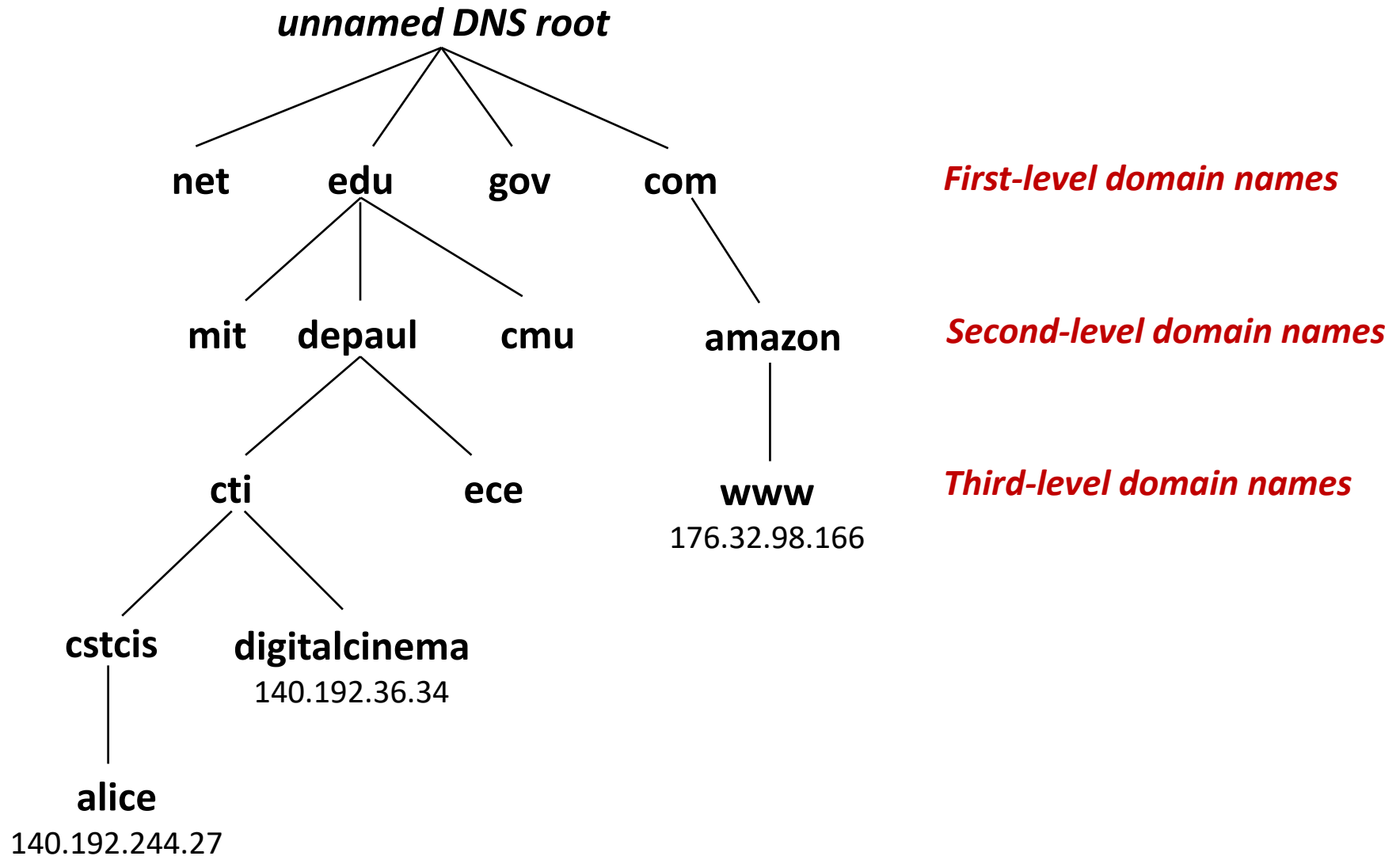


Network Programming:

A Programmer's View of the Internet:

2. Internet Domain Names

Internet Domain Names



Domain Naming System (DNS)

- The Internet maintains a mapping between IP addresses and domain names in a huge worldwide distributed database: **DNS**
- Conceptually, programmers can view the DNS database as a collection of millions of *host entries*. Access = **resolution**
 - Each host entry defines the mapping between a set of domain names and IP addresses (and much more info)
 - Domain names mapped to multiple IP addresses, and vice versa
- **Decentralized: plenty of DNS servers around**
 - DNS servers cache info, but DNS records indicate when stale
- **Hierarchical: Fresh DNS server knows only a *root* nameserver**
 - “Where is `cdm.depaul.edu`?” (iterative resolution)
 1. Ask root nameserver for `edu`,
 2. Ask `edu` nameserver for `depaul`,
 3. Ask `depaul` nameserver for `cdm`

Properties of DNS Mappings

■ Can explore properties of DNS mappings using nslookup

- Output edited for brevity

```
$ nslookup -query=any perdu.com
Server:          192.168.2.1
Address:         192.168.2.1#53
Non-authoritative answer:
perdu.com        nameserver = ns1.dreamhost.com. [...]
                  serial = 2020053003
                  refresh = 19714
                  retry = 1800
                  expire = 1814400
                  minimum = 14400
Name:   perdu.com
Address: 208.97.177.124
perdu.com mail exchanger = 10 spool.mail.gandi.net.
Authoritative answers can be found from:
ns1.dreamhost.com      internet address = 66.33.205.230
```


Properties of DNS Mappings

- DNS servers stored in `/etc/resolv.conf`

```
$ cat /etc/resolv.conf
nameserver 8.8.8.8
```

- Local file to “bypass” DNS listed in `/etc/resolv.conf`

```
$ cat /etc/hosts
127.0.0.1      localhost
::1           localhost
216.220.181.74 cdmcscmcprd01.dpu.depaul.edu
$ nslookup localhost
Address: 127.0.0.1
```



loopback addresses

- Use `hostname` to determine real domain name of local host:

```
$ hostname      # or cat /etc/hostname
cdmcscmcprd01.dpu.depaul.edu
```

Properties of DNS Mappings (cont)

- Simple case: one-to-one mapping between domain name and IP address:

```
$ nslookup mc.cdm.depaul.edu  
Address: 216.220.181.74
```

- Multiple domain names mapped to the same IP address:

```
$ nslookup michael.cadilhac.name  
Address: 163.172.56.42  
$ nslookup noemie.cadilhac.name  
Address: 163.172.56.42
```

Properties of DNS Mappings (cont)

- Multiple domain names mapped to multiple IP addresses:

```
$ nslookup www.twitter.com
Address: 199.16.156.6
Address: 199.16.156.70
Address: 199.16.156.102
Address: 199.16.156.230
```

```
$ nslookup www.twitter.com
Address: 199.16.156.102
Address: 199.16.156.230
Address: 199.16.156.6
Address: 199.16.156.70
```

- Some valid domain names don't map to any IP address:

```
$ nslookup tcs.cdm.depaul.edu
** server can't find tcs.cdm.depaul.edu: NXDOMAIN
```