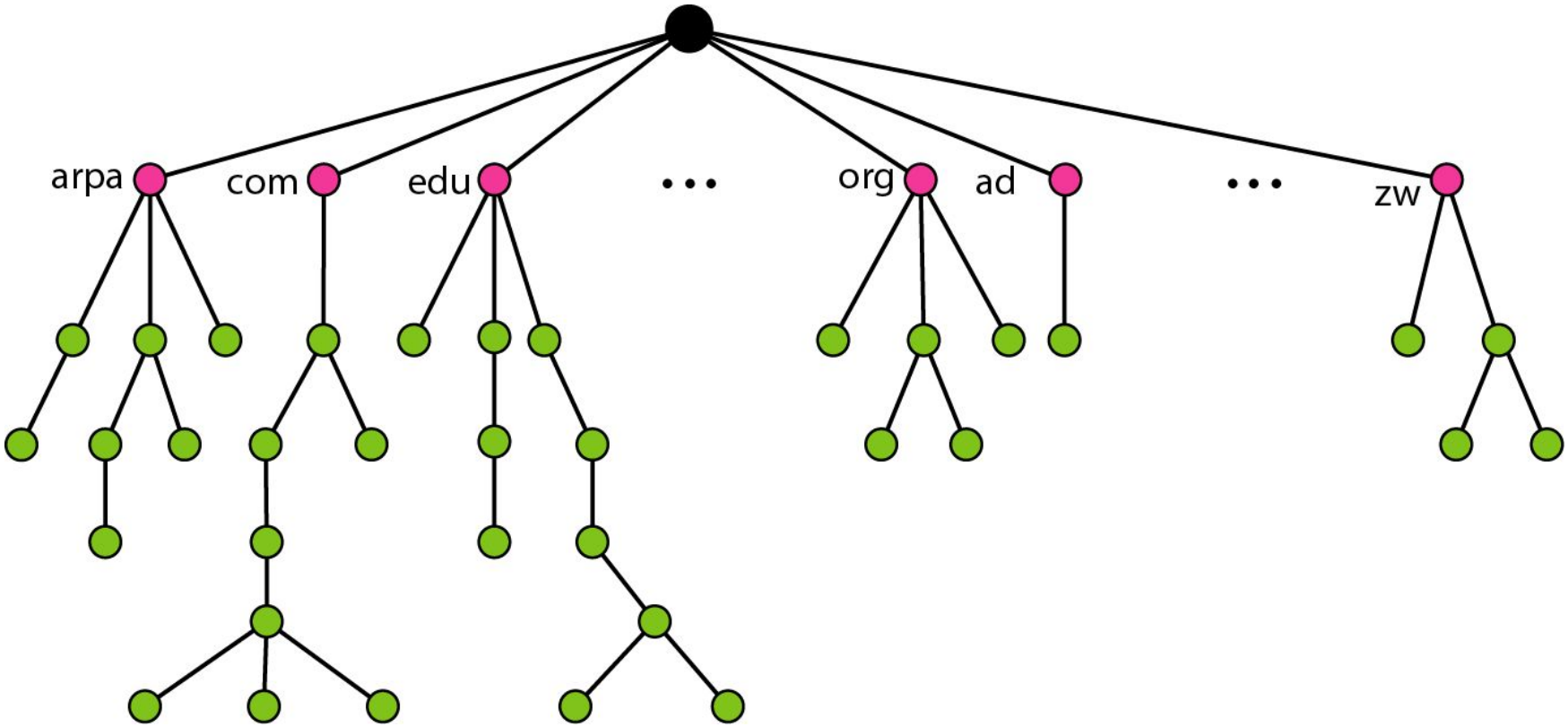
Domain Name Space (DNS)

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.

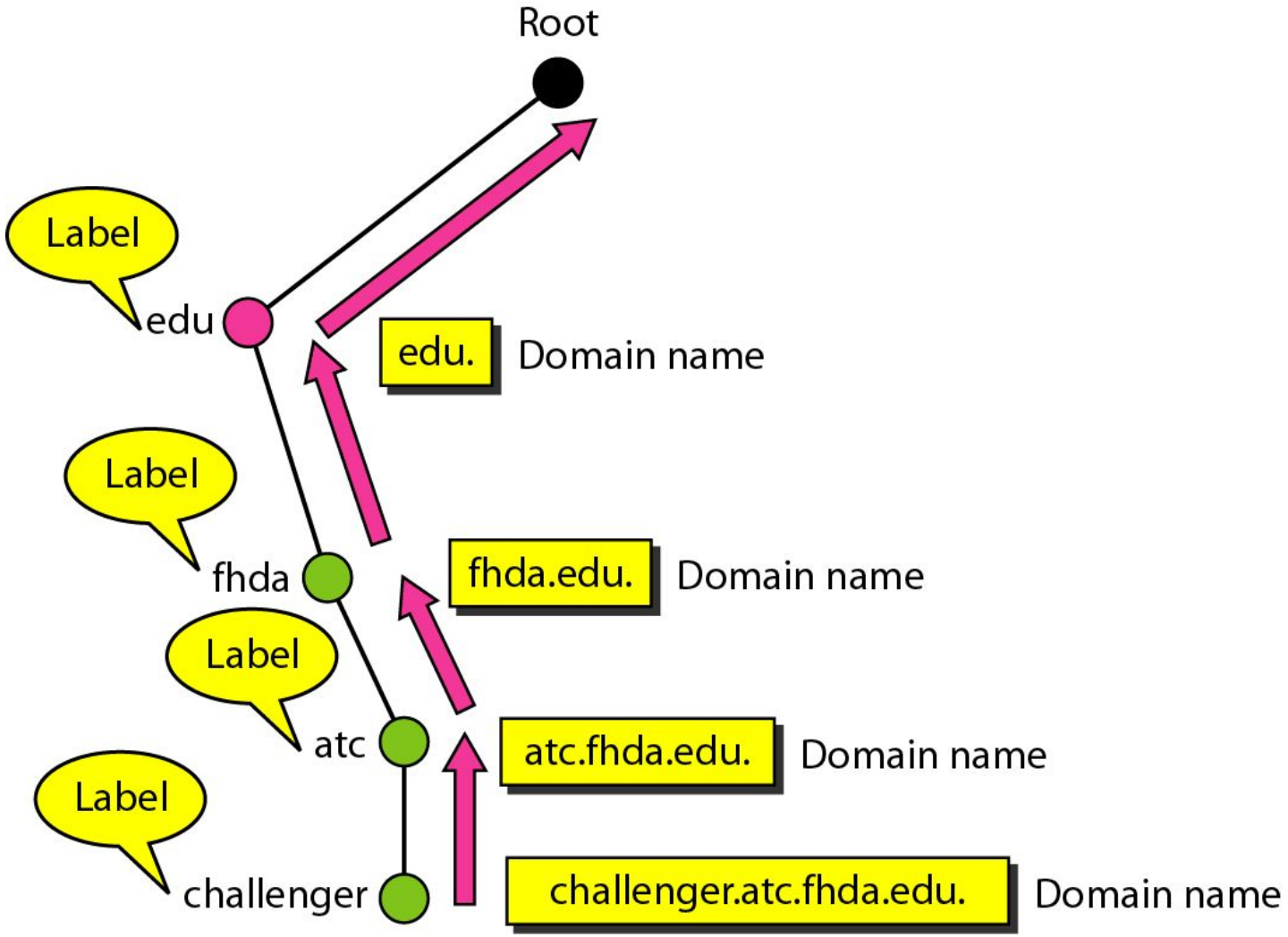
Topics discussed in this section:

- Label
- Domain Name
- Domain

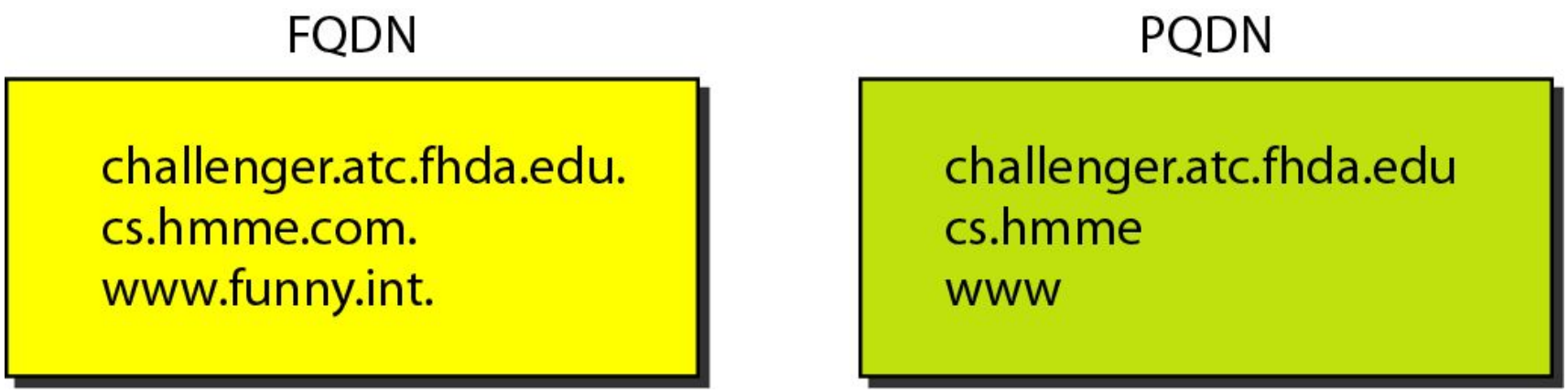
Contd..



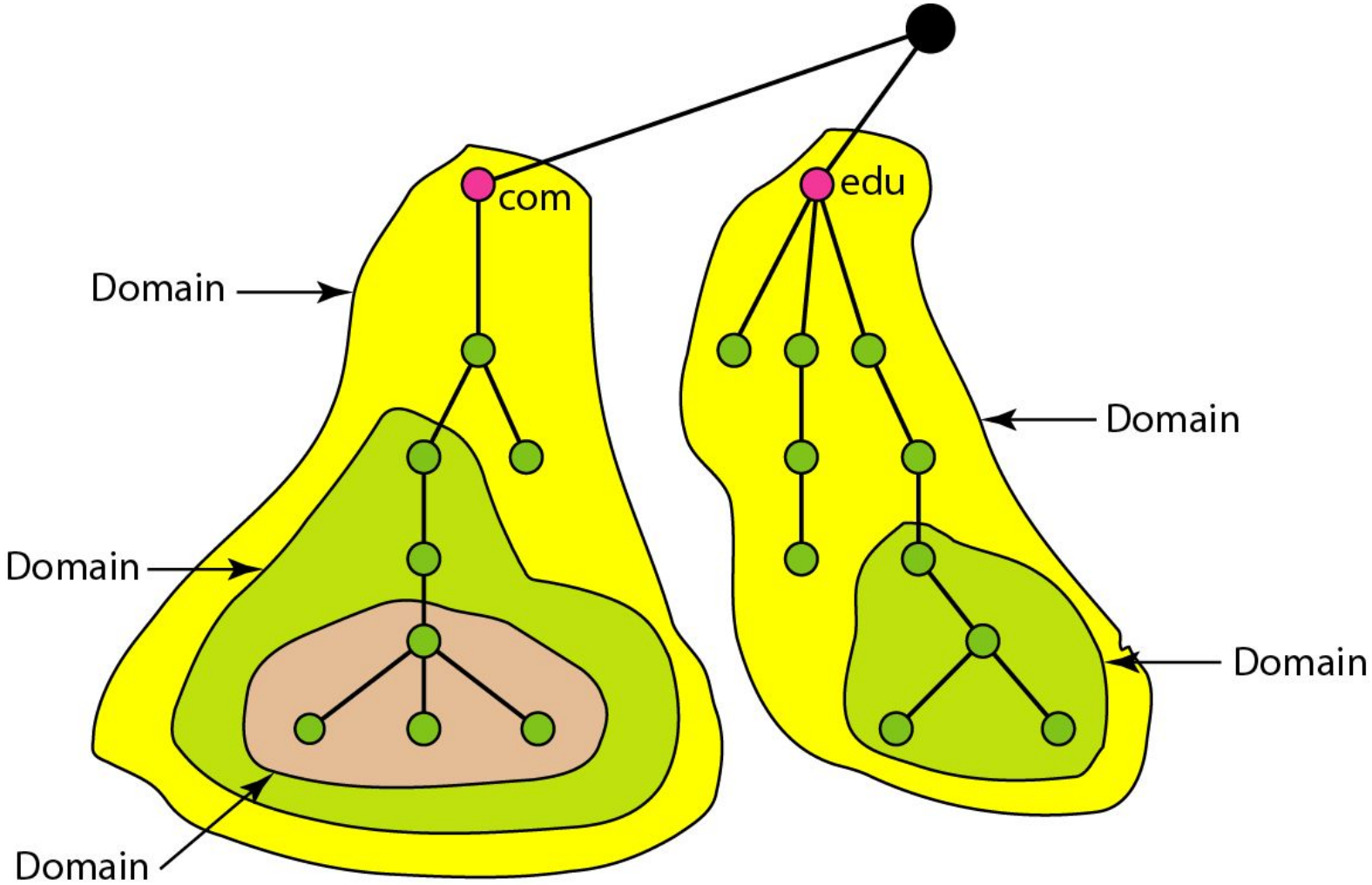
Domain names and labels



FQDN and PQDN



Domains



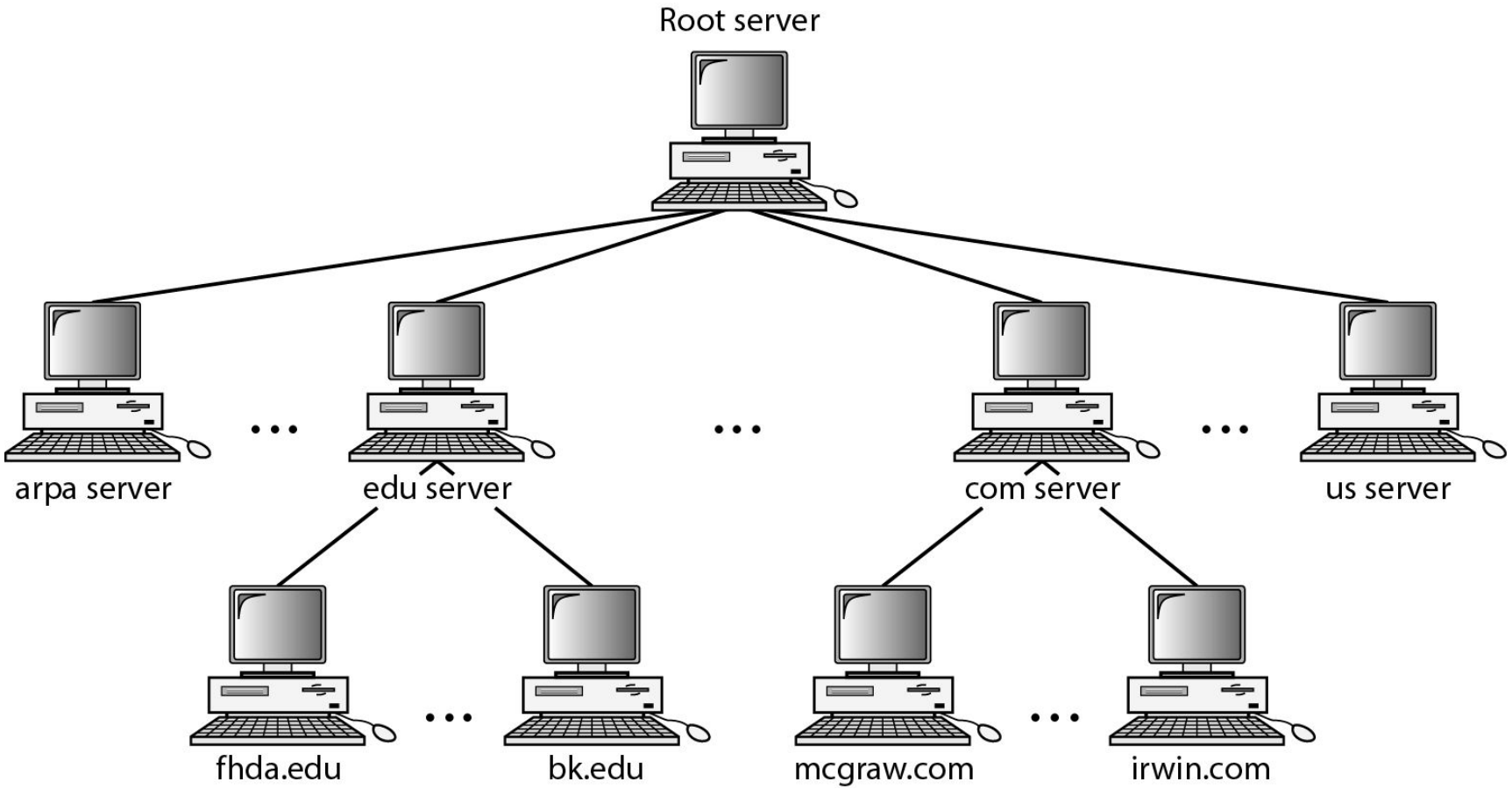
Distribution of Name Space

The information contained in the domain name space must be stored. However, it is very inefficient and also unreliable to have just one computer store such a huge amount of information. In this section, we discuss the distribution of the domain name space.

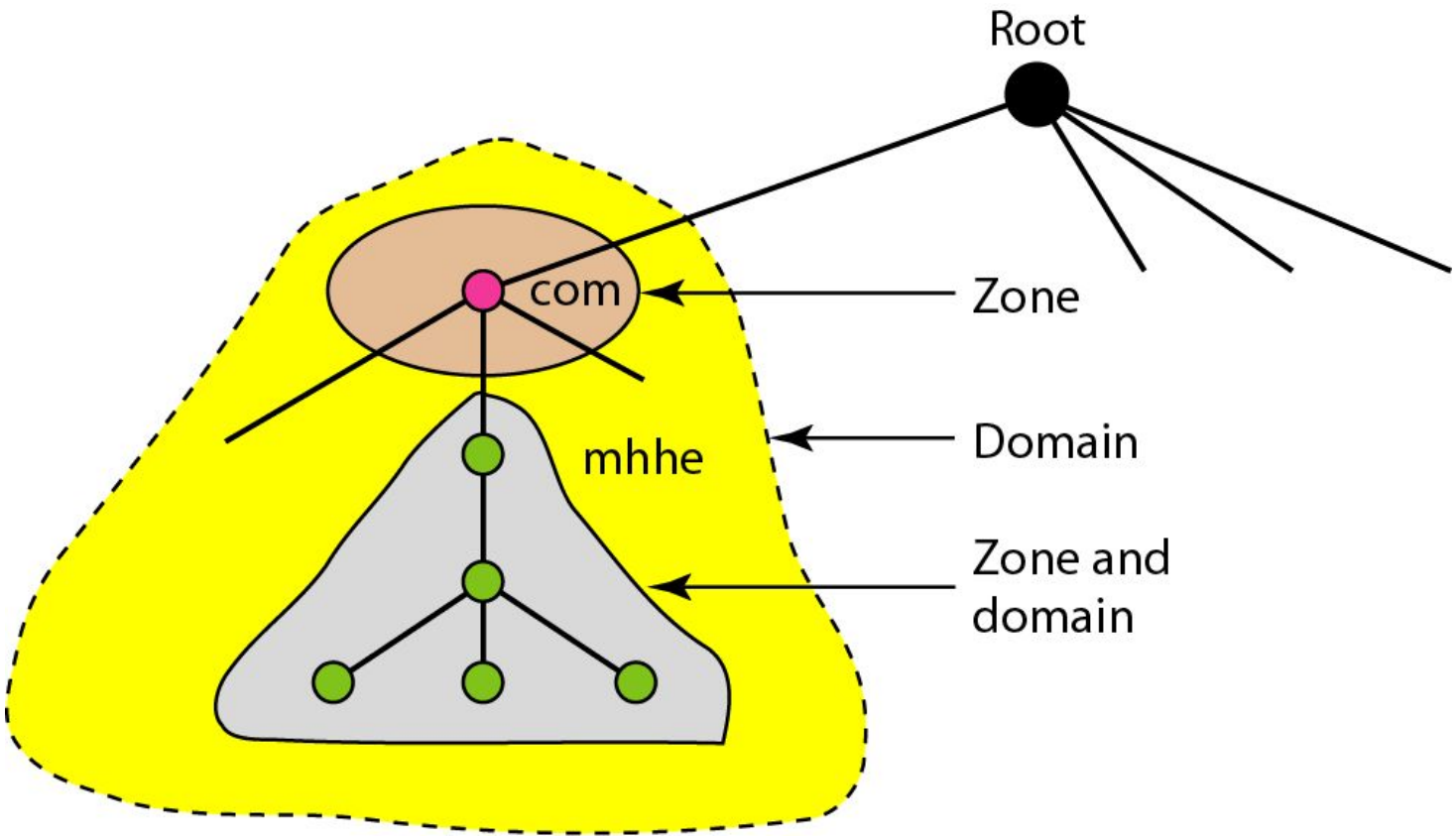
Topics discussed in this section:

- Hierarchy of Name Servers
- Zone
- Root Server
- Primary and Secondary Servers

Hierarchy of name servers



Zones and domains



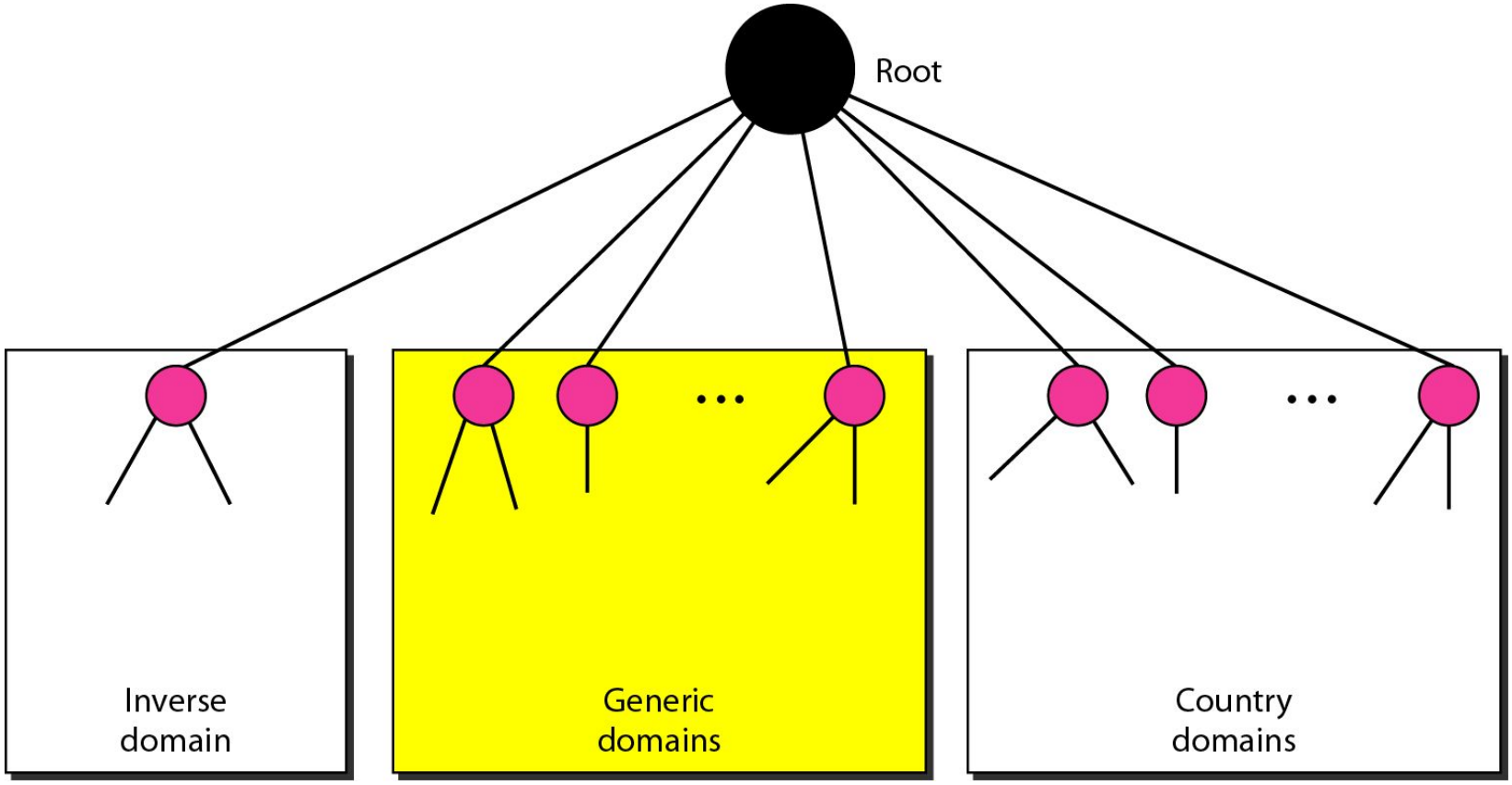
DNS in Internet

DNS is a protocol that can be used in different platforms. In the Internet, the domain name space (tree) is divided into three different sections: generic domains, country domains, and the inverse domain.

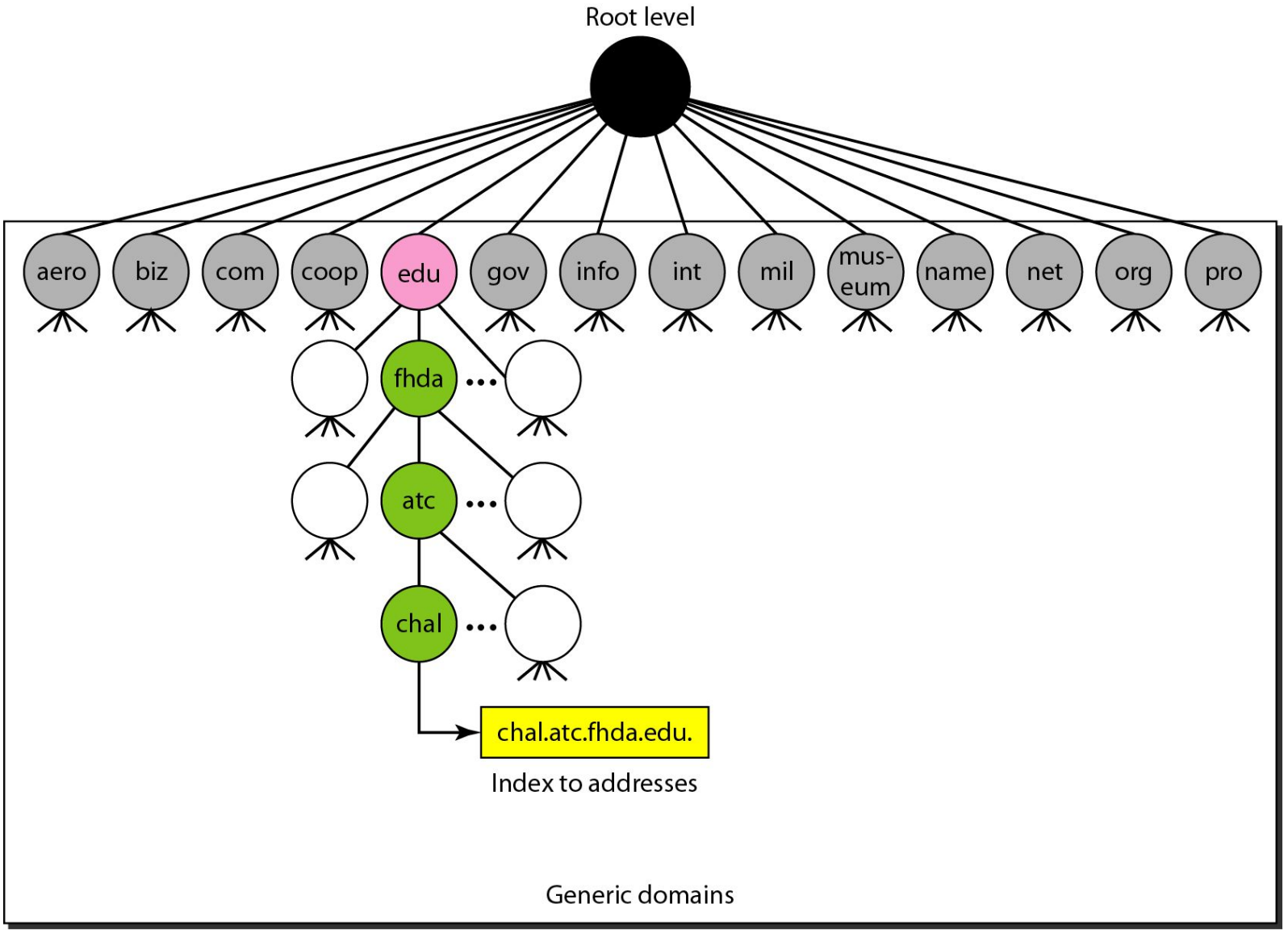
Topics discussed in this section:

- Generic Domains
- Country Domain
- Inverse Domain

Contd..



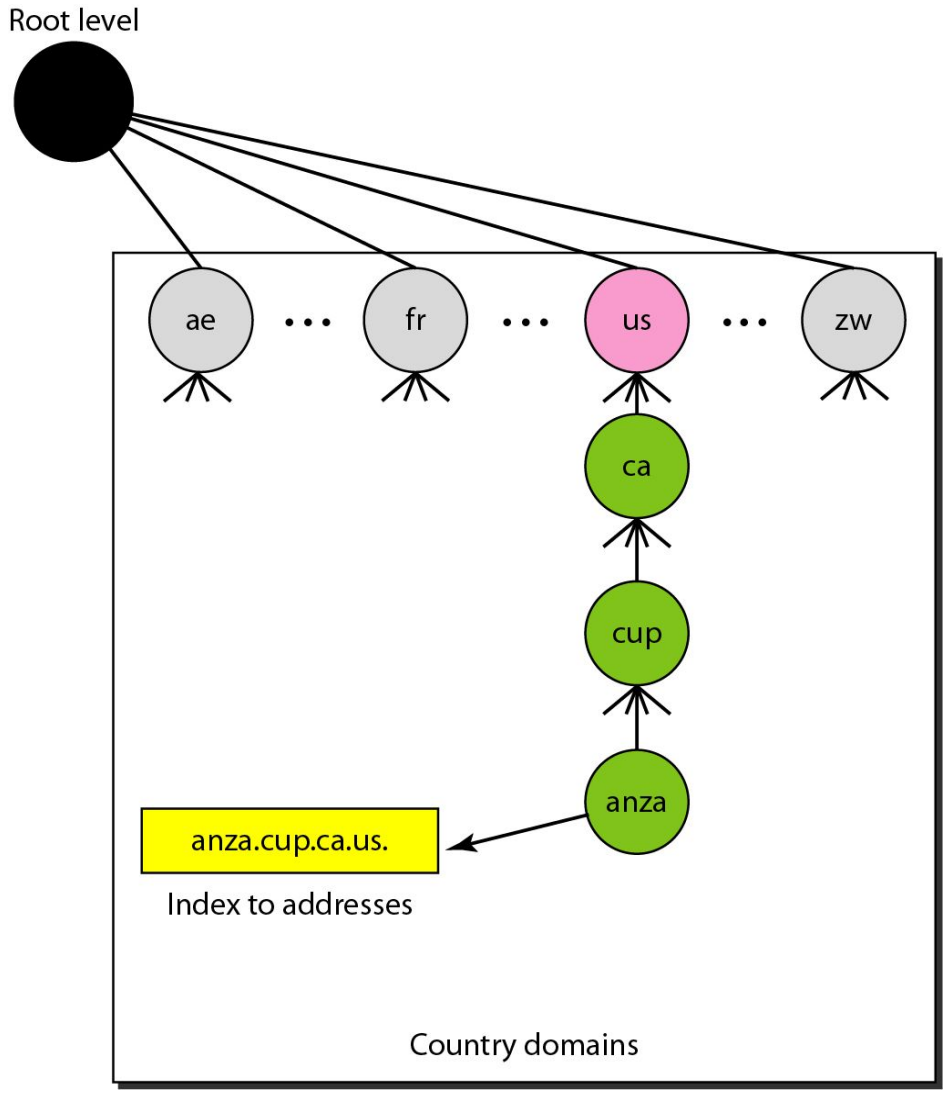
Generic domain labels



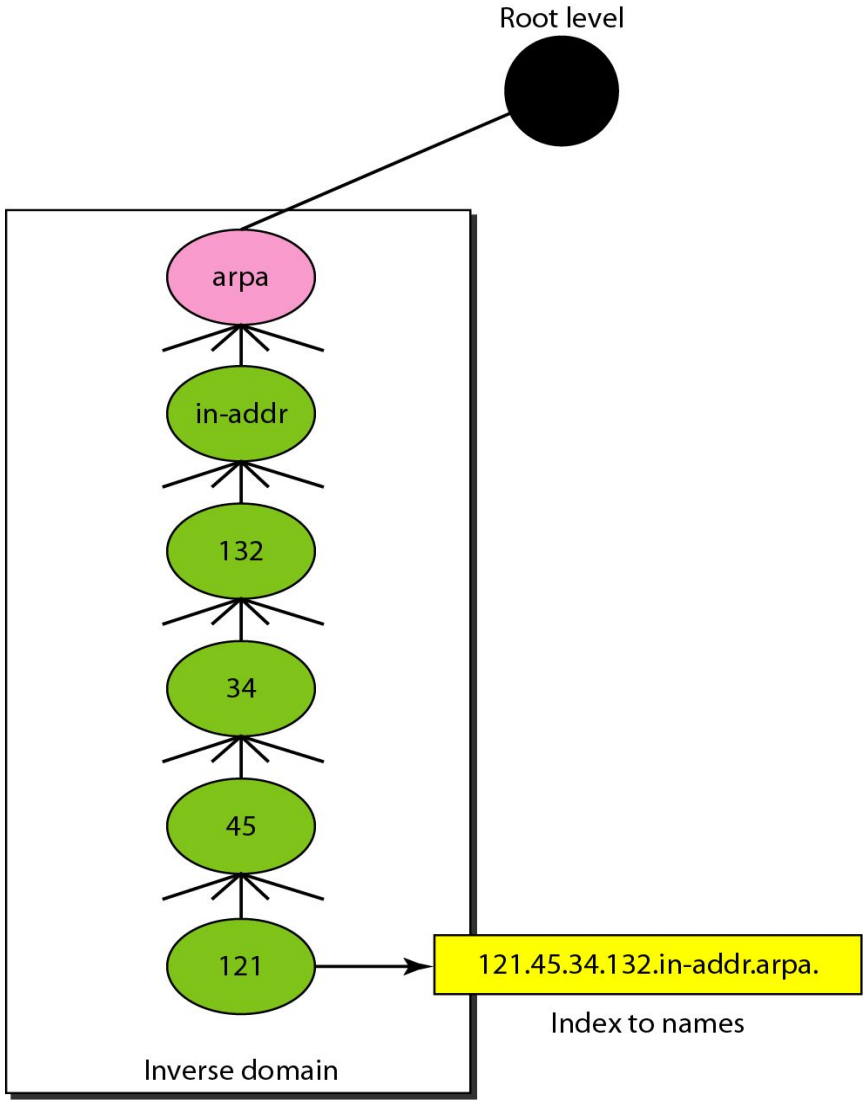
Generic domain labels

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

Country Domains



Inverse domain



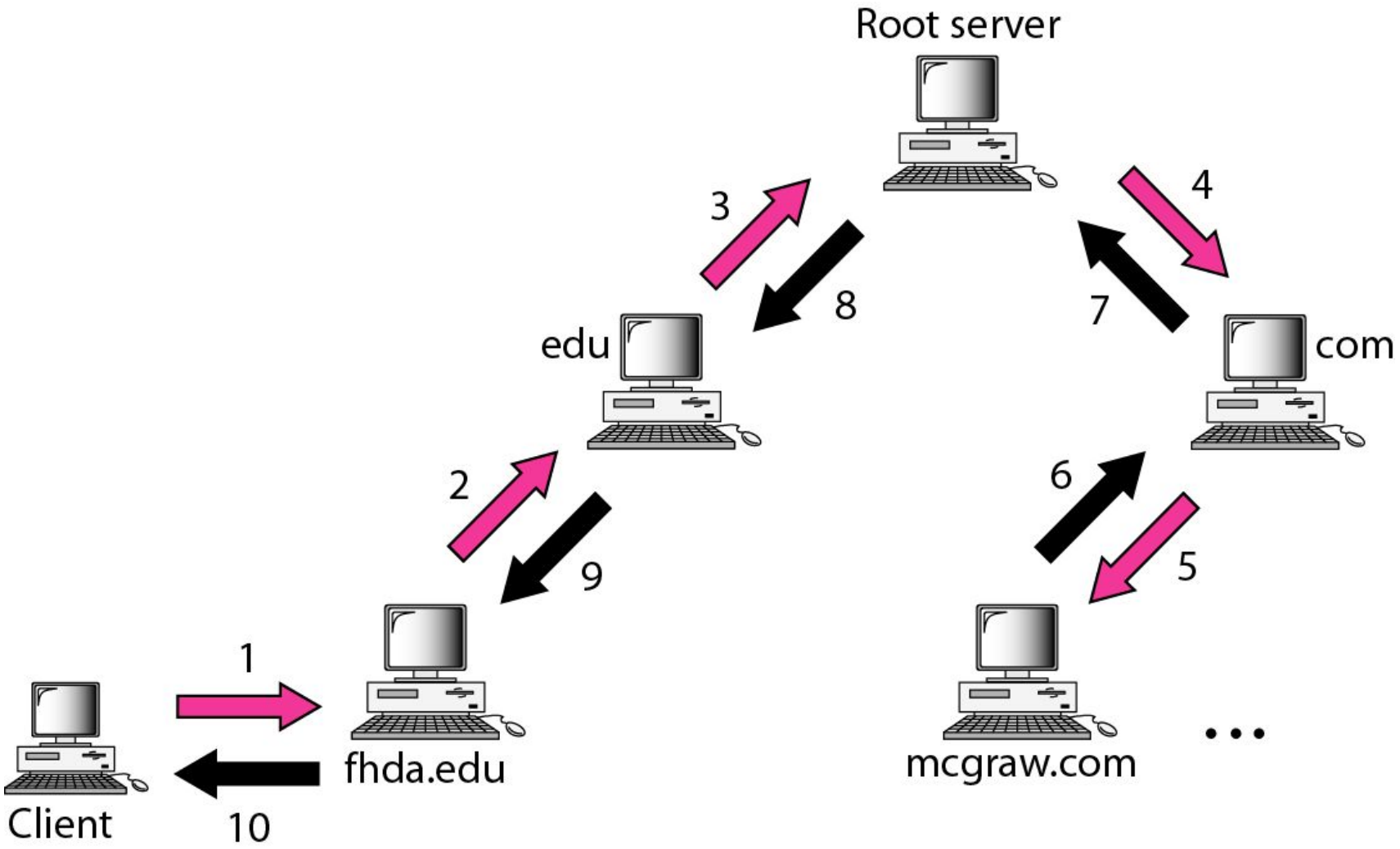
Resolution

Mapping a name to an address or an address to a name is called name-address resolution.

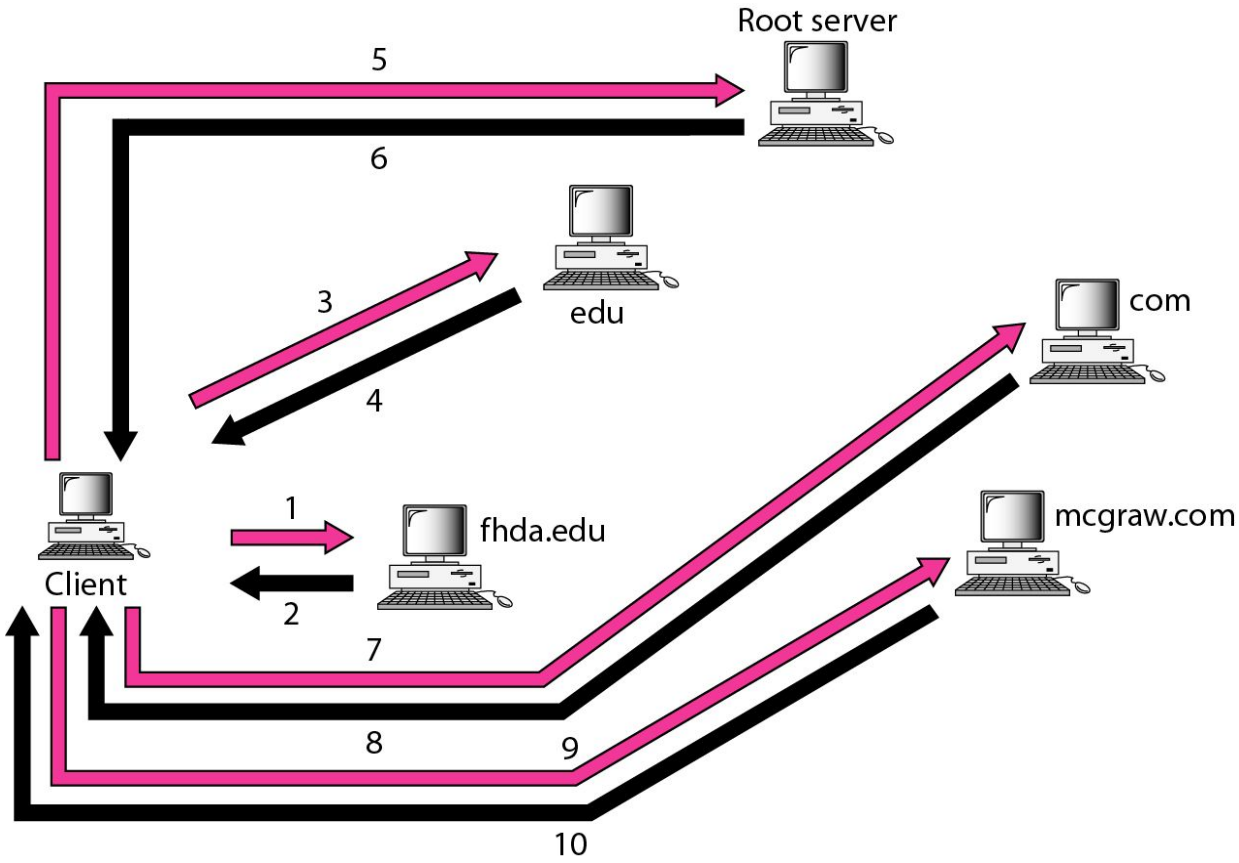
Topics discussed in this section:

- Resolver
- Mapping Names to Addresses
- Mapping Addresses to Names
- Recursive Resolution
- Caching

Recursive resolution



Iterative resolution

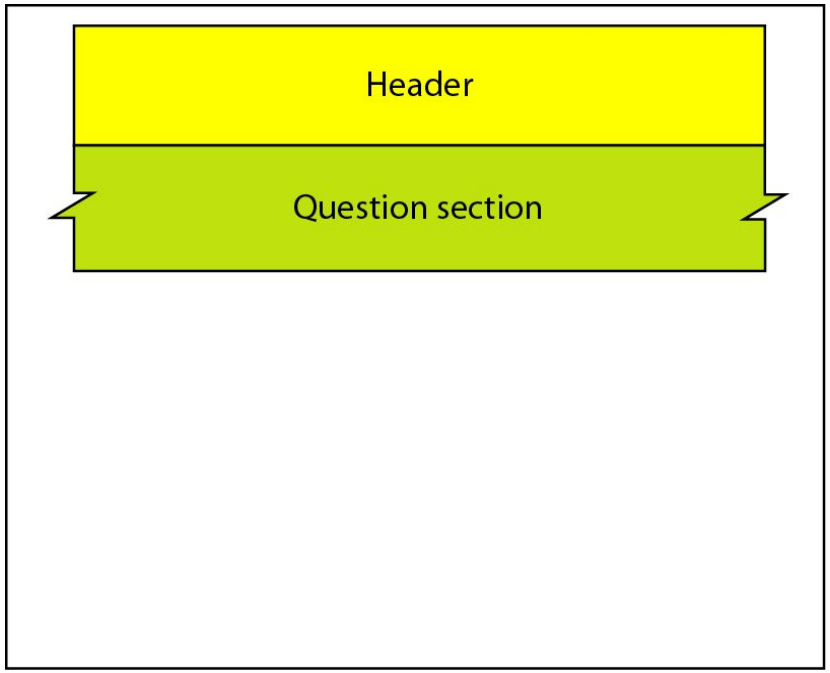


DNS Messages

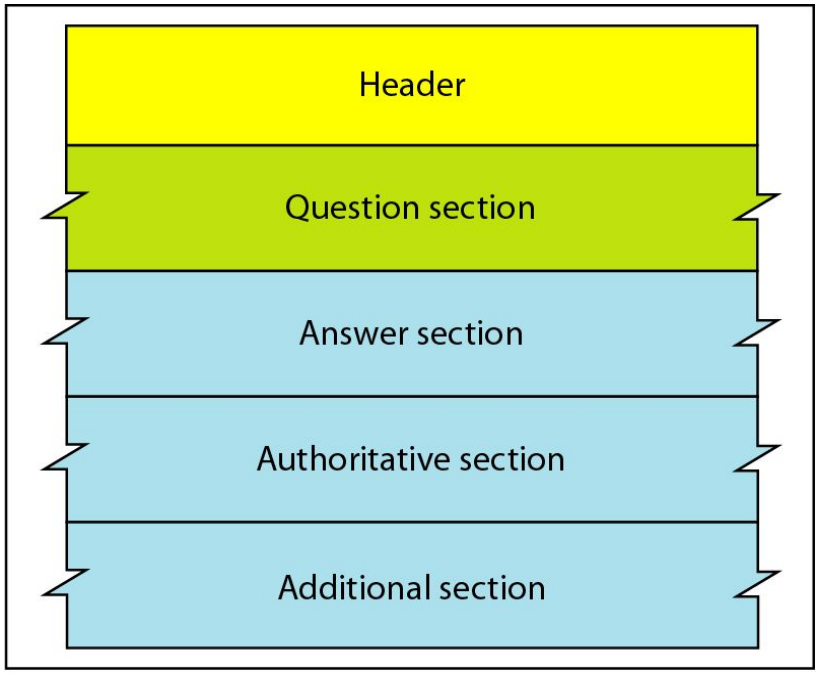
DNS has two types of messages: query and response.

- Both types have the same format.
- The query message consists of a header and question records; the response message consists of a header, question records, answer records, authoritative records, and additional records.

Query and response messages



a. Query



b. Response

Header format

Identification	Flags
Number of question records	Number of answer records (all 0s in query message)
Number of authoritative records (all 0s in query message)	Number of additional records (all 0s in query message)

Types of Records

As we saw in Section 25.6, two types of records are used in DNS. The question records are used in the question section of the query and response messages. The resource records are used in the answer, authoritative, and additional information sections of the response message.

Topics discussed in this section:

- Question Record
- Resource Record

Registrars

- How are new domains added to DNS?
  - This is done through a registrar, a commercial entity accredited by ICANN.
  - A registrar first verifies that the requested domain name is unique and then enters it into the DNS database.
  - A fee is charged.

Encapsulation

- DNS can use either UDP or TCP.
- In both cases the well-known port used by the server is port 53.
- UDP is used when the size of the response message is less than 512 bytes because most UDP packages have a 512-byte packet size limit.
- If the size of the response message is more than 512 bytes, a TCP connection is used.

Thank You