

# The Domain Name System

- The *domain name system* is usually used to translate a host name into an IP address .
- Domain names comprise a hierarchy so that names are unique, yet easy to remember.

# DNS Hierarchy



# Host name structure

- Each host name is made up of a sequence of *labels* separated by periods.
  - Each label can be up to 63 characters
  - The total name can be at most 255 characters.
- Examples:
  - whitehouse.gov
  - barney.the.purple.dinosaur.com
  - monica.cs.rpi.edu

# Domain Name

- The domain name for a host is the sequence of labels that lead from the host (leaf node in the naming tree) to the top of the worldwide naming tree.
- A domain is a subtree of the worldwide naming tree.

# Top level domains

- edu, gov, com, net, org, mil, ...
- Countries each have a top level domain (2 letter domain name).
- New top level domains include:  
.aero .biz .coop .info .name .pro

# DNS Namespace

DOMAIN	DESCRIPTION
.com	Commercial organization such as business
.edu	Educational organization such as universities
.gov	Government Organization
.int	International organization
.mil	US military organization
.net	A network that doesn't fit in any of the above category
.org	An organization that doesn't fit any organization(non profit organizations)

# DNS Organization

- Distributed Database
  - The organization that owns a domain name is responsible for running a DNS server that can provide the mapping between hostnames within the domain to IP addresses.
  - So - some machine run by RPI is responsible for everything within the rpi.edu domain.

# DNS Clients

- A DNS client is called a *resolver*.
- A call to `gethostbyname()` is handled by a resolver (typically part of the client).
- Most Unix workstations have the file `/etc/resolv.conf` that contains the local domain and the addresses of DNS servers for that domain.



# DNS Servers

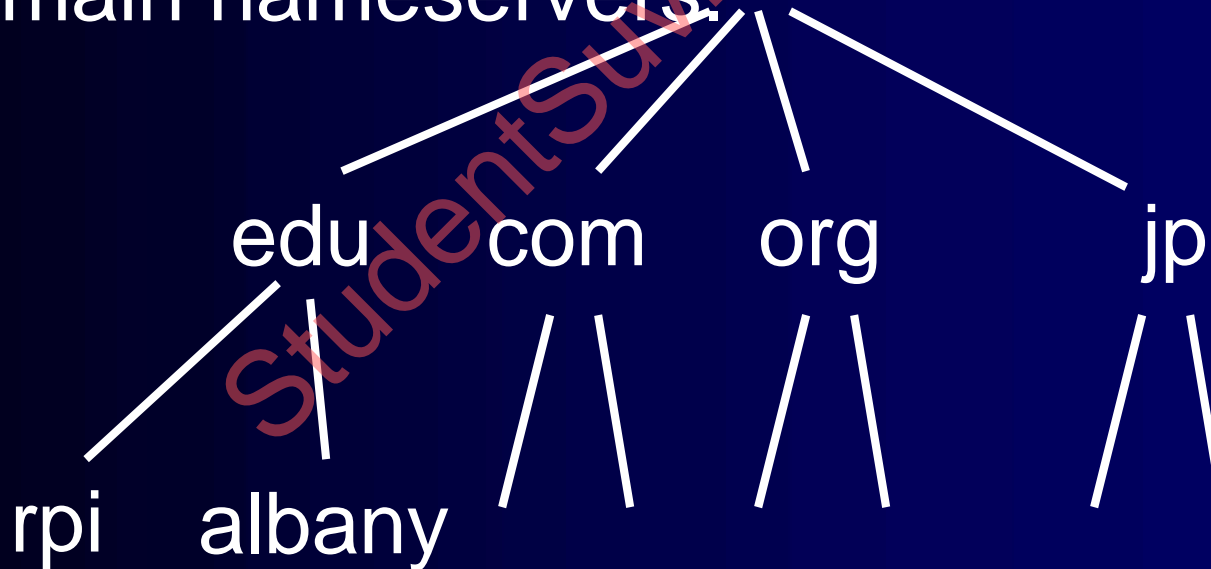
- Servers handle requests for their domain directly.
- Servers handle requests for other domains by contacting remote DNS server(s).
- Servers cache external mappings.

# DNS Data

- DNS databases contain more than just hostname-to-address records:
  - Name server records NS
  - Hostname aliases CNAME
  - Mail Exchangers MX
  - Host Information HINFO

# The Root DNS Server

- The root server needs to know the address of 1st (and many 2nd) level domain nameservers.



# Server Operation

- If a server has no clue about where to find the address for a hostname, ask the root server.
- The root server will tell you what nameserver to contact.
- A request may get forwarded a few times.

# Assignment

- Explain the term DNS.