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Network Services

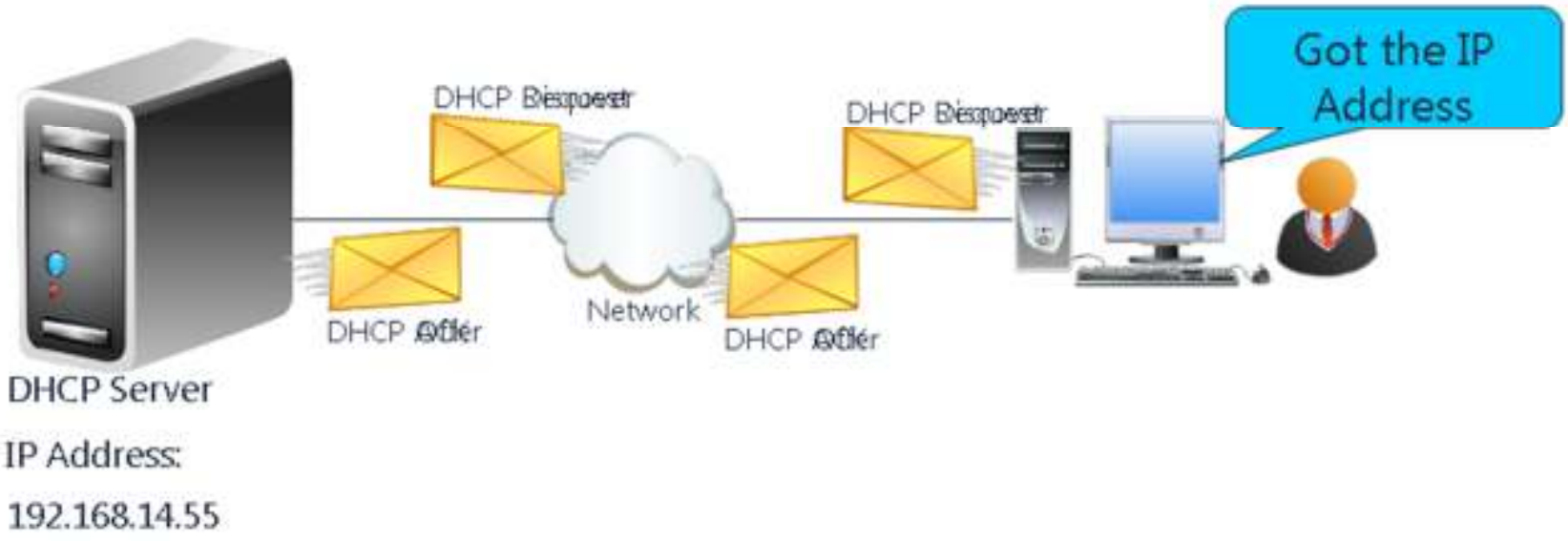
People matter, results count.

Network Services

- DHCP
- DNS
- Proxy Service
- Directory Services
- Mail Service

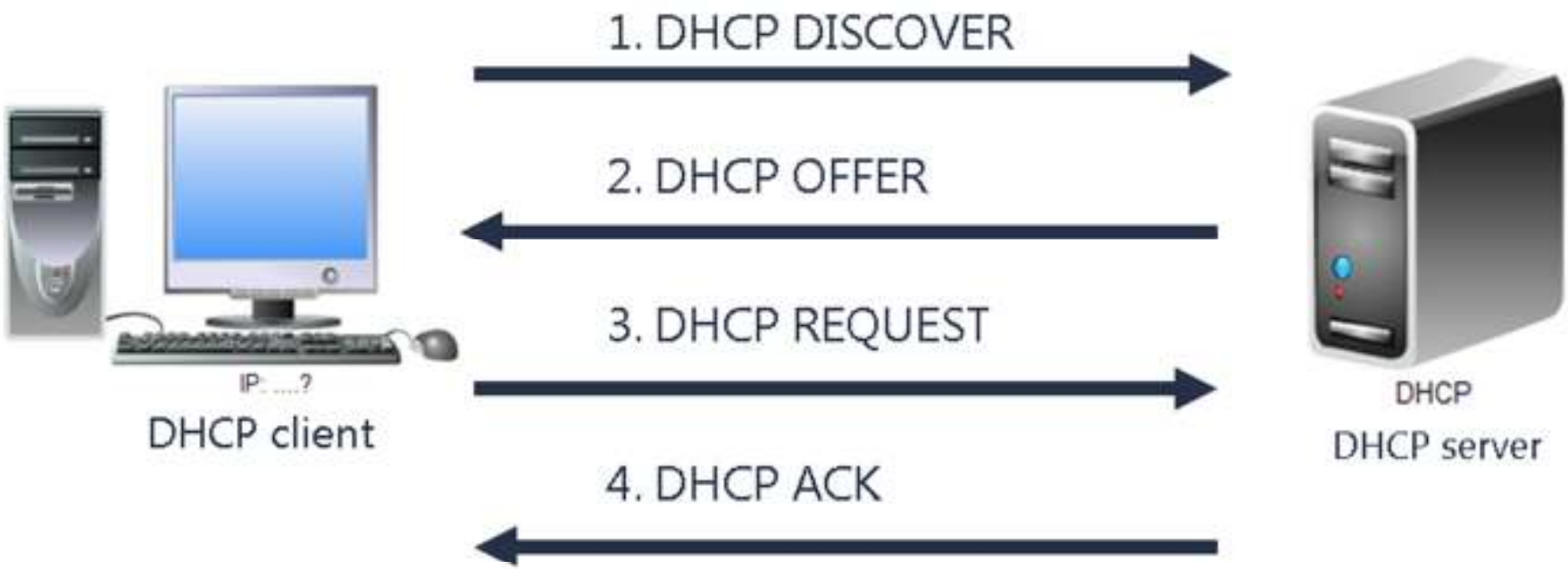
DHCP Server

- Automatic assigning of host configuration to other machine



DHCP

DHCP Client & Server's Operations



DHCP Server

Three mechanisms to allocate IP address to hosts

- Automatic allocation:

  - Assigns a permanent IP address to a client

- Dynamic allocation:

  - Assigns an IP address to a client for a limited time or until the client explicitly relinquishes the address

- Manual allocation:

  - Network administrator assigns a client's IP address, DHCP is just to convey the assigned address to the client

Name Resolution

Name resolution is used to find a lower level address (such as an IP address) that corresponds to a given higher level address (such as a hostname).

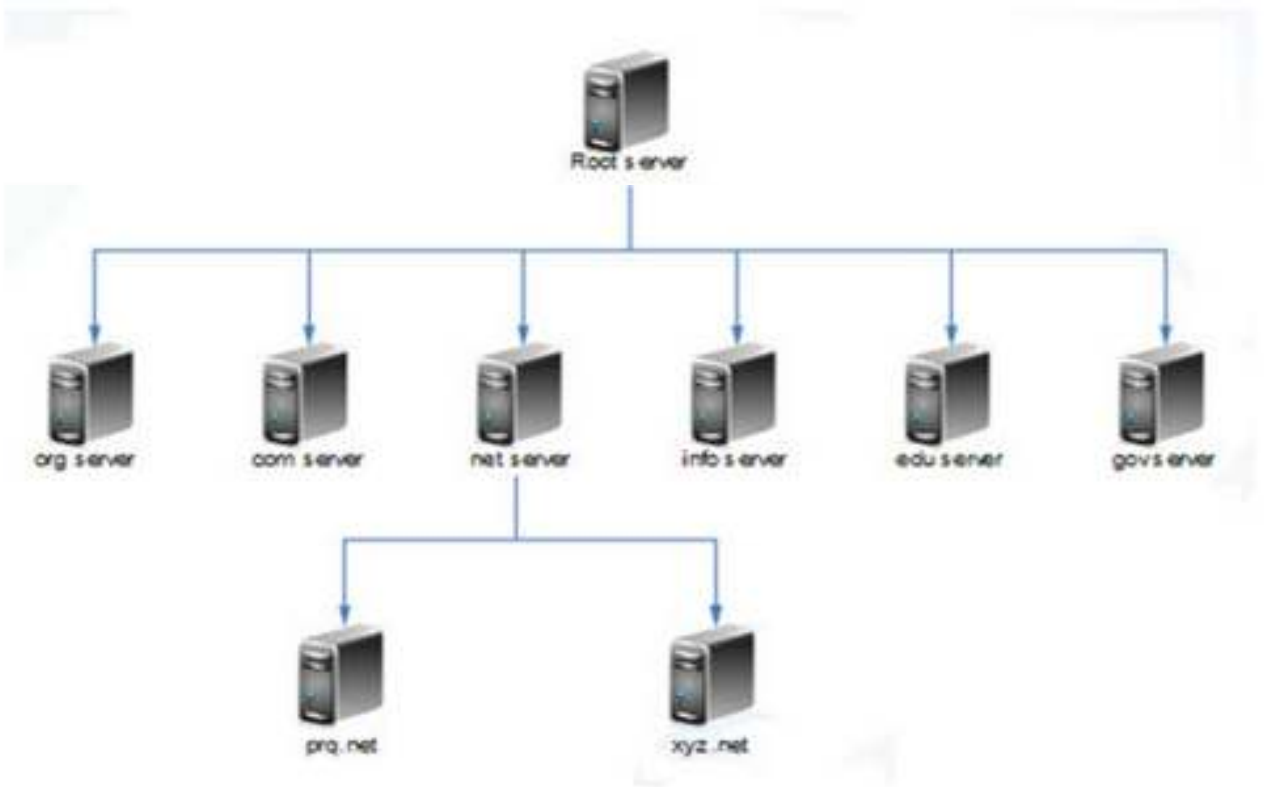
TCP/IP
- Host file (Windows and Linux)
- DNS

NetBIOS
- LMHost file (Windows)
- WINS

DNS

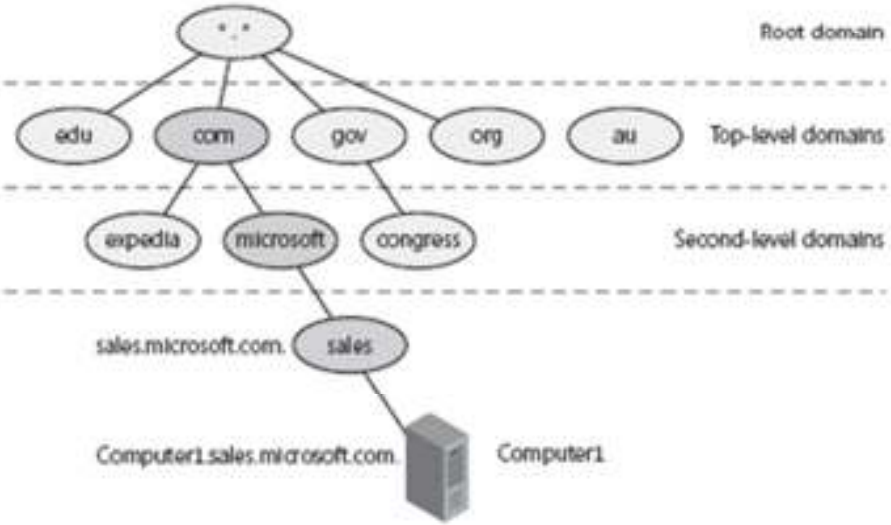
DNS resolves domain names into IP address and vice versa.

DNS Hierarchy :



What Is the Domain Namespace?

- The domain namespace is the naming scheme that provides the hierarchical structure for the DNS database. Each node, referred to as a domain, represents a partition of the DNS database.
- The DNS database is indexed by name, so each domain must have a name. As you add domains to the hierarchy, the name of the parent domain is added to its child domain (called as sub domain). Consequently, a domain's name identifies its position in the hierarchy.

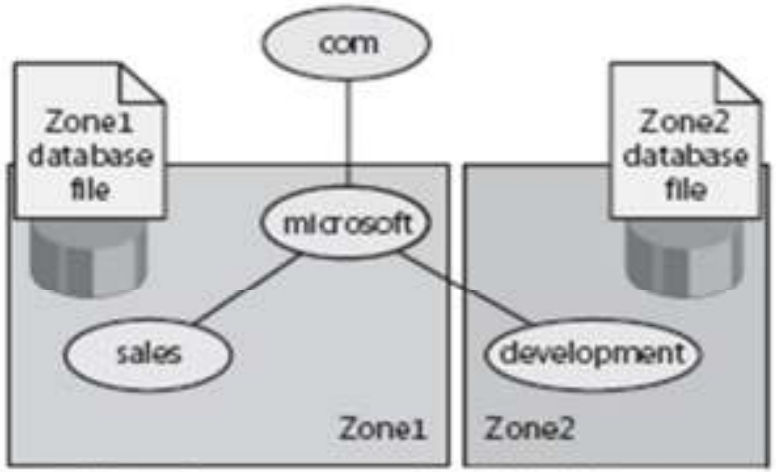


The domain namespace is hierarchical in structure.

DNS

What Are Zones?

- A zone represents a discrete portion of the domain namespace.
- Zones provide a way to partition the domain namespace into manageable sections.
- Multiple zones in a domain namespace are used to distribute administrative tasks to different groups. For example, following figure depicts the microsoft.com domain namespace divided into two zones. These zones allow one administrator to manage the Microsoft and sales domains, and another administrator to manage the development domain.



A domain namespace is divided into zones.

DNS

The Resolution Process:

- Let's look at the resolution process step-by-step:

desk9.msatlab.com

ping www.google.com.

DNS

The Resolution Process:

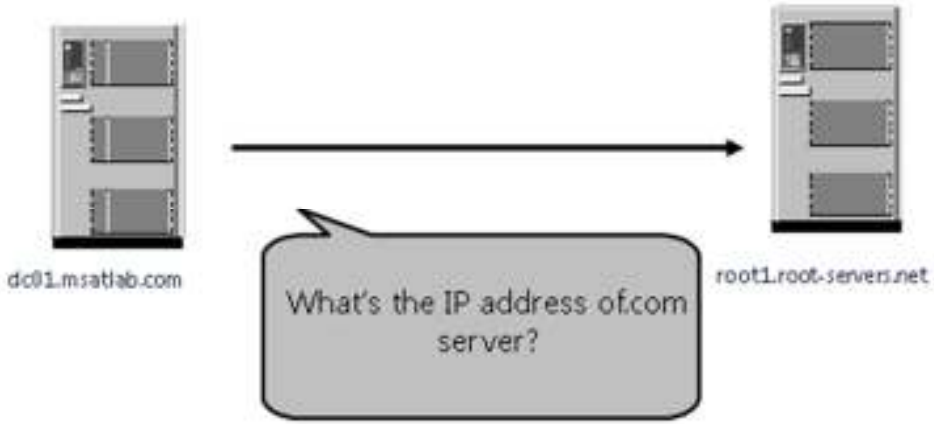
- The workstation desk9 asks its configured name server, dc01, for www.google.com's address

ping www.google.com.

DNS

The Resolution Process:

- The name server dc01 asks a root name server, root1, for www.google.com's address

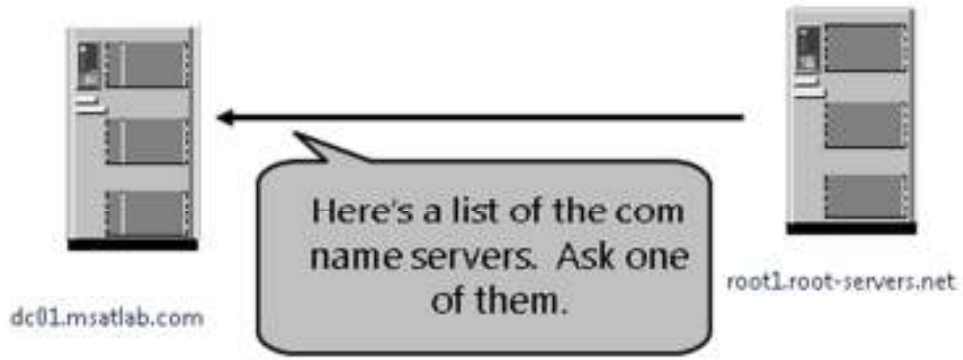


ping www.google.com.

DNS

The Resolution Process:

- The root server root1 refers dc01 to the com name servers



desk9.msatlab.com

ping www.google.com.

DNS

The Resolution Process:

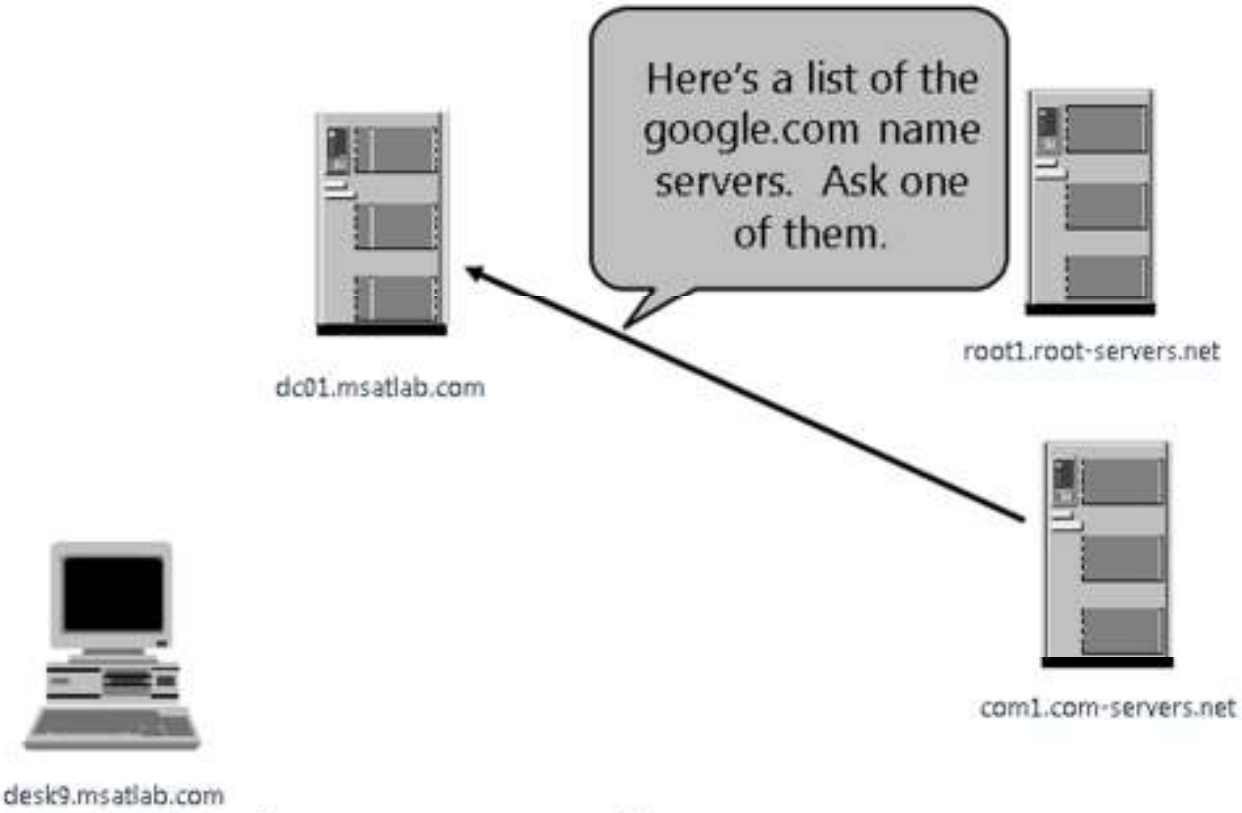
- The name server dc01 asks a com name server, com1, for www.google.com's address

ping www.google.com.

DNS

The Resolution Process:

- The com name server com1 refers dc01 to the google.com name servers



ping www.google.com.

DNS

The Resolution Process:

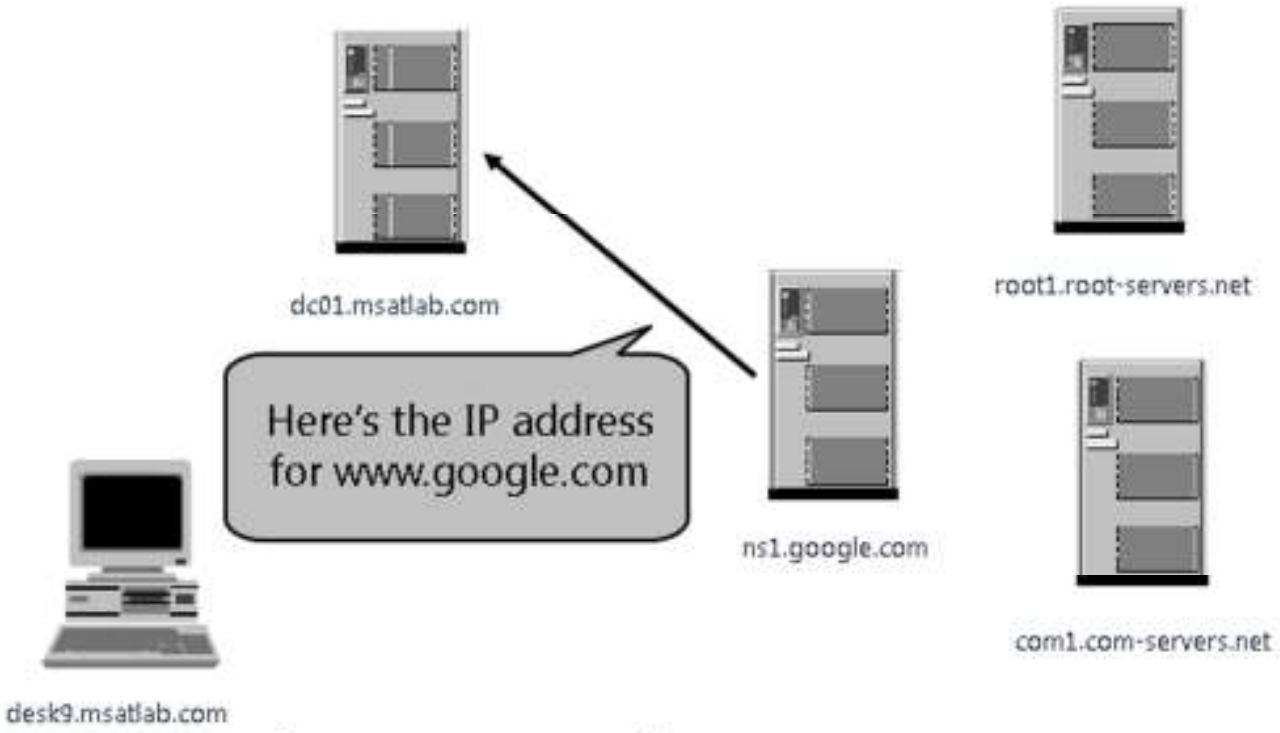
- The name server dc01 asks an google.com name server, ns1, for www.google.com's address

ping www.google.com.

DNS

The Resolution Process:

- The google.com name server ns1 responds with www.google.com's address

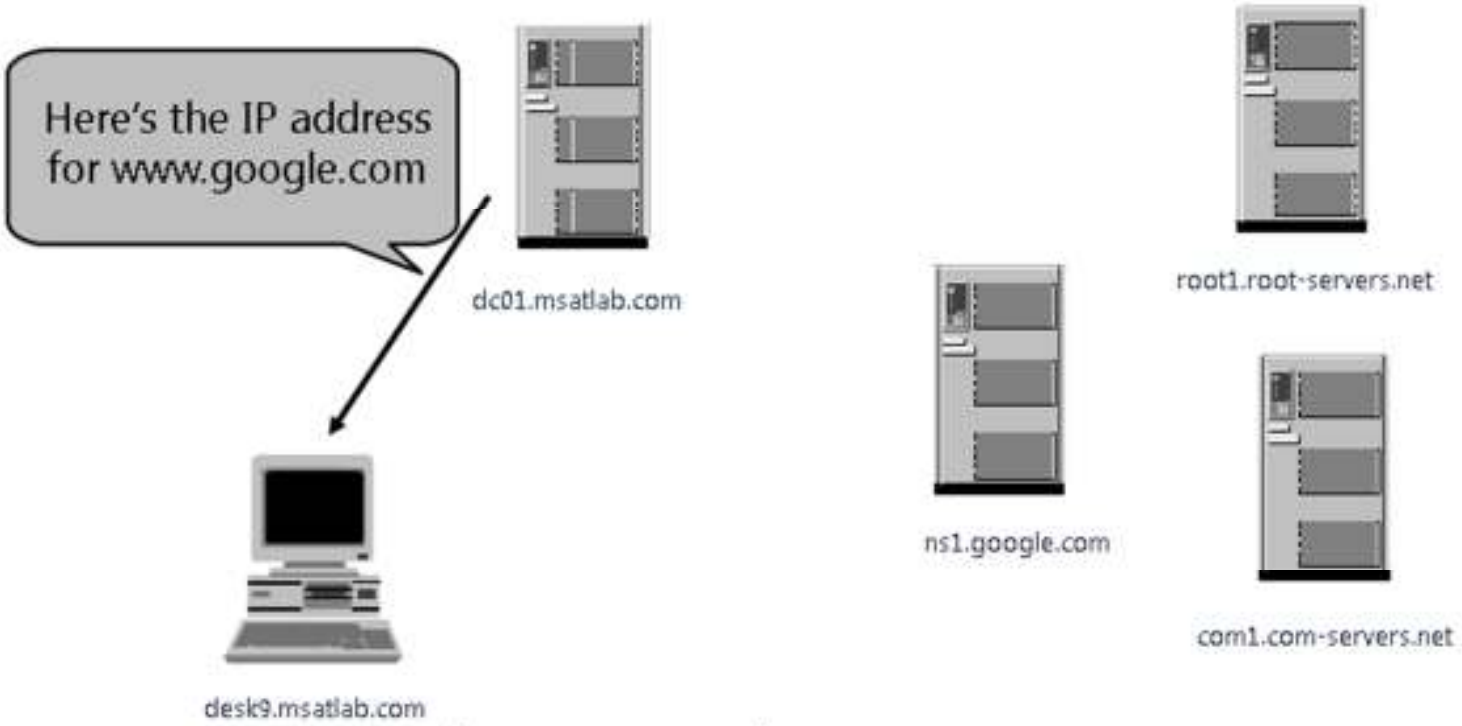


ping www.google.com.

DNS

The Resolution Process:

- The name server dc01 responds to desk9 with www.google.com's address



ping www.google.com.

DNS

Resolution Process (Caching):

- After the previous query, the name server dc01 now knows:
  - The names and IP addresses of the com name servers
  - The names and IP addresses of the google.com name servers
  - The IP address of www.google.com
- Let's look at the resolution process again

desk9.msatlab.com

ping **ftp**.google.com.

DNS

Resolution Process (Caching):

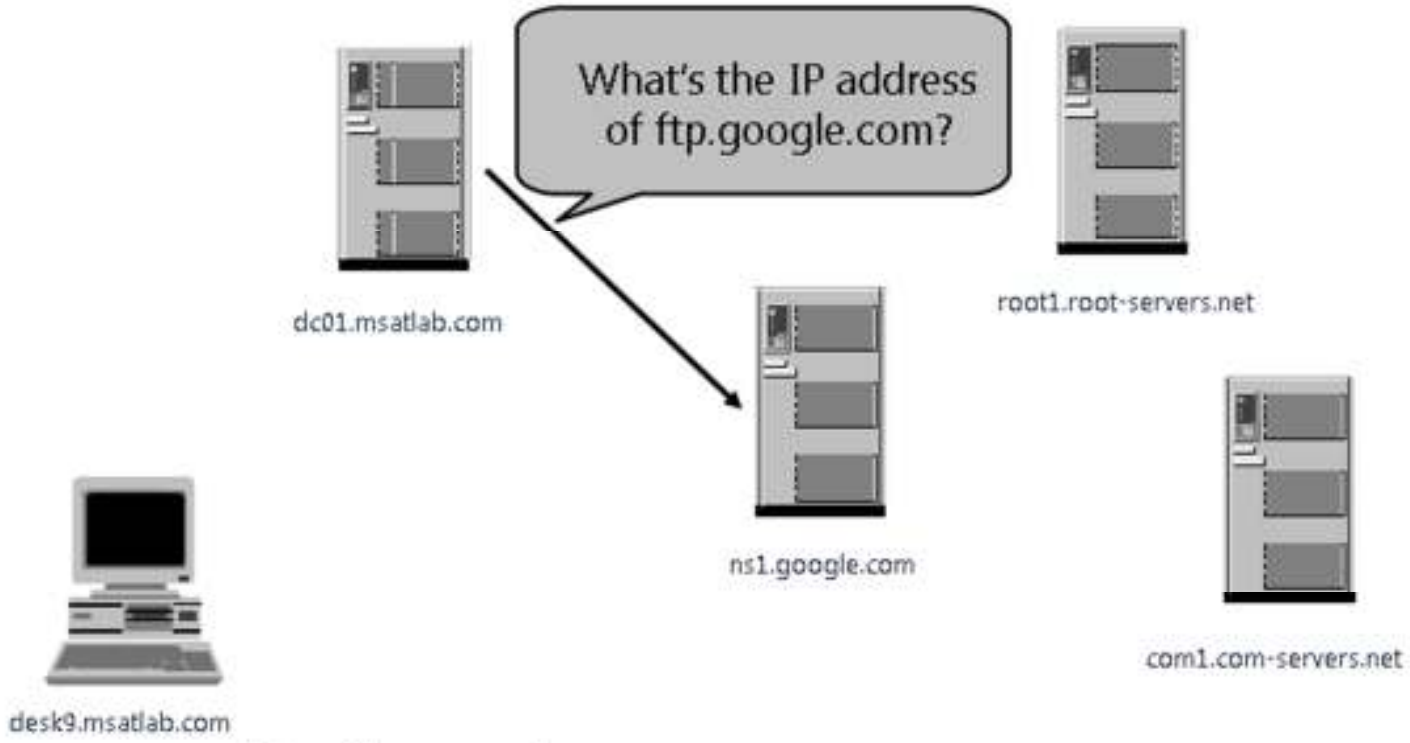
- The workstation desk9 asks its configured name server, dc01, for ftp.google.com's address

Ping ftp.google.com.

DNS

Resolution Process (Caching):

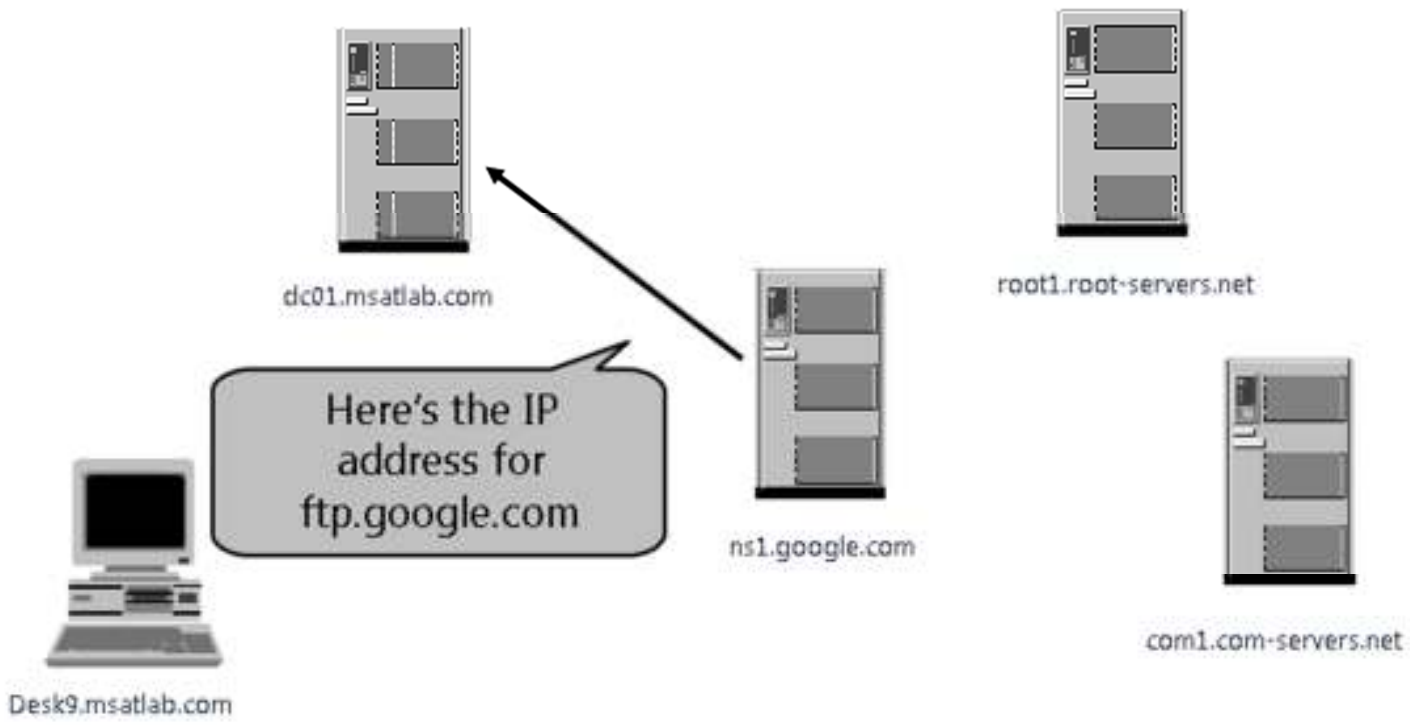
- dc01 has cached an NS record indicating ns1 is an google.com name server, so it asks it for ftp.google.com's address



Ping ftp.google.com.

DNS

Resolution Process (Caching):

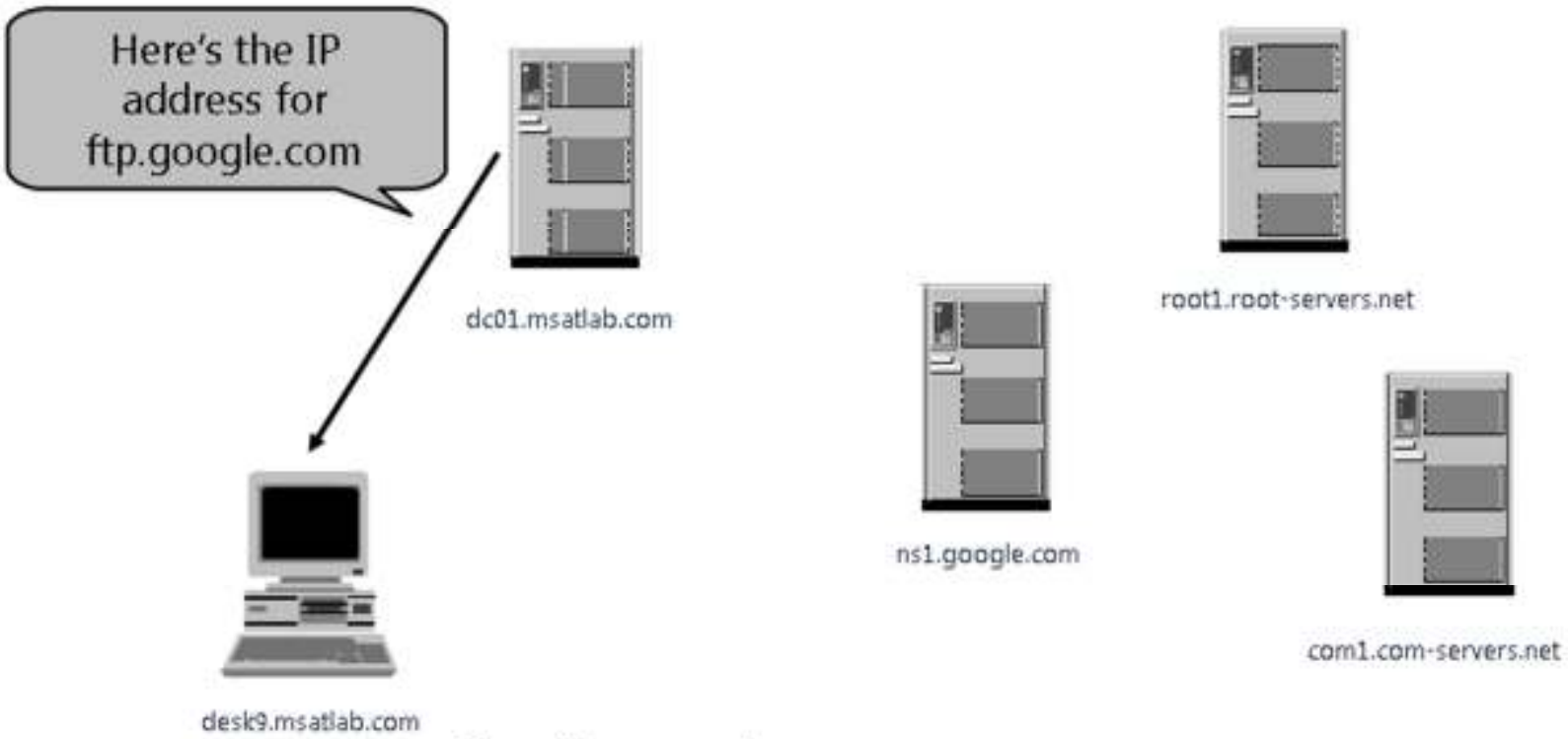


Ping ftp.google.com.

DNS

Resolution Process (Caching):

- The name server dc01 responds to desk9 with ftp.google.com's address

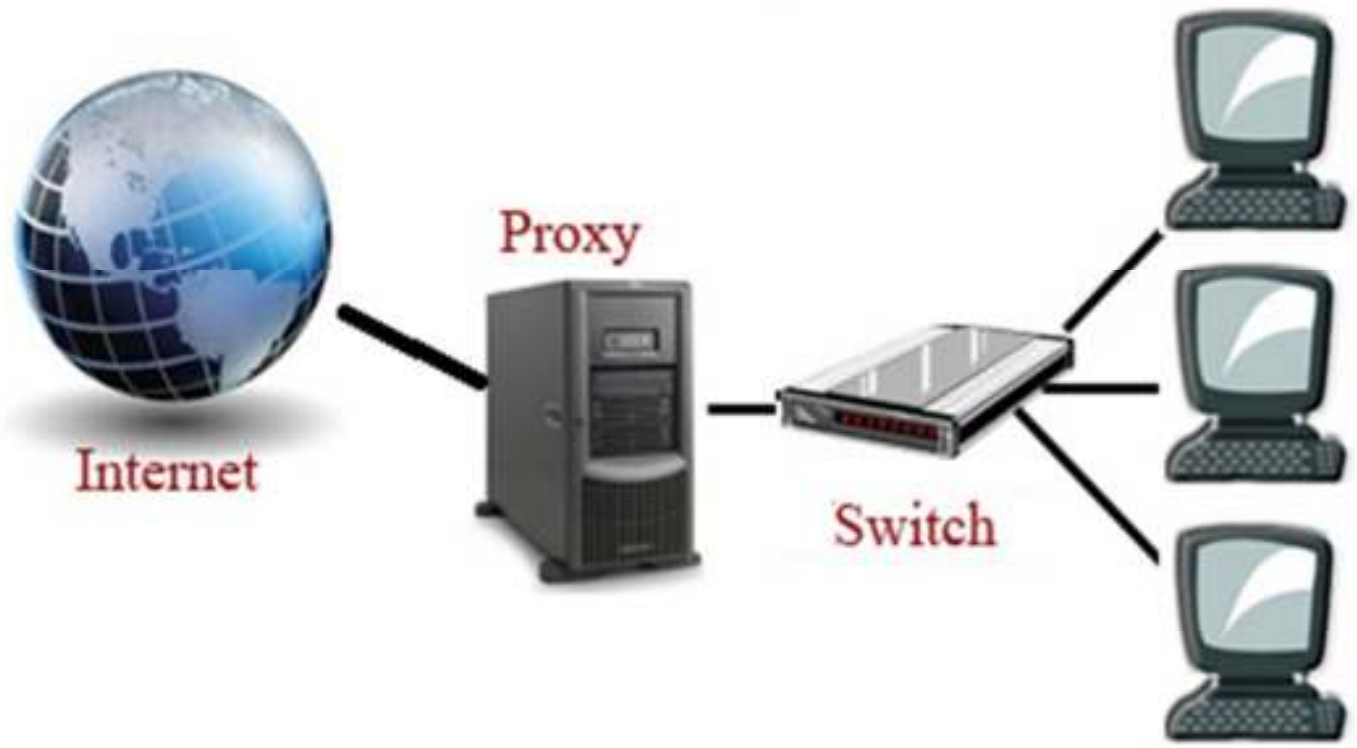


Ping ftp.google.com.

DNS: Addressing Records

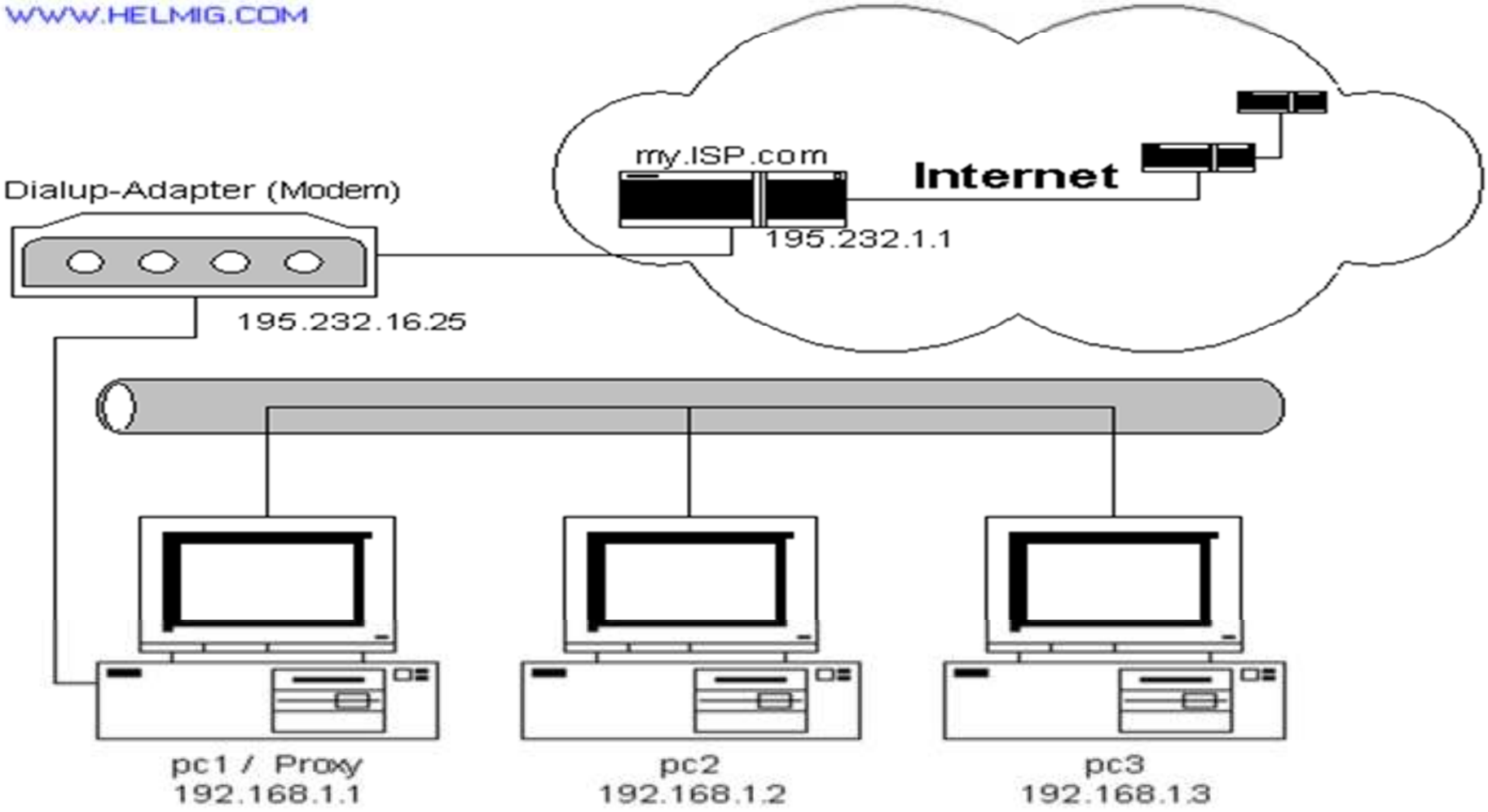
- Four major types of addressing records: A, AAAA, CNAME, PTR
- A, AAAA: Translate a text name into an IP address (A: IPv4, AAAA: IPv6)
  - One hostname can have multiple A and/or AAAA records (ex: www.cnn.com)
- CNAME: aliases for a certain hostname
  - Ex: rescom.stanford.edu is just an alias for rescomp.stanford.edu
  - Note that CNAMEs point to hostnames not IP addresses
- PTR: translates from an IP address to a hostname
  - Each IP address can only have 1 PTR record
- Note that PTR and A/AAAA records do not have to be symmetrical!
  - Ex: foo.sample.com can have A records for 10.0.0.2 and 10.0.0.3, while 10.0.0.2 can have a PTR record for bar.sample.com

Proxy



Proxy

WWW.HELMIG.COM



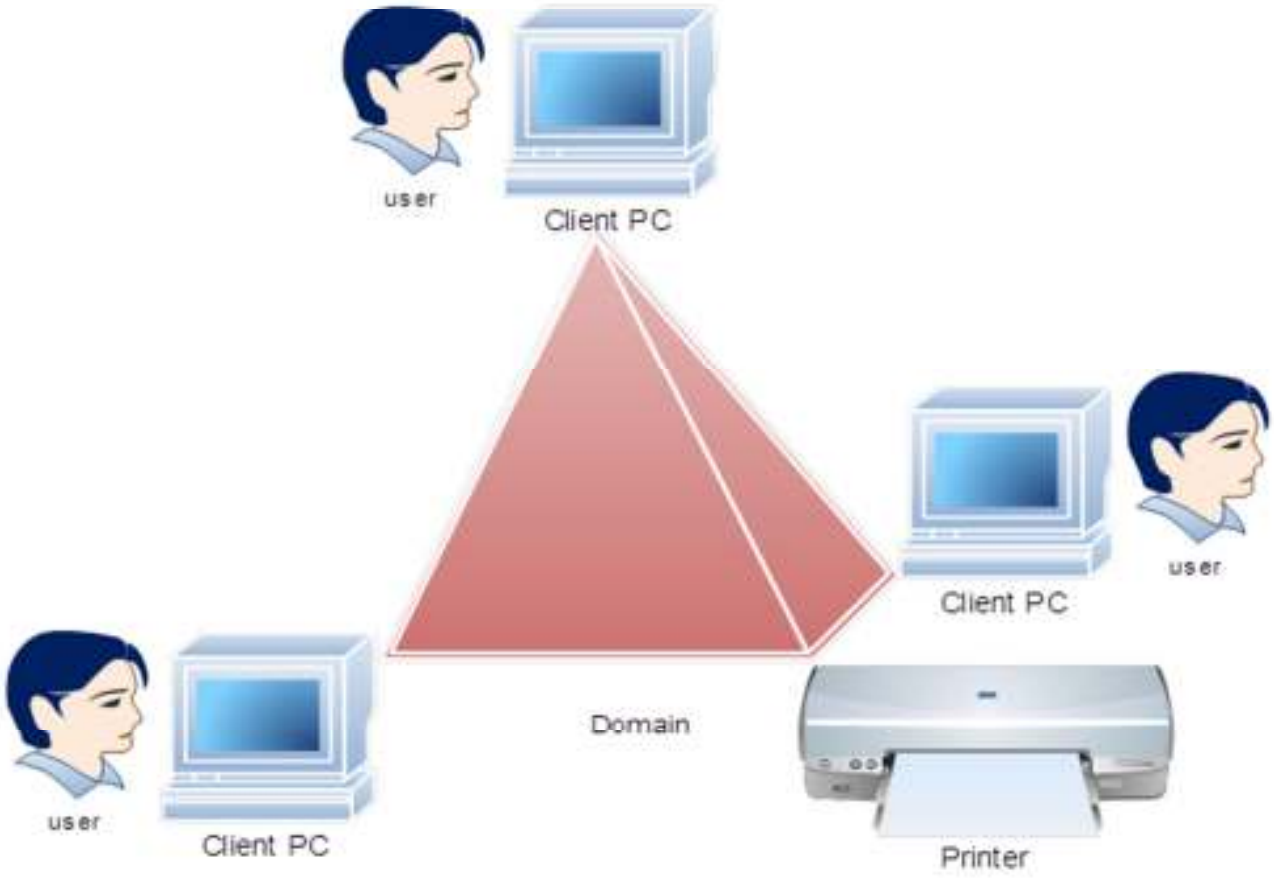
Directory Service

- The Lightweight Directory Access Protocol (or) LDAP, is an Internet protocol that email and other programs use to look up information from a server.

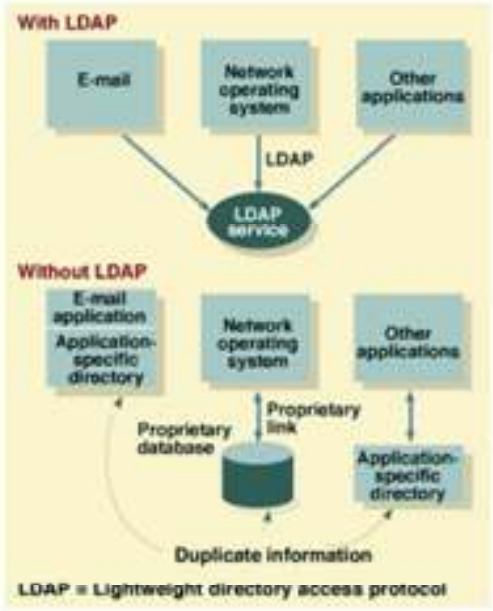
- Example:-
  - Telephone directory

Contact Name: Peter Chan
mail: peter@ust.hk
Telephone Number: 2358-1234
Telephone Number: 2358-4321
Room Number: 2228

Directory Services



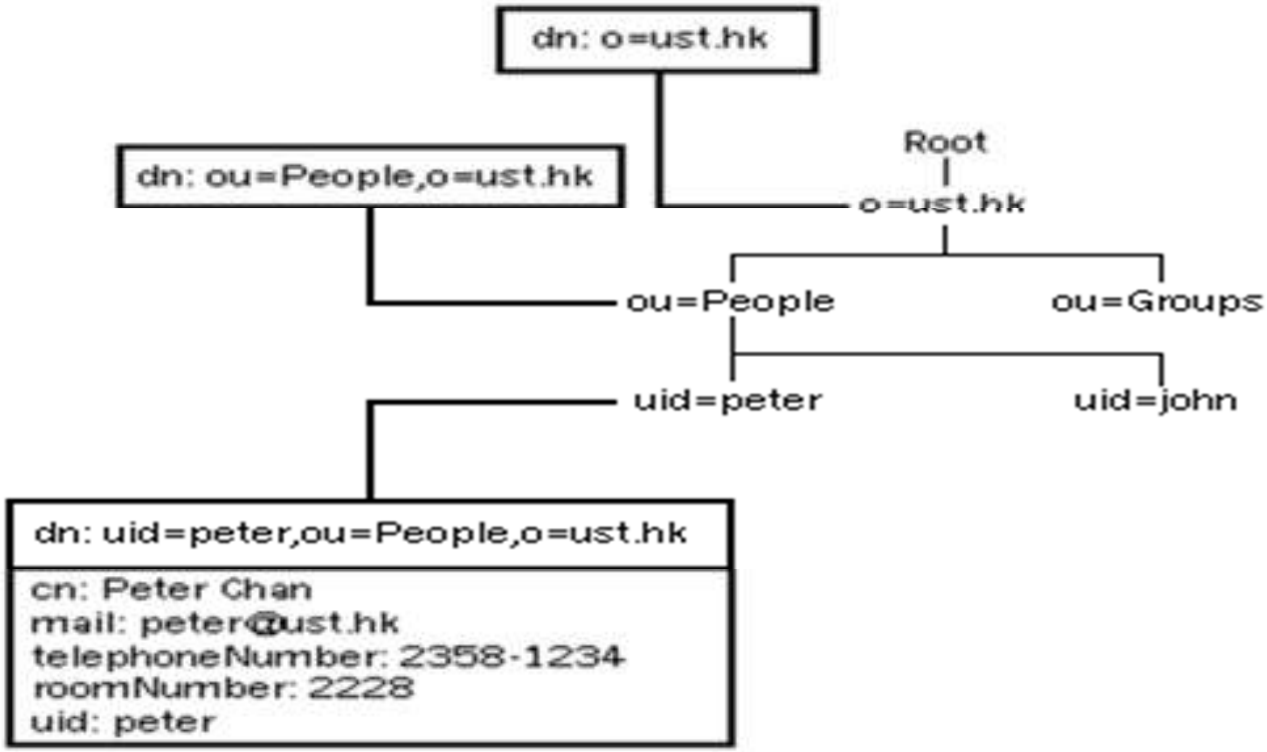
Directory Services



Directory Services

How LDAP organize directories

In LDAP, directory entries are arranged in a hierarchical tree-like structure, starting at a root and then branching down into individual entries.



Email

- **Electronic mail**, most commonly abbreviated **email** or **e-mail**, is a method of exchanging digital messages across the Internet or other computer networks.

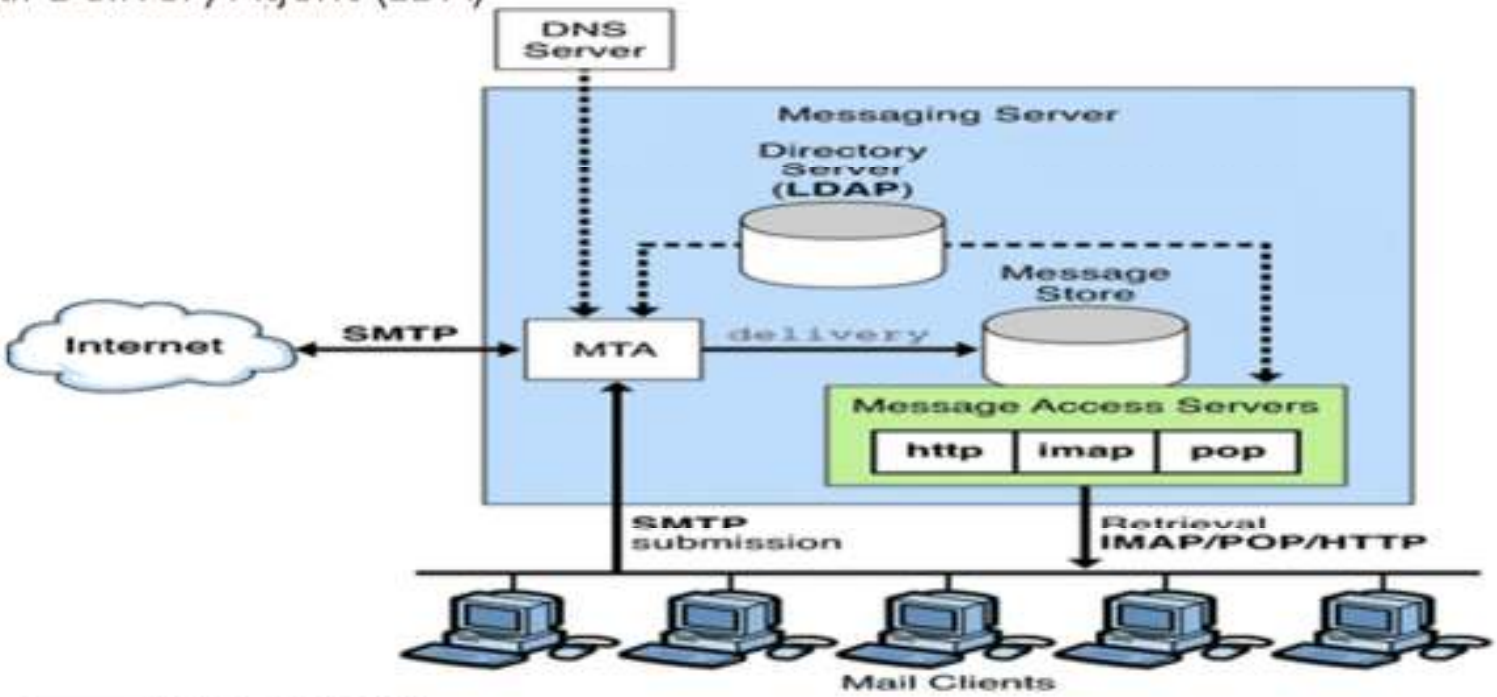
- E-mail systems are based on a store-and-forward model in which e-mail server computer systems accept, forward, deliver and store messages on behalf of users, who only need to connect to the e-mail infrastructure, typically an e-mail server, with a network-enabled device for the duration of message submission or retrieval.

- An electronic mail message consists of two components, the message header, and the message body, which is the email's content

Email

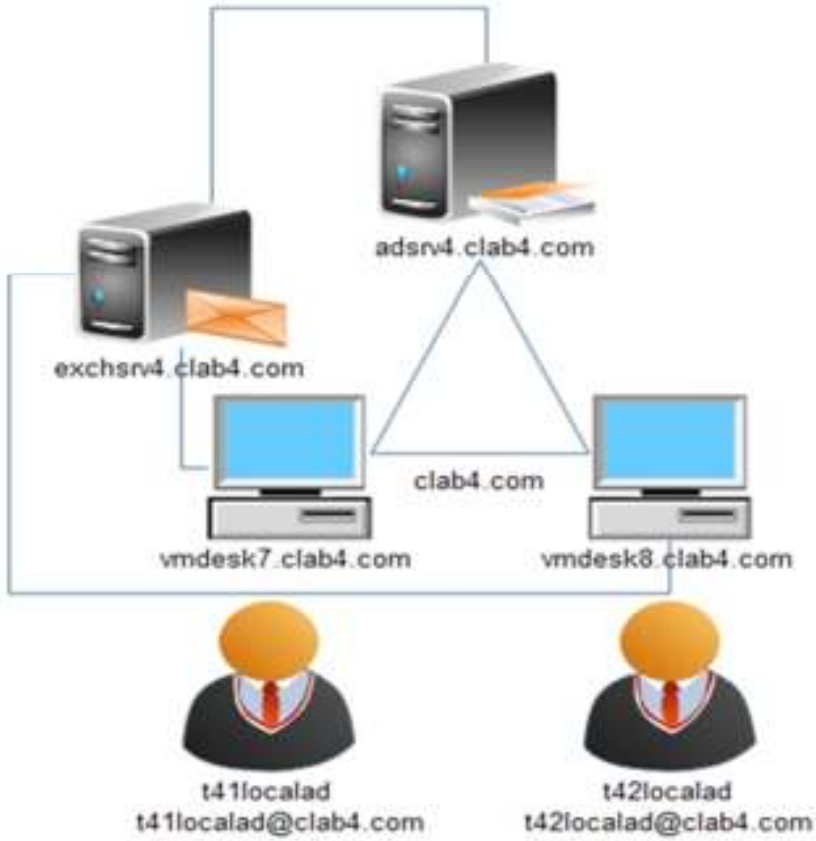
Components of an Email System:

- Mail Transport Agent (MTA)
- Mail User Agent (MUA)
- Local Delivery Agent (LDA)



Exchange Server

Mail Server by windows:



Common Email Protocols

- **Sending Mail:**
  - SMTP (Simple Mail Transport Protocol)

    Servers include Sendmail, Postfix, Exim, Qmail

- **Receiving Mail:**
  - IMAP (Internet Message Access Protocol)
  - POP3 (Post Office Protocol v3)
    - Servers Include Dovecot, Courier, Qmail

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Thank You

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