DNS

ITL

see: Douglas Comer: Internetworking with TCP/IP, volume I” pages 311-324

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Rationale

- People remember names better that numbers (think 1-800-flowers)
- Names should be assigned and controlled within the organization that “owns” the named hosts
- Names must be unique

A Distributed Database is Required

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Keeping Track of Names

- Host f le maintained locally by local admin
- As networks interconnect, admins email updates to other admins
- Move to a central authority (NIC) to collect changes and publish a complete list
- By 1992, the central zone f le > 50 meg, and download restrictions were in place.
- A Distributed Database was a necessity.

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Name Structure

- abc.xyc.foo.bar
- Some portion (or all) of this name designates the “domain”
- If the name designates a host, the leftmost portion of the name designates the host
- www.ohiou.edu points to a host
- its.ohiou.edu is a domain

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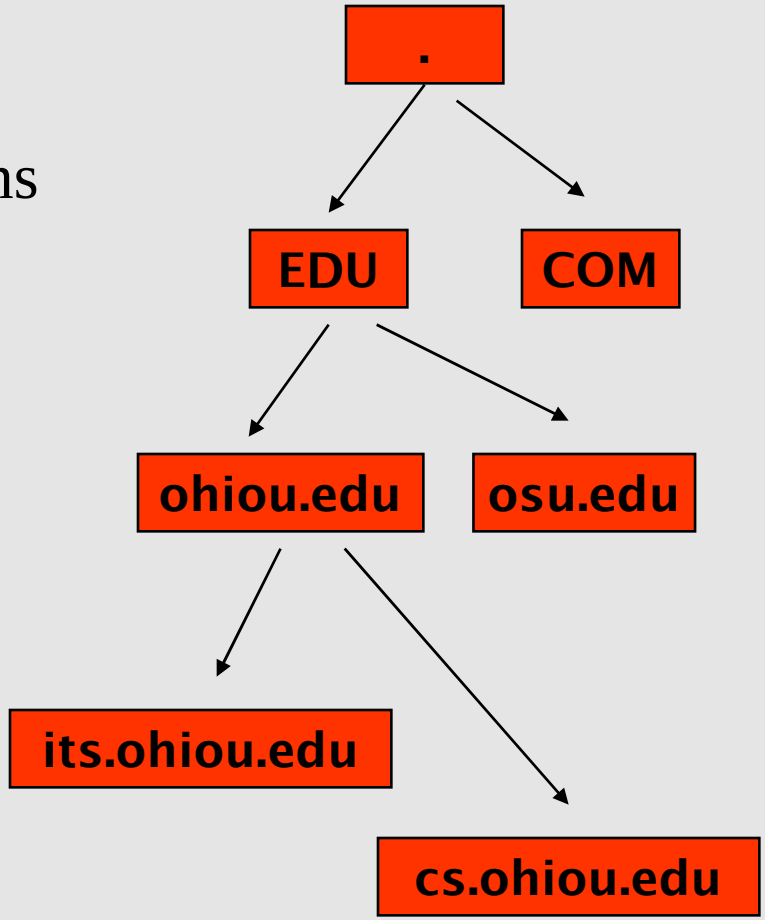
Naming Hierarchy

- The Root Domain, “.”
- International Top Level Domains (TLDs)
  - ISO Country Codes, .INT
- Generic TLDs
  - .COM, .NET, .ORG, .GOV, .MIL, .EDU, .INFO, …
- Special Purpose - .ARPA
- 127 levels deep, 63 char. long.



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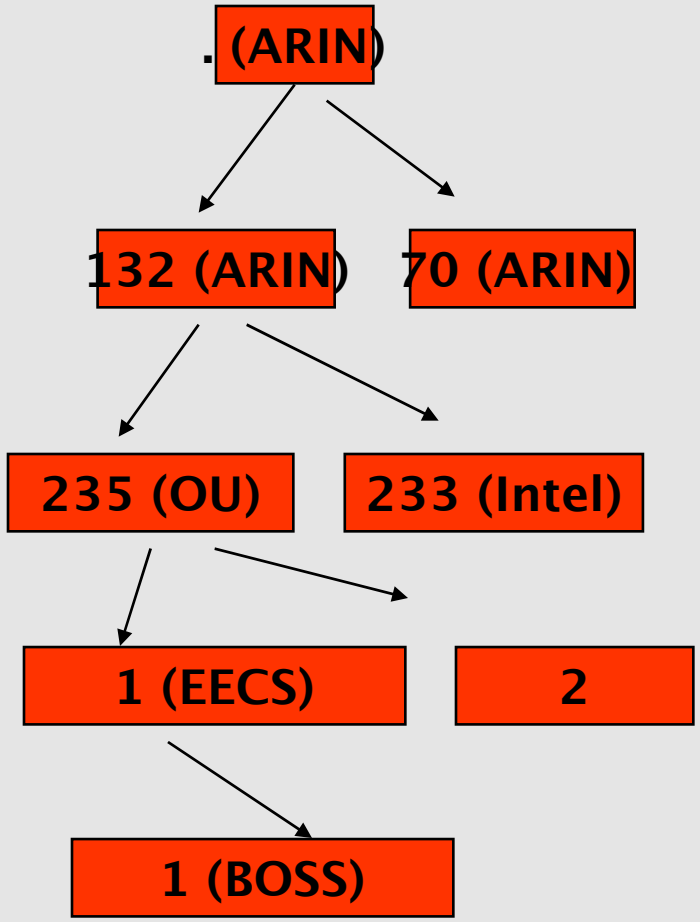
Reverse Naming Hierarchy

- The Root Domain, “.”
- Same tree structure as for names.
- Limited depth.
- Special Purpose - .ARPA
- Look up number to name with x.x.x.x.in-addr.arpa.



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Naming Examples

- International domain:
  - www.athenscity.k12.oh.us
  - *.com.br.
- Longest Domain Name

  3.14159265358979323846264338327950288419716939937510582097494459 2.com
- Not What It Seems Domain Name:
  - WWW.WHITEHOUSE.COM
  - WWW.OHIO.EDU.COM
- Special Purpose - .IN_ADDR.ARPA
  - 50.201.235.132.in-addr.arpa.
- Alternate DNS setups
  - BOGUS.WEB

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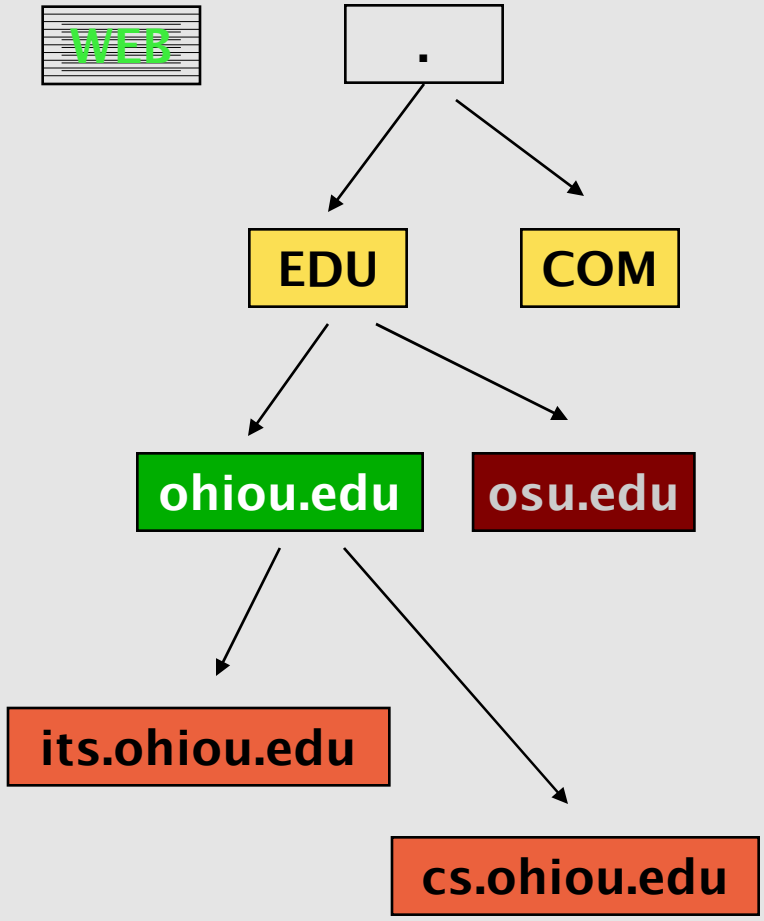
Zones of Authority

- A Name-Server is said to be “Authoritative” for the domains it has actual data-base records for
- A Name Server can service more than one domain.
- Name Servers must be redundant



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Query Structure

- The Domain Name system is designed to hold multiple pieces of information under any given name; a request must designate the Query Type
- Technically, information for multiple protocol stacks can be stored; the normal Query Class is “Internet”.
- A query can request that the contacted name server complete a query, even if it has to contact other Name Servers – a Recursive query
- A Non-Recursive, or Iterative query will provide the address of the next name server instead.

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Query Process

- A hosts f le usually takes precedence and is checked f rst.
- A “Resolver” must know at least one Name Server (from a conf guration f le.)
- A Name Server must at least know one Root Name Server (Again, from a conf guration f le.)
- The Resolver formulates the query and contacts its known Name Server.
- Name Servers store, or cache, answers to recent queries, and supply those when the same question is asked again (e.g., by another host – think web browser and google!).

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Types of Nameservers

- Forwarding server – knows some addresses or domains, but forwards other queries on. Caches queries.
  Good for a group of workstations or a lab
- Authoritative Server – gives true, up to date answers for zones it is authoritative for.
- Recursive Server – will f nd the answer for you, not just how to get to the next level.

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For Each Box on the Internet

- Typical Box -
  One domain name
  One Ethernet connection
  One IP number
- But what about a box with:
  Multiple Ethernet connections
  Multiple domains (VM or web server)
  Multiple IP numbers

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Command Line Tools

- nslookup -- no longer current
  - still available on Windows, Unix, Linux
- dig
  - newer, available on Unix/Linux
  - refer to the summary provided in the assigned readings section

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NAMED.CONF

- options {
- directory "/etc/named.db";
- version "quacamole patch";
- allow-transfer { 128.174.5.103;}
- allow-recursion { 132.235.0.0/16;}
- allow-query { any ; }; }
- zone "." { type hint;f le "cache.init";};
- ....

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NAMED.CONF – Master Zone

- zone "tcptrace.org" {
- 	type master;
- 	f le "hosts/tcptrace.org";
- 	allow-query { any ; } ;
- };
-

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NAMED.CONF - SLAVE

- zone "alum.OhioU.Edu" {
- type slave;
- f le "Cache/Domain/alum";
- allow-query { any ; } ;
- masters {
- 132.235.64.1;
- 132.235.64.2; };
- };
-

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NAMED.CONF – OU MASTER

- zone "eecs.OhioU.Edu" {
- 	type master;
- 	f le "hosts/eecs";
- 	allow-query { any ; } ;
- };
-

NAMED.CONF - DYNAMIC

- zone "dyn.eecs.ohiou.edu" {
- type master;
- f le "hosts/dyn.eecs";
- allow-update { 132.235.1.1/32; };
- };
-

DOMAIN FILE - HEADER

- $TTL 7200
- @ IN SOA boss.cs.ohiou.edu. tysko.boss.cs.ohiou.edu. (
- 2008011501 ;Serial
- 21600 ;Time to Refresh - 6 hrs
- 1800 ;Time to Retry - ½ hr
- 604800 ;Time to Expire – 1 wk
- 600) ;NeG. Cache – 10 min

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DOMAIN FILE – HEADER 2

- IN NS boss.cs.ohiou.edu.
- IN NS oucsace.cs.ohiou.edu.
- IN HINFO "Computer” “Science"
- IN MX 0 prime.cs.ohiou.edu.
- localhost IN A 127.0.0.1
-

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DOMAIN FILE - MORE

- oucsace IN A 132.235.1.2
- IN MX 0 oucsace.cs.ohiou.edu.
- IN MX 100 boss.cs.ohiou.edu.
- ace IN CNAME oucsace
-

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NAMED.CONF - REVERSE

- zone "2.235.132.IN-ADDR.ARPA" {
- 	type master;
- 	f le "rev/cs.c";
- 	allow-query { any ; } ;
- };
-

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REVERSE IP FILE

- IN HINFO "Computer” “Science”
- IN NS boss.cs.ohiou.edu.
- IN NS oucsace.cs.ohiou.edu.
- 1 IN PTR boss.cs.ohiou.edu.
- 2 IN PTR oucsace.cs.ohiou.edu.
- 3 IN PTR acemime.cs.ohiou.edu.

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