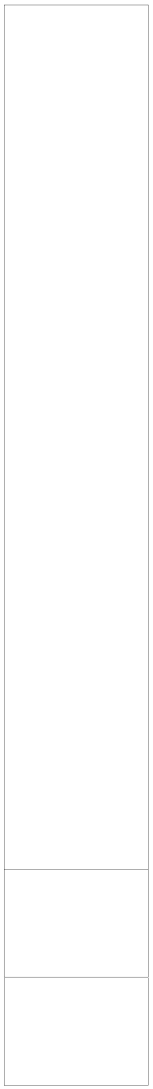
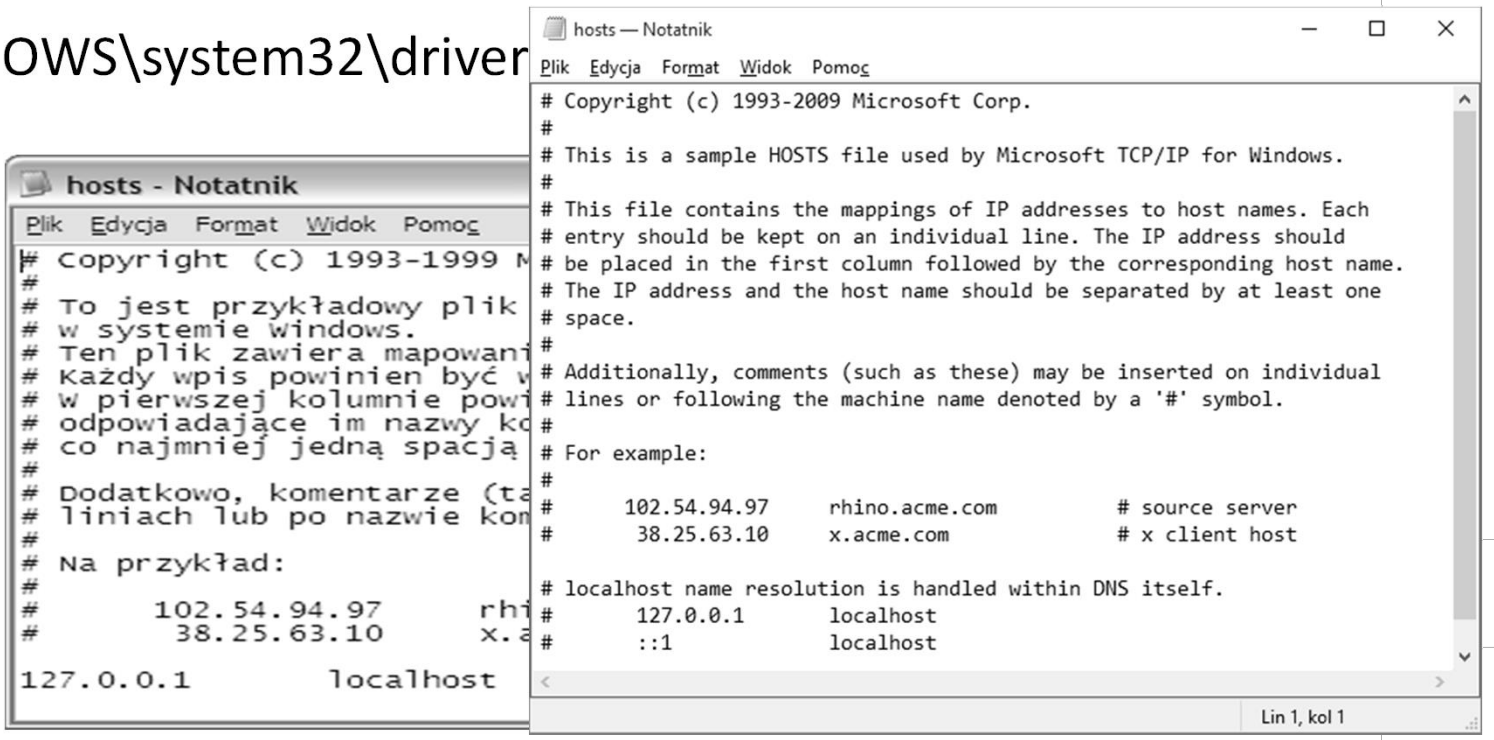
DNS

Foundations of computer networks



Hosts file

- The Seventies
- C:\WINDOWS\system32\driver

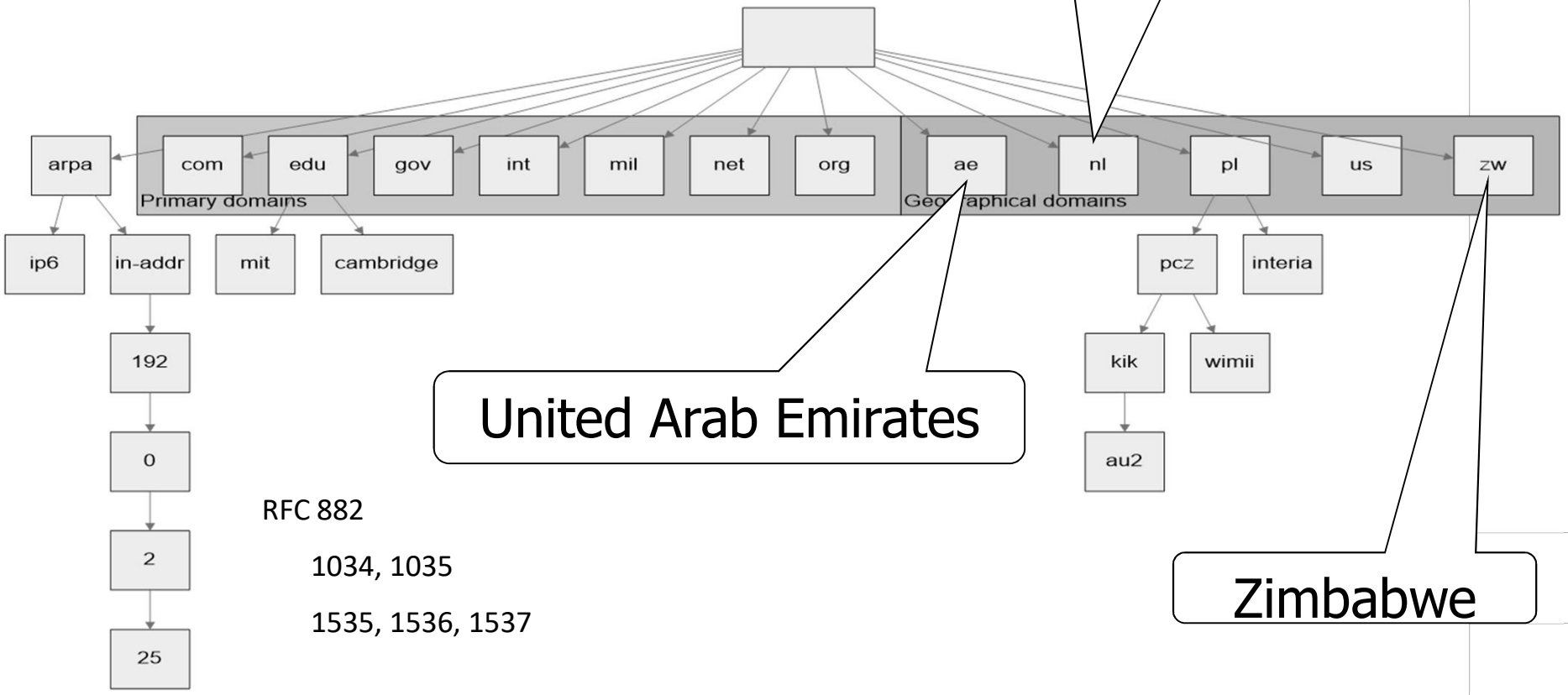


When hosts file?

- IP network without DNS, WINS etc.
- Old software, which needs host file in use
- Special applications

- **Warning!** Poisoning the hosts file is possible

DNS - 1984



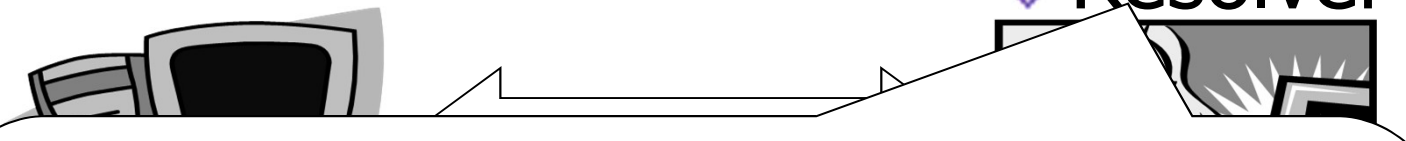
RFC 882

1034, 1035

1535, 1536, 1537

DNS servers

- Name servers



- Resolver function
  - General questions
  - Translation from mnemonic to IP
  - Translation from IP to mnemonic
- Information from resolver
  - Resource record (RR) with desired data
  - Name error
  - Data error

Resource record

- NAME
  - Name of the node to which this record pertains (variable length)
- TYPE
  - Type of RR in numeric form (e.g. 15 for MX RRs) (2 bytes)
- CLASS
  - Class code (2 bytes)
- TTL
  - Count of seconds that the RR stays valid (The maximum is 2^{31}-1, which is about 68 years) (4 bytes)
- RDLENGTH
  - Length of RDATA field (2 bytes)
- RDATA
  - Additional RR-specific data (variable length)

Common types of DNS records

- SOA – DNS zone authority
- A, AAAA – IP addresses
- CNAME – domain [illegible]liases
- PTR – pointers for
- MX – SMTP mail
- NS – name serve
- RP – responsibl
- HINFO
- TXT
- …

SPF

Sender ID

Sender Policy Framework

v=spf1 a –all

v=spf1 mx a –all

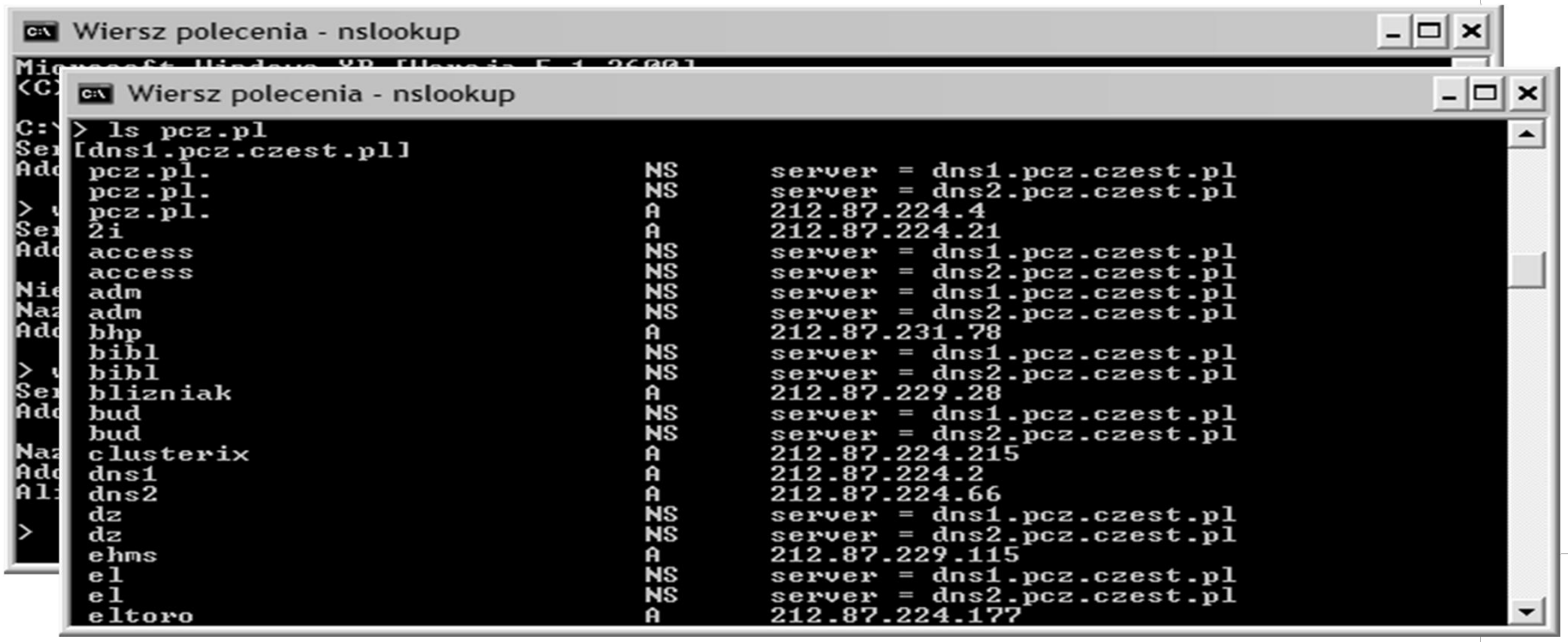
v=spf1 ip4: 123.123.1.123 mx –all

v=spf1 ip6:1080::8:800:200C:417A/96 -all

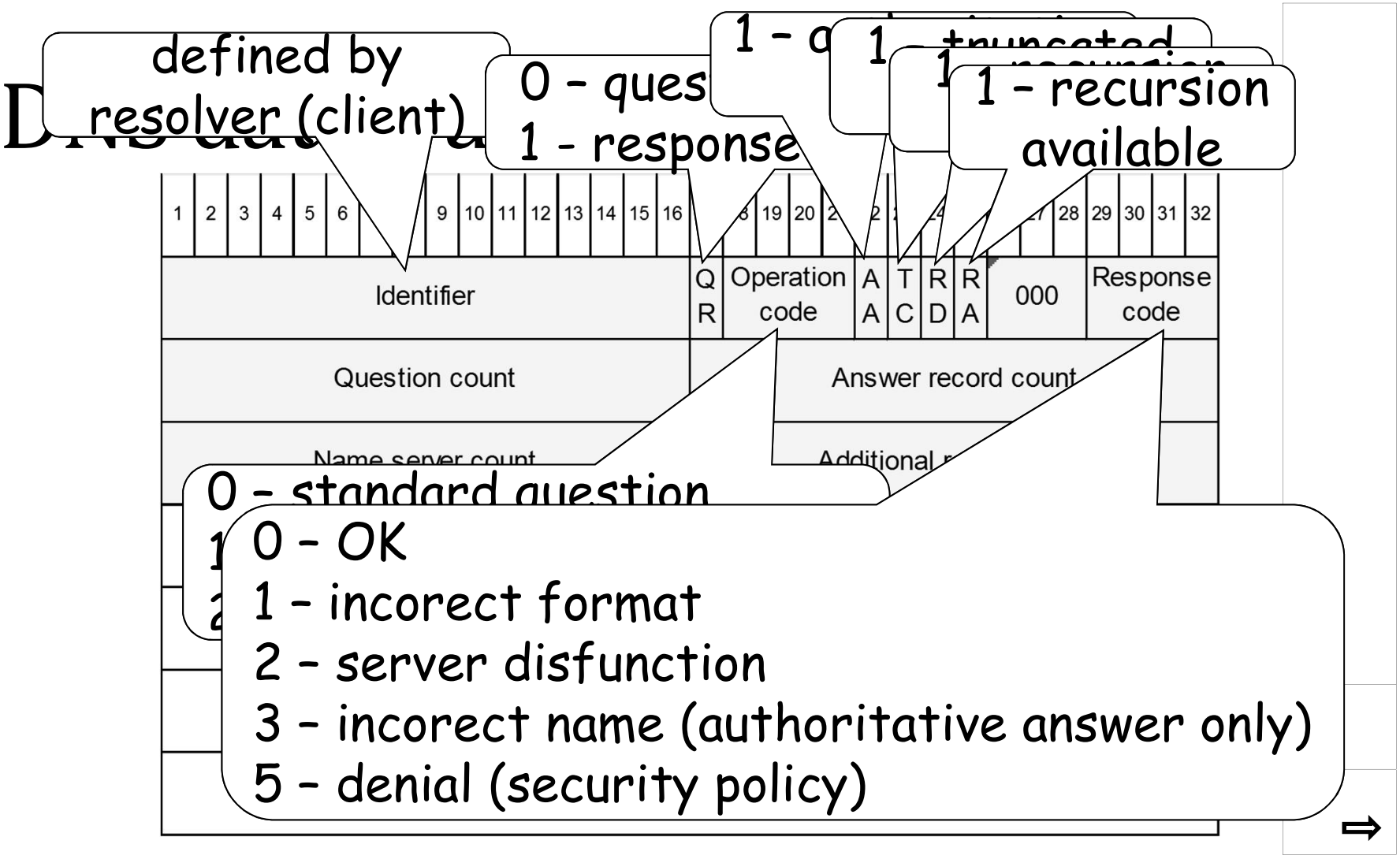
Zone file

```
$ORIGIN example.com.     ; designates the start of this zone file in the namespace
$TTL 1h                  ; default expiration time of all resource records without their own TTL value
example.com.  IN  SOA    ns.example.com. username.example.com. ( 2007120710 1d 2h 4w 1h )
example.com.  IN  NS     ns                    ; ns.example.com is a nameserver for example.com
example.com.  IN  NS     ns.somewhere.example. ; ns.somewhere.example is a backup nameserver for example.com
example.com.  IN  MX     10 mail.example.com.  ; mail.example.com is the mailserver for example.com
@             IN  MX     20 mail2.example.com. ; equivalent to above line, "@" represents zone origin
@             IN  MX     50 mail3              ; equivalent to above line, but using a relative host name
example.com.  IN  A      192.0.2.1             ; IPv4 address for example.com
              IN  AAAA   2001:db8:10::1        ; IPv6 address for example.com
ns            IN  A      192.0.2.2             ; IPv4 address for ns.example.com
              IN  AAAA   2001:db8:10::2        ; IPv6 address for ns.example.com
www           IN  CNAME  example.com.          ; www.example.com is an alias for example.com
wwwtest       IN  CNAME  www                   ; wwwtest.example.com is another alias for www.example.com
mail          IN  A      192.0.2.3             ; IPv4 address for mail.example.com
mail2         IN  A      192.0.2.4             ; IPv4 address for mail2.example.com
mail3         IN  A      192.0.2.5             ; IPv4 address for mail3.example.com
```

nslookup


Wiersz polecenia - nslookup
Wiersz polecenia - nslookup
> ls pcz.pl
[dns1.pcz.czest.pl]
pcz.pl. NS server = dns1.pcz.czest.pl
pcz.pl. NS server = dns2.pcz.czest.pl
pcz.pl. A 212.87.224.4
2i A 212.87.224.21
access NS server = dns1.pcz.czest.pl
access NS server = dns2.pcz.czest.pl
adm NS server = dns1.pcz.czest.pl
adm NS server = dns2.pcz.czest.pl
bhp A 212.87.231.78
bibl NS server = dns1.pcz.czest.pl
bibl NS server = dns2.pcz.czest.pl
blizniak A 212.87.229.28
bud NS server = dns1.pcz.czest.pl
bud NS server = dns2.pcz.czest.pl
clusterix A 212.87.224.215
dns1 A 212.87.224.2
dns2 A 212.87.224.66
dz NS server = dns1.pcz.czest.pl
dz NS server = dns2.pcz.czest.pl
ehms A 212.87.229.115
el NS server = dns1.pcz.czest.pl
el NS server = dns2.pcz.czest.pl
eltoro A 212.87.224.177

DNS data


defined by resolver (client)
0 – ques
1 - response
1 – q
1 – truncated
1 – recursion available
1 2 3 4 5 6 9 10 11 12 13 14 15 16 19 20 28 29 30 31 32
Identifier
QR
Operation code
AA
TC
RD
RA
000
Response code
Question count
Answer record count
0 – standard question
0 – OK
1 – incorect format
2 – server disfunction
3 – incorect name (authoritative answer only)
5 – denial (security policy)