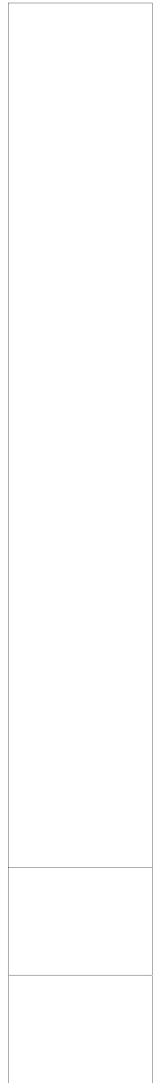


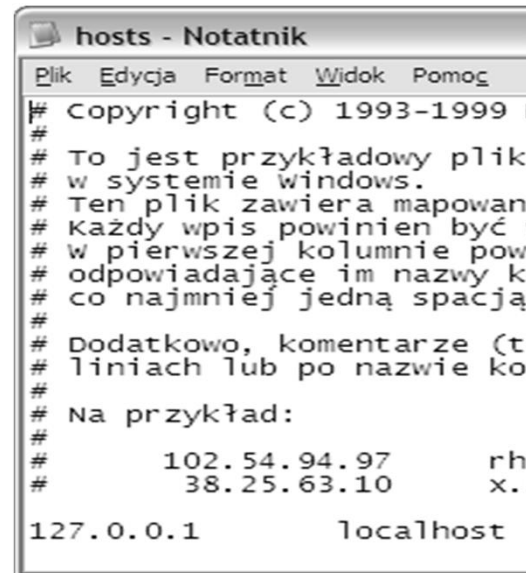
DNS

Foundations of computer networks

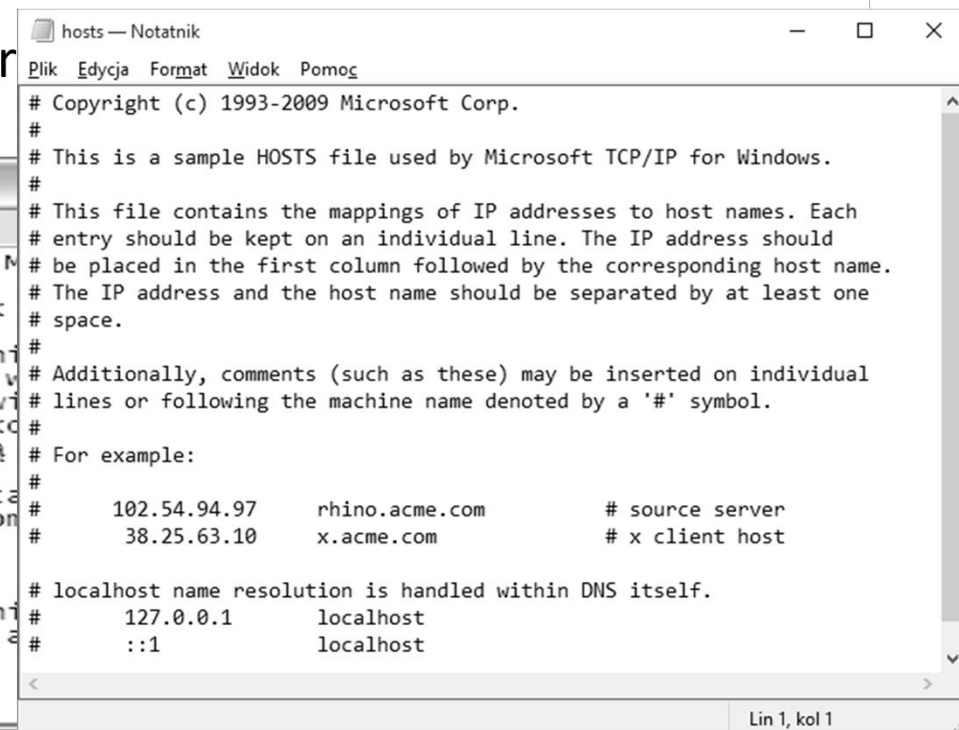


Hosts file

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



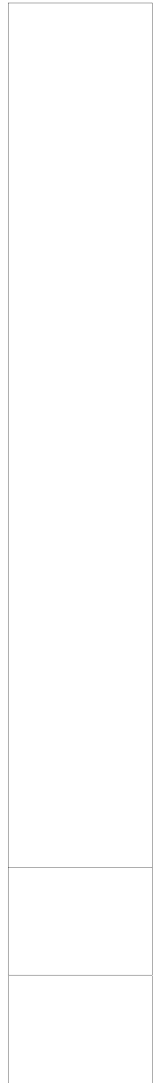
```
hosts - Notatnik
Plik  Edycja  Format  Widok  Pomoc
# Copyright (c) 1993-1999 Microsoft Corp.
#
# To jest przykładowy plik
# w systemie windows.
# Ten plik zawiera mapowanie
# Każdy wpis powinien być w
# w pierwszej kolumnie powi
# odpowiadające im nazwy ko
# co najmniej jedną spacją
#
# Dodatkowo, komentarze (ta
# liniach lub po nazwie kon
#
# Na przykład:
#
#       102.54.94.97      rh
#       38.25.63.10      x.a
#
127.0.0.1      localhost
```



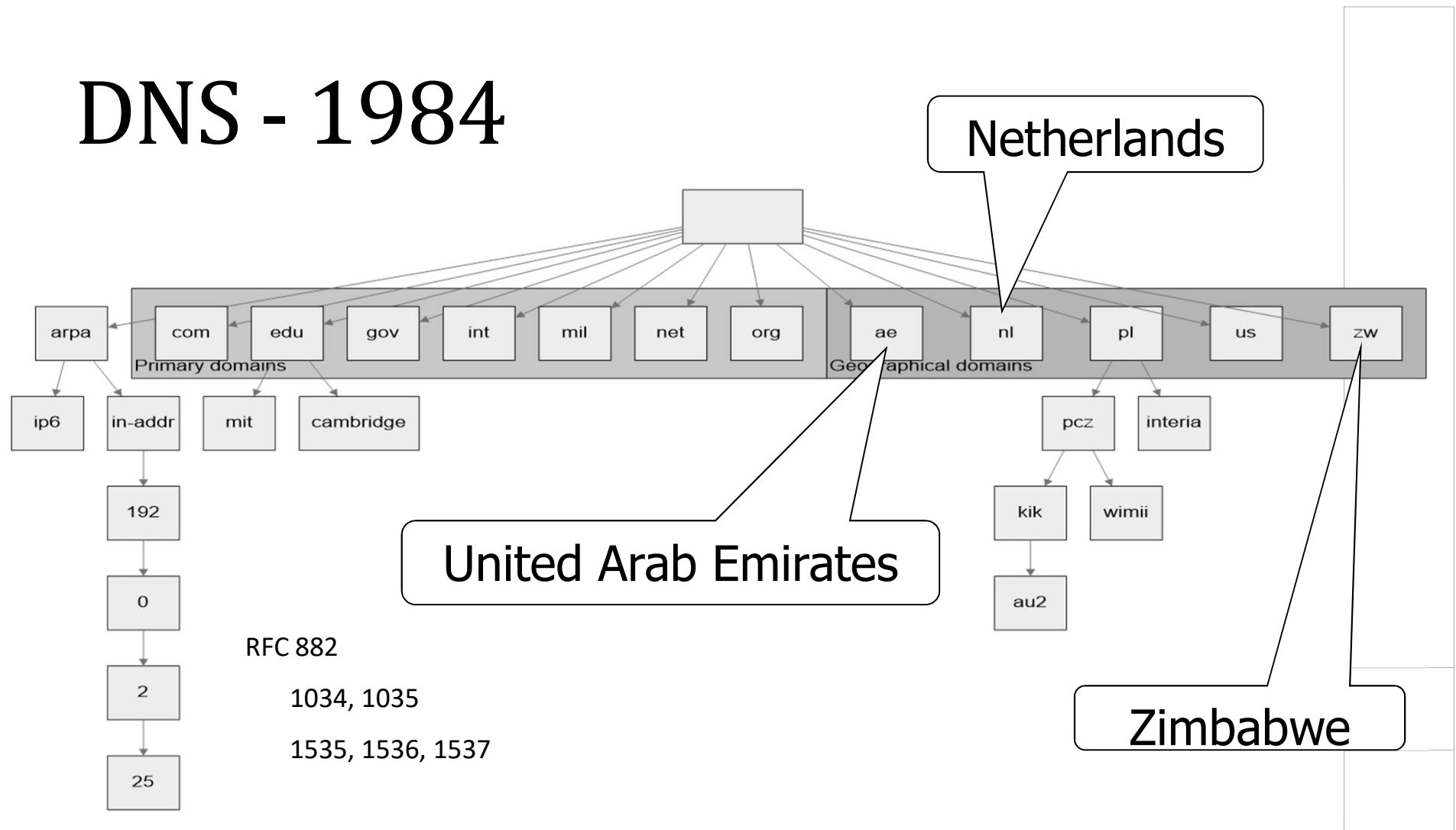
```
hosts — Notatnik
Plik  Edycja  Format  Widok  Pomoc
# Copyright (c) 1993-2009 Microsoft Corp.
#
# This is a sample HOSTS file used by Microsoft TCP/IP for Windows.
#
# This file contains the mappings of IP addresses to host names. Each
# entry should be kept on an individual line. The IP address should
# be placed in the first column followed by the corresponding host name.
# The IP address and the host name should be separated by at least one
# space.
#
# Additionally, comments (such as these) may be inserted on individual
# lines or following the machine name denoted by a '#' symbol.
#
# For example:
#
#       102.54.94.97      rhino.acme.com      # source server
#       38.25.63.10      x.acme.com         # x client host
#
# localhost name resolution is handled within DNS itself.
#
#       127.0.0.1        localhost
#       ::1              localhost
#
Lin 1, kol 1
```

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



DNS servers

- Name servers

◆ Resolver

◆ Resolver function

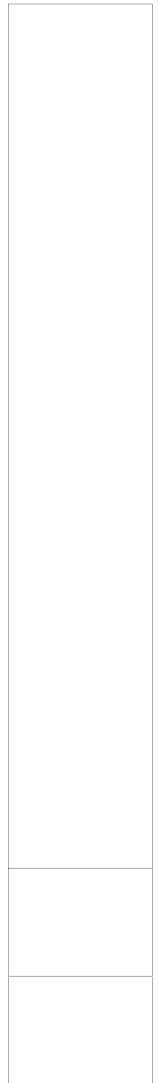
- General questions
- Translation from mnemonic to IP
- Translation from IP to mnemonic

◆ 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 aliases
- PTR – pointers for
- MX – SMTP mail
- NS – name server
- RP – responsible person
- HINFO
- TXT
- ...

SPF
Sender ID

Sender Policy Framework

v=spf1 a -all

v=spf1 mx a -all

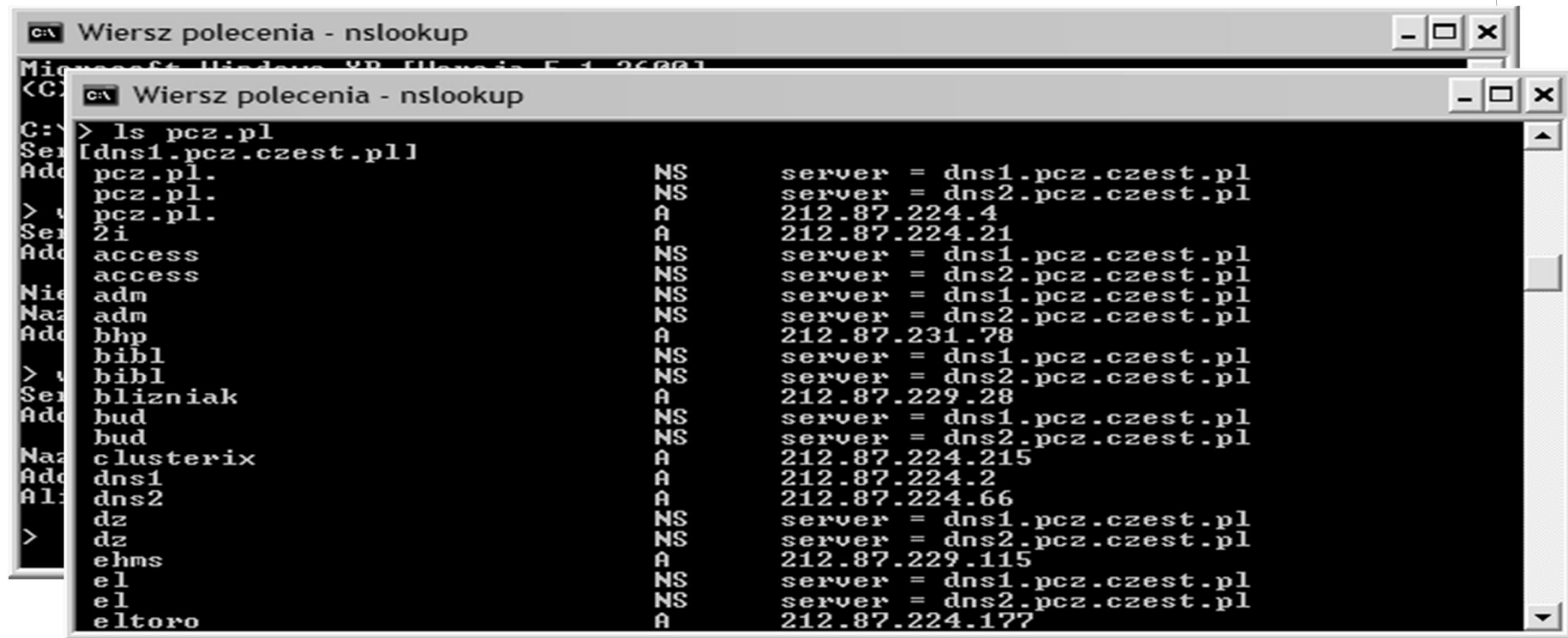
v=spf1 ip4: 123.123.1.123 mx -all

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



The image shows a Windows XP command prompt window titled "Wiersz polecenia - nslookup". The user has entered the command `nslookup pcz.pl`. The output displays DNS records for the domain `pcz.pl`, including nameservers, A records, and other hostnames. The window is overlaid on another similar window, showing the command history.

```
C:\> nslookup pcz.pl
Server: dns1.pcz.czest.pl
Address: 212.87.224.2
Non-authoritative answer:
pcz.pl.      NS      server = dns1.pcz.czest.pl
pcz.pl.      NS      server = dns2.pcz.czest.pl
pcz.pl.      A       212.87.224.4
212.87.224.21
pcz.pl.      A       212.87.224.21
pcz.pl.      NS      server = dns1.pcz.czest.pl
pcz.pl.      NS      server = dns2.pcz.czest.pl
pcz.pl.      A       212.87.231.78
pcz.pl.      NS      server = dns1.pcz.czest.pl
pcz.pl.      NS      server = dns2.pcz.czest.pl
pcz.pl.      A       212.87.229.28
pcz.pl.      NS      server = dns1.pcz.czest.pl
pcz.pl.      NS      server = dns2.pcz.czest.pl
pcz.pl.      A       212.87.224.215
pcz.pl.      A       212.87.224.2
pcz.pl.      A       212.87.224.66
pcz.pl.      NS      server = dns1.pcz.czest.pl
pcz.pl.      NS      server = dns2.pcz.czest.pl
pcz.pl.      A       212.87.229.115
pcz.pl.      NS      server = dns1.pcz.czest.pl
pcz.pl.      NS      server = dns2.pcz.czest.pl
pcz.pl.      A       212.87.224.177
```

