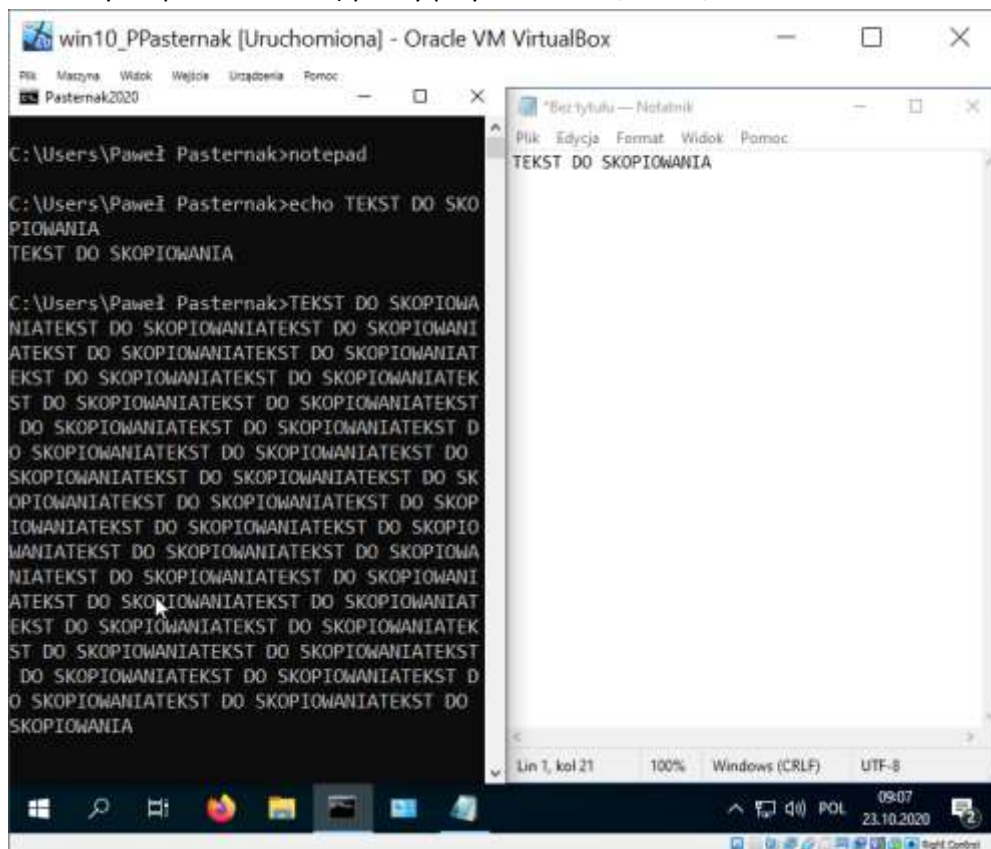


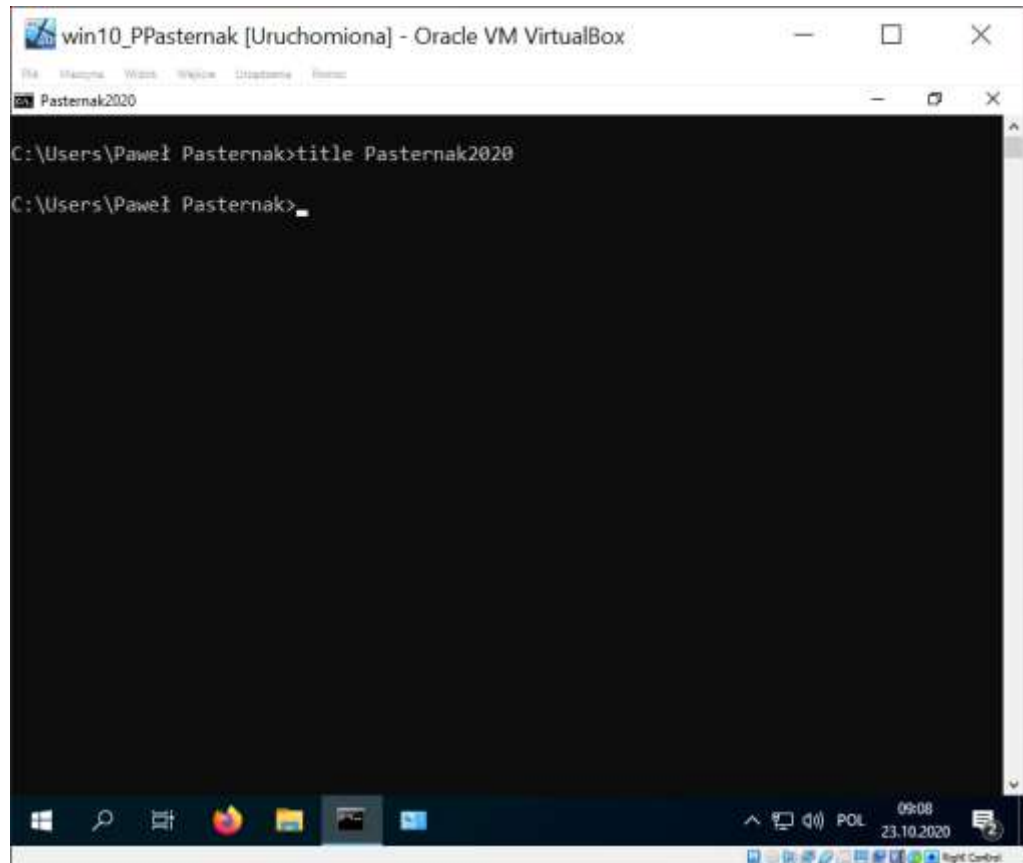
Polecenia Sieciowe

1. CMD podstawy

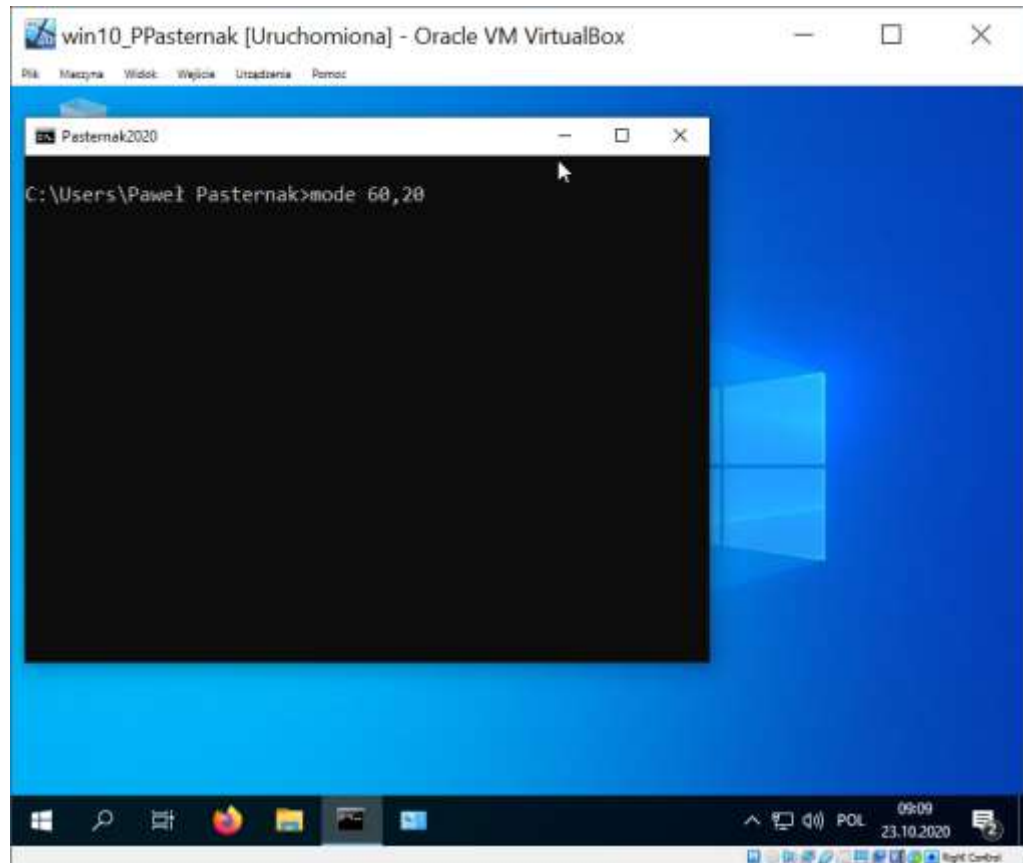
- a) Komunikacja dokument cmd(przenoszenie danych pomiędzy oknem a dokumentem tekstowym np. notatnikiem) prawy przycisk w cmd / ctrl+c, ctrl+v w notatniku



b) Tytuł (zmiana tytułu okna na NazwiskoROK)



- c) Zmiana rozmiarów okna (zmiana rozmiarów okna za pomocą polecenia)



- d) GETMAC (przedstaw co zostało wyświetlone, przedstaw kartę z helpa na temat polecenia) Polecenie to wyświetla adres MAC kart sieciowych.



```
C:\Users\Paweł Pasternak>getmac

Physical Address      Transport Name
-----
08-00-27-42-4F-E3    N/A

C:\Users\Paweł Pasternak>getmac /?

GETMAC [/S system [/U username [/P [password]]]] [/FO format] [/NH] [/V]

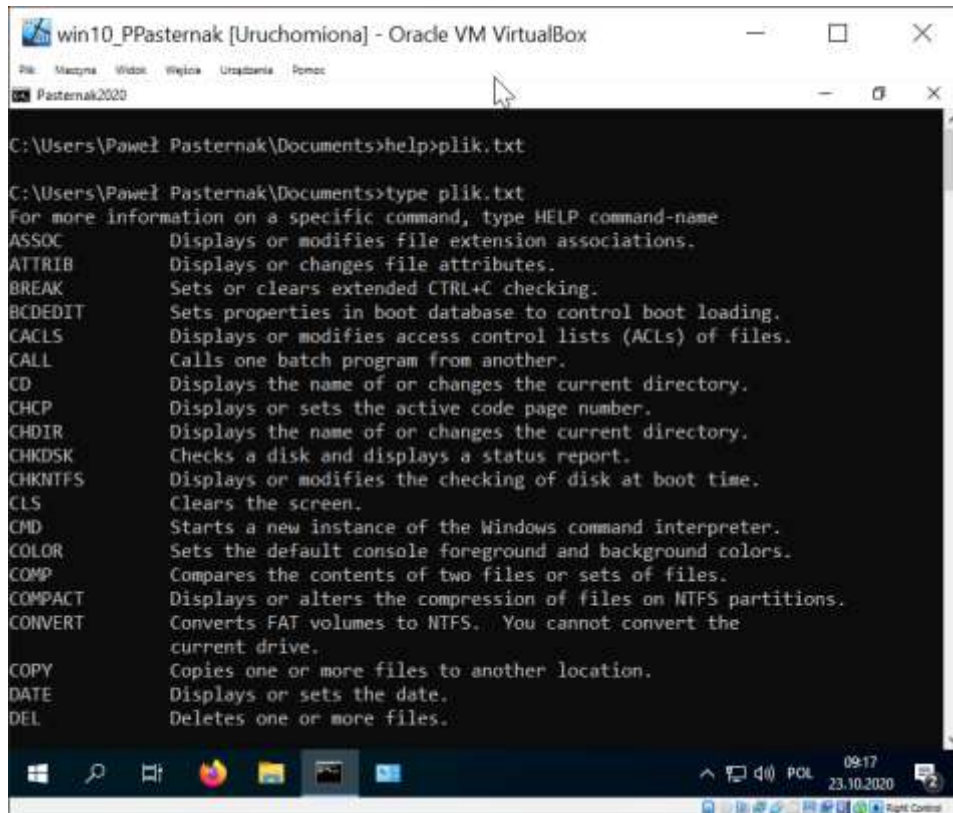
Description:
  This tool enables an administrator to display the MAC address
  for network adapters on a system.

Parameter List:
  /S      system          Specifies the remote system to connect to.
  /U      [domain\]user   Specifies the user context under
                           which the command should execute.
  /P      [password]      Specifies the password for the given
                           user context. Prompts for input if omitted.
  /FO     format          Specifies the format in which the output
                           is to be displayed.
                           Valid values: "TABLE", "LIST", "CSV".
  /NH                                           Specifies that the "Column Header" should
                           not be displayed in the output.
                           Valid only for TABLE and CSV formats.
  /V                                           Specifies that verbose output is displayed.
  /?                                           Displays this help message.

Examples:
  GETMAC /?
  GETMAC /FO csv
  GETMAC /S system /NH /V
  GETMAC /S system /U user
  GETMAC /S system /U domain\user /P password /FO list /V
  GETMAC /S system /U domain\user /P password /FO table /NH
```

- e) Help > plik.txt (co powstanie w wyniku takiego zapisu) do pliku.txt zostanie wypisana cała treść polecenia help, które wyświetla podstawowe komendy konsoli i ich krótki opis

f) Type plik.txt

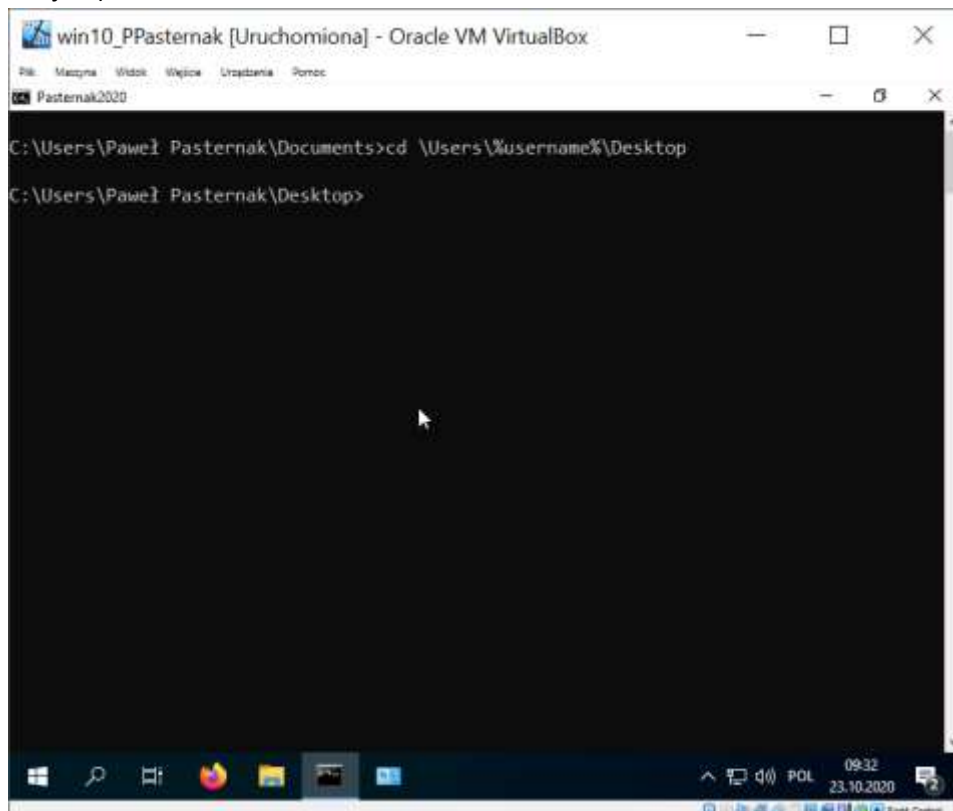


```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik: Myszyna Widok: Włajcowa Urządzenia Pomoc
Pasternak2020

C:\Users\Paweł Pasternak\Documents>help>plik.txt

C:\Users\Paweł Pasternak\Documents>type plik.txt
For more information on a specific command, type HELP command-name
ASSOC      Displays or modifies file extension associations.
ATTRIB     Displays or changes file attributes.
BREAK      Sets or clears extended CTRL+C checking.
BCDEDIT    Sets properties in boot database to control boot loading.
CACLS      Displays or modifies access control lists (ACLs) of files.
CALL       Calls one batch program from another.
CD         Displays the name of or changes the current directory.
CHCP       Displays or sets the active code page number.
CHDIR      Displays the name of or changes the current directory.
CHKDSK     Checks a disk and displays a status report.
CHKNTFS    Displays or modifies the checking of disk at boot time.
CLS        Clears the screen.
CMD        Starts a new instance of the Windows command interpreter.
COLOR      Sets the default console foreground and background colors.
COMP       Compares the contents of two files or sets of files.
COMPACT    Displays or alters the compression of files on NTFS partitions.
CONVERT    Converts FAT volumes to NTFS. You cannot convert the
           current drive.
COPY       Copies one or more files to another location.
DATE       Displays or sets the date.
DEL        Deletes one or more files.
```

g) Cd > pulpit (za pomocą polecenia CD przenieś się do lokalizacji Pulpit z dowolnego miejsca)

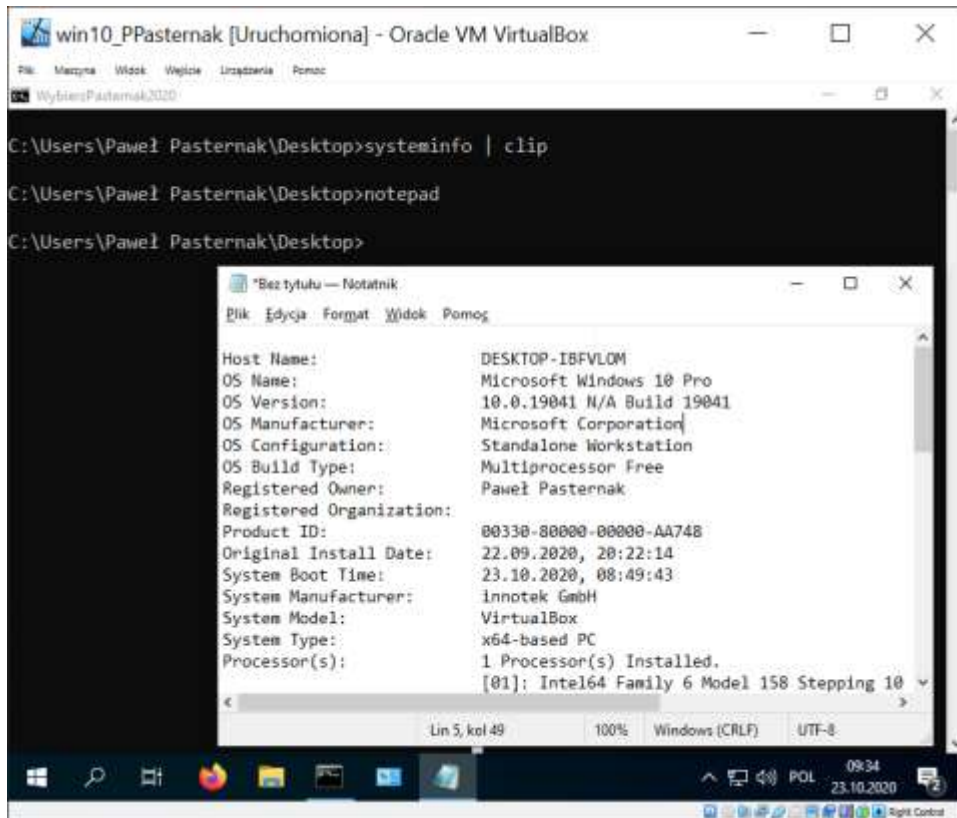


```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik: Myszyna Widok: Włajcowa Urządzenia Pomoc
Pasternak2020

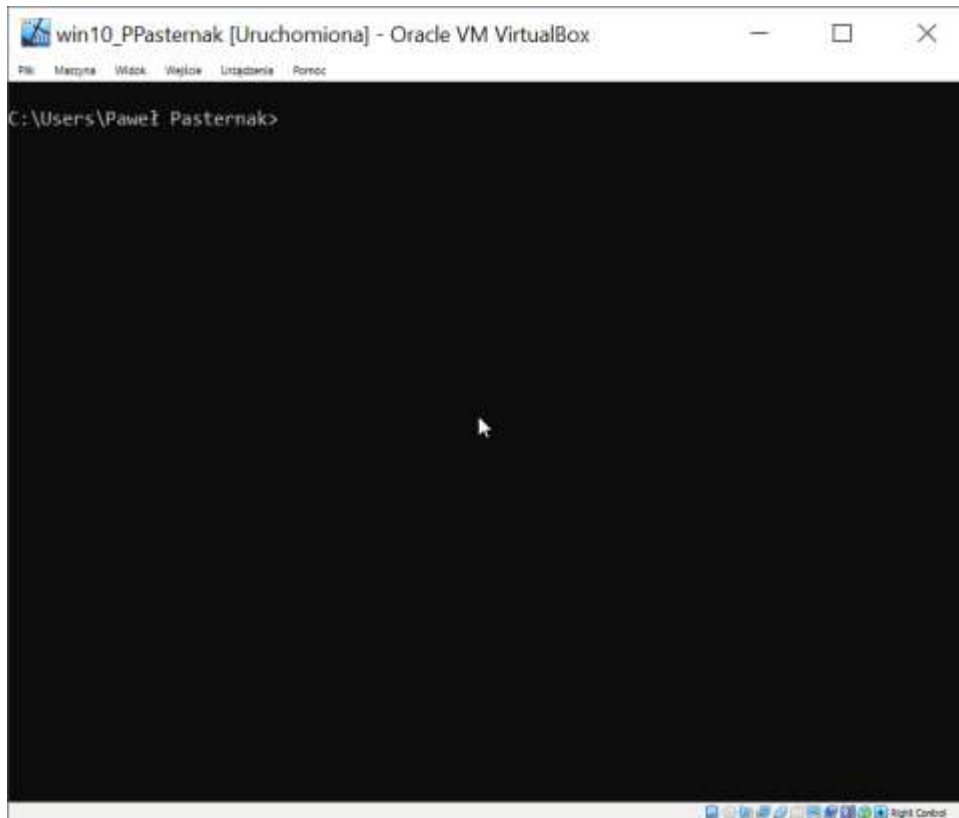
C:\Users\Paweł Pasternak\Documents>cd \Users\Username\Desktop

C:\Users\Paweł Pasternak\Desktop>
```

- h) Systeminfo | clip (jaki jest przeznaczenie takiego zapisu, co dalej możemy zrobić aby mieć dostęp do zawartości polecenia systeminfo) polecenie clip kopiuje wynik komendy do schowka, aby wyświetlić ten wynik należy go wkleić np. do notatnika.

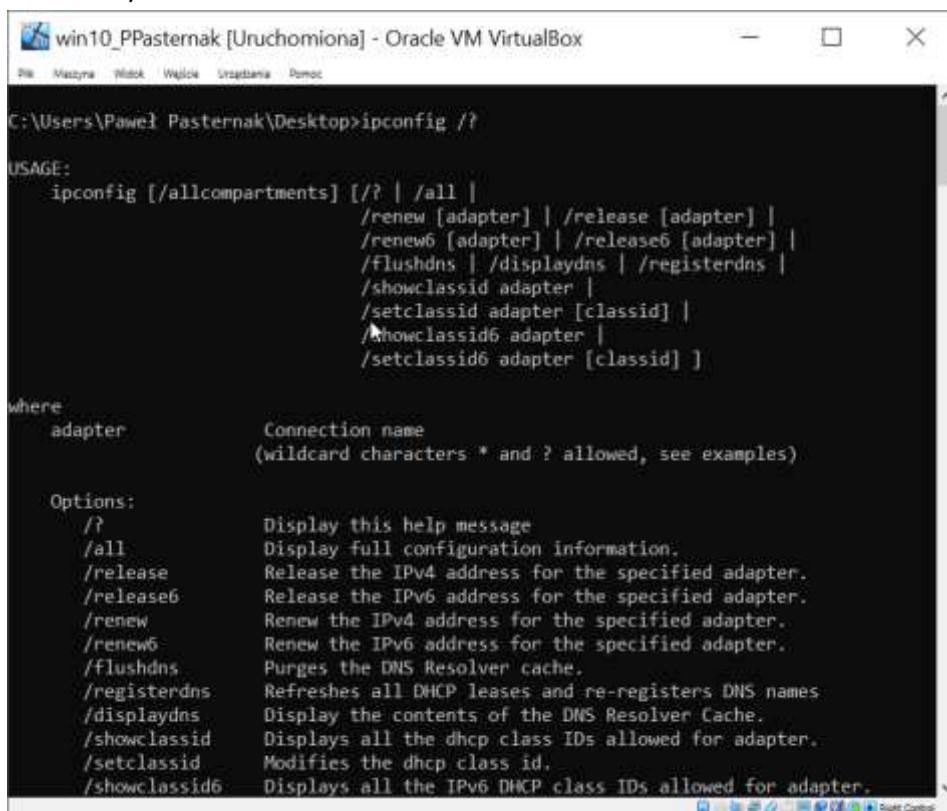


- i) alt + Enter (przeznaczenie polecenia) działa jak F11 i włącza tryb pełno ekranowy

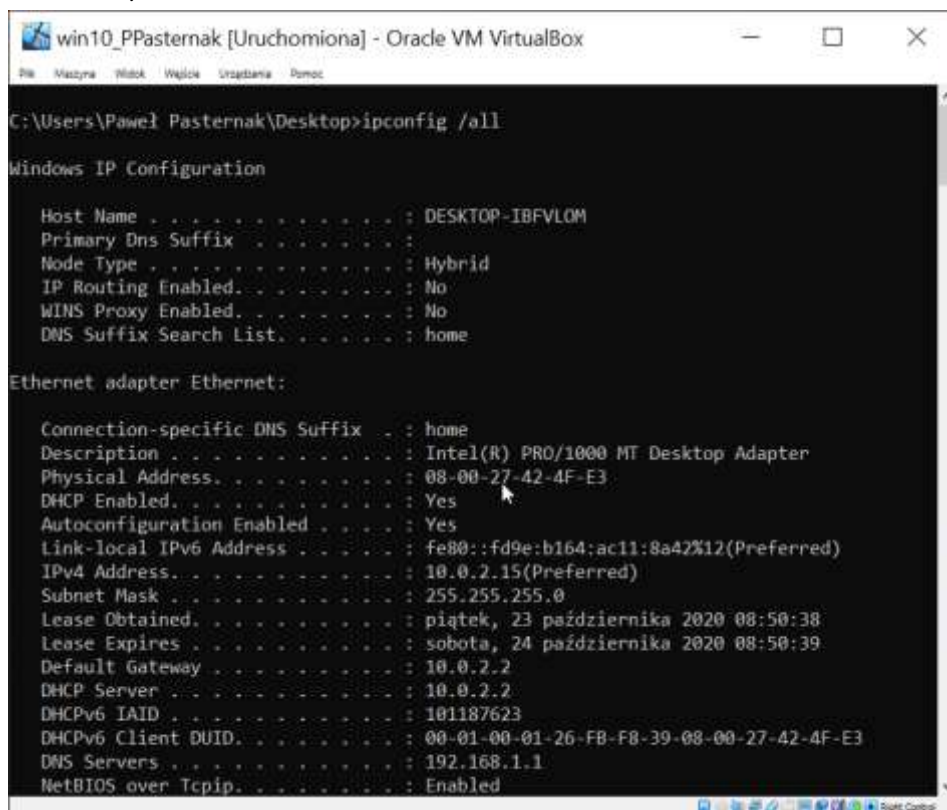


2. IPCONFIG

- a) IPCONFIG /?



b) IPCONFIG /ALL



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Wideo Węzła Urządzenia Pomoc

C:\Users\Paweł Pasternak\Desktop>ipconfig /all

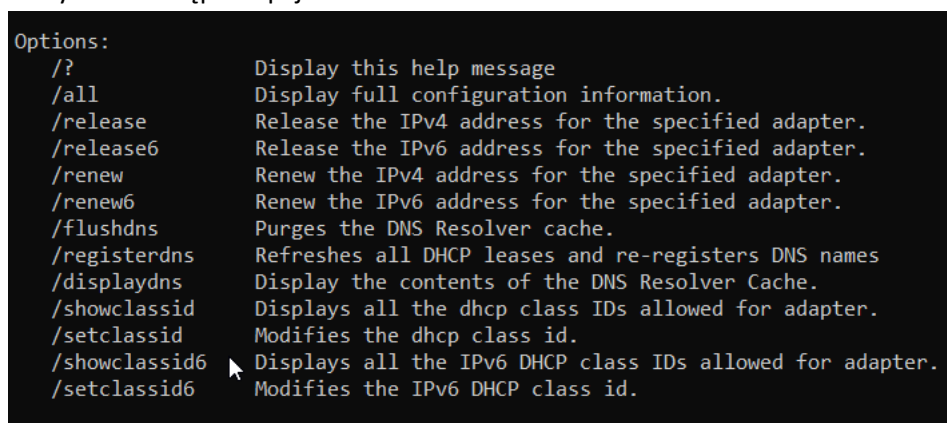
Windows IP Configuration

Host Name . . . . . : DESKTOP-IBFVL0M
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : home

Ethernet adapter Ethernet:

Connection-specific DNS Suffix . : home
Description . . . . . : Intel(R) PRO/1000 MT Desktop Adapter
Physical Address. . . . . : 08-00-27-42-4F-E3
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::fd9e:b164:ac11:8a42%12(Preferred)
IPv4 Address. . . . . : 10.0.2.15(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : piątek, 23 października 2020 08:50:38
Lease Expires . . . . . : sobota, 24 października 2020 08:50:39
Default Gateway . . . . . : 10.0.2.2
DHCP Server . . . . . : 10.0.2.2
DHCPv6 IAID . . . . . : 101187623
DHCPv6 Client DUID. . . . . : 00-01-00-01-26-FB-F8-39-08-00-27-42-4F-E3
DNS Servers . . . . . : 192.168.1.1
NetBIOS over Tcpip. . . . . : Enabled
```

c) Wszystkie dostępne opcje → Polecenie 6d



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Wideo Węzła Urządzenia Pomoc

C:\Users\Paweł Pasternak\Desktop>ipconfig /?>

Options:
/?          Display this help message
/all       Display full configuration information.
/release   Release the IPv4 address for the specified adapter.
/release6  Release the IPv6 address for the specified adapter.
/renew     Renew the IPv4 address for the specified adapter.
/renew6    Renew the IPv6 address for the specified adapter.
/flushdns  Purges the DNS Resolver cache.
/registerdns Refreshes all DHCP leases and re-registers DNS names
/displaydns Display the contents of the DNS Resolver Cache.
/showclassid Displays all the dhcp class IDs allowed for adapter.
/setclassid Modifies the dhcp class id.
/showclassid6 Displays all the IPv6 DHCP class IDs allowed for adapter.
/setclassid6 Modifies the IPv6 DHCP class id.
```

3. Ping

- a) Ping 44 paczki 10 bajtów wikipedia(wygenerowanie 44 pakietów wielkości 10 bajtów na adres Wikipedii)

[illegible]

- b) Max paczka – pakietów (jaka jest maksymalna wielkość pakietu który jesteśmy w stanie wysłać – pokaż przykład sieć lokalna oraz strona www.onet.pl)

```
C:\Users\Paweł Pasternak\Desktop>ping www.onet.pl -l 10000000000000000000
Bad value for option -l, valid range is from 0 to 65500.

C:\Users\Paweł Pasternak\Desktop>ping www.onet.pl -n 1 -l 65500

Pinging www.onet.pl [213.180.141.140] with 65500 bytes of data:
Request timed out.

Ping statistics for 213.180.141.140:
    Packets: Sent = 1, Received = 0, Lost = 1 (100% loss),

C:\Users\Paweł Pasternak\Desktop>
C:\Users\Paweł Pasternak\Desktop>ipconfig | findstr IPv4
    IPv4 Address. . . . . : 10.0.2.15

C:\Users\Paweł Pasternak\Desktop>ping 10.0.2.15 -n 1 -l 65500

Pinging 10.0.2.15 with 65500 bytes of data:
Reply from 10.0.2.15: bytes=65500 time<1ms TTL=128

Ping statistics for 10.0.2.15:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

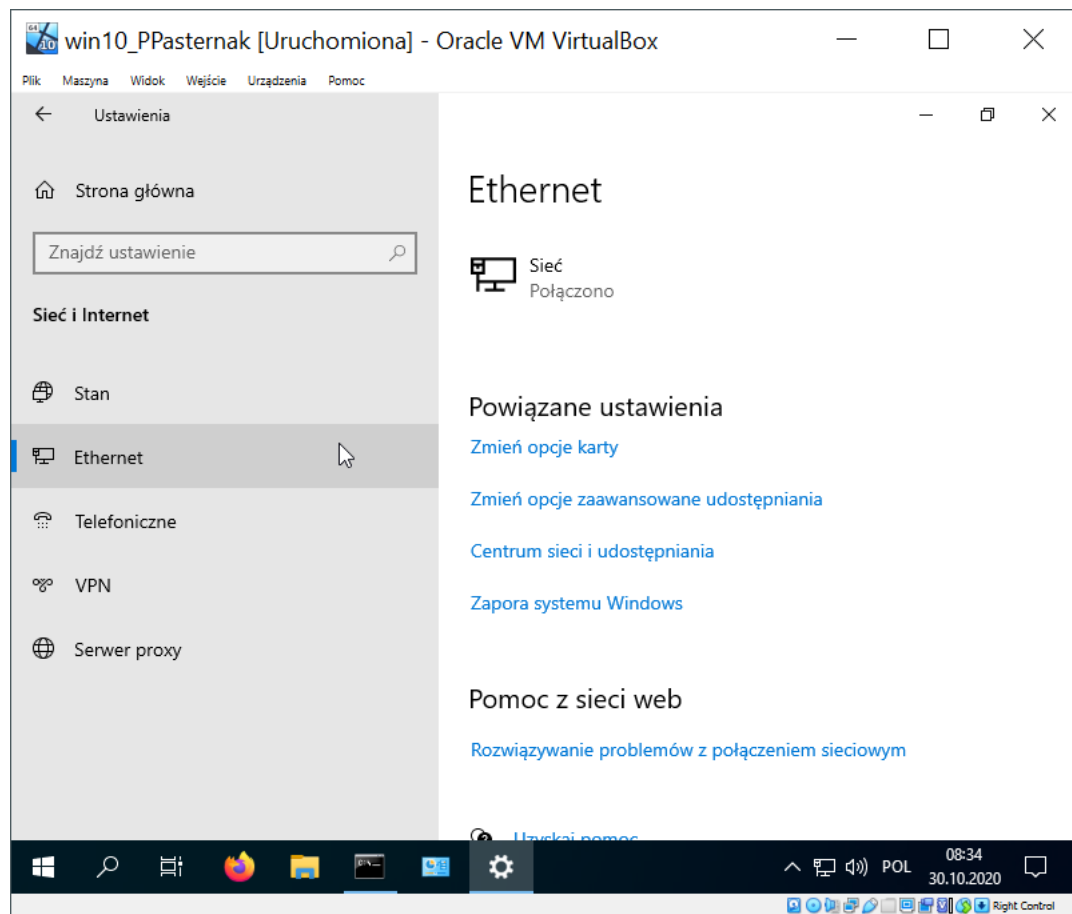
4. Powiązanie adresów IP z nazwami 5szt

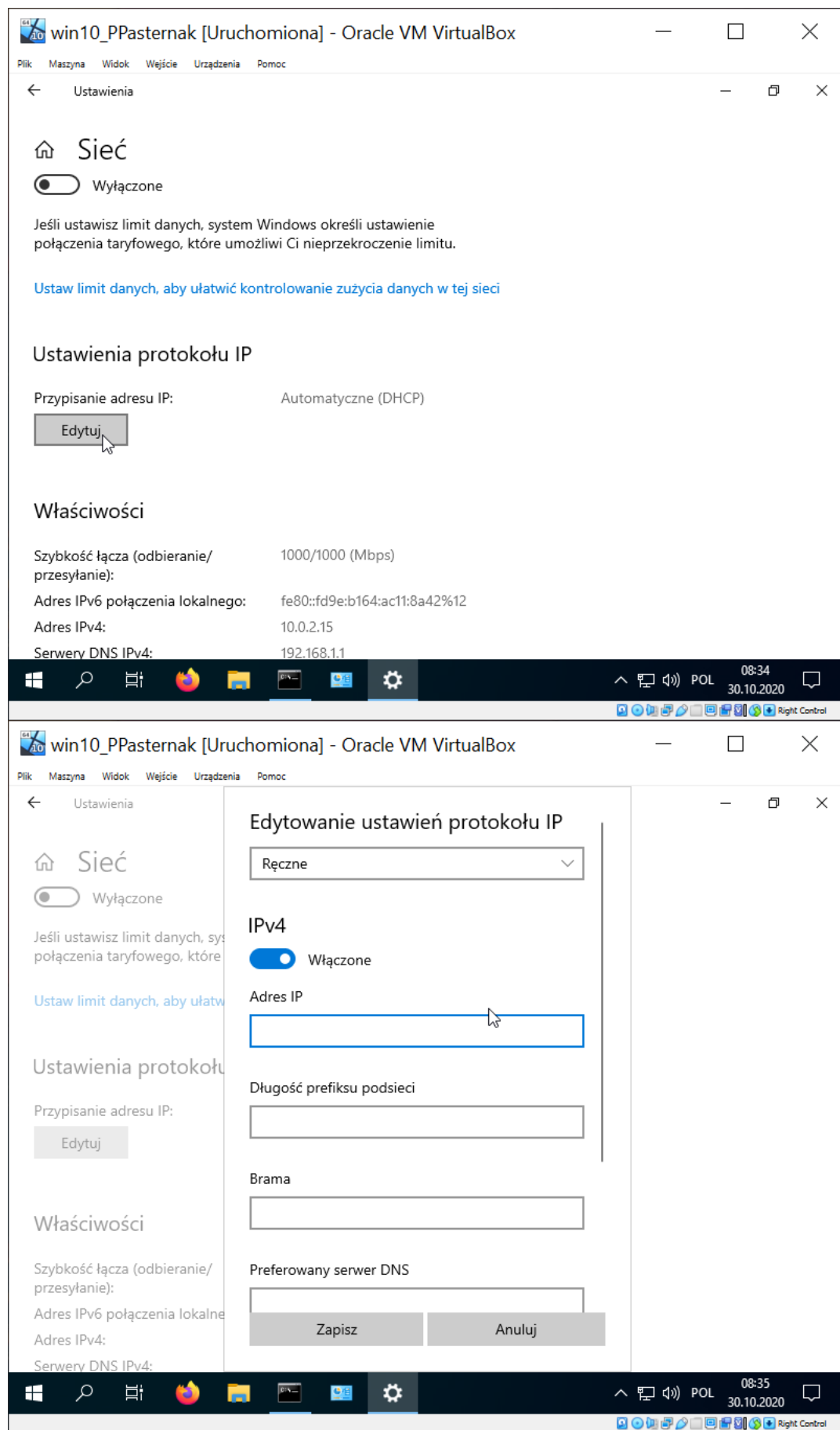
wikipedia.org	208.80.154.224
google.com	172.217.10.78
archwiki.org	217.64.195.201
wiki.archlinux.org/	138.201.81.199
spidersweb.pl	195.149.198.226

5. Konfiguracja kart sieciowych Windows

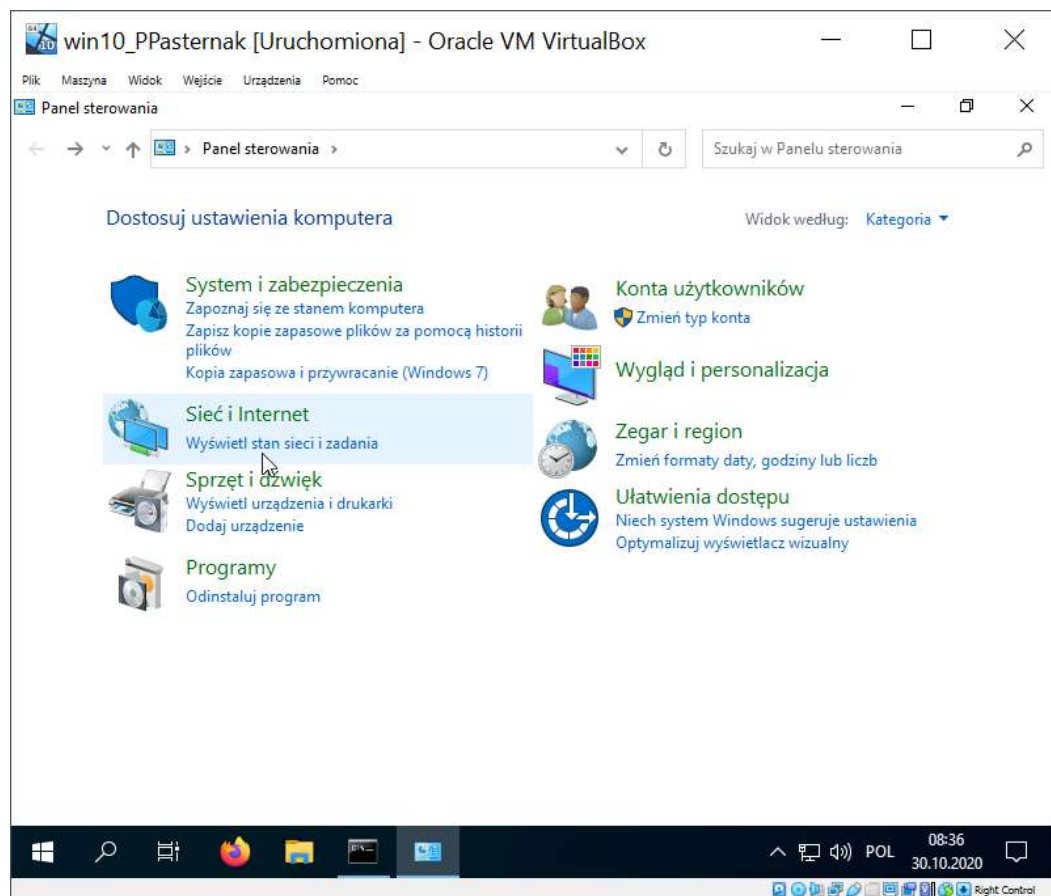
- a) Statyczny Adres IP (czym jest i gdzie możemy go wprowadzić)

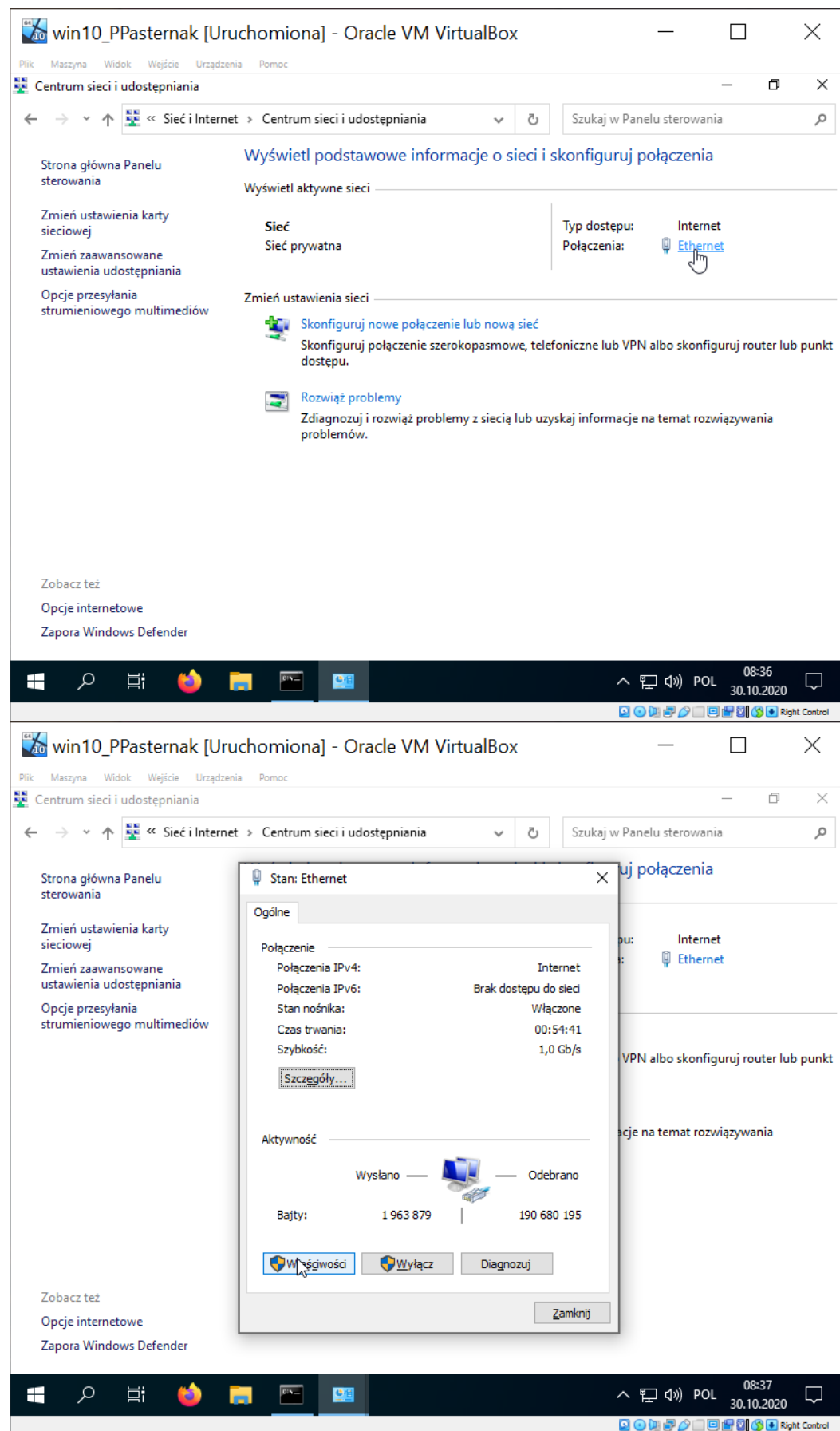
o W Ustawieniach

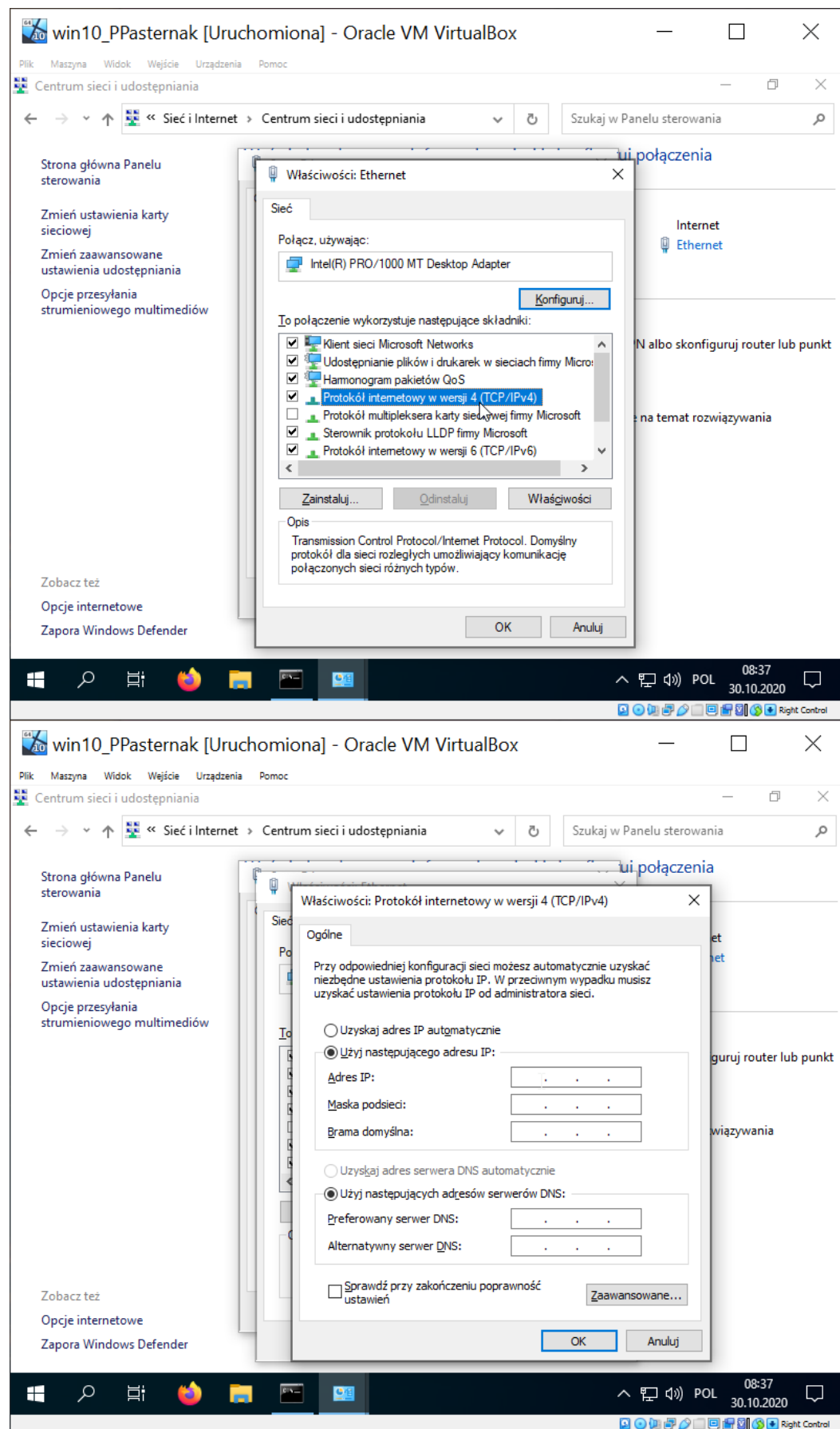




o W Panelu Sterowania







- o W cmd -> Polecenie ***netsh interface ip set address (nazwa sieci) static (statyczny adres ip i maska) (stary adres ip)***

```
C:\Users\Paweł Pasternak>netsh interface ip show config

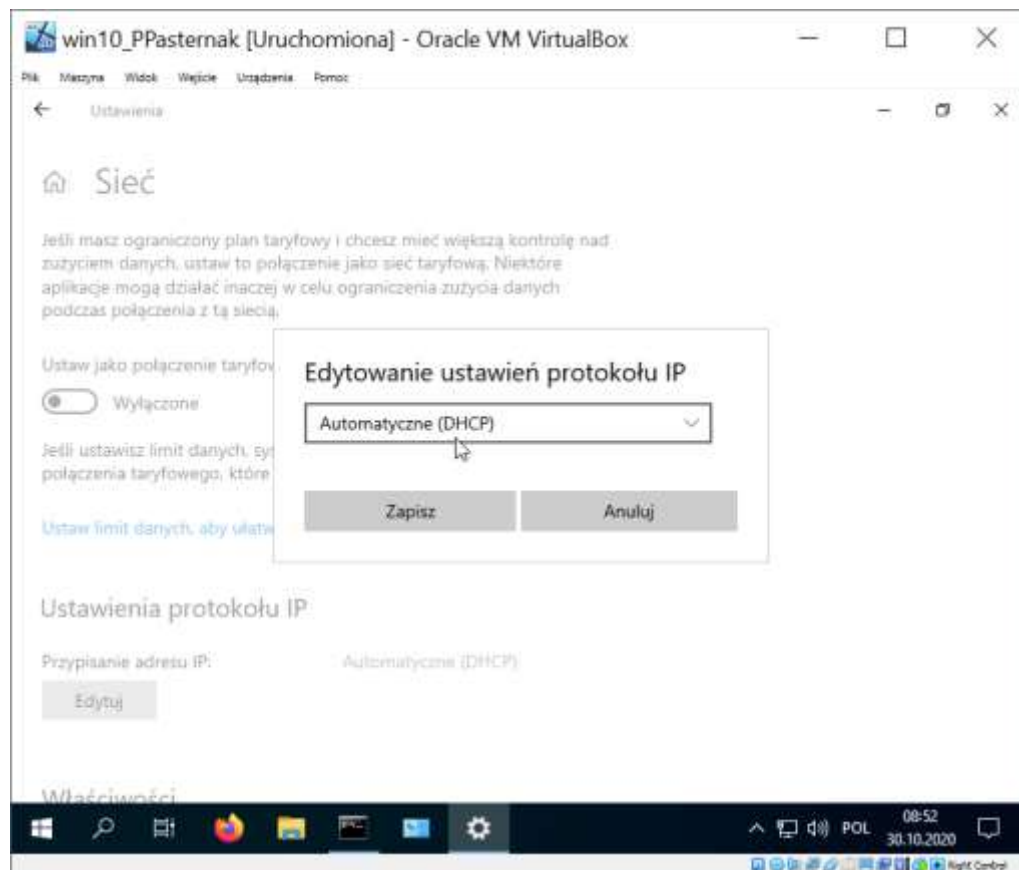
Configuration for interface "Ethernet"
    DHCP enabled:                Yes
    IP Address:                  10.0.2.15
    Subnet Prefix:               10.0.2.0/24 (mask 255.255.255.0)
    Default Gateway:            10.0.2.2
    Gateway Metric:              0
    InterfaceMetric:            25
    DNS servers configured through DHCP: 192.168.1.1
    Register with which suffix:  Primary only
    WINS servers configured through DHCP: None

Configuration for interface "Loopback Pseudo-Interface 1"
    DHCP enabled:                No
    IP Address:                  127.0.0.1
    Subnet Prefix:               127.0.0.0/8 (mask 255.0.0.0)
    InterfaceMetric:            75
    Statically Configured DNS Servers: None
    Register with which suffix:  Primary only
    Statically Configured WINS Servers: None

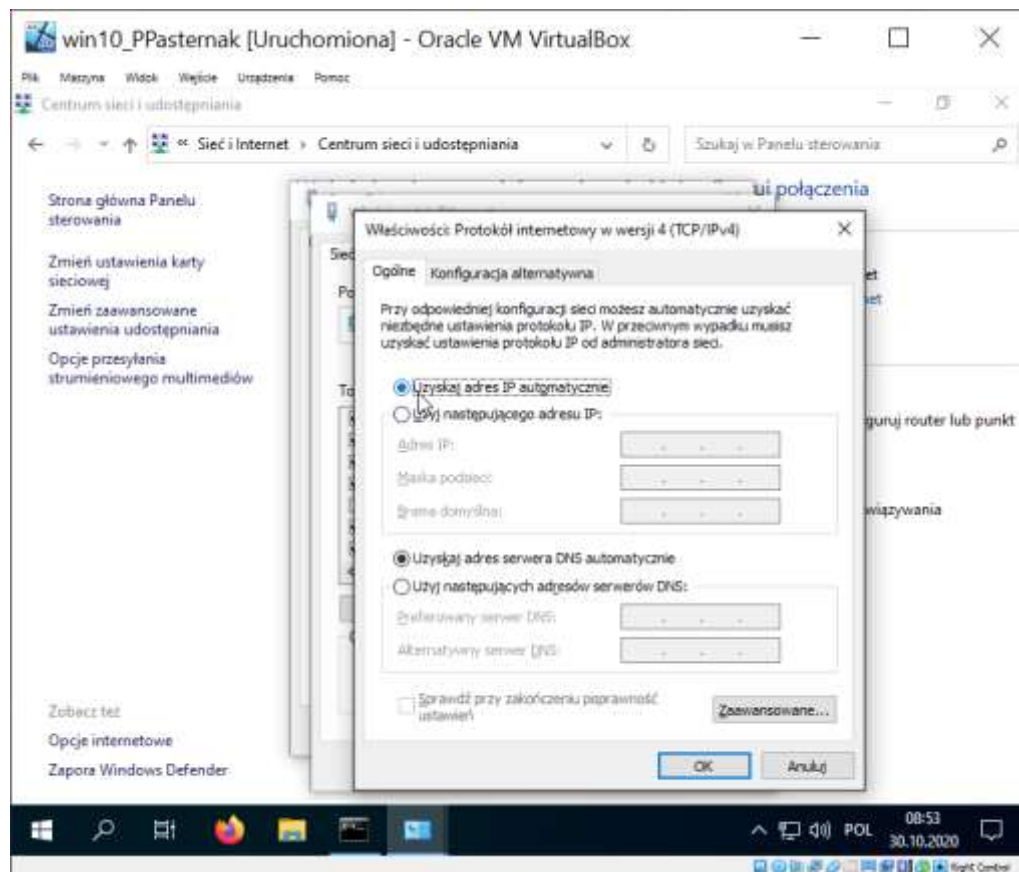
C:\Users\Paweł Pasternak>netsh interface ip set address "Ethernet" static 192.168.1.10
255.255.255.0 192.168.1.1
```

- b) Dynamiczny Adres IP (gdzie możemy zmienić ustawienia)

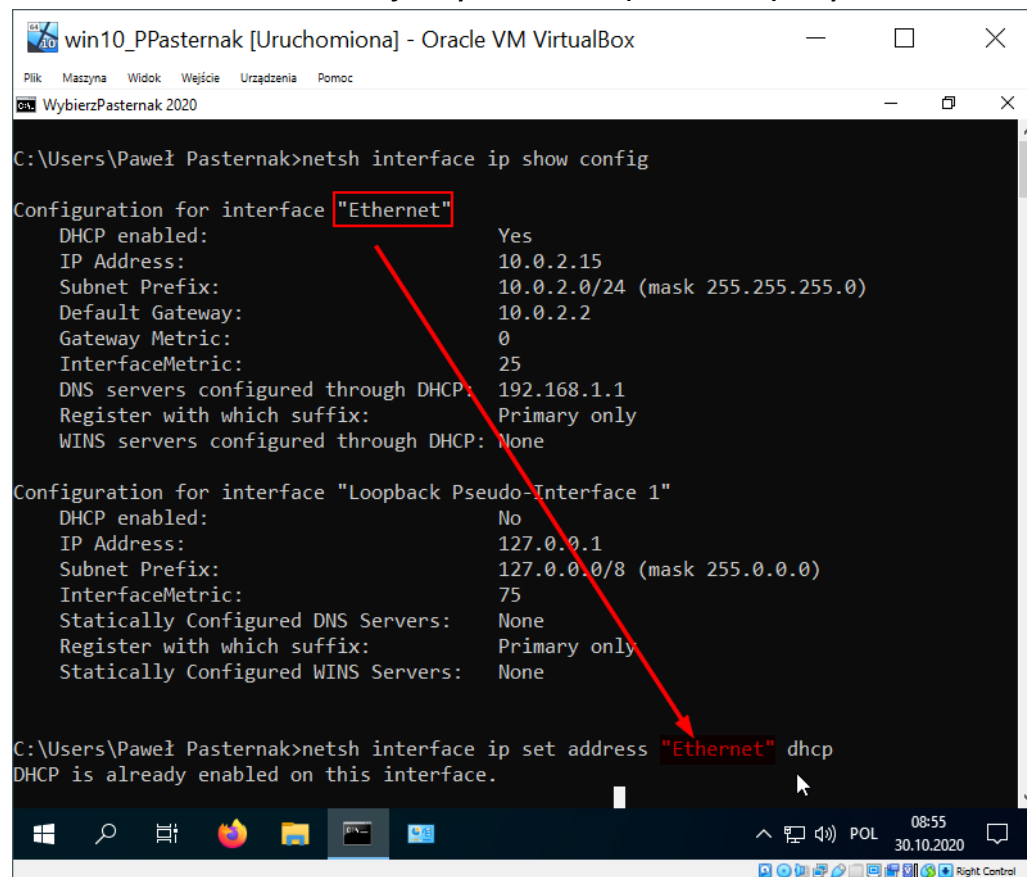
o W Ustawieniach



o W Panelu Sterowania



- o W cmd -> Polecenie **netsh interface ip set address (nazwa sieci) dhcp**



```
C:\Users\Paweł Pasternak>netsh interface ip show config

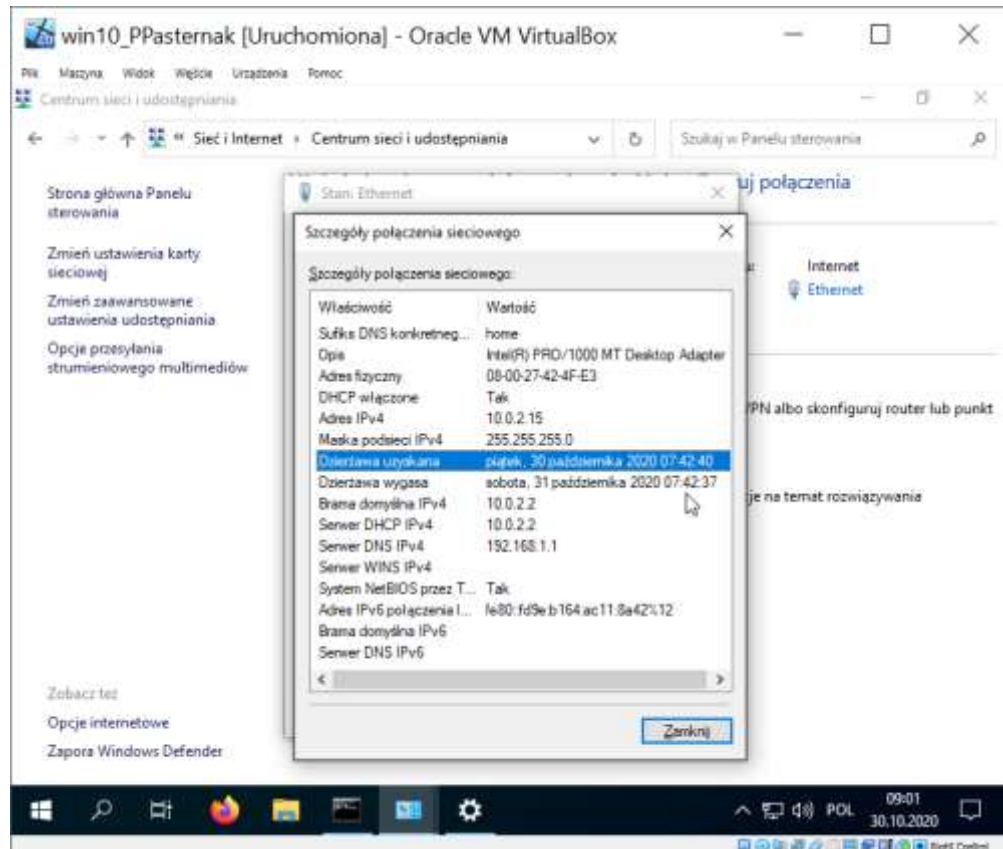
Configuration for interface "Ethernet"
    DHCP enabled:                Yes
    IP Address:                  10.0.2.15
    Subnet Prefix:               10.0.2.0/24 (mask 255.255.255.0)
    Default Gateway:            10.0.2.2
    Gateway Metric:              0
    InterfaceMetric:             25
    DNS servers configured through DHCP: 192.168.1.1
    Register with which suffix:  Primary only
    WINS servers configured through DHCP: None

Configuration for interface "Loopback Pseudo-Interface 1"
    DHCP enabled:                No
    IP Address:                  127.0.0.1
    Subnet Prefix:               127.0.0.0/8 (mask 255.0.0.0)
    InterfaceMetric:             75
    Statically Configured DNS Servers: None
    Register with which suffix:  Primary only
    Statically Configured WINS Servers: None

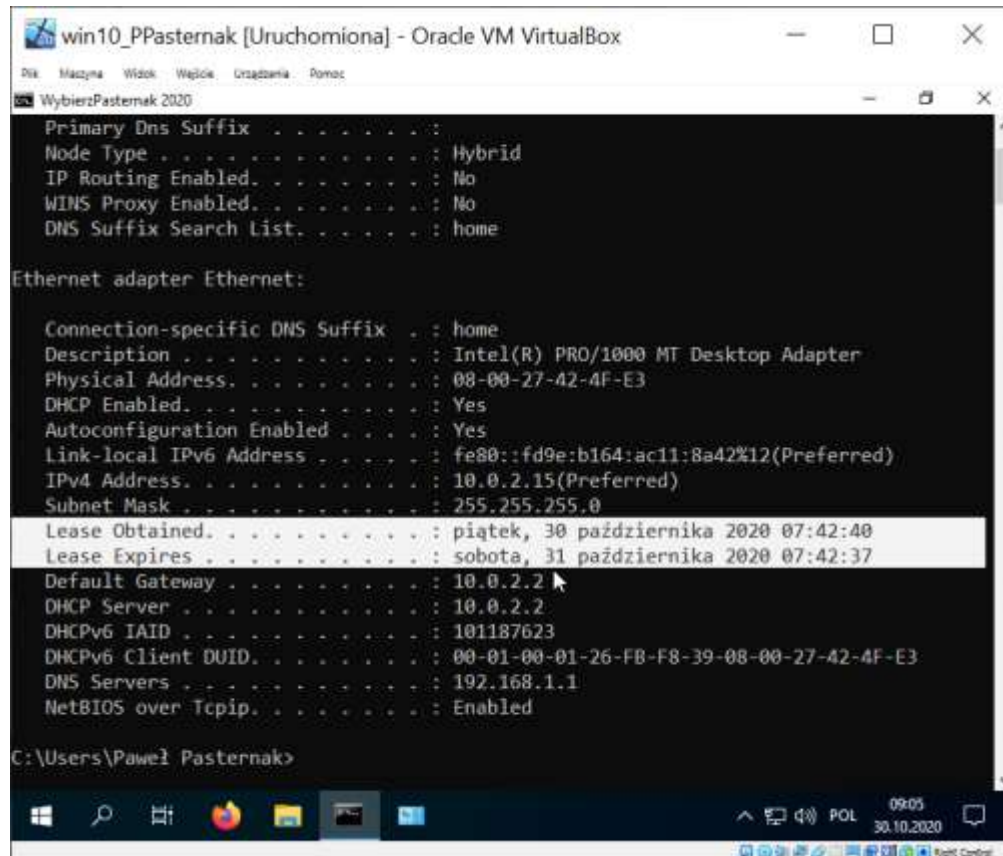
C:\Users\Paweł Pasternak>netsh interface ip set address "Ethernet" dhcp
DHCP is already enabled on this interface.
```

- o #!# Dzierżawa adresów (pokazać przynajmniej w dwóch lokalizacjach)

- W Panelu Sterowania



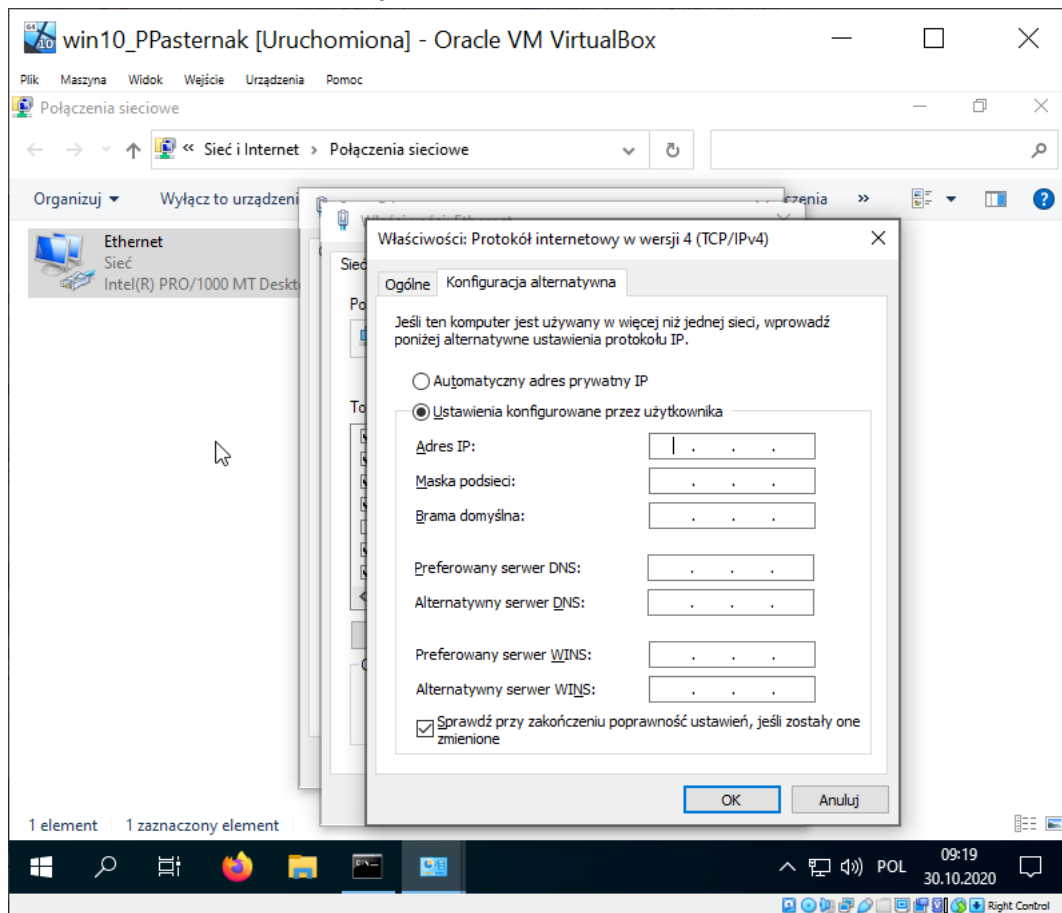
- W CMD



- c) Alternatywna (dodatkowa konfiguracja karty sieciowej – gdzie się znajduje i jakie jest jej przeznaczenie)

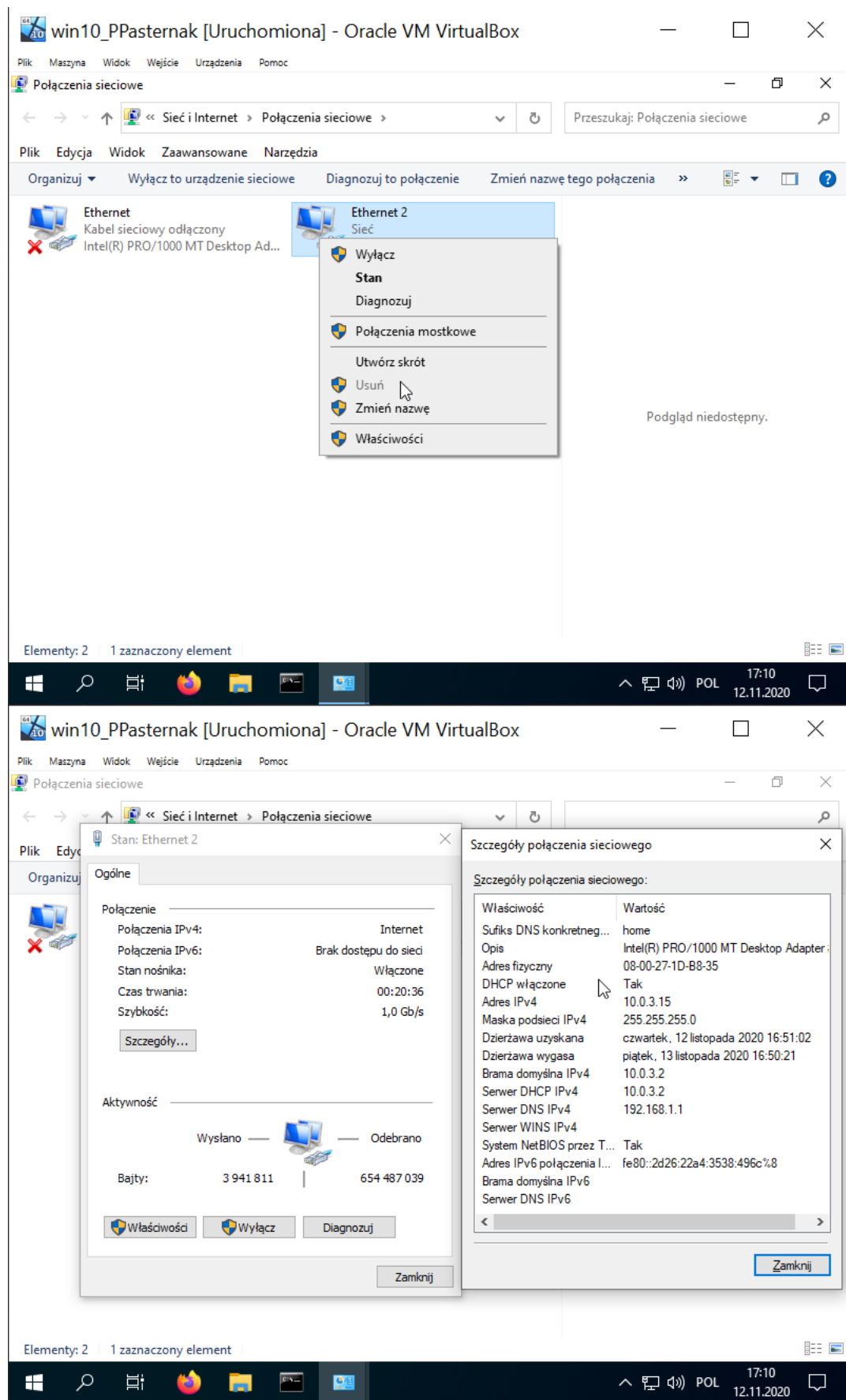
Konfiguracja alternatywna jest użyteczna, gdy komputer działa w więcej niż jednej sieci i co najmniej w jednej z tych sieci nie ma serwera DHCP. Dobrym przykładem może być komputer przenośny używany w biurze i w domu.

Alternatywna konfiguracja karty sieciowej znajduje się w panelu sterowania w zakładce: *Panel Sterowania>Sieć i Internet>Połączenia sieciowe*

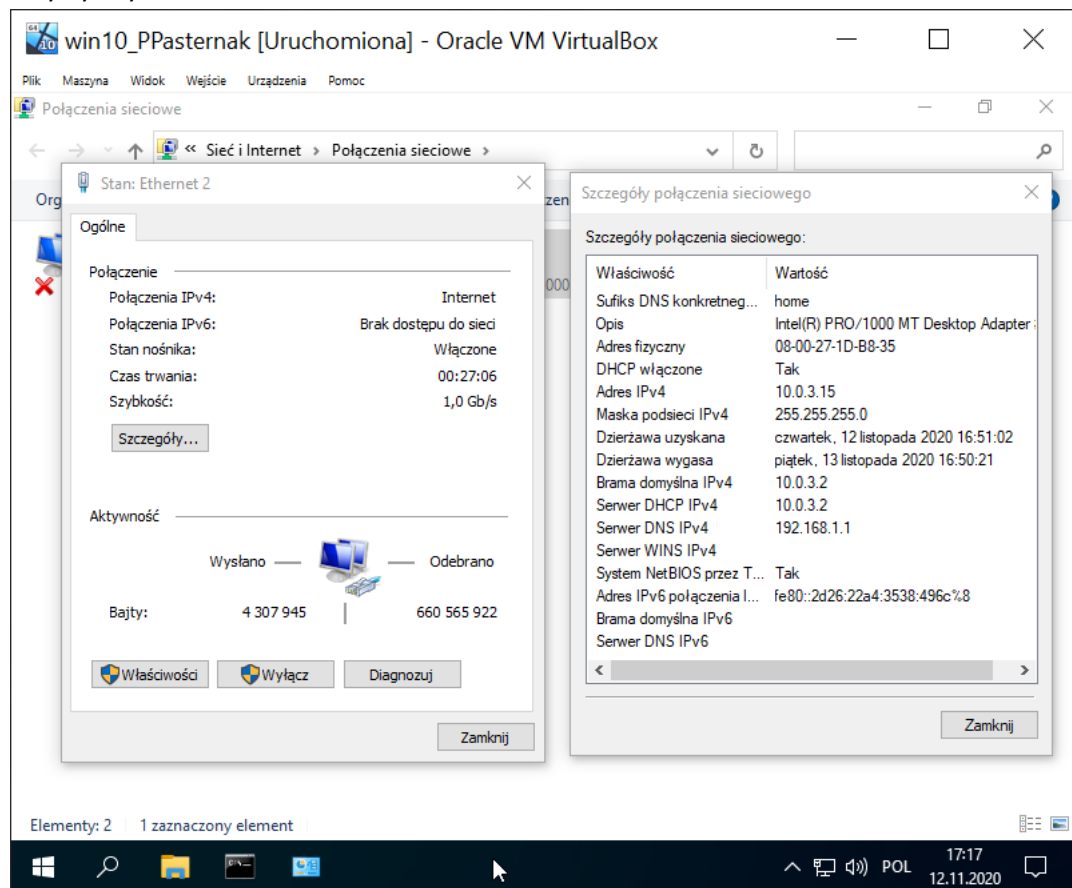


- d) Zakładki – Stan, szczegóły (Jakie informacje są dostępne dla użytkownika nawet dla użytkownika z ograniczeniami)

o Administrator

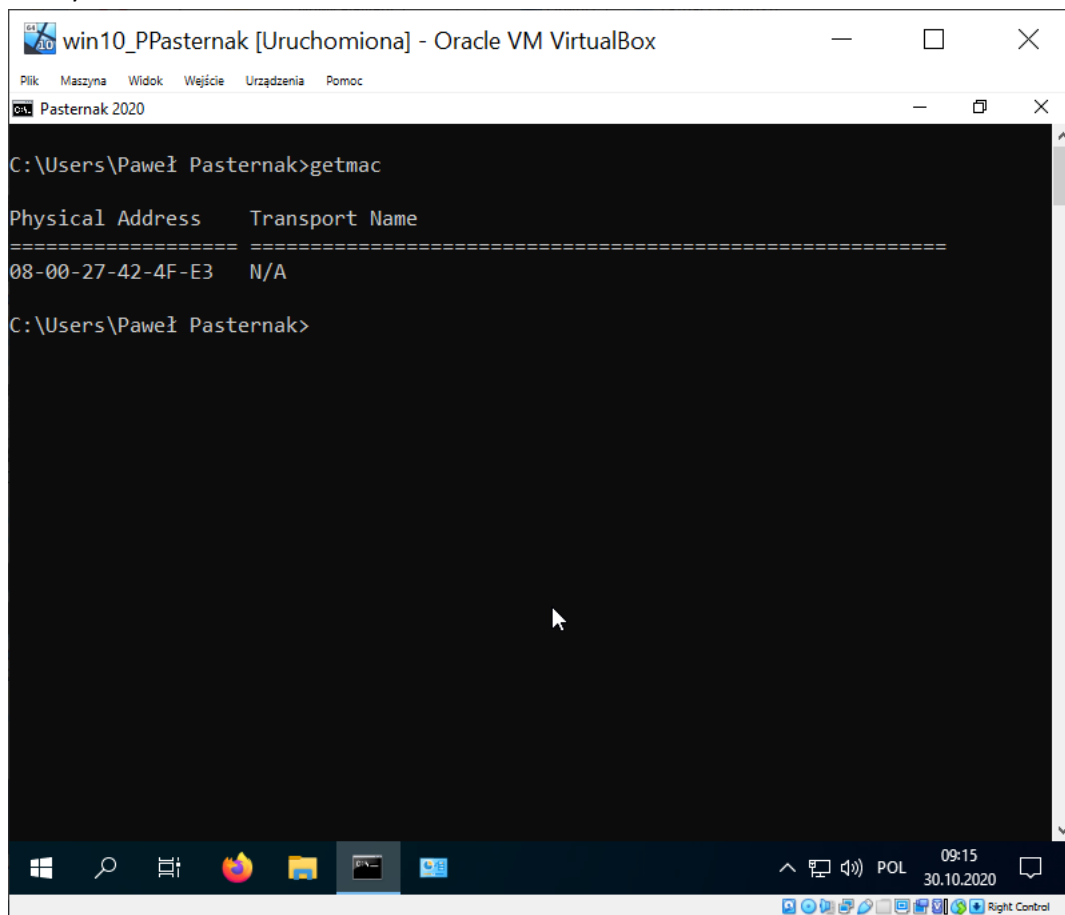


o Zwykły użytkownik



e) Adres Mac – z ilu znaków się składa – odczytaj adres MAC swojego komputera

Adres MAC składa się z 12 cyfr w systemie hexadecymalnym. Adres MAC karty sieciowej w mojej maszynie to **08 00 27 42 4F E3**



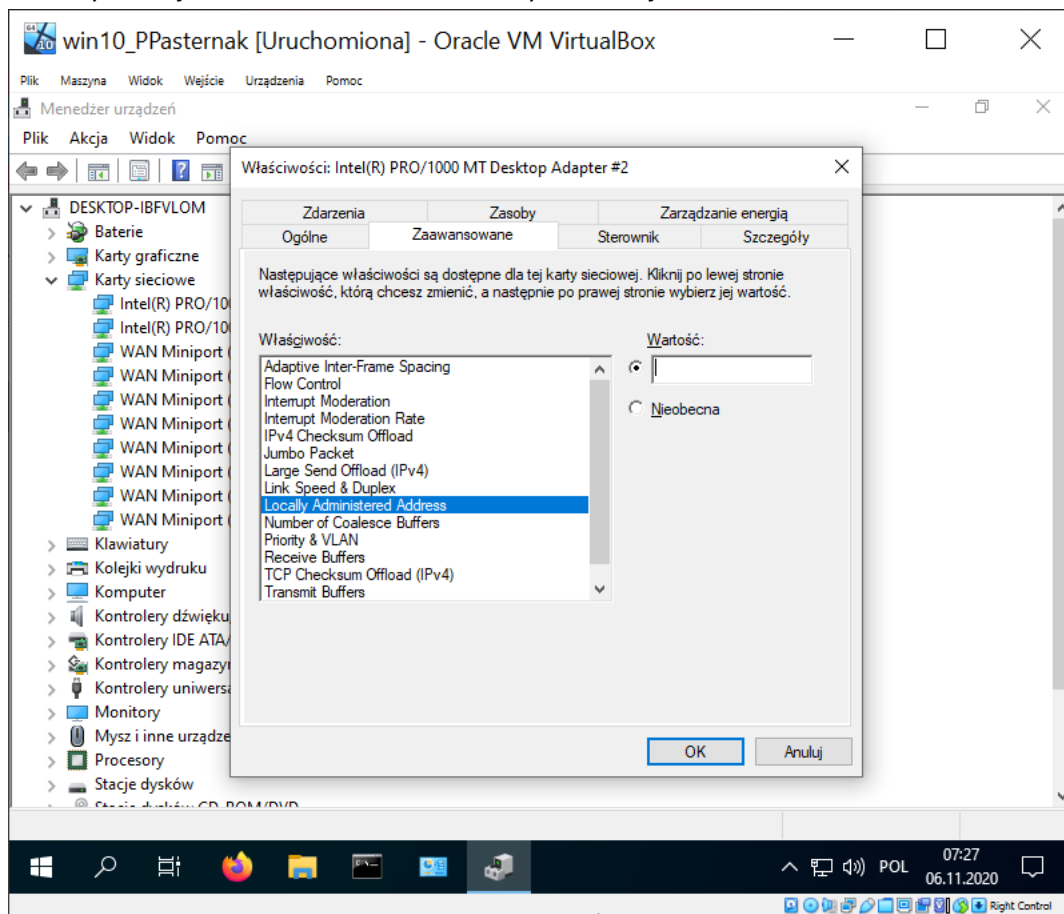
```
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Plik Maszyna Widok Wejście Urządzenia Pomoc
Pasternak 2020

C:\Users\Paweł Pasternak>getmac

Physical Address    Transport Name
=====
08-00-27-42-4F-E3  N/A

C:\Users\Paweł Pasternak>
```

f) W którym miejscu można zmienić MAC karty sieciowej



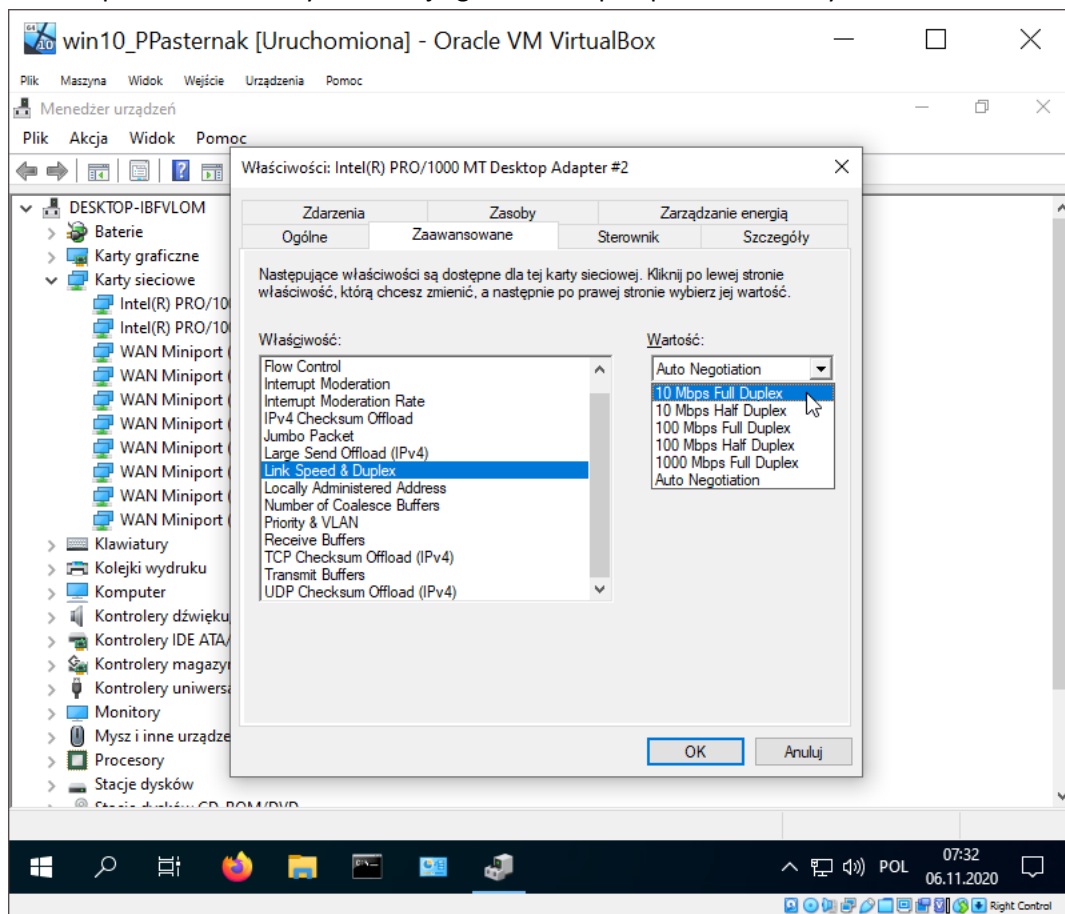
g) W jakim celu dopisujemy kilka adresów dns

Dodatkowe adresy dns dodajemy, aby nie zostać odcięci od internetu, jeżeli jeden z tych adresów nie zadziałał.

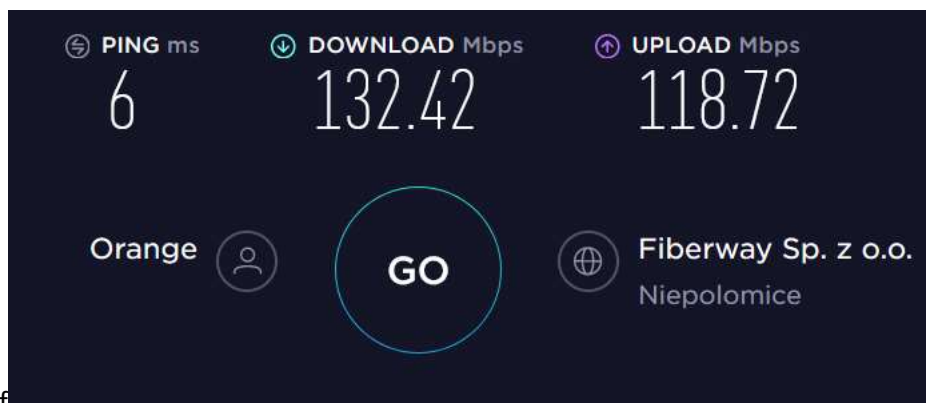
h) Po co klonuje się adres MAC w urządzeniach typu router (uzasadnienie)

Klon adresu MAC wykonujemy wtedy jeżeli, usługodawca „zabezpieczył się”, aby internet był tylko i wyłącznie na jednej maszynie, a my chcielibyśmy korzystać z niego na większej ilości urządzeń.

i) Zmiana parametrów karty sieciowej ograniczenie przepustowości i wykonanie testu



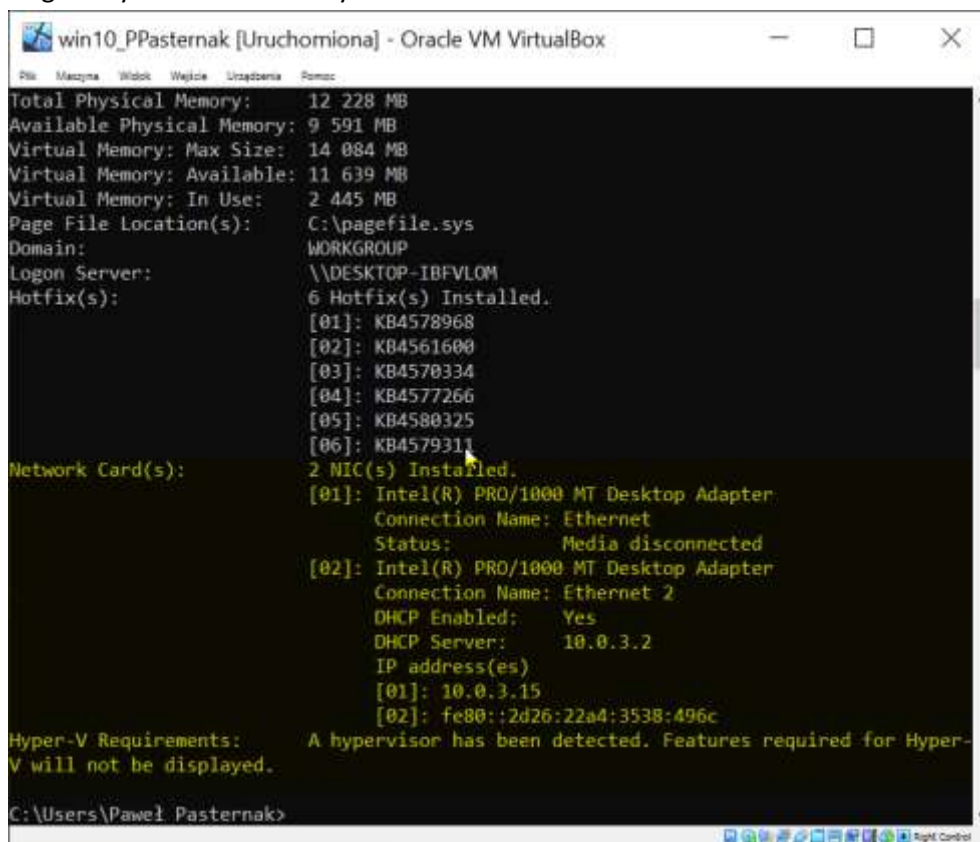
Full



Half

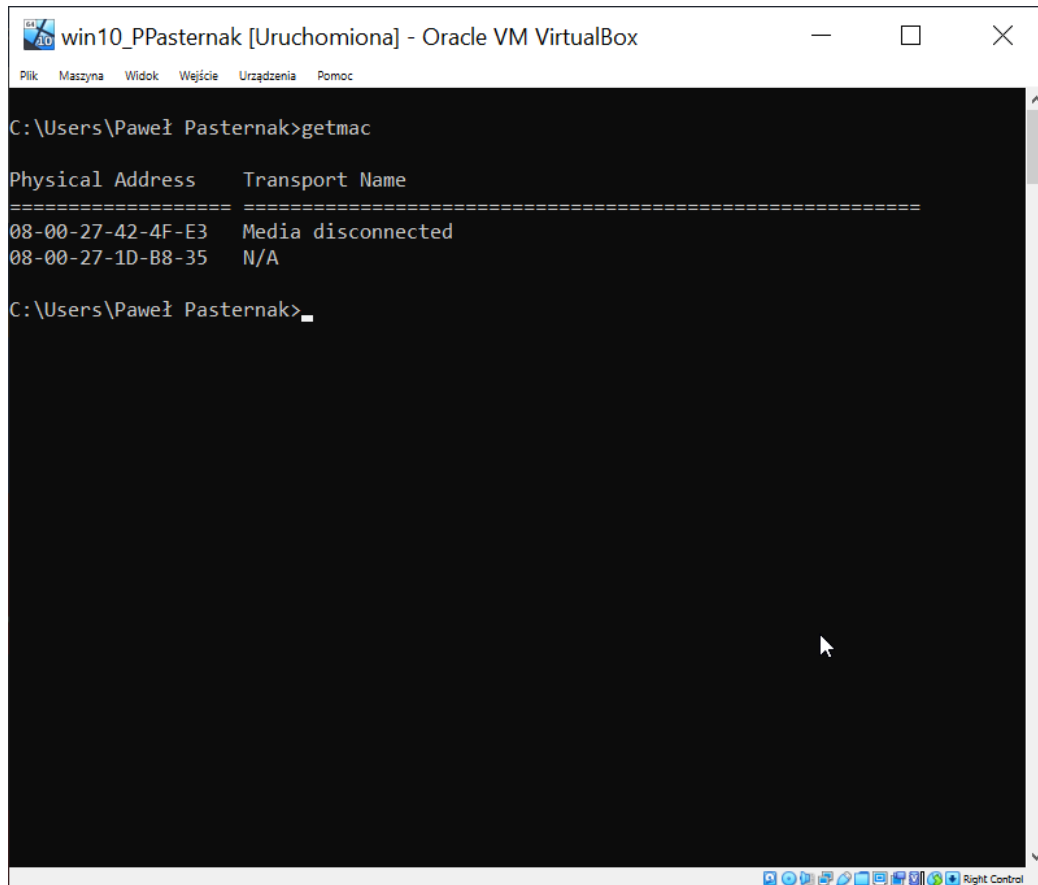
6. Polecenia sieciowe

- a) Informacje o systemie SYSTEMINFO (karty sieciowe itp.) Wyświetl i zaznacz istotne fragmenty dot. Kart sieciowych



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik  Maszyna  Widok  Wejście  Urządzenia  Pomoc
Total Physical Memory: 12 228 MB
Available Physical Memory: 9 591 MB
Virtual Memory: Max Size: 14 084 MB
Virtual Memory: Available: 11 639 MB
Virtual Memory: In Use: 2 445 MB
Page File Location(s): C:\pagefile.sys
Domain: WORKGROUP
Logon Server: \\DESKTOP-IBFVL0M
Hotfix(s): 6 Hotfix(s) Installed.
[01]: KB4578968
[02]: KB4561600
[03]: KB4570334
[04]: KB4577266
[05]: KB4580325
[06]: KB4579311
Network Card(s): 2 NIC(s) Installed.
[01]: Intel(R) PRO/1000 MT Desktop Adapter
Connection Name: Ethernet
Status: Media disconnected
[02]: Intel(R) PRO/1000 MT Desktop Adapter
Connection Name: Ethernet 2
DHCP Enabled: Yes
DHCP Server: 10.0.3.2
IP address(es)
[01]: 10.0.3.15
[02]: fe80::2d26:22a4:3538:496c
Hyper-V Requirements: A hypervisor has been detected. Features required for Hyper-
V will not be displayed.
C:\Users\Paweł Pasternak>
```

- b) Polecenie GETMAC pokaż działanie i wskaż swoją aktywną kartę sieciową

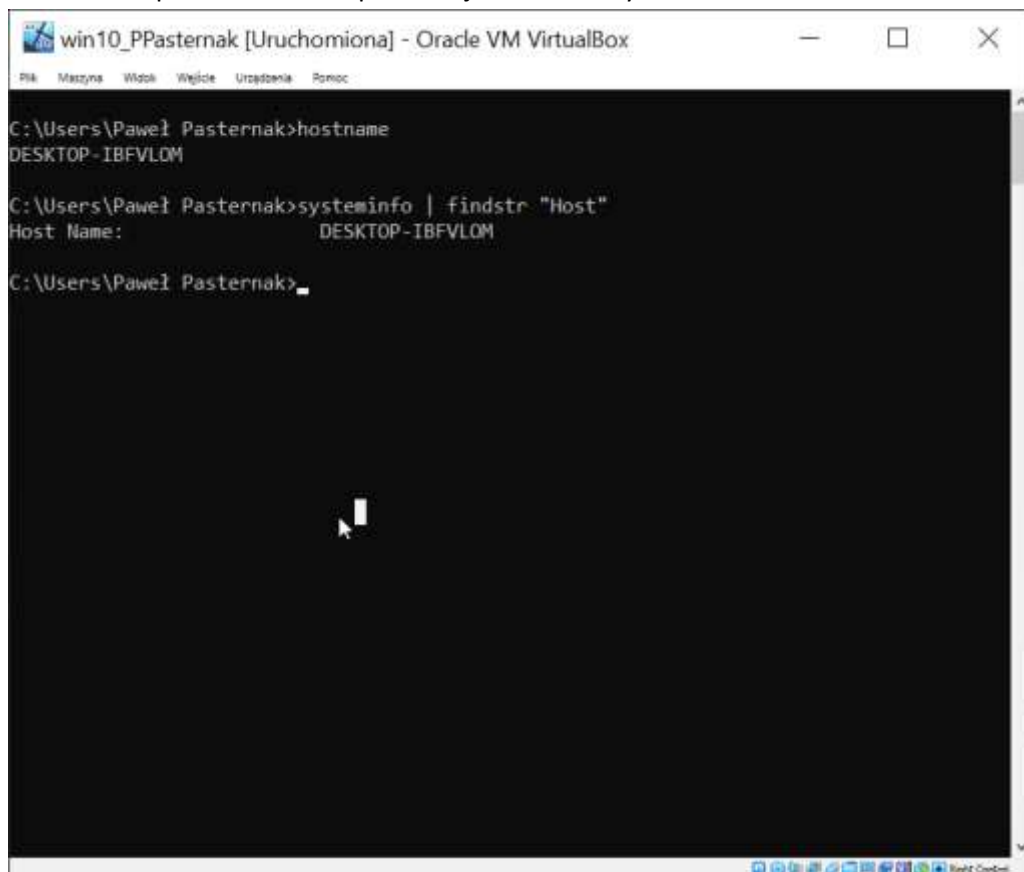


```
C:\Users\Paweł Pasternak>getmac

Physical Address      Transport Name
=====
08-00-27-42-4F-E3    Media disconnected
08-00-27-1D-B8-35    N/A

C:\Users\Paweł Pasternak>
```

- c) HOSTNAME pokaż działanie i porównaj do nazw w systemie



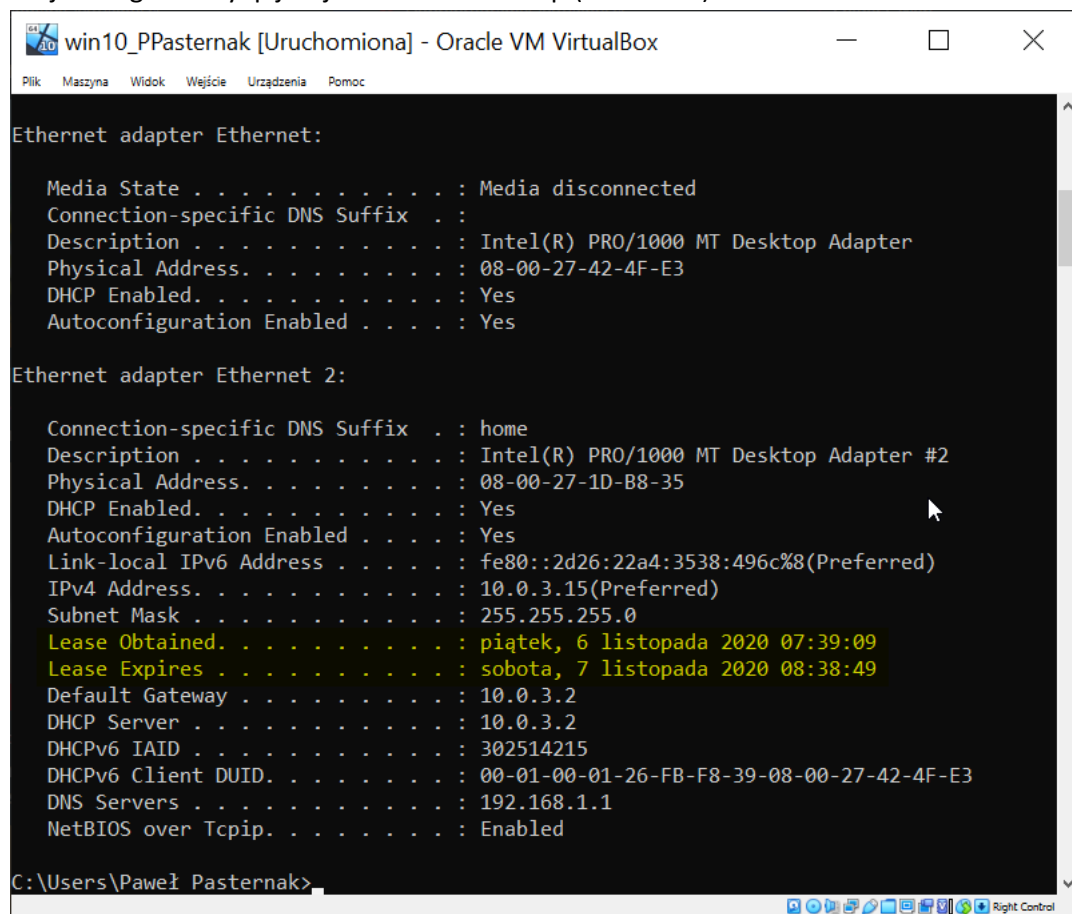
```
C:\Users\Paweł Pasternak>hostname
DESKTOP-IBFVL0M

C:\Users\Paweł Pasternak>systeminfo | findstr "Host"
Host Name:                DESKTOP-IBFVL0M

C:\Users\Paweł Pasternak>
```

d) Ipconfig

- o Na jak długo mamy Ip jaki jest adres server itp.(dzierżawa)



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

Ethernet adapter Ethernet:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . : 
Description . . . . . : Intel(R) PRO/1000 MT Desktop Adapter
Physical Address. . . . . : 08-00-27-42-4F-E3
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes

Ethernet adapter Ethernet 2:

Connection-specific DNS Suffix . : home
Description . . . . . : Intel(R) PRO/1000 MT Desktop Adapter #2
Physical Address. . . . . : 08-00-27-1D-B8-35
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::2d26:22a4:3538:496c%8(Preferred)
IPv4 Address. . . . . : 10.0.3.15(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : piątek, 6 listopada 2020 07:39:09
Lease Expires . . . . . : sobota, 7 listopada 2020 08:38:49
Default Gateway . . . . . : 10.0.3.2
DHCP Server . . . . . : 10.0.3.2
DHCPv6 IAID . . . . . : 302514215
DHCPv6 Client DUID. . . . . : 00-01-00-01-26-FB-F8-39-08-00-27-42-4F-E3
DNS Servers . . . . . : 192.168.1.1
NetBIOS over Tcpip. . . . . : Enabled

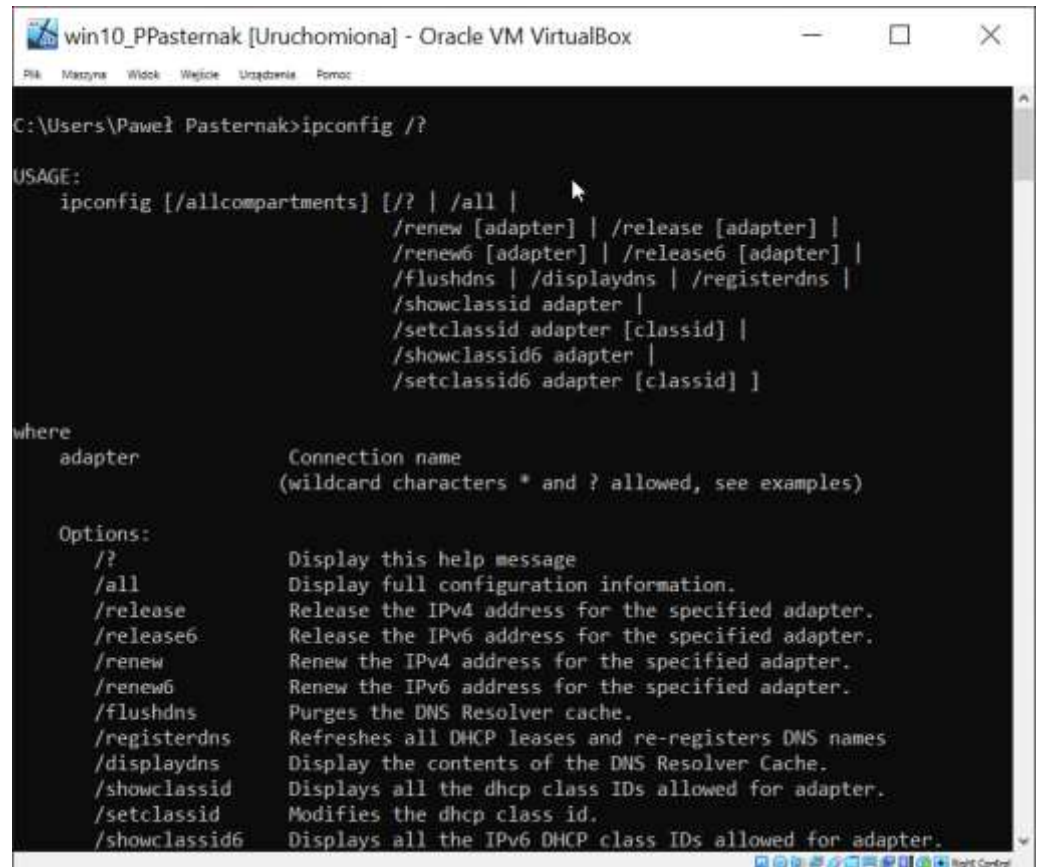
C:\Users\Paweł Pasternak>
```

25h

- o Ipconfig /All przeznaczenie polecenia

Polecenie wyświetla wszystkie możliwe informacje na temat konfiguracji.

- o Ipconfig /? – jakie mamy możliwości



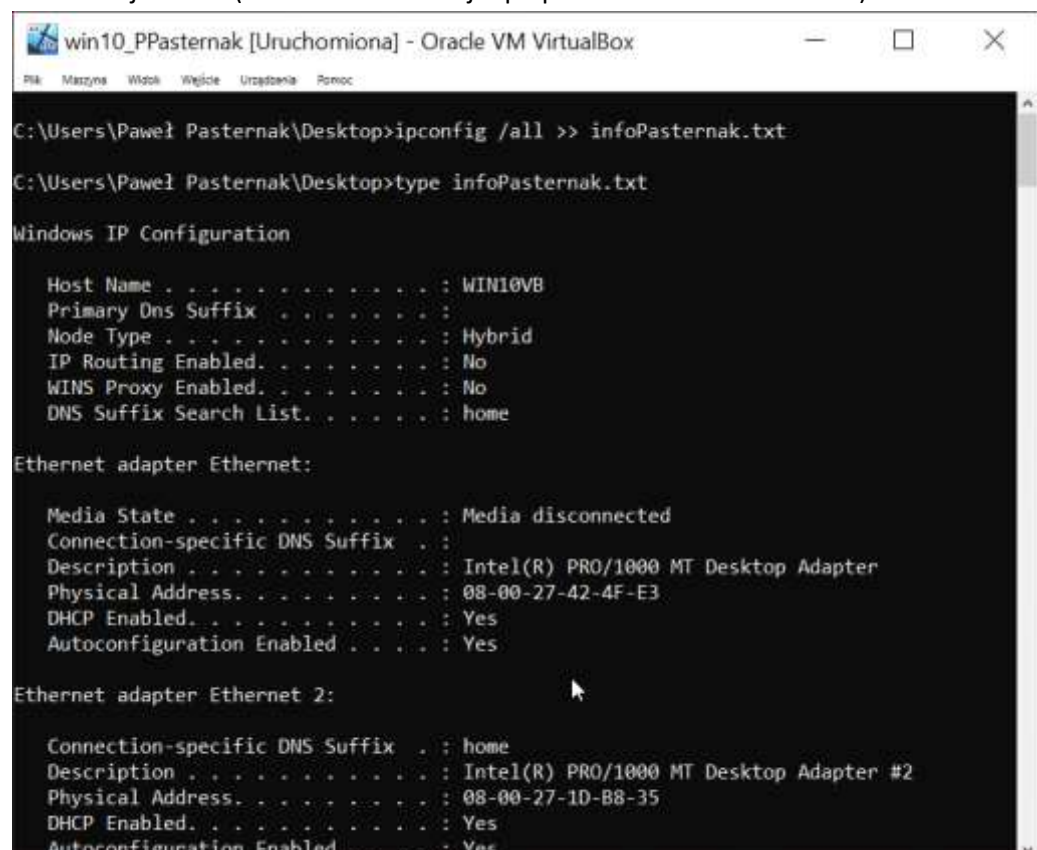
```
C:\Users\Paweł Pasternak>ipconfig /?

USAGE:
    ipconfig [/allcompartments] [/? | /all |
        /renew [adapter] | /release [adapter] |
        /renew6 [adapter] | /release6 [adapter] |
        /flushdns | /displaydns | /registerdns |
        /showclassid adapter |
        /setclassid adapter [classid] |
        /showclassid6 adapter |
        /setclassid6 adapter [classid] ]

where
    adapter          Connection name
                     (wildcard characters * and ? allowed, see examples)

Options:
    /?              Display this help message
    /all            Display full configuration information.
    /release        Release the IPv4 address for the specified adapter.
    /release6       Release the IPv6 address for the specified adapter.
    /renew          Renew the IPv4 address for the specified adapter.
    /renew6         Renew the IPv6 address for the specified adapter.
    /flushdns       Purges the DNS Resolver cache.
    /registerdns     Refreshes all DHCP leases and re-registers DNS names
    /displaydns     Display the contents of the DNS Resolver Cache.
    /showclassid    Displays all the dhcp class IDs allowed for adapter.
    /setclassid     Modifies the dhcp class id.
    /showclassid6   Displays all the IPv6 DHCP class IDs allowed for adapter.
```

- o Zapisanie informacji dotyczącej interfejsów sieciowych do pliku tekstowego o określonej nazwie (określona lokalizacja- pulpit nazwa infonazwisko.txt)



```
C:\Users\Paweł Pasternak\Desktop>ipconfig /all >> infoPasternak.txt

C:\Users\Paweł Pasternak\Desktop>type infoPasternak.txt

Windows IP Configuration

Host Name . . . . . : WIN10VB
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : home

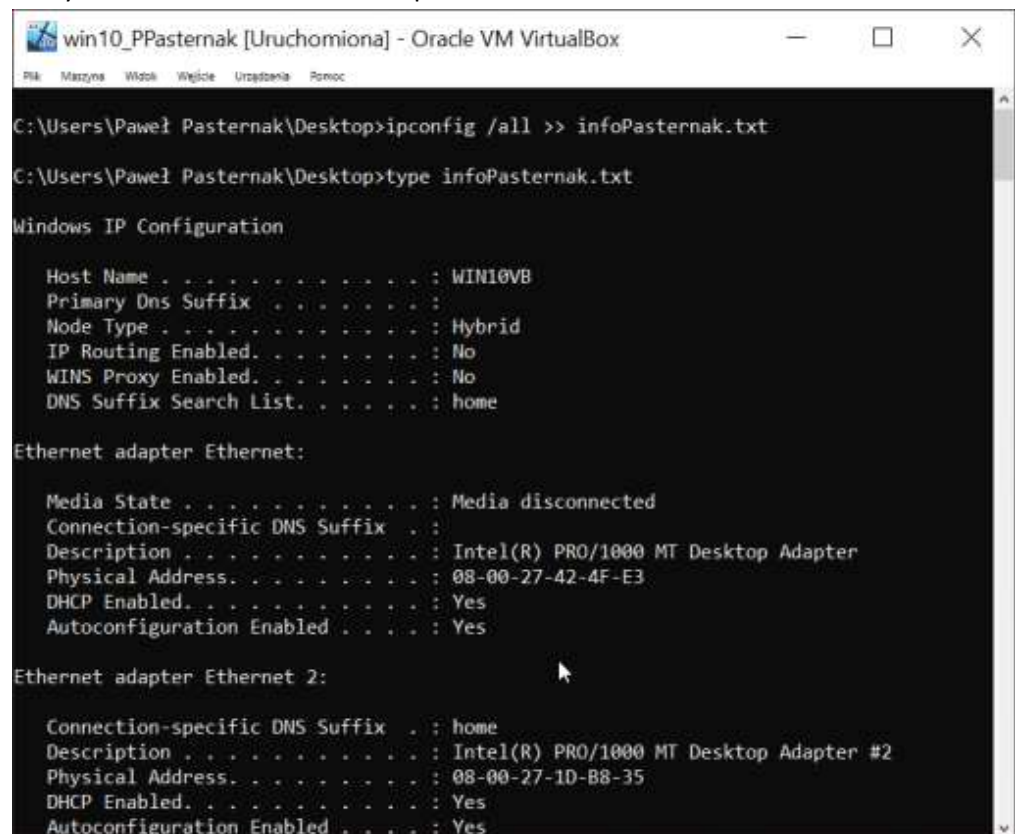
Ethernet adapter Ethernet:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Description . . . . . : Intel(R) PRO/1000 MT Desktop Adapter
Physical Address. . . . . : 08-00-27-42-4F-E3
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes

Ethernet adapter Ethernet 2:

Connection-specific DNS Suffix . : home
Description . . . . . : Intel(R) PRO/1000 MT Desktop Adapter #2
Physical Address. . . . . : 08-00-27-1D-B8-35
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
```

- Wczytanie dokumentu w wierszu poleceń



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik  Maszyna  Widok  Węzły  Urządzenia  Pomoc

C:\Users\Paweł Pasternak\Desktop>ipconfig /all >> infoPasternak.txt

C:\Users\Paweł Pasternak\Desktop>type infoPasternak.txt

Windows IP Configuration

Host Name . . . . . : WIN10VB
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : home

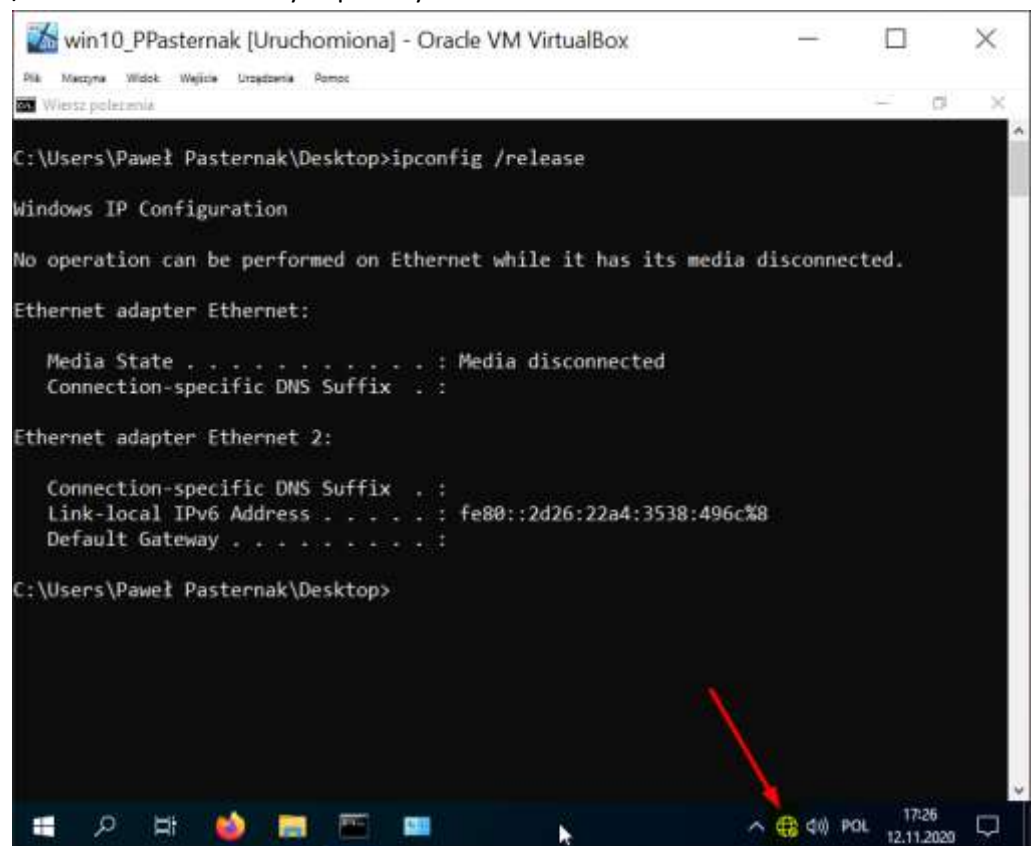
Ethernet adapter Ethernet:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Description . . . . . : Intel(R) PRO/1000 MT Desktop Adapter
Physical Address. . . . . : 08-00-27-42-4F-E3
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes

Ethernet adapter Ethernet 2:

Connection-specific DNS Suffix . : home
Description . . . . . : Intel(R) PRO/1000 MT Desktop Adapter #2
Physical Address. . . . . : 08-00-27-10-B8-35
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
```

- /release – Zwalnianie adresy IP podanych kart



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik  Maszyna  Widok  Węzły  Urządzenia  Pomoc

Wiersz poleceń

C:\Users\Paweł Pasternak\Desktop>ipconfig /release

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.

Ethernet adapter Ethernet:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

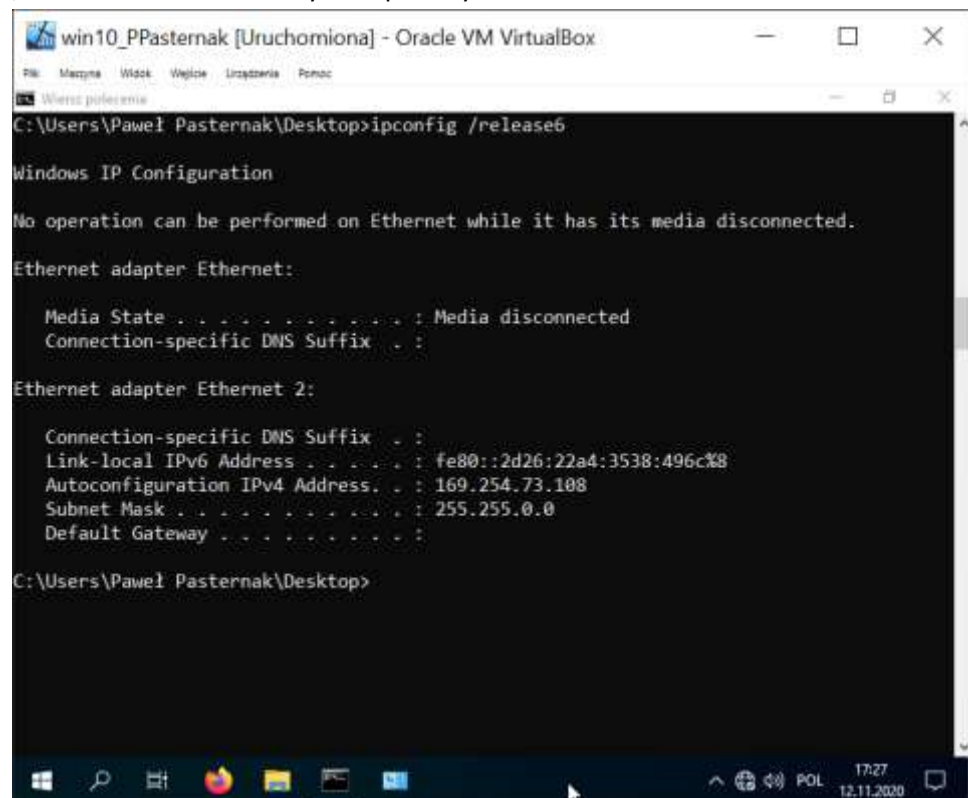
Ethernet adapter Ethernet 2:

Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::2d26:22a4:3538:496c%8
Default Gateway . . . . . :

C:\Users\Paweł Pasternak\Desktop>
```

A red arrow points to the network status icon in the Windows taskbar at the bottom right of the screenshot.

- o / release6 – zwalnia adresy IPv6 podanych kart



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik: Maszyna Wlókno Wątki Urządzenia Pomoc
Wiersz polecenia
C:\Users\Paweł Pasternak\Desktop>ipconfig /release6

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.

Ethernet adapter Ethernet:

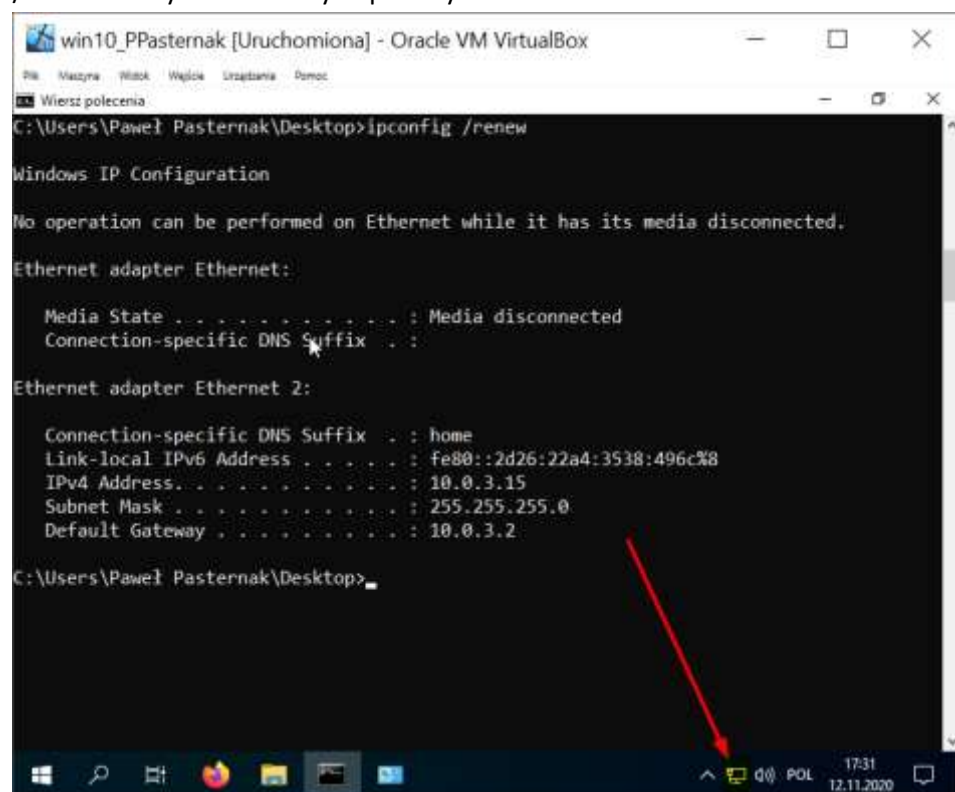
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

Ethernet adapter Ethernet 2:

    Connection-specific DNS Suffix . :
    Link-local IPv6 Address . . . . . : fe80::2d26:22a4:3538:496c%8
    Autoconfiguration IPv4 Address. . . : 169.254.73.108
    Subnet Mask . . . . . : 255.255.0.0
    Default Gateway . . . . . :

C:\Users\Paweł Pasternak\Desktop>
```

- o /renew – Przydziela adresy IP podanym kartom



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik: Maszyna Wlókno Wątki Urządzenia Pomoc
Wiersz polecenia
C:\Users\Paweł Pasternak\Desktop>ipconfig /renew

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.

Ethernet adapter Ethernet:

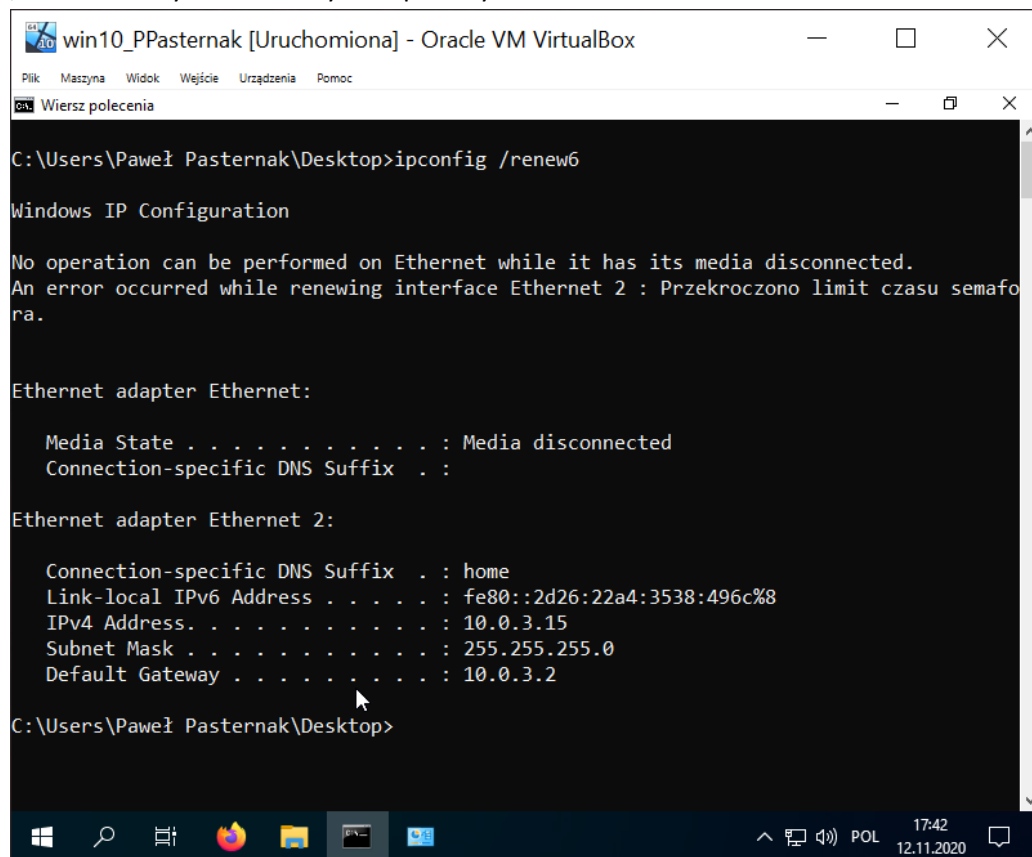
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

Ethernet adapter Ethernet 2:

    Connection-specific DNS Suffix . : home
    Link-local IPv6 Address . . . . . : fe80::2d26:22a4:3538:496c%8
    IPv4 Address. . . . . : 10.0.3.15
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.0.3.2

C:\Users\Paweł Pasternak\Desktop>
```

- /renew6— Przydziela adresy IPv6 podanym kartom



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc
Wiersz polecenia

C:\Users\Paweł Pasternak\Desktop>ipconfig /renew6

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.
An error occurred while renewing interface Ethernet 2 : Przekroczono limit czasu semafora.

Ethernet adapter Ethernet:

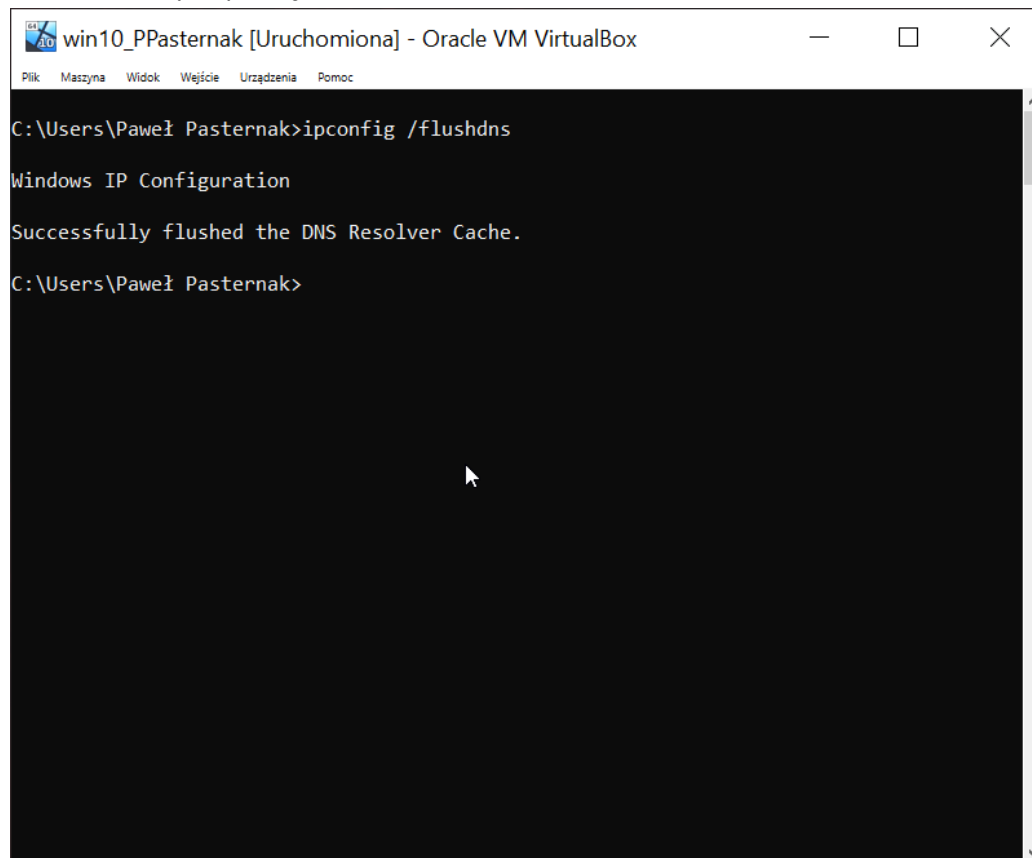
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Ethernet adapter Ethernet 2:

    Connection-specific DNS Suffix  . : home
    Link-local IPv6 Address . . . . . : fe80::2d26:22a4:3538:496c%8
    IPv4 Address. . . . . : 10.0.3.15
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.0.3.2

C:\Users\Paweł Pasternak\Desktop>
```

- /flushdns – czyści pamięć cache adresu DNS



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

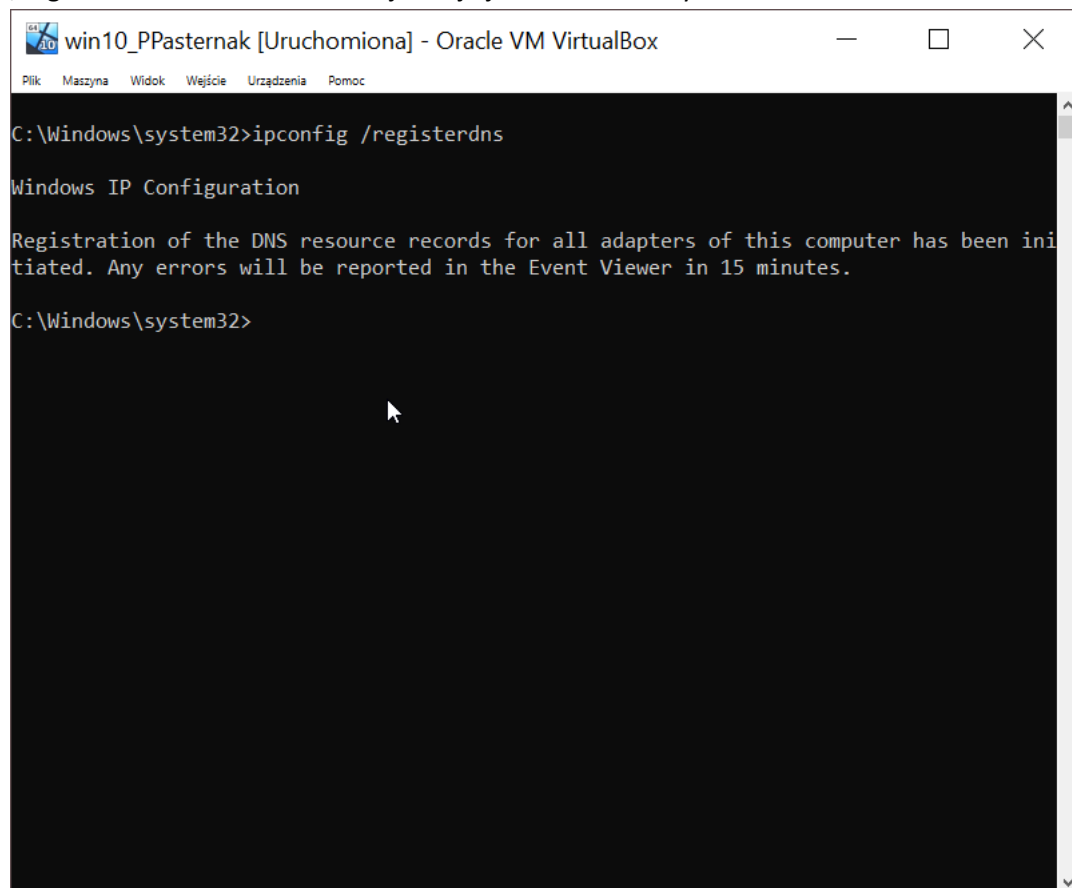
C:\Users\Paweł Pasternak>ipconfig /flushdns

Windows IP Configuration

Successfully flushed the DNS Resolver Cache.

C:\Users\Paweł Pasternak>
```

- o /registerdns – odświeża DNS i rejestruje jeszcze raz nazwy domenowe



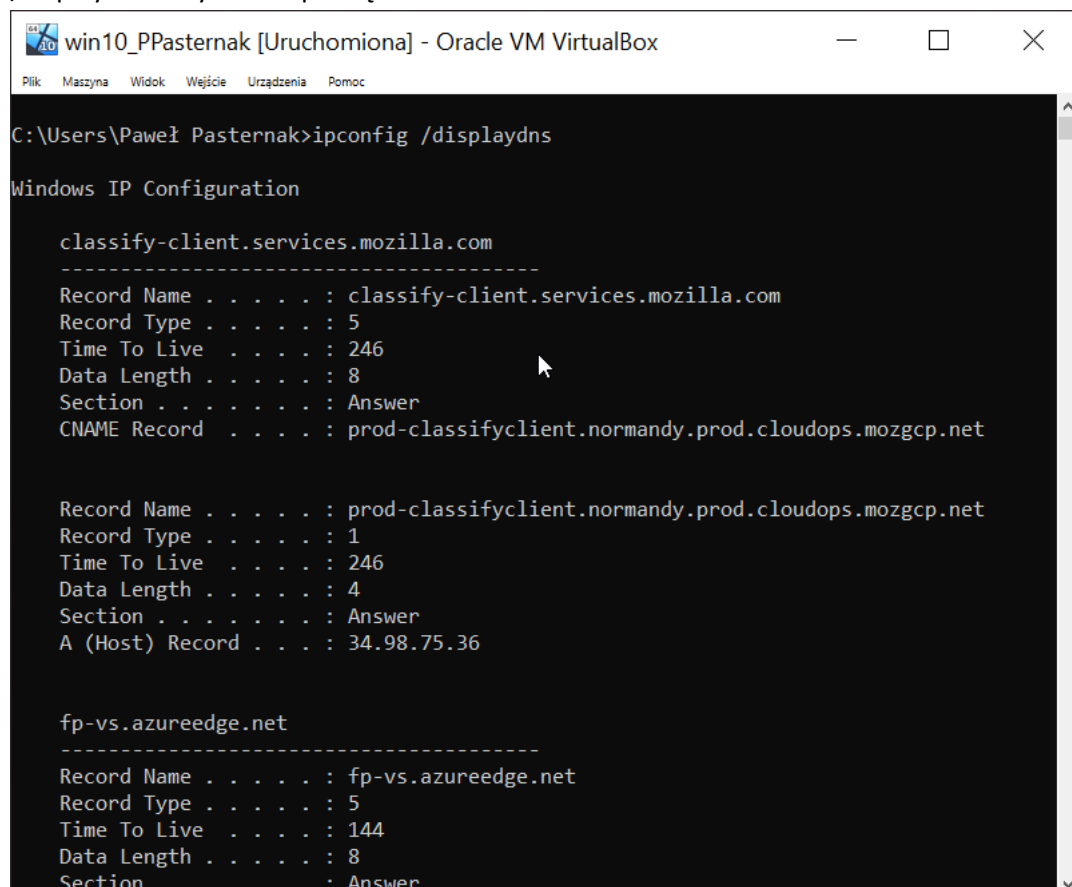
```
C:\Windows\system32>ipconfig /registerdns

Windows IP Configuration

Registration of the DNS resource records for all adapters of this computer has been initiated. Any errors will be reported in the Event Viewer in 15 minutes.

C:\Windows\system32>
```

- o /displaydns – wyświetla pamięć cache dns.



```
C:\Users\Paweł Pasternak>ipconfig /displaydns

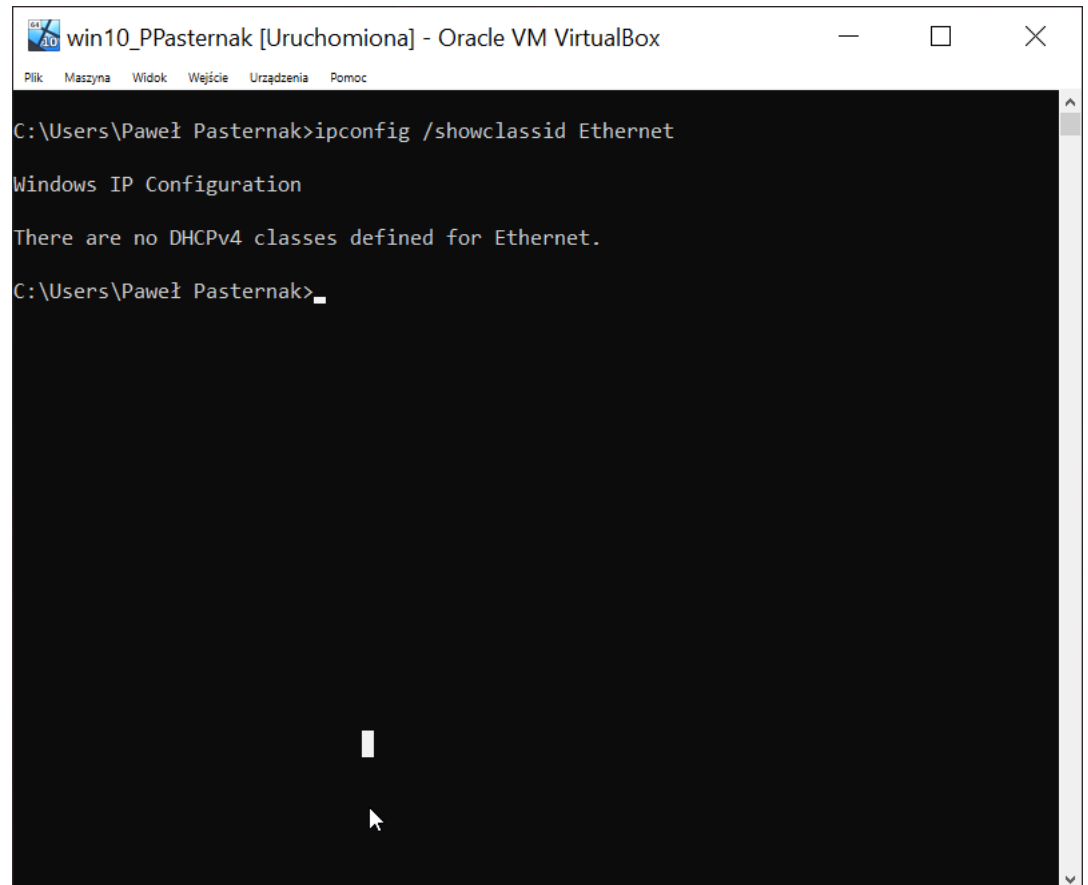
Windows IP Configuration

classify-client.services.mozilla.com
-----
Record Name . . . . . : classify-client.services.mozilla.com
Record Type . . . . . : 5
Time To Live . . . . . : 246
Data Length . . . . . : 8
Section . . . . . : Answer
CNAME Record . . . . . : prod-classifyclient.normandy.prod.cloudops.mozgcp.net

Record Name . . . . . : prod-classifyclient.normandy.prod.cloudops.mozgcp.net
Record Type . . . . . : 1
Time To Live . . . . . : 246
Data Length . . . . . : 4
Section . . . . . : Answer
A (Host) Record . . . . : 34.98.75.36

fp-vs.azureedge.net
-----
Record Name . . . . . : fp-vs.azureedge.net
Record Type . . . . . : 5
Time To Live . . . . . : 144
Data Length . . . . . : 8
Section . . . . . : Answer
```

- o /showclassid – Wyświetla wszystkie identyfikatory klas DHCP dozwolone dla karty



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

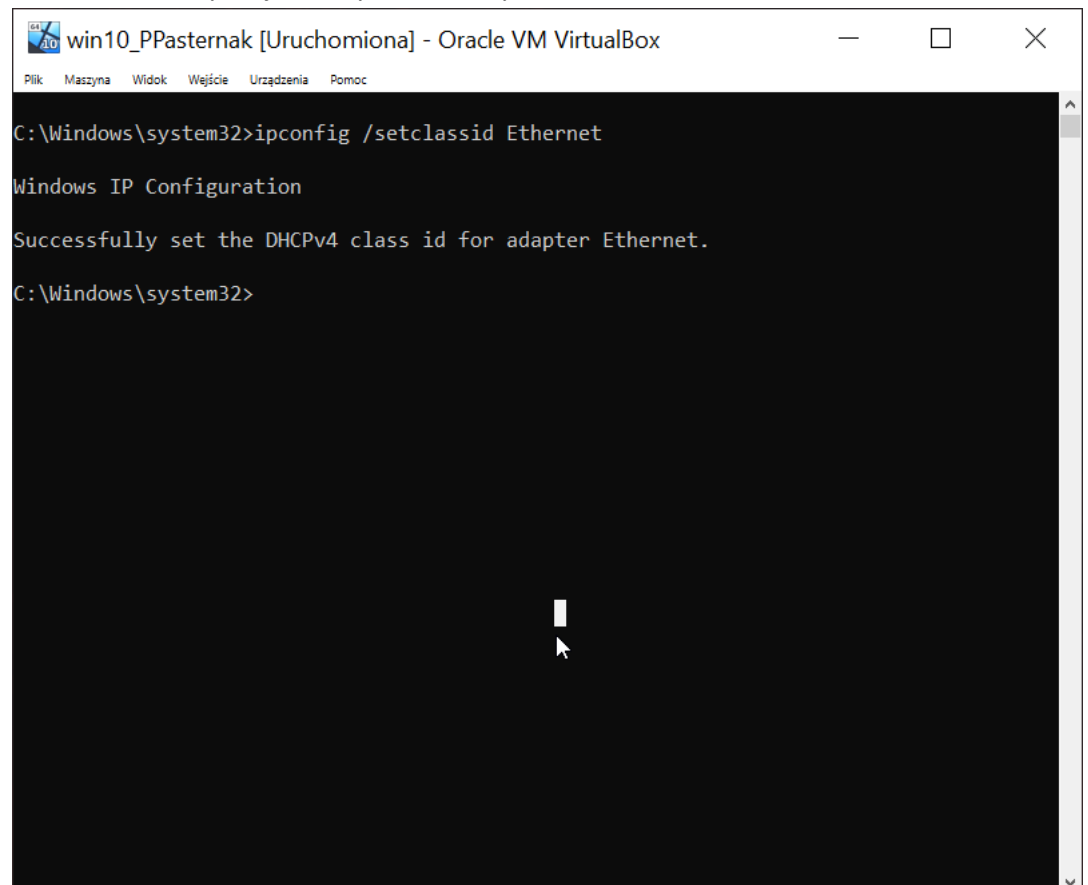
C:\Users\Paweł Pasternak>ipconfig /showclassid Ethernet

Windows IP Configuration

There are no DHCPv4 classes defined for Ethernet.

C:\Users\Paweł Pasternak>
```

- o /setclassid – modyfikuje identyfikator klasy DHCP



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

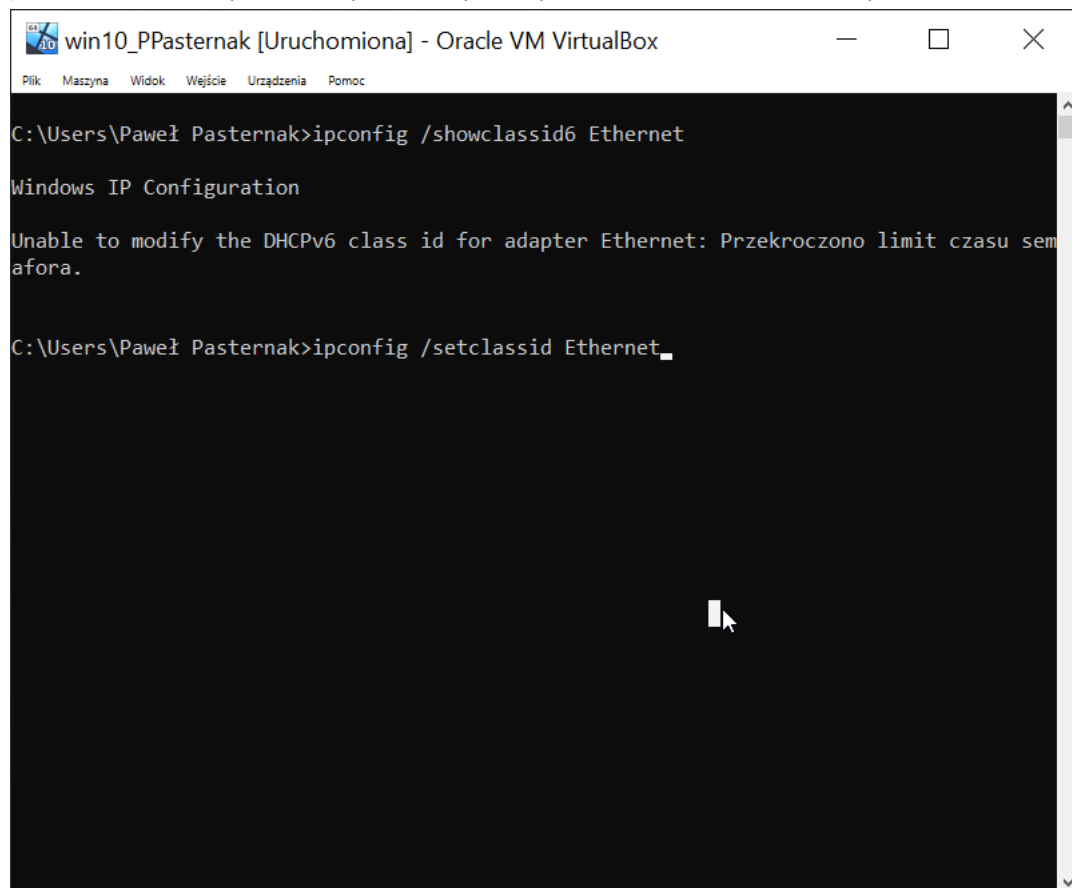
C:\Windows\system32>ipconfig /setclassid Ethernet

Windows IP Configuration

Successfully set the DHCPv4 class id for adapter Ethernet.

C:\Windows\system32>
```

- o /showclassid6 – Wyświetla wszystkie identyfikatory klas DHCPv6 dozwolone dla karty



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

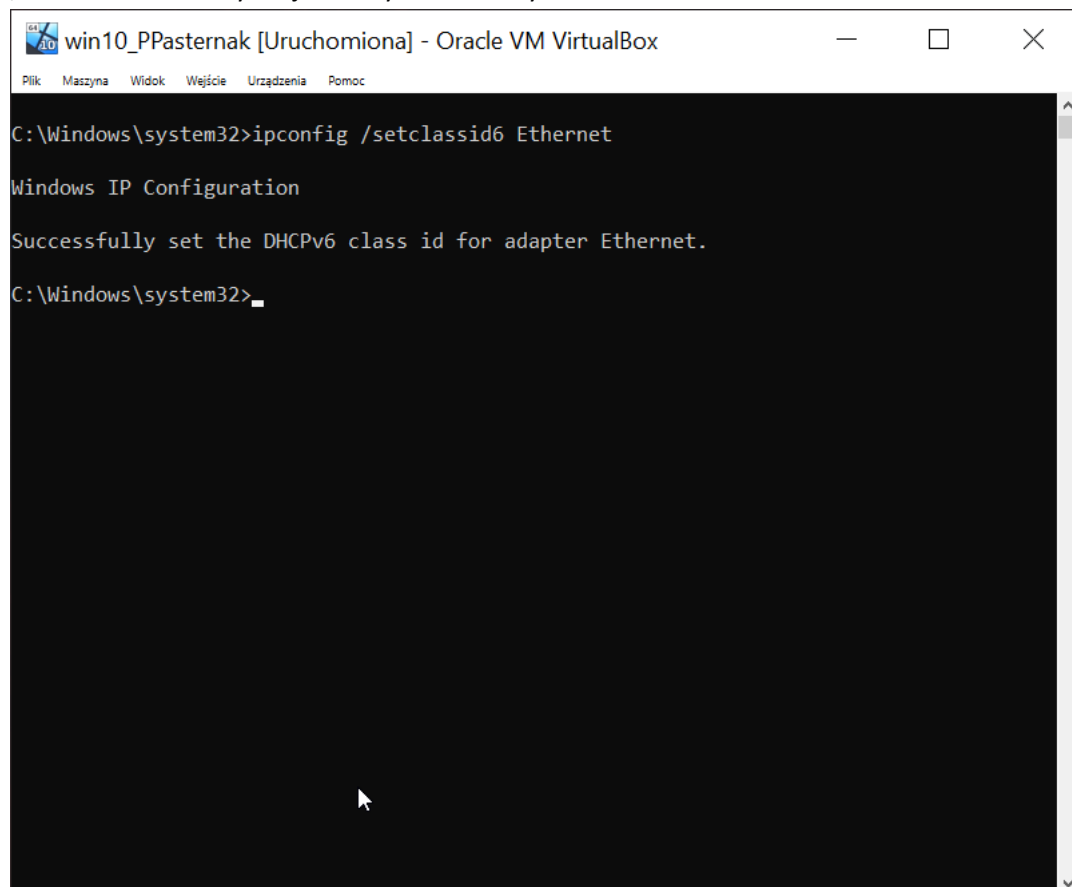
C:\Users\Paweł Pasternak>ipconfig /showclassid6 Ethernet

Windows IP Configuration

Unable to modify the DHCPv6 class id for adapter Ethernet: Przekroczono limit czasu semafora.

C:\Users\Paweł Pasternak>ipconfig /setclassid Ethernet_
```

- o /setclassid6 – Modyfikuje identyfikator klasy DHCPv6



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

C:\Windows\system32>ipconfig /setclassid6 Ethernet

Windows IP Configuration

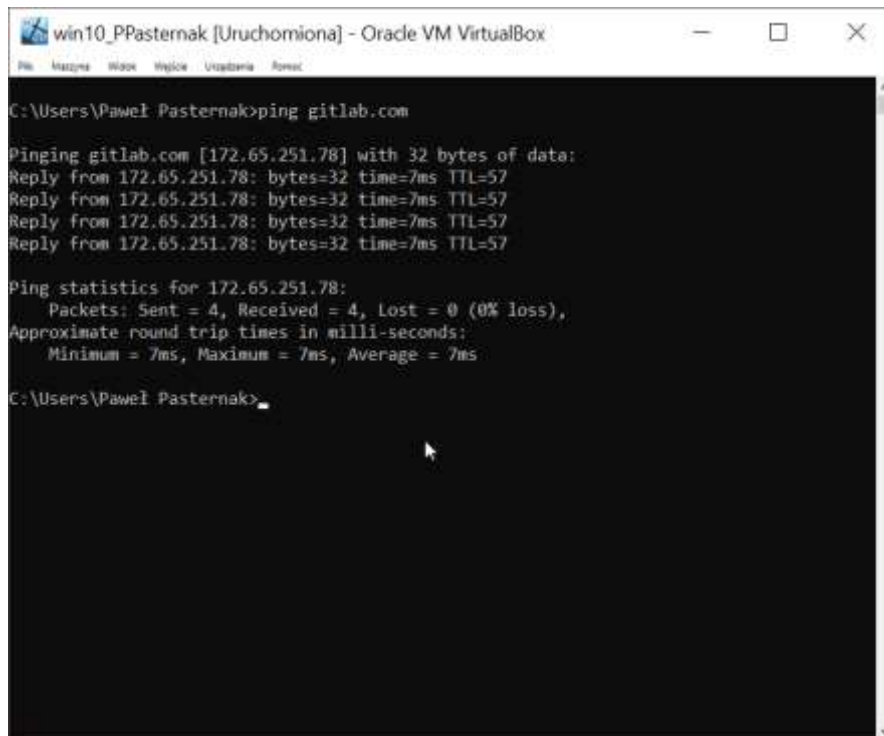
Successfully set the DHCPv6 class id for adapter Ethernet.

C:\Windows\system32>
```

e) Ping

- Pingowanie stron internetowych – jakie informacje możemy uzyskać ?

Możemy uzyskać informację o adresie IP serwera, jak szybko się komunikujemy z tą stroną, a także ile pakietów straciliśmy przy komunikacji i czy występują jakieś błędy



```
C:\Users\Paweł Pasternak>ping gitlab.com

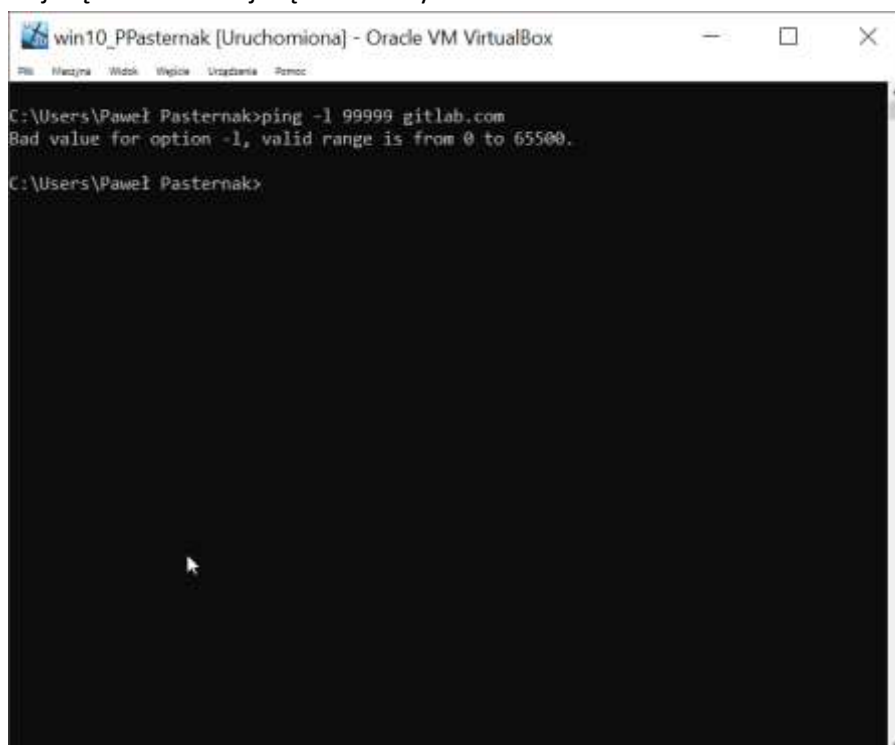
Pinging gitlab.com [172.65.251.78] with 32 bytes of data:
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57

Ping statistics for 172.65.251.78:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 7ms, Maximum = 7ms, Average = 7ms

C:\Users\Paweł Pasternak>
```

- -l Zmiana wielkości pakietów (Określenie maksymalnego rozmiaru)

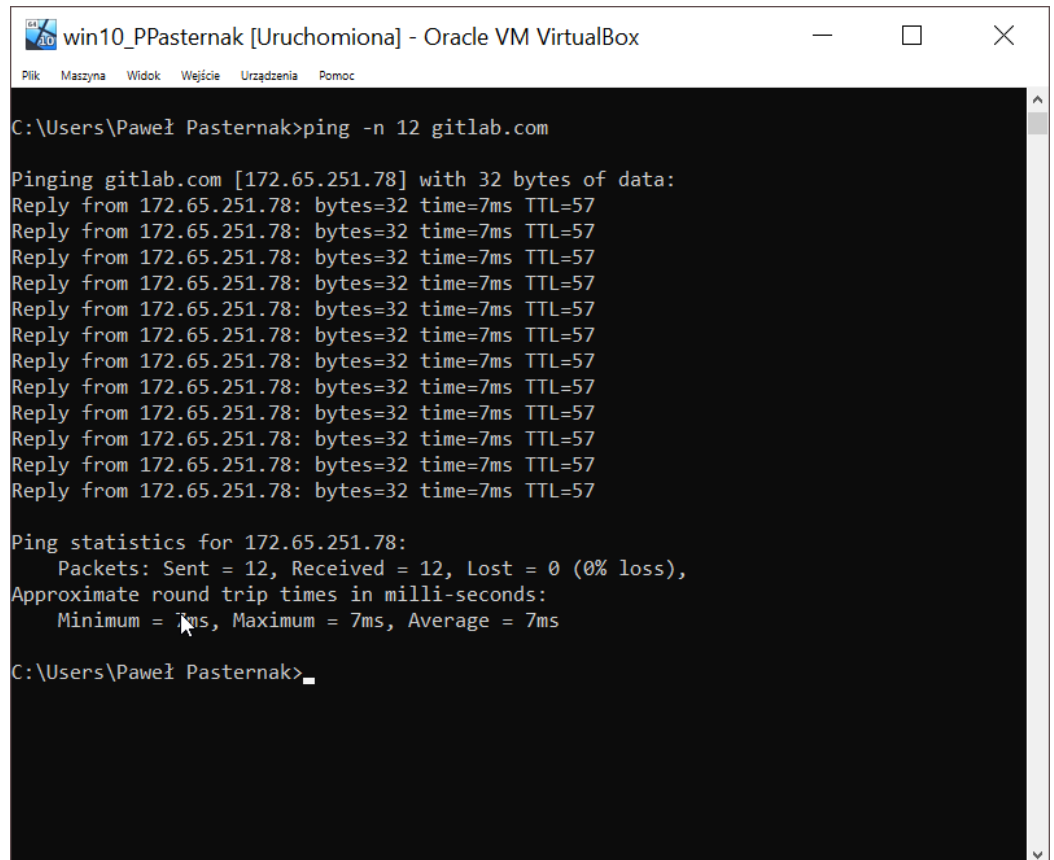
Największa wartość jaką można uzyskać to 65500.



```
C:\Users\Paweł Pasternak>ping -l 99999 gitlab.com
Bad value for option -l, valid range is from 0 to 65500.

C:\Users\Paweł Pasternak>
```

- o -n Zmiana ilości wysłanych pakietów np. 12



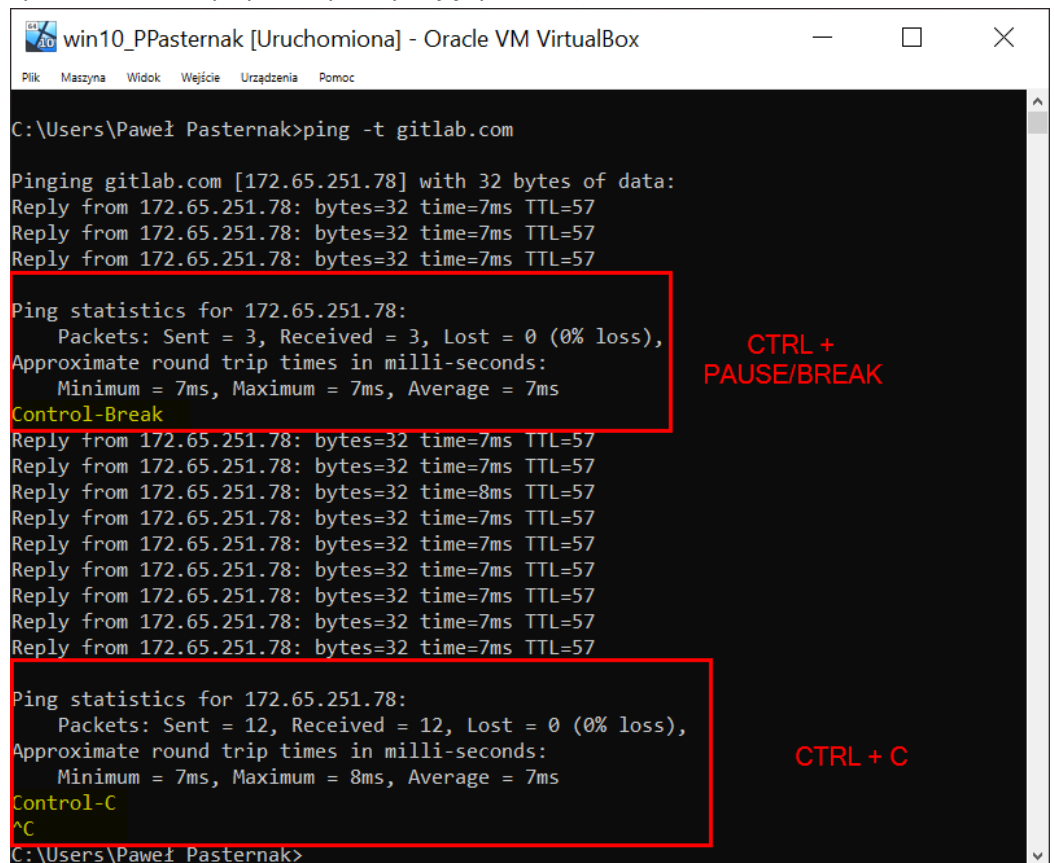
```
C:\Users\Paweł Pasternak>ping -n 12 gitlab.com

Pinging gitlab.com [172.65.251.78] with 32 bytes of data:
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57

Ping statistics for 172.65.251.78:
    Packets: Sent = 12, Received = 12, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 7ms, Average = 7ms

C:\Users\Paweł Pasternak>
```

- o Dodatkowa opcja -t (jak przerwać w dowolnym momencie, jak wyświetlić tymczasowe statystyki nie przerywając procesu)



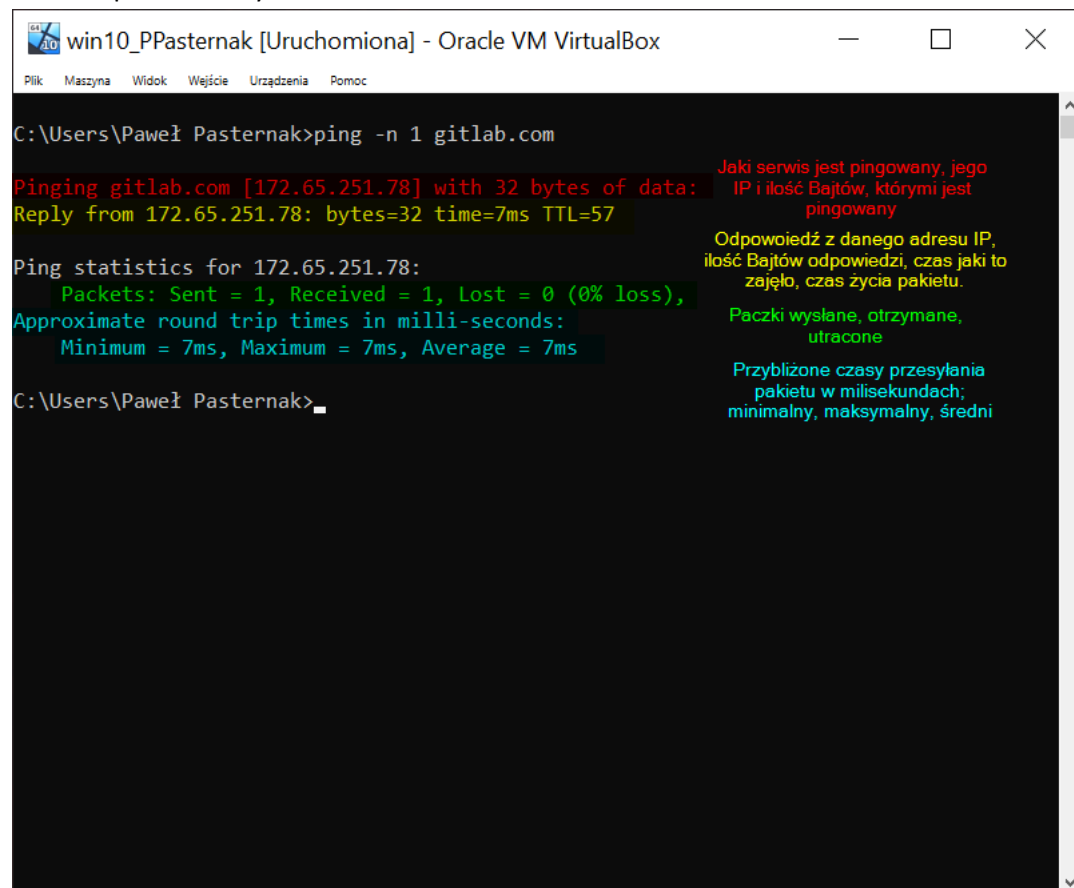
```
C:\Users\Paweł Pasternak>ping -t gitlab.com

Pinging gitlab.com [172.65.251.78] with 32 bytes of data:
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57

Ping statistics for 172.65.251.78:
    Packets: Sent = 3, Received = 3, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 7ms, Average = 7ms
Control-Break
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=8ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57

Ping statistics for 172.65.251.78:
    Packets: Sent = 12, Received = 12, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 8ms, Average = 7ms
Control-C
^C
C:\Users\Paweł Pasternak>
```

○ Jak interpretować wynik



```
C:\Users\Paweł Pasternak>ping -n 1 gitlab.com

Pinging gitlab.com [172.65.251.78] with 32 bytes of data:
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57

Ping statistics for 172.65.251.78:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 7ms, Maximum = 7ms, Average = 7ms

C:\Users\Paweł Pasternak>
```

Jaki serwis jest pingowany, jego IP i ilość Bajtów, którymi jest pingowany

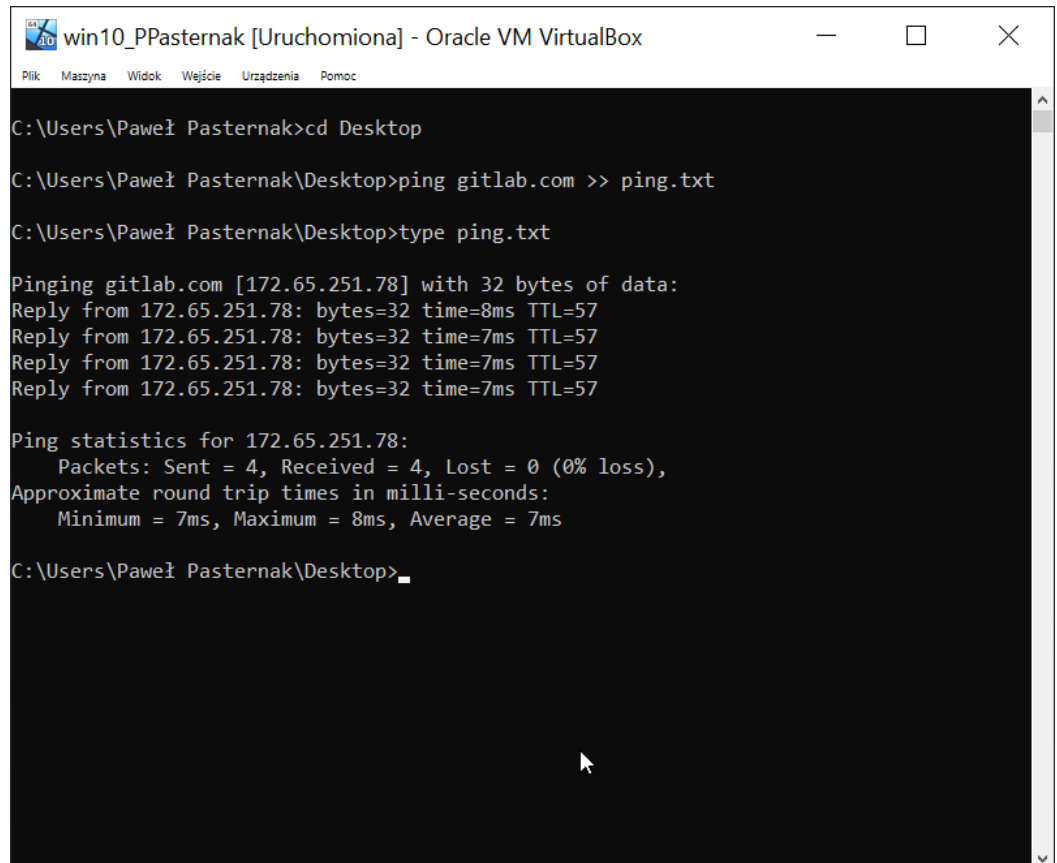
Odpowiedź z danego adresu IP, ilość Bajtów odpowiedzi, czas jaki to zajęło, czas życia pakietu.

Paczki wysłane, otrzymane, utracone

○ Jak mogą być najczęstsze błędy podczas używania polecenia – i o czym świadczą

1. Pakiet nie dociera
2. Pakiety tracą ważność w trakcie przekazu, bo ich czas życia (ang. TTL) jest za krótki
3. Pakiety są za duże

- o Zapisać wynik do pliku o nazwie Ping.txt



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

C:\Users\Paweł Pasternak>cd Desktop

C:\Users\Paweł Pasternak\Desktop>ping gitlab.com >> ping.txt

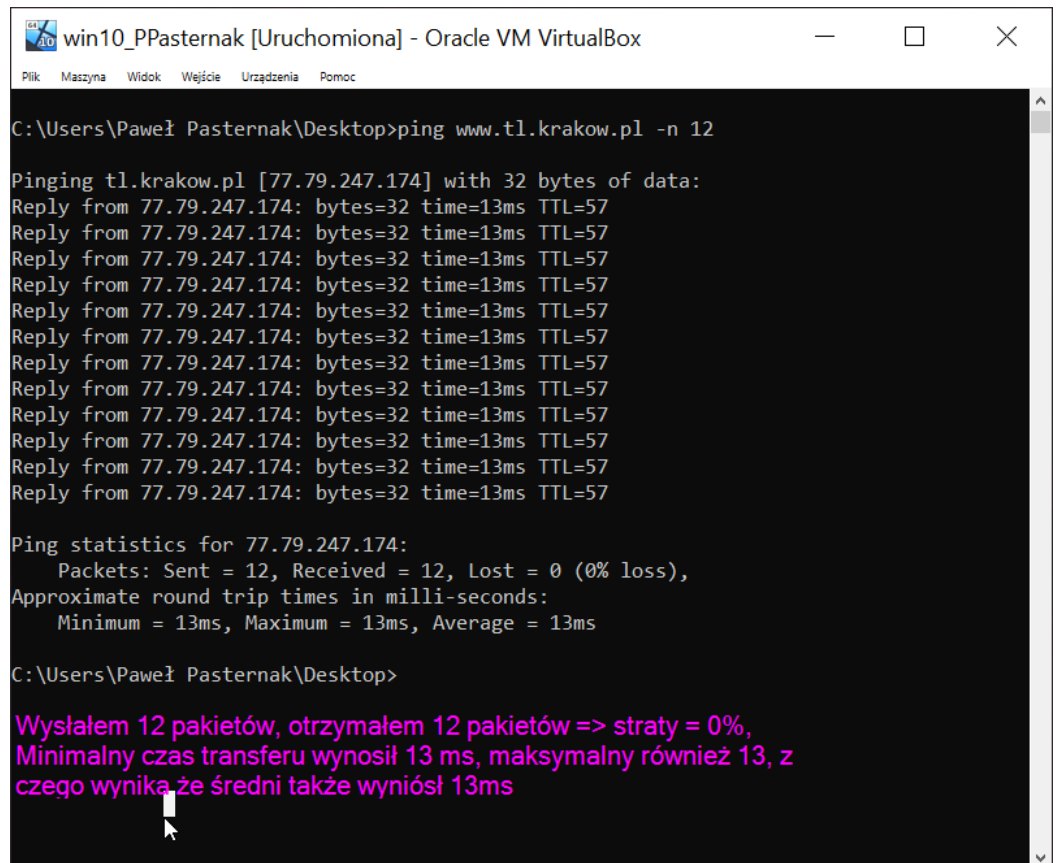
C:\Users\Paweł Pasternak\Desktop>type ping.txt

Pinging gitlab.com [172.65.251.78] with 32 bytes of data:
Reply from 172.65.251.78: bytes=32 time=8ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57

Ping statistics for 172.65.251.78:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 7ms, Maximum = 8ms, Average = 7ms

C:\Users\Paweł Pasternak\Desktop>
```

- o ping www.tl.krakow.pl -n 12 (pokaż wynik i opisz)



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

C:\Users\Paweł Pasternak\Desktop>ping www.tl.krakow.pl -n 12

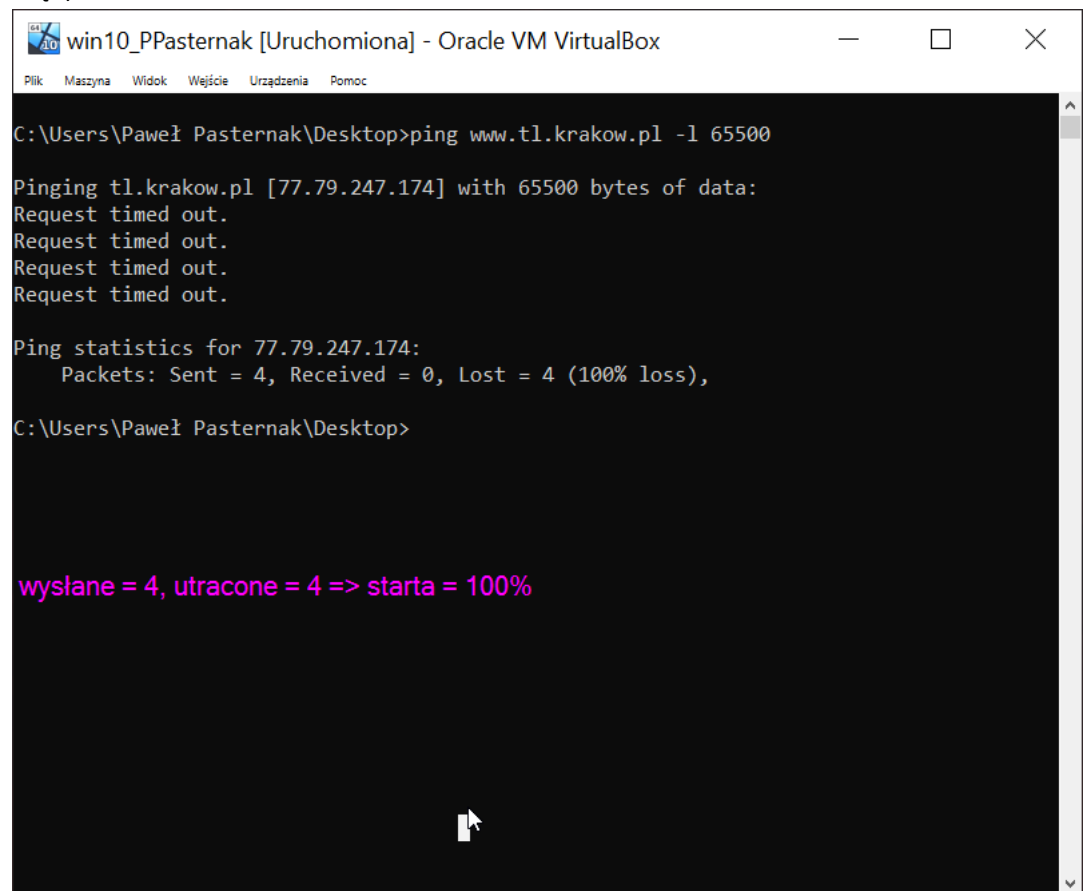
Pinging tl.krakow.pl [77.79.247.174] with 32 bytes of data:
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57

Ping statistics for 77.79.247.174:
    Packets: Sent = 12, Received = 12, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 13ms, Maximum = 13ms, Average = 13ms

C:\Users\Paweł Pasternak\Desktop>
```

Wysłałem 12 pakietów, otrzymałem 12 pakietów => straty = 0%,
Minimalny czas transferu wynosił 13 ms, maksymalny również 13, z
czego wynika że średni także wyniósł 13ms

- ping www.tl.krakow.pl -l 65500 (pokaż wynik i opisz – dla czego może wystąpić błąd)



```
C:\Users\Paweł Pasternak\Desktop>ping www.tl.krakow.pl -l 65500

Pinging tl.krakow.pl [77.79.247.174] with 65500 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 77.79.247.174:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Users\Paweł Pasternak\Desktop>
```

wysłane = 4, utracone = 4 => strata = 100%

Prawdopodobnie pakiety były za duże dla serwera.

- ping help jakie mamy jeszcze możliwości korzystania z tego narzędzia – podaj kilka przykładów

```

win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

Options:
-t          Ping the specified host until stopped.
            To see statistics and continue - type Control-Break;
            To stop - type Control-C.
-a          Resolve addresses to hostnames.
-n count   Number of echo requests to send.
-l size     Send buffer size.
-f          Set Don't Fragment flag in packet (IPv4-only).
-i TTL      Time To Live.
-v TOS      Type Of Service (IPv4-only. This setting has been deprecated
            and has no effect on the type of service field in the IP
            Header).
-r count    Record route for count hops (IPv4-only).
-s count    Timestamp for count hops (IPv4-only).
-j host-list Loose source route along host-list (IPv4-only).
-k host-list Strict source route along host-list (IPv4-only).
-w timeout  Timeout in milliseconds to wait for each reply.
-R          Use routing header to test reverse route also (IPv6-only).
            Per RFC 5095 the use of this routing header has been
            deprecated. Some systems may drop echo requests if
            this header is used.
-S srcaddr  Source address to use.
-c compartment Routing compartment identifier.
-p          Ping a Hyper-V Network Virtualization provider address.
-4          Force using IPv4.
-6          Force using IPv6.

C:\Users\Paweł Pasternak\Desktop>

```

```

win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

C:\Users\Paweł Pasternak\Desktop>ping -i 1 gitlab.com

Pinging gitlab.com [172.65.251.78] with 32 bytes of data:
Reply from 10.0.3.2: TTL expired in transit.
Reply from 10.0.3.2: TTL expired in transit.
Reply from 10.0.3.2: TTL expired in transit.
Reply from 10.0.3.2: TTL expired in transit.

Ping statistics for 172.65.251.78:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

C:\Users\Paweł Pasternak\Desktop>ping -i 100 gitlab.com

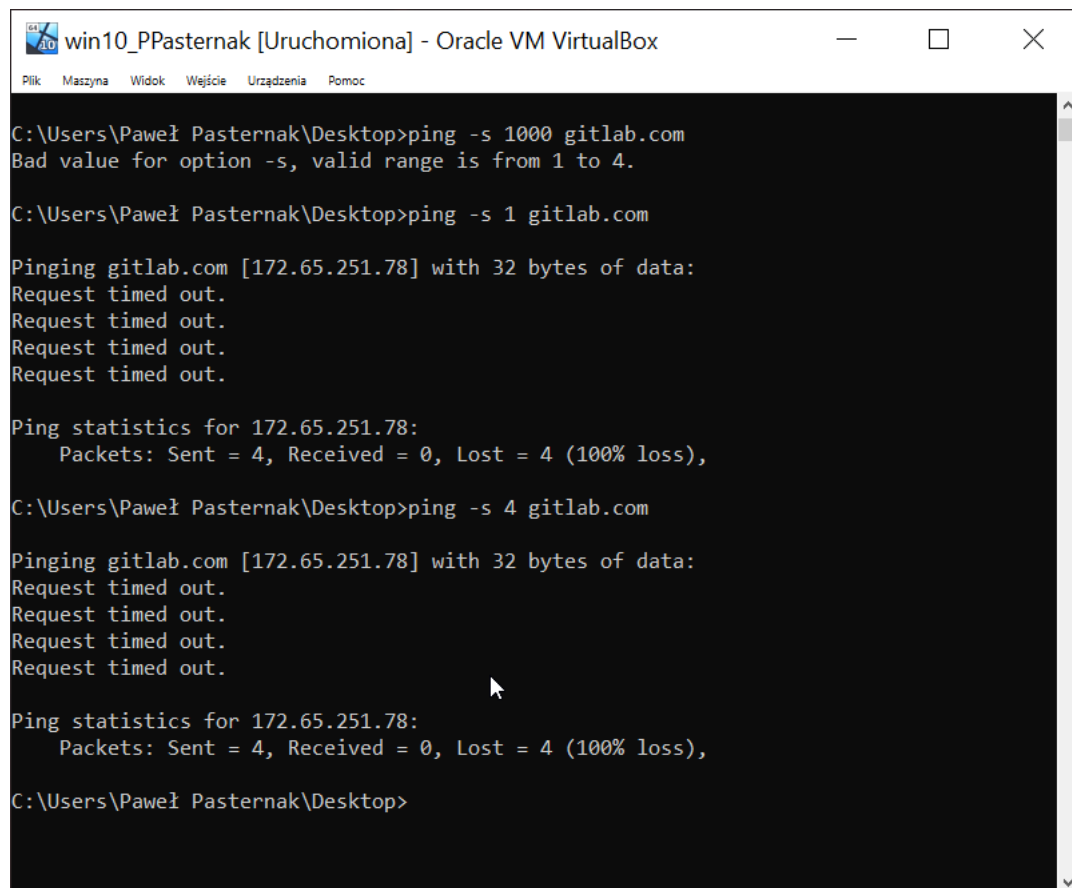
Pinging gitlab.com [172.65.251.78] with 32 bytes of data:
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=15ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57
Reply from 172.65.251.78: bytes=32 time=7ms TTL=57

Ping statistics for 172.65.251.78:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 7ms, Maximum = 15ms, Average = 9ms

C:\Users\Paweł Pasternak\Desktop>

Pingowanie z użyciem różnego ttl (ang. Time To Live)

```



```
C:\Users\Paweł Pasternak\Desktop>ping -s 1000 gitlab.com
Bad value for option -s, valid range is from 1 to 4.

C:\Users\Paweł Pasternak\Desktop>ping -s 1 gitlab.com

Pinging gitlab.com [172.65.251.78] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 172.65.251.78:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Users\Paweł Pasternak\Desktop>ping -s 4 gitlab.com

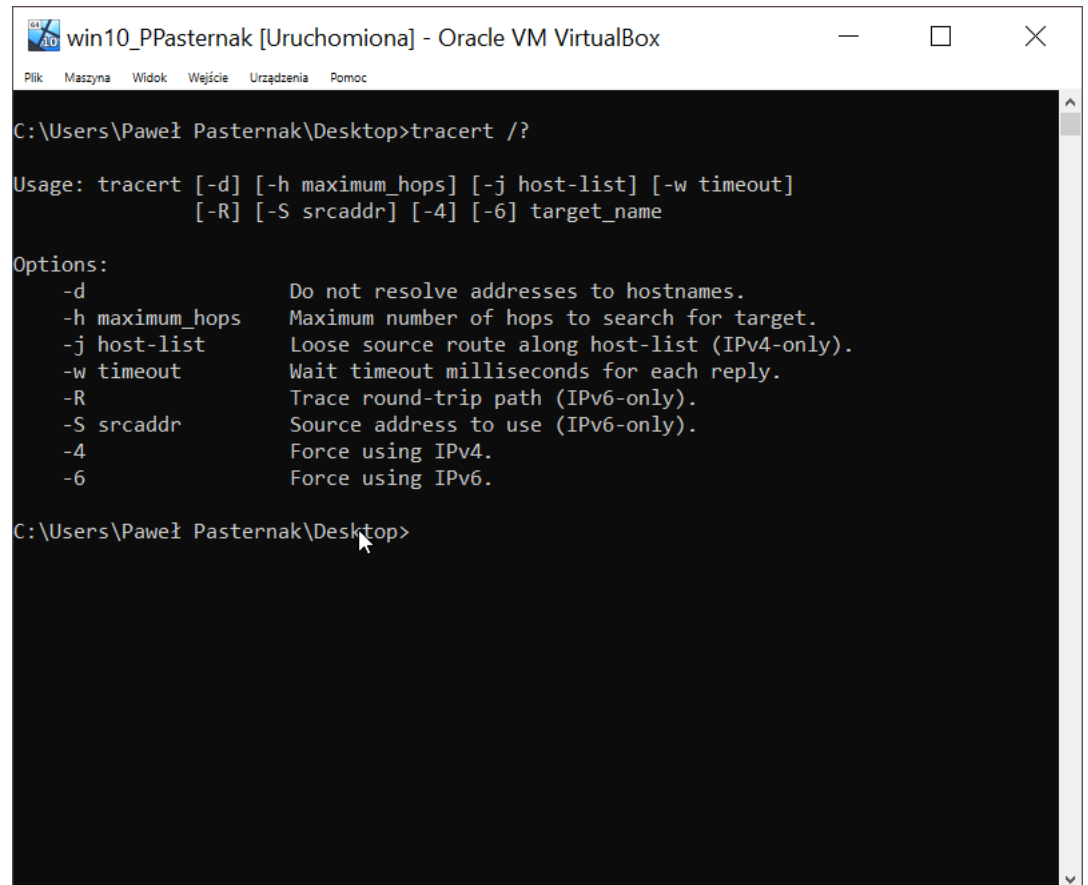
Pinging gitlab.com [172.65.251.78] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 172.65.251.78:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Users\Paweł Pasternak\Desktop>
```

- f) Tracert – Służy do śledzenia trasy pakietów.

○ Help



```

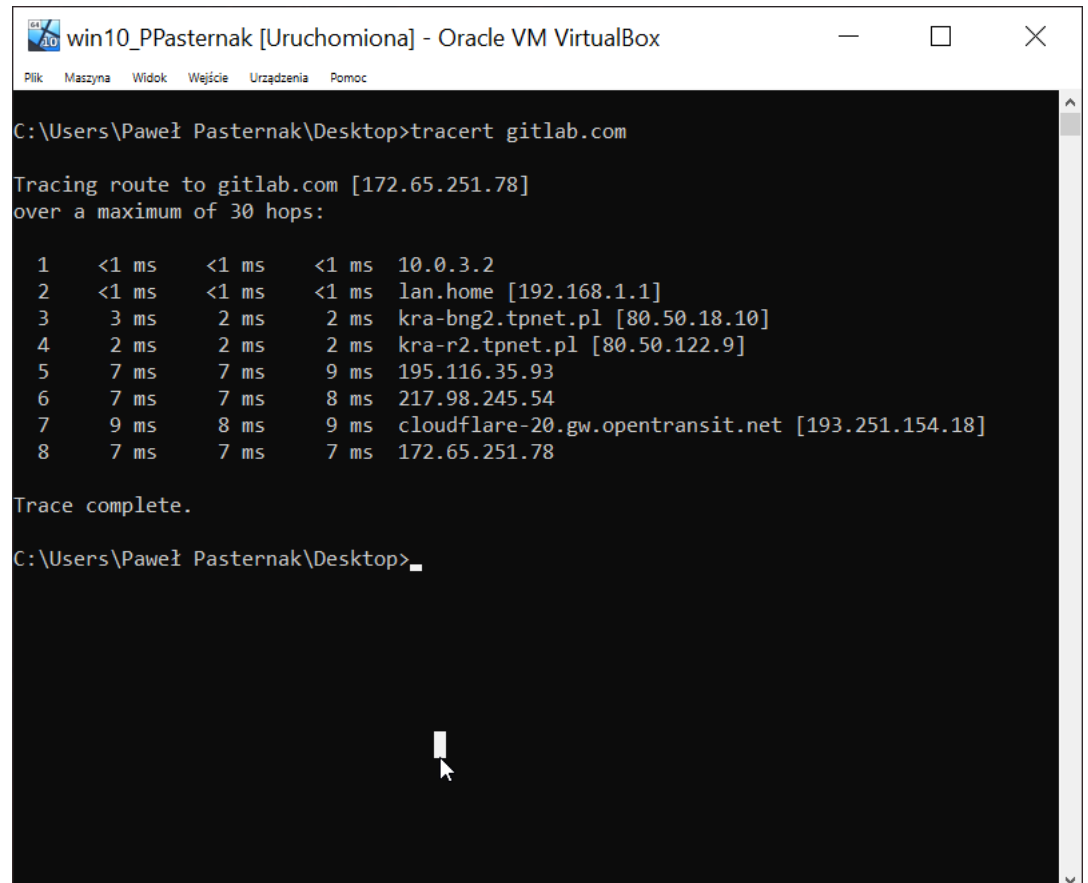
C:\Users\Paweł Pasternak\Desktop>tracert /?

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
              [-R] [-S srcaddr] [-4] [-6] target_name

Options:
    -d                Do not resolve addresses to hostnames.
    -h maximum_hops   Maximum number of hops to search for target.
    -j host-list       Loose source route along host-list (IPv4-only).
    -w timeout         Wait timeout milliseconds for each reply.
    -R                Trace round-trip path (IPv6-only).
    -S srcaddr         Source address to use (IPv6-only).
    -4                Force using IPv4.
    -6                Force using IPv6.

C:\Users\Paweł Pasternak\Desktop>
  
```

○ Możliwe opcje



```

C:\Users\Paweł Pasternak\Desktop>tracert gitlab.com

Tracing route to gitlab.com [172.65.251.78]
over a maximum of 30 hops:

  1  <1 ms    <1 ms    <1 ms    10.0.3.2
  2  <1 ms    <1 ms    <1 ms    lan.home [192.168.1.1]
  3   3 ms    2 ms     2 ms     kra-bng2.tpnet.pl [80.50.18.10]
  4   2 ms    2 ms     2 ms     kra-r2.tpnet.pl [80.50.122.9]
  5   7 ms    7 ms     9 ms     195.116.35.93
  6   7 ms    7 ms     8 ms     217.98.245.54
  7   9 ms    8 ms     9 ms     cloudflare-20.gw.opentransit.net [193.251.154.18]
  8   7 ms    7 ms     7 ms     172.65.251.78

Trace complete.

C:\Users\Paweł Pasternak\Desktop>
  
```

- o -d --- ukrywa nazwy routerów

```
C:\Users\Paweł Pasternak\Desktop>tracert -d gitlab.com

Tracing route to gitlab.com [172.65.251.78]
over a maximum of 30 hops:

  1  <1 ms    <1 ms    <1 ms    10.0.3.2
  2   1 ms    <1 ms    <1 ms    192.168.1.1
  3   2 ms     2 ms     2 ms    80.50.18.10
  4   2 ms     3 ms     2 ms    80.50.122.9
  5   7 ms     7 ms     7 ms    195.116.35.93
  6   7 ms     7 ms     8 ms    217.98.245.54
  7  53 ms     8 ms     8 ms    193.251.154.18
  8   7 ms     7 ms     7 ms    172.65.251.78

Trace complete.

C:\Users\Paweł Pasternak\Desktop>
```

- o -h --- Określa ilość skoków

```
C:\Users\Paweł Pasternak\Desktop>tracert -h 5 gitlab.com

Tracing route to gitlab.com [172.65.251.78]
over a maximum of 5 hops:

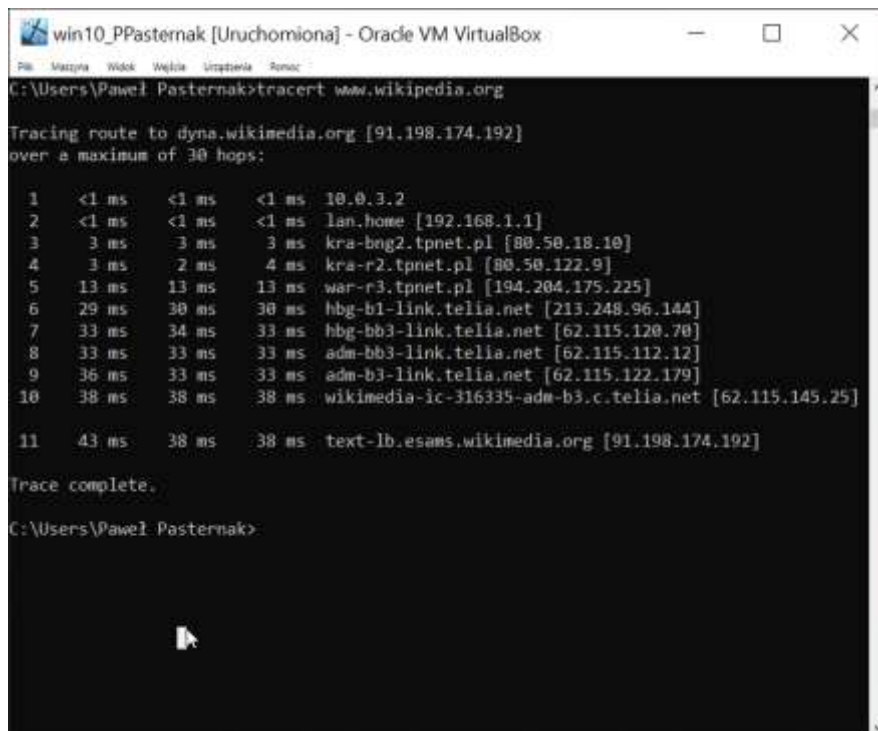
  1  <1 ms    <1 ms    <1 ms    10.0.3.2
  2  <1 ms    <1 ms    <1 ms    lan.home [192.168.1.1]
  3   2 ms     2 ms     2 ms    kra-bng2.tpnet.pl [80.50.18.10]
  4   2 ms     3 ms     3 ms    kra-r2.tpnet.pl [80.50.122.9]
  5  15 ms    19 ms     8 ms    195.116.35.93

Trace complete.

C:\Users\Paweł Pasternak\Desktop>
```

- o -j --- Określa trasę pakietów przez dane przez nas routery np. 5 routerów
- o -w --- Określa ile czasu host będzie czekał na odpowiedź routera
- o -R --- Pokazuje trasę ścieżki pakietów, tylko IPv6

- -S --- Źródło adresu do użycia, tylko IPv6
- -4 --- Wymusza użycia ipv4
- -6 --- Wymusza użycia ipv6
- Prześledzenie trasy dla stron szkoły oraz wikipedi interpretacja wyniku
- wiki



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Pli  Maszyna  Widok  Węzła  Urządzenia  Remoc
C:\Users\Paweł Pasternak>tracert www.wikipedia.org

Tracing route to dyna.wikimedia.org [91.198.174.192]
over a maximum of 30 hops:

  1  <1 ms  <1 ms  <1 ms  10.0.3.2
  2  <1 ms  <1 ms  <1 ms  lan.home [192.168.1.1]
  3   3 ms   3 ms   3 ms  kra-bng2.tpnet.pl [80.50.18.10]
  4   3 ms   2 ms   4 ms  kra-r2.tpnet.pl [80.50.122.9]
  5  13 ms  13 ms  13 ms  war-r3.tpnet.pl [194.204.175.225]
  6  29 ms  30 ms  30 ms  hbg-b1-link.teliana.net [213.248.96.144]
  7  33 ms  34 ms  33 ms  hbg-bb3-link.teliana.net [62.115.120.70]
  8  33 ms  33 ms  33 ms  adm-bb3-link.teliana.net [62.115.112.12]
  9  36 ms  33 ms  33 ms  adm-b3-link.teliana.net [62.115.122.179]
 10  38 ms  38 ms  38 ms  wikimedia-ic-316335-adm-b3.c.teliana.net [62.115.145.25]

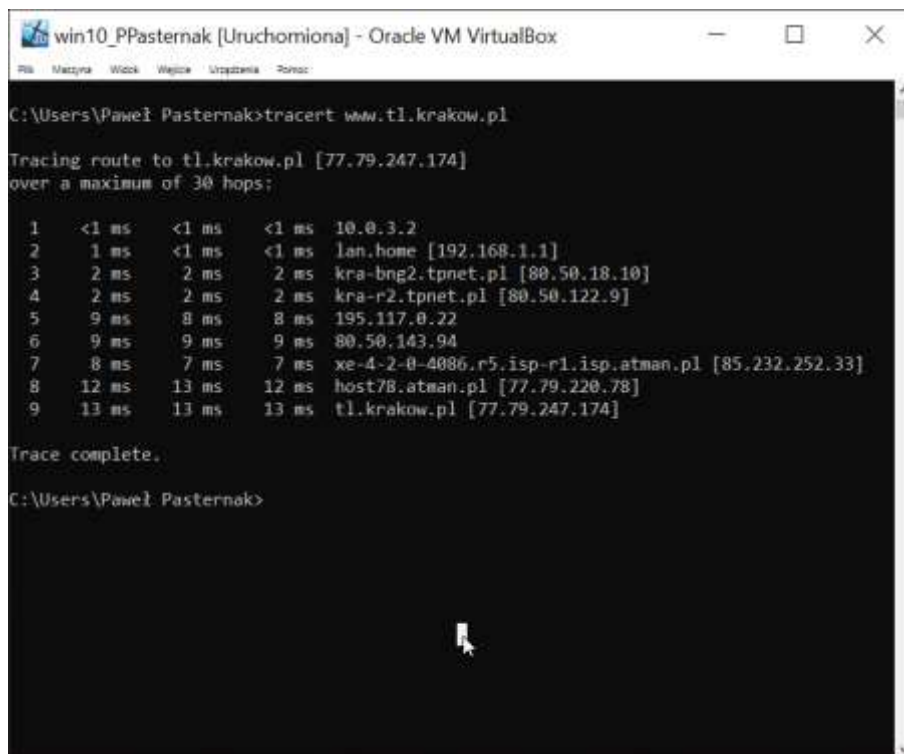
 11  43 ms  38 ms  38 ms  text-lb.esams.wikimedia.org [91.198.174.192]

Trace complete.

C:\Users\Paweł Pasternak>
```

Przechodzi przez Kraków, Warszawę, Łódź, Szwajcarię aż do adresu docelowego.

○ TI



```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik  Maszyna  Widok  Węzły  Urządzenia  Pomoc

C:\Users\Paweł Pasternak>tracert www.tl.krakow.pl

Tracing route to tl.krakow.pl [77.79.247.174]
over a maximum of 30 hops:

  0  <1 ms    <1 ms    <1 ms    10.0.3.2
  1  1 ms     <1 ms    <1 ms    lan.hone [192.168.1.1]
  2  2 ms     2 ms     2 ms     kra-bng2.tpnet.pl [80.50.18.10]
  3  2 ms     2 ms     2 ms     kra-r2.tpnet.pl [80.50.122.9]
  4  9 ms     8 ms     8 ms     195.117.0.22
  5  9 ms     9 ms     9 ms     80.50.143.94
  6  8 ms     7 ms     7 ms     xe-4-2-0-4086.r5.isp-r1.isp.atman.pl [85.232.252.33]
  7  12 ms    13 ms    12 ms    host7B.atman.pl [77.79.220.78]
  8  13 ms    13 ms    13 ms    tl.krakow.pl [77.79.247.174]

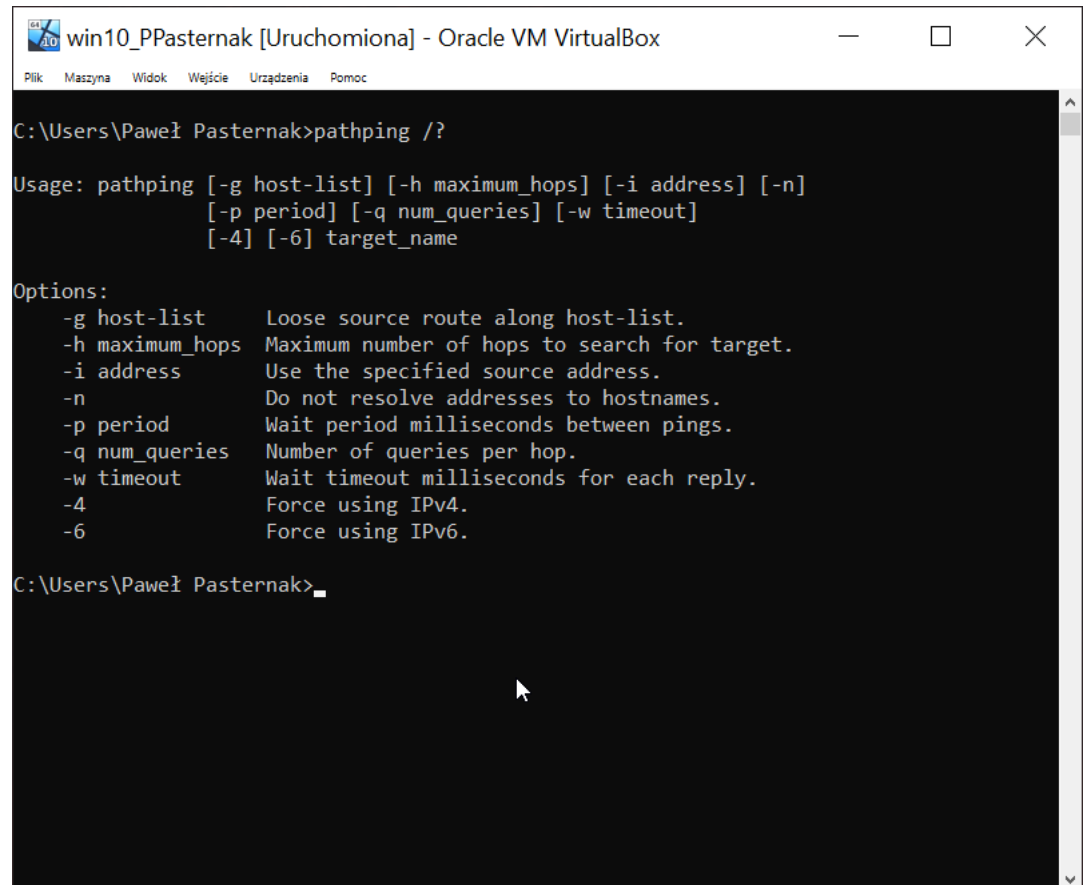
Trace complete.

C:\Users\Paweł Pasternak>
```

Serwer = 77.79.249.174, przechodzi przez serwery w Katowicach, Warszawie

- g) Pathping – – Polecenie też służy do śledzenia trasy pakietu, ale też określa stopień utraty pakietów na określonym routerze, lub łączu i pozwala ustalić routery, lub łącza, które mogą być przyczyną problemów.

○ Help



```
C:\Users\Paweł Pasternak>pathping /?

Usage: pathping [-g host-list] [-h maximum_hops] [-i address] [-n]
               [-p period] [-q num_queries] [-w timeout]
               [-4] [-6] target_name

Options:
  -g host-list      Loose source route along host-list.
  -h maximum_hops  Maximum number of hops to search for target.
  -i address        Use the specified source address.
  -n                Do not resolve addresses to hostnames.
  -p period         Wait period milliseconds between pings.
  -q num_queries    Number of queries per hop.
  -w timeout        Wait timeout milliseconds for each reply.
  -4                Force using IPv4.
  -6                Force using IPv6.

C:\Users\Paweł Pasternak>
```

○ Możliwe opcje

○ -g

```

win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

C:\Users\Paweł Pasternak>pathping -g gitlab.com

Tracing route to gitlab.com [172.65.251.78]
over a maximum of 30 hops:
  0  WIN10VB.home [10.0.3.15]
  1  10.0.3.2
  2  * * *
Computing statistics for 25 seconds...
Hop  RTT      Source to Here   This Node/Link
    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                               WIN10VB.home [10.0.3.15]
    |
  1    0ms      0/ 100 = 0%      0/ 100 = 0%    10.0.3.2
Trace complete.

C:\Users\Paweł Pasternak>

```

Określa, że komunikaty żądania echa używają opcji swobodnej trasy źródłowej w nagłówku protokołu IP z zestawem pośrednich lokalizacji docelowych wskazanych przez parametr lista_hostów. W przypadku swobodnego routingu źródła kolejne docelowe lokalizacje pośrednie mogą być oddzielone pojedynczym routerem lub kilkoma routerami. Maksymalna liczba adresów lub nazw na liście hostów jest równa 9. Parametr lista_hostów to seria adresów IP (w zapisie kropkowo-cyfrowym)

- -h

```
C:\Users\Paweł Pasternak>pathping -h 5 gitlab.com

Tracing route to gitlab.com [172.65.251.78]
over a maximum of 5 hops:
  0  WIN10VB.home [10.0.3.15]
  1  10.0.3.2
  2  lan.home [192.168.1.1]
  3  kra-bng2.tpnet.pl [80.50.18.10]
  4  kra-r2.tpnet.pl [80.50.122.9]
  5  195.116.35.93

Computing statistics for 125 seconds...
Hop  RTT      Source to Here   This Node/Link   Address
  0                               Lost/Sent = Pct  Lost/Sent = Pct  WIN10VB.home [10.0.3.15]
  1    0ms      0/ 100 = 0%      0/ 100 = 0%      10.0.3.2
  2    0ms      0/ 100 = 0%      0/ 100 = 0%      lan.home [192.168.1.1]
  3    4ms      0/ 100 = 0%      0/ 100 = 0%      kra-bng2.tpnet.pl [80.50.18.10]
  4    3ms      0/ 100 = 0%      0/ 100 = 0%      kra-r2.tpnet.pl [80.50.122.9]
  5    ---     100/ 100 =100%   100/ 100 =100%   195.116.35.93

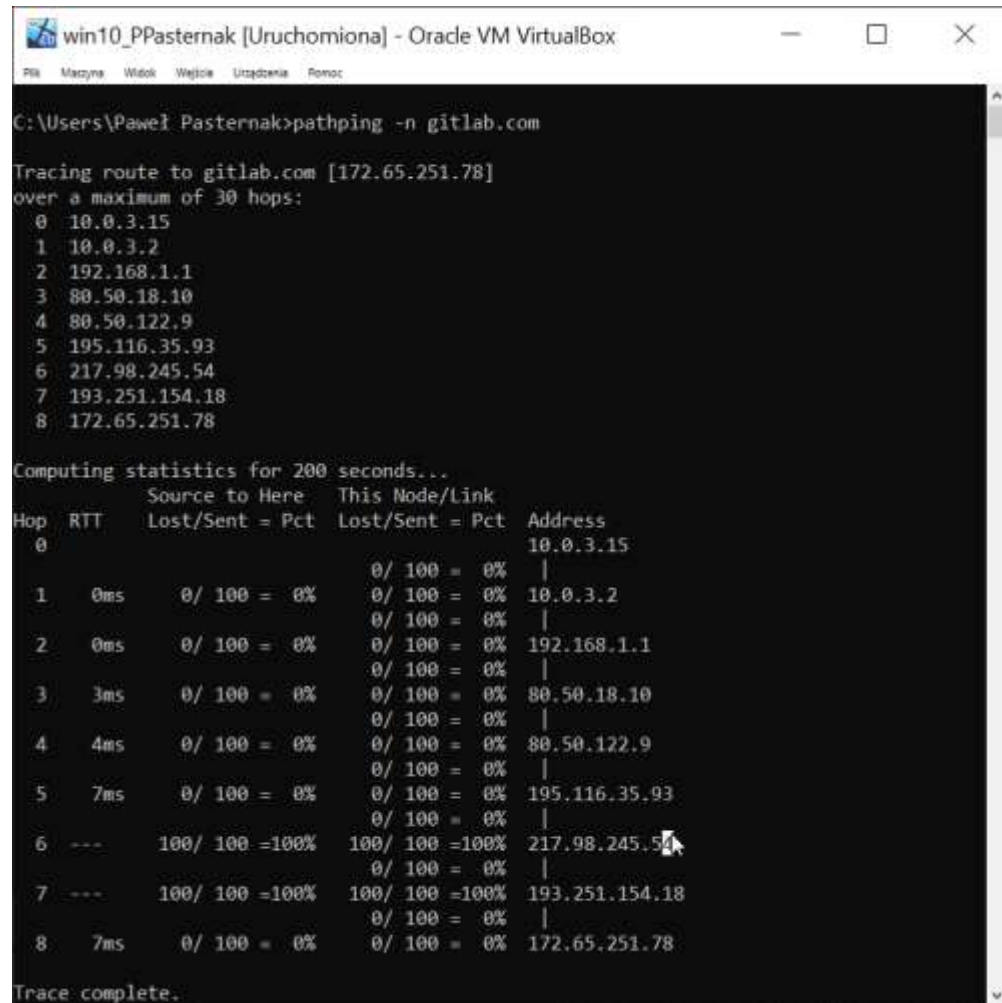
Trace complete.

C:\Users\Paweł Pasternak>
```

Określa liczbę przeskoków.

- -i działa tylko na ipv6

- -n



```
C:\Users\Paweł Pasternak>pathping -n gitlab.com

Tracing route to gitlab.com [172.65.251.78]
over a maximum of 30 hops:
 0 10.0.3.15
 1 10.0.3.2
 2 192.168.1.1
 3 80.50.18.10
 4 80.50.122.9
 5 195.116.35.93
 6 217.98.245.54
 7 193.251.154.18
 8 172.65.251.78

Computing statistics for 200 seconds...
Hop  RTT      Source to Here   This Node/Link   Address
    0ms      Lost/Sent = Pct Lost/Sent = Pct  Lost/Sent = Pct
 0  0ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      10.0.3.15
 1  0ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      10.0.3.2
 2  0ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      192.168.1.1
 3  3ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      80.50.18.10
 4  4ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      80.50.122.9
 5  7ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      195.116.35.93
 6  ---      100/ 100 =100%   100/ 100 =100%   100/ 100 =100%   217.98.245.54
 7  ---      100/ 100 =100%   100/ 100 =100%   100/ 100 =100%   193.251.154.18
 8  7ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      172.65.251.78

Trace complete.
```

Ukrywa nazwy routerów

○ -p

```
C:\Users\Paweł Pasternak>pathping -p 3 gitlab.com

Tracing route to gitlab.com [172.65.251.78]
over a maximum of 30 hops:
 0  WIN10VB.home [10.0.3.15]
 1  10.0.3.2
 2  lan.home [192.168.1.1]
 3  kra-bng2.tpnet.pl [80.50.18.10]
 4  kra-r2.tpnet.pl [80.50.122.9]
 5  195.116.35.93
 6  217.98.245.54
 7  akamai.gw.opentransit.net [193.251.154.18]
 8  172.65.251.78

Computing statistics for 2 seconds...
Hop  RTT      Source to Here   This Node/Link   Address
     Lost/Sent = Pct Lost/Sent = Pct
 0                               0/ 100 = 0%      WIN10VB.home [10.0.3.15]
 1    0ms      0/ 100 = 0%      0/ 100 = 0%      10.0.3.2
 2    0ms      0/ 100 = 0%      0/ 100 = 0%      lan.home [192.168.1.1]
 3    3ms      0/ 100 = 0%      0/ 100 = 0%      kra-bng2.tpnet.pl [80.50.18.10]
 4    3ms      0/ 100 = 0%      0/ 100 = 0%      kra-r2.tpnet.pl [80.50.122.9]
 5    7ms      0/ 100 = 0%      0/ 100 = 0%      195.116.35.93
 6    ---     100/ 100 =100%   100/ 100 =100%   217.98.245.54
 7    ---     100/ 100 =100%   100/ 100 =100%   akamai.gw.opentransit.net [193.251.154.18]
 8    7ms      0/ 100 = 0%      0/ 100 = 0%      172.65.251.78

Trace complete.

C:\Users\Paweł Pasternak>
```

Określa czas na badania utraty pakietów.

○ -q

```

win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc
C:\Users\Paweł Pasternak>pathping -q 3 gitlab.com

Tracing route to gitlab.com [172.65.251.78]
over a maximum of 30 hops:
 0 WIN10VB.home [10.0.3.15]
 1 10.0.3.2
 2 lan.home [192.168.1.1]
 3 kra-bng2.tpnet.pl [80.50.18.10]
 4 kra-r2.tpnet.pl [80.50.122.9]
 5 195.116.35.93
 6 217.98.245.54
 7 akamai.gw.opentransit.net [193.251.154.18]
 8 172.65.251.78

Computing statistics for 6 seconds...
Hop  RTT      Source to Here   This Node/Link   Address
      Lost/Sent = Pct  Lost/Sent = Pct
 0
 1    0ms      0/    3 =  0%    0/    3 =  0%    | 10.0.3.2
 2    0ms      0/    3 =  0%    0/    3 =  0%    | lan.home [192.168.1.1]
 3    2ms      0/    3 =  0%    0/    3 =  0%    | kra-bng2.tpnet.pl [80.50.18.10]
 4    2ms      0/    3 =  0%    0/    3 =  0%    | kra-r2.tpnet.pl [80.50.122.9]
 5    7ms      0/    3 =  0%    0/    3 =  0%    | 195.116.35.93
 6    ---      3/    3 =100%    3/    3 =100%    | 217.98.245.54

```

Określa liczbę komunikatów żądania echa wysyłanych do poszczególnych routerów w ścieżce.
Wartość domyślna to 100 kwerend.

- -W

```

win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc
C:\Users\Paweł Pasternak>pathping -w 1 gitlab.com

Tracing route to gitlab.com [172.65.251.78]
over a maximum of 30 hops:
  0  WIN10VB.home [10.0.3.15]
  1  10.0.3.2
  2  lan.home [192.168.1.1]
  3  kra-bng2.tpnet.pl [80.50.18.10]
  4  kra-r2.tpnet.pl [80.50.122.9]
  5  195.116.35.93
  6  217.98.245.54
  7  akamai.gw.opentransit.net [193.251.154.18]
  8  172.65.251.78

Computing statistics for 200 seconds...
Hop  RTT      Source to Here   This Node/Link   Address
     RTT      Lost/Sent = Pct  Lost/Sent = Pct  Lost/Sent = Pct  Address
  0    0ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      WIN10VB.home [10.0.3.15]
  1    0ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      10.0.3.2
  2    0ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      lan.home [192.168.1.1]
  3    3ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      kra-bng2.tpnet.pl [80.50.18.10]
  4    3ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      kra-r2.tpnet.pl [80.50.122.9]
  5    7ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      195.116.35.93
  6    ---    100/ 100 =100%   100/ 100 =100%   100/ 100 =100%   217.98.245.54
  7    ---    100/ 100 =100%   100/ 100 =100%   100/ 100 =100%   akamai.gw.opentransit.net [193.251.154.18]
  8    7ms      0/ 100 = 0%      0/ 100 = 0%      0/ 100 = 0%      172.65.251.78

Trace complete.

C:\Users\Paweł Pasternak>

```

określa czas jaki czeka komputer na odpowiedź przy każdym zapytaniu

- -4 tylko ipv4
- -6 tylko ipv6

h) Netstat , wszystkie możliwe opcje

- o netstat -a - wyświetla wszystkie połączenia i porty nasłuchujące

```

win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

C:\Users\Paweł Pasternak>netstat -a

Active Connections

Proto Local Address           Foreign Address         State
TCP    0.0.0.0:135              WIN10VB:0               LISTENING
TCP    0.0.0.0:445              WIN10VB:0               LISTENING
TCP    0.0.0.0:5040             WIN10VB:0               LISTENING
TCP    0.0.0.0:5357             WIN10VB:0               LISTENING
TCP    0.0.0.0:7680             WIN10VB:0               LISTENING
TCP    0.0.0.0:49664            WIN10VB:0               LISTENING
TCP    0.0.0.0:49665            WIN10VB:0               LISTENING
TCP    0.0.0.0:49666            WIN10VB:0               LISTENING
TCP    0.0.0.0:49667            WIN10VB:0               LISTENING
TCP    0.0.0.0:49668            WIN10VB:0               LISTENING
TCP    0.0.0.0:49669            WIN10VB:0               LISTENING
TCP    10.0.3.15:139            WIN10VB:0               LISTENING
TCP    10.0.3.15:49678          152.199.19.161:https    CLOSE_WAIT
TCP    10.0.3.15:49681          152.199.19.161:https    CLOSE_WAIT
TCP    10.0.3.15:49682          152.199.19.161:https    CLOSE_WAIT
TCP    10.0.3.15:49683          152.199.19.161:https    CLOSE_WAIT
TCP    10.0.3.15:49713          51.103.5.186:https      ESTABLISHED
TCP    10.0.3.15:49738          51.103.5.159:https      ESTABLISHED
TCP    10.0.3.15:49745          a104-79-89-181:https    CLOSE_WAIT
TCP    10.0.3.15:49746          a23-201-185-84:http     CLOSE_WAIT
TCP    10.0.3.15:49747          a23-201-185-84:http     CLOSE_WAIT
TCP    10.0.3.15:49748          a2-18-213-74:https      CLOSE_WAIT
TCP    10.0.3.15:49749          a23-201-185-84:http     CLOSE_WAIT
TCP    10.0.3.15:49750          a23-201-185-84:http     CLOSE_WAIT

```

- o netstat -e - Wyświetla statystykę sieci Ethernet

```

win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

C:\Users\Paweł Pasternak>netstat -e

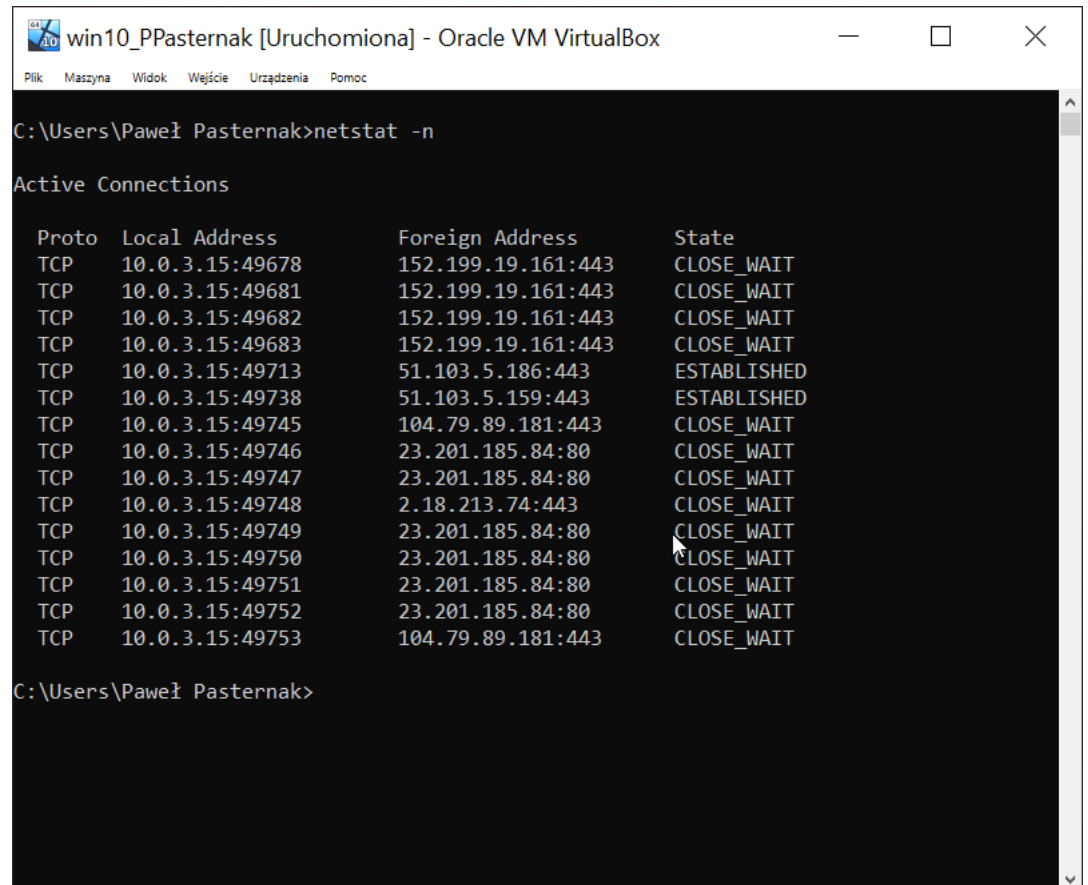
Interface Statistics

          Received          Sent
Bytes          9301952          2965988
Unicast packets    23028          19340
Non-unicast packets    0           2304
Discards          0              0
Errors            0              0
Unknown protocols    0

C:\Users\Paweł Pasternak>

```

- o netstat -n - wyświetla adresy i nr portów w postaci liczbowej



```
C:\Users\Paweł Pasternak>netstat -n

Active Connections

Proto Local Address          Foreign Address         State
TCP    10.0.3.15:49678         152.199.19.161:443      CLOSE_WAIT
TCP    10.0.3.15:49681         152.199.19.161:443      CLOSE_WAIT
TCP    10.0.3.15:49682         152.199.19.161:443      CLOSE_WAIT
TCP    10.0.3.15:49683         152.199.19.161:443      CLOSE_WAIT
TCP    10.0.3.15:49713         51.103.5.186:443        ESTABLISHED
TCP    10.0.3.15:49738         51.103.5.159:443        ESTABLISHED
TCP    10.0.3.15:49745         104.79.89.181:443       CLOSE_WAIT
TCP    10.0.3.15:49746         23.201.185.84:80        CLOSE_WAIT
TCP    10.0.3.15:49747         23.201.185.84:80        CLOSE_WAIT
TCP    10.0.3.15:49748         2.18.213.74:443         CLOSE_WAIT
TCP    10.0.3.15:49749         23.201.185.84:80        CLOSE_WAIT
TCP    10.0.3.15:49750         23.201.185.84:80        CLOSE_WAIT
TCP    10.0.3.15:49751         23.201.185.84:80        CLOSE_WAIT
TCP    10.0.3.15:49752         23.201.185.84:80        CLOSE_WAIT
TCP    10.0.3.15:49753         104.79.89.181:443       CLOSE_WAIT

C:\Users\Paweł Pasternak>
```

- o netstat -r - Pokazuje tablice routingu

```

win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc
C:\Users\Paweł Pasternak>netstat -r

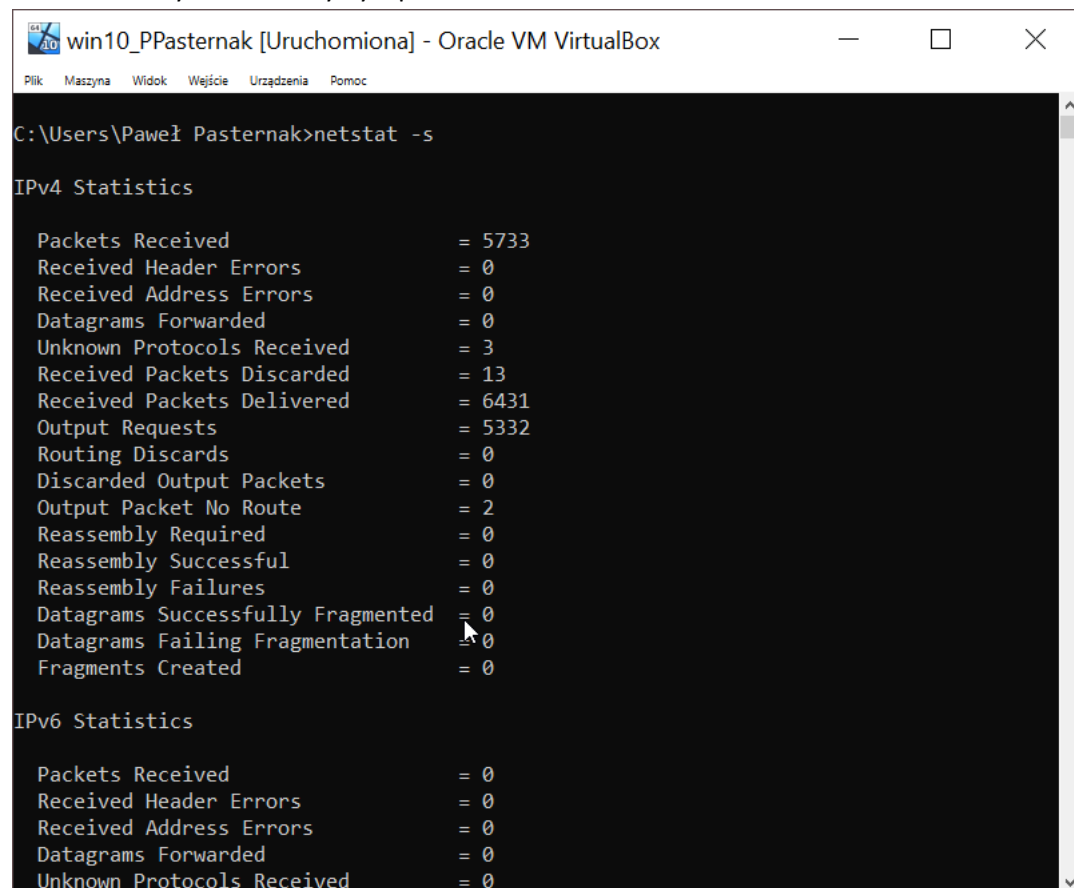
=====
Interface List
13...08 00 27 42 4f e3 .....Intel(R) PRO/1000 MT Desktop Adapter
8...08 00 27 1d b8 35 .....Intel(R) PRO/1000 MT Desktop Adapter #2
1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination        Netmask          Gateway           Interface        Metric
0.0.0.0                    0.0.0.0          10.0.3.2          10.0.3.15         25
10.0.3.0                   255.255.255.0    On-link          10.0.3.15         281
10.0.3.15                  255.255.255.255  On-link          10.0.3.15         281
10.0.3.255                 255.255.255.255  On-link          10.0.3.15         281
127.0.0.0                  255.0.0.0        On-link          127.0.0.1         331
127.0.0.1                  255.255.255.255  On-link          127.0.0.1         331
127.255.255.255            255.255.255.255  On-link          127.0.0.1         331
169.254.0.0                255.255.0.0      On-link          169.254.138.66    281
169.254.138.66             255.255.255.255  On-link          169.254.138.66    281
169.254.255.255            255.255.255.255  On-link          169.254.138.66    281
224.0.0.0                  240.0.0.0        On-link          127.0.0.1         331
224.0.0.0                  240.0.0.0        On-link          169.254.138.66    281
224.0.0.0                  240.0.0.0        On-link          10.0.3.15         281
255.255.255.255            255.255.255.255  On-link          127.0.0.1         331
255.255.255.255            255.255.255.255  On-link          169.254.138.66    281
255.255.255.255            255.255.255.255  On-link          10.0.3.15         281
=====
Persistent Routes:
None

IPv6 Route Table
=====
Active Routes:
If Metric Network Destination      Gateway
1    331 ::1/128                On-link
13   281 fe80::/64             On-link
8    281 fe80::/64             On-link
8    281 fe80::2d26:22a4:3538:496c/128 On-link
13   281 fe80::fd9e:b164:ac11:8a42/128 On-link
1    331 ff00::/8                On-link
13   281 ff00::/8                On-link
8    281 ff00::/8                On-link
=====
Persistent Routes:
None

```

- o netstat -s - wyświetla statystyki protokołów



```

C:\Users\Paweł Pasternak>netstat -s

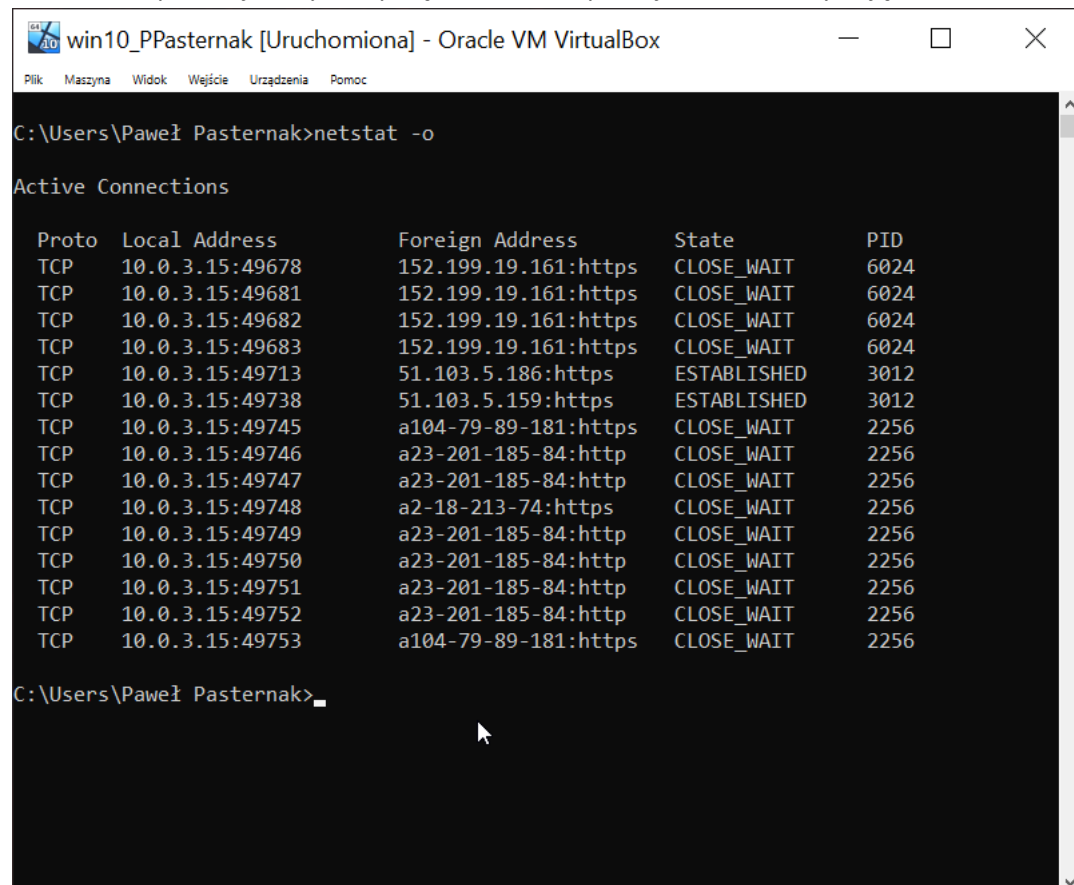
IPv4 Statistics

Packets Received                = 5733
Received Header Errors          = 0
Received Address Errors         = 0
Datagrams Forwarded             = 0
Unknown Protocols Received      = 3
Received Packets Discarded      = 13
Received Packets Delivered      = 6431
Output Requests                 = 5332
Routing Discards                = 0
Discarded Output Packets        = 0
Output Packet No Route          = 2
Reassembly Required             = 0
Reassembly Successful           = 0
Reassembly Failures             = 0
Datagrams Successfully Fragmented = 0
Datagrams Failing Fragmentation = 0
Fragments Created               = 0

IPv6 Statistics

Packets Received                = 0
Received Header Errors          = 0
Received Address Errors         = 0
Datagrams Forwarded             = 0
Unknown Protocols Received      = 0
    
```

- o netstat -o - pokazuje aktywne połączenia i PID aplikacji, które ich używają



```

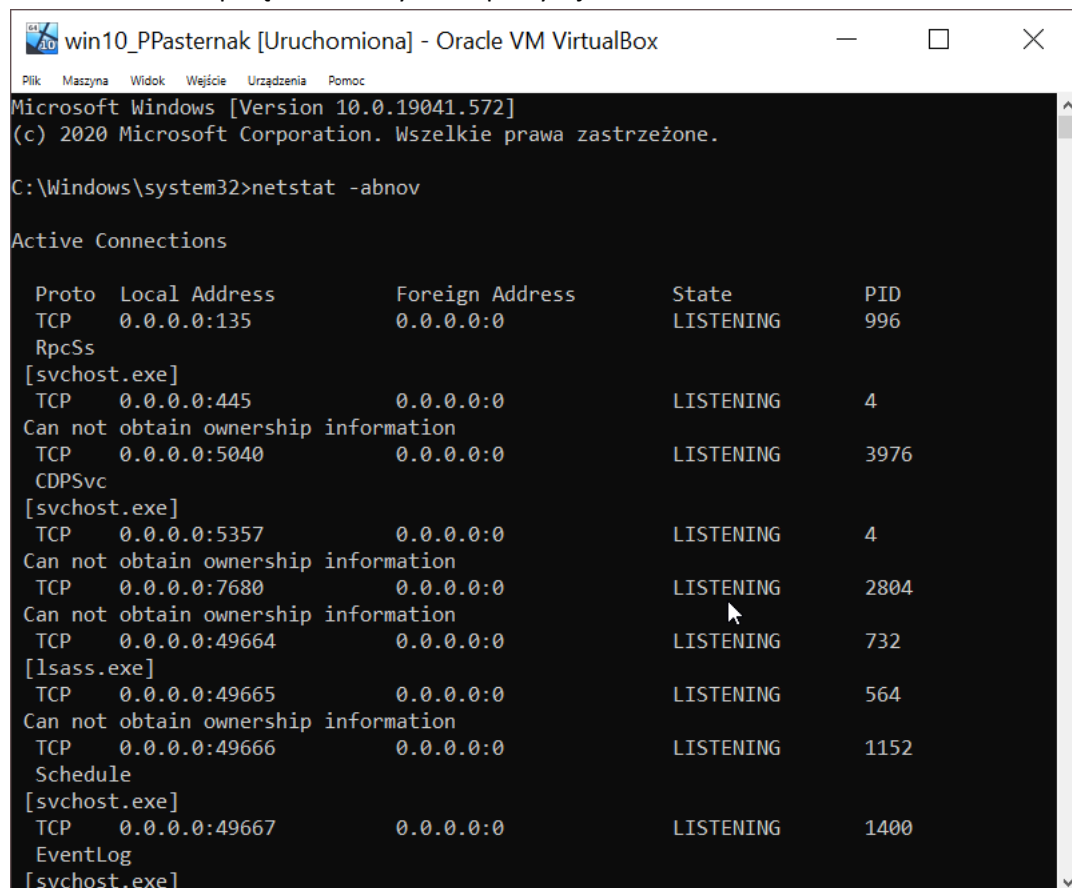
C:\Users\Paweł Pasternak>netstat -o

Active Connections

Proto Local Address          Foreign Address         State       PID
TCP   10.0.3.15:49678         152.199.19.161:https    CLOSE_WAIT 6024
TCP   10.0.3.15:49681         152.199.19.161:https    CLOSE_WAIT 6024
TCP   10.0.3.15:49682         152.199.19.161:https    CLOSE_WAIT 6024
TCP   10.0.3.15:49683         152.199.19.161:https    CLOSE_WAIT 6024
TCP   10.0.3.15:49713         51.103.5.186:https      ESTABLISHED 3012
TCP   10.0.3.15:49738         51.103.5.159:https      ESTABLISHED 3012
TCP   10.0.3.15:49745         a104-79-89-181:https    CLOSE_WAIT 2256
TCP   10.0.3.15:49746         a23-201-185-84:http     CLOSE_WAIT 2256
TCP   10.0.3.15:49747         a23-201-185-84:http     CLOSE_WAIT 2256
TCP   10.0.3.15:49748         a2-18-213-74:https      CLOSE_WAIT 2256
TCP   10.0.3.15:49749         a23-201-185-84:http     CLOSE_WAIT 2256
TCP   10.0.3.15:49750         a23-201-185-84:http     CLOSE_WAIT 2256
TCP   10.0.3.15:49751         a23-201-185-84:http     CLOSE_WAIT 2256
TCP   10.0.3.15:49752         a23-201-185-84:http     CLOSE_WAIT 2256
TCP   10.0.3.15:49753         a104-79-89-181:https    CLOSE_WAIT 2256

C:\Users\Paweł Pasternak>
    
```

- o netstat -abnov – połączenie wszystkich powyżej



```

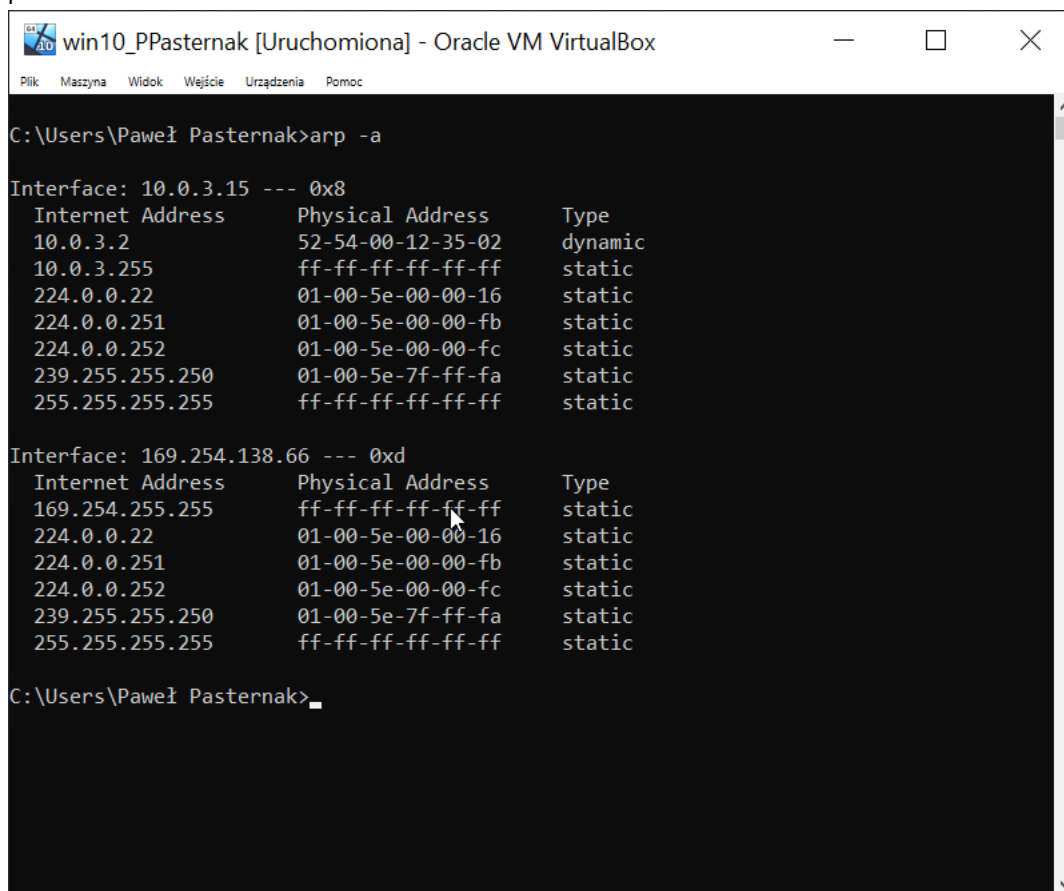
Microsoft Windows [Version 10.0.19041.572]
(c) 2020 Microsoft Corporation. Wszelkie prawa zastrzeżone.

C:\Windows\system32>netstat -abnov

Active Connections

Proto Local Address          Foreign Address        State               PID
TCP    0.0.0.0:135             0.0.0.0:0              LISTENING           996
RpcSs
[svchost.exe]
TCP    0.0.0.0:445             0.0.0.0:0              LISTENING           4
Can not obtain ownership information
TCP    0.0.0.0:5040            0.0.0.0:0              LISTENING           3976
CDPSvc
[svchost.exe]
TCP    0.0.0.0:5357            0.0.0.0:0              LISTENING           4
Can not obtain ownership information
TCP    0.0.0.0:7680            0.0.0.0:0              LISTENING           2804
Can not obtain ownership information
TCP    0.0.0.0:49664           0.0.0.0:0              LISTENING           732
[lsass.exe]
TCP    0.0.0.0:49665           0.0.0.0:0              LISTENING           564
Can not obtain ownership information
TCP    0.0.0.0:49666           0.0.0.0:0              LISTENING           1152
Schedule
[svchost.exe]
TCP    0.0.0.0:49667           0.0.0.0:0              LISTENING           1400
EventLog
[svchost.exe]
  
```

- i) Arp -a - wyświetla przetłumaczenie adresów IP na adresy MAC, które są używane przez protokół ARP



```
C:\Users\Paweł Pasternak>arp -a

Interface: 10.0.3.15 --- 0x8
Internet Address      Physical Address      Type
10.0.3.2              52-54-00-12-35-02    dynamic
10.0.3.255           ff-ff-ff-ff-ff-ff    static
224.0.0.22           01-00-5e-00-00-16    static
224.0.0.251          01-00-5e-00-00-fb    static
224.0.0.252          01-00-5e-00-00-fc    static
239.255.255.250      01-00-5e-7f-ff-fa    static
255.255.255.255      ff-ff-ff-ff-ff-ff    static

Interface: 169.254.138.66 --- 0xd
Internet Address      Physical Address      Type
169.254.255.255      ff-ff-ff-ff-ff-ff    static
224.0.0.22           01-00-5e-00-00-16    static
224.0.0.251          01-00-5e-00-00-fb    static
224.0.0.252          01-00-5e-00-00-fc    static
239.255.255.250      01-00-5e-7f-ff-fa    static
255.255.255.255      ff-ff-ff-ff-ff-ff    static

C:\Users\Paweł Pasternak>
```

- Dodanie ręcznie wpisu który będzie miał parametry 10.20.30.X (X nr stanowiska)aa-bb-cc-dd-ee-ff adres MAC, dałem numer 26

```

win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

C:\Windows\system32>arp -s 10.20.30.26 aa-bb-cc-dd-ee-ff

C:\Windows\system32>arp -a

Interface: 10.0.3.15 --- 0x8
Internet Address      Physical Address      Type
10.0.3.2              52-54-00-12-35-02    dynamic
10.0.3.255            ff-ff-ff-ff-ff-ff    static
10.20.30.26           aa-bb-cc-dd-ee-ff    static
224.0.0.22            01-00-5e-00-00-16    static
224.0.0.251           01-00-5e-00-00-fb    static
224.0.0.252           01-00-5e-00-00-fc    static
239.255.255.250       01-00-5e-7f-ff-fa    static
255.255.255.255       ff-ff-ff-ff-ff-ff    static

Interface: 169.254.138.66 --- 0xd
Internet Address      Physical Address      Type
169.254.255.255       ff-ff-ff-ff-ff-ff    static
224.0.0.22            01-00-5e-00-00-16    static
224.0.0.251           01-00-5e-00-00-fb    static
224.0.0.252           01-00-5e-00-00-fc    static
239.255.255.250       01-00-5e-7f-ff-fa    static
255.255.255.255       ff-ff-ff-ff-ff-ff    static

C:\Windows\system32>

```

- Arp -d - usuwa dany host

```

win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

C:\Windows\system32>arp -d 10.20.30.26

C:\Windows\system32>arp -a

Interface: 10.0.3.15 --- 0x8
Internet Address      Physical Address      Type
10.0.3.2              52-54-00-12-35-02    dynamic
10.0.3.255            ff-ff-ff-ff-ff-ff    static
224.0.0.22            01-00-5e-00-00-16    static
224.0.0.251           01-00-5e-00-00-fb    static
224.0.0.252           01-00-5e-00-00-fc    static
239.255.255.250       01-00-5e-7f-ff-fa    static
255.255.255.255       ff-ff-ff-ff-ff-ff    static

Interface: 169.254.138.66 --- 0xd
Internet Address      Physical Address      Type
169.254.255.255       ff-ff-ff-ff-ff-ff    static
224.0.0.22            01-00-5e-00-00-16    static
224.0.0.251           01-00-5e-00-00-fb    static
224.0.0.252           01-00-5e-00-00-fc    static
239.255.255.250       01-00-5e-7f-ff-fa    static
255.255.255.255       ff-ff-ff-ff-ff-ff    static

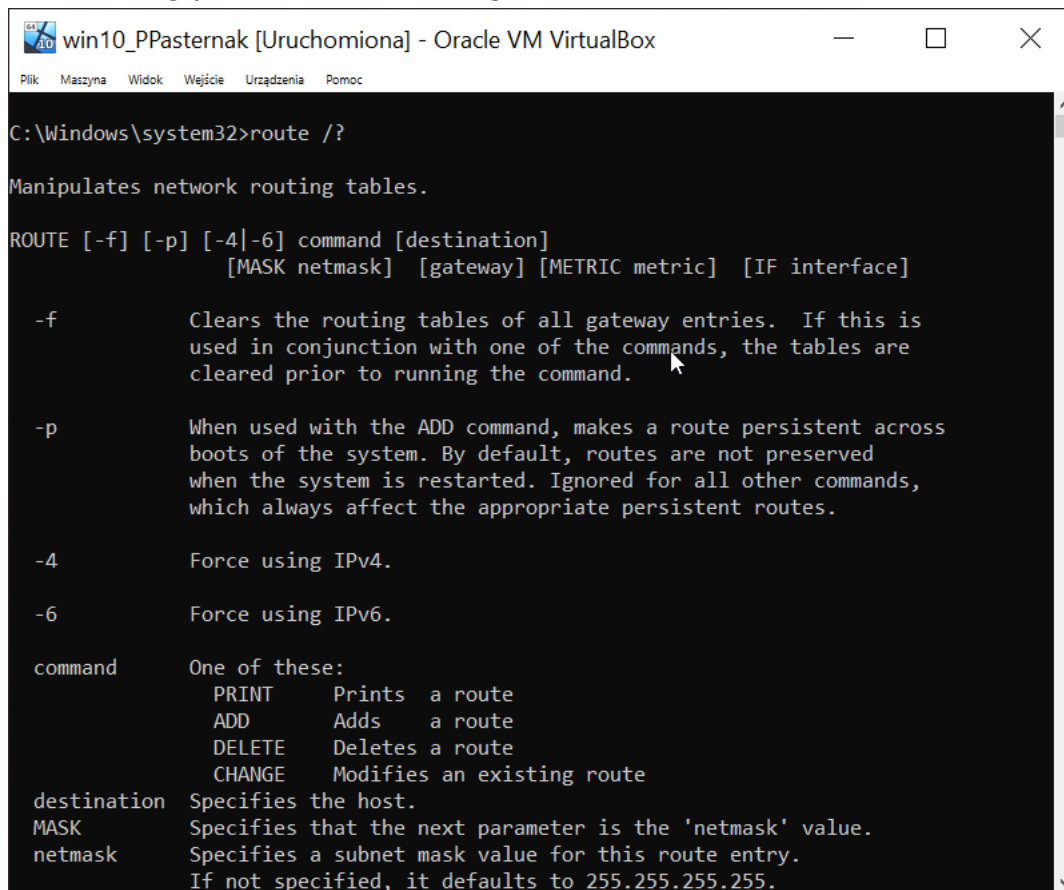
C:\Windows\system32>

```

- Po co stosować wpisy w arp ?

Wpisy arp używamy, kiedy mamy np.: salę komputerową i mamy adresy ustawione statycznie, to żeby uniknąć chaosu, to ustawiamy sobie to w arp i wtedy każdy komputer wie, jakie są adresy IP i ich adresy MAC w sieci.

j) Route - obsługuje sieciowe tabele routingu



```
C:\Windows\system32>route /?

Manipulates network routing tables.

ROUTE [-f] [-p] [-4|-6] command [destination]
                                [MASK netmask] [gateway] [METRIC metric] [IF interface]

-f          Clears the routing tables of all gateway entries.  If this is
            used in conjunction with one of the commands, the tables are
            cleared prior to running the command.

-p          When used with the ADD command, makes a route persistent across
            boots of the system.  By default, routes are not preserved
            when the system is restarted.  Ignored for all other commands,
            which always affect the appropriate persistent routes.

-4          Force using IPv4.

-6          Force using IPv6.

command     One of these:
            PRINT      Prints a route
            ADD        Adds a route
            DELETE     Deletes a route
            CHANGE     Modifies an existing route

destination Specifies the host.
MASK         Specifies that the next parameter is the 'netmask' value.
netmask      Specifies a subnet mask value for this route entry.
            If not specified, it defaults to 255.255.255.255.
```

- Route print – pokazuje tabele routingu

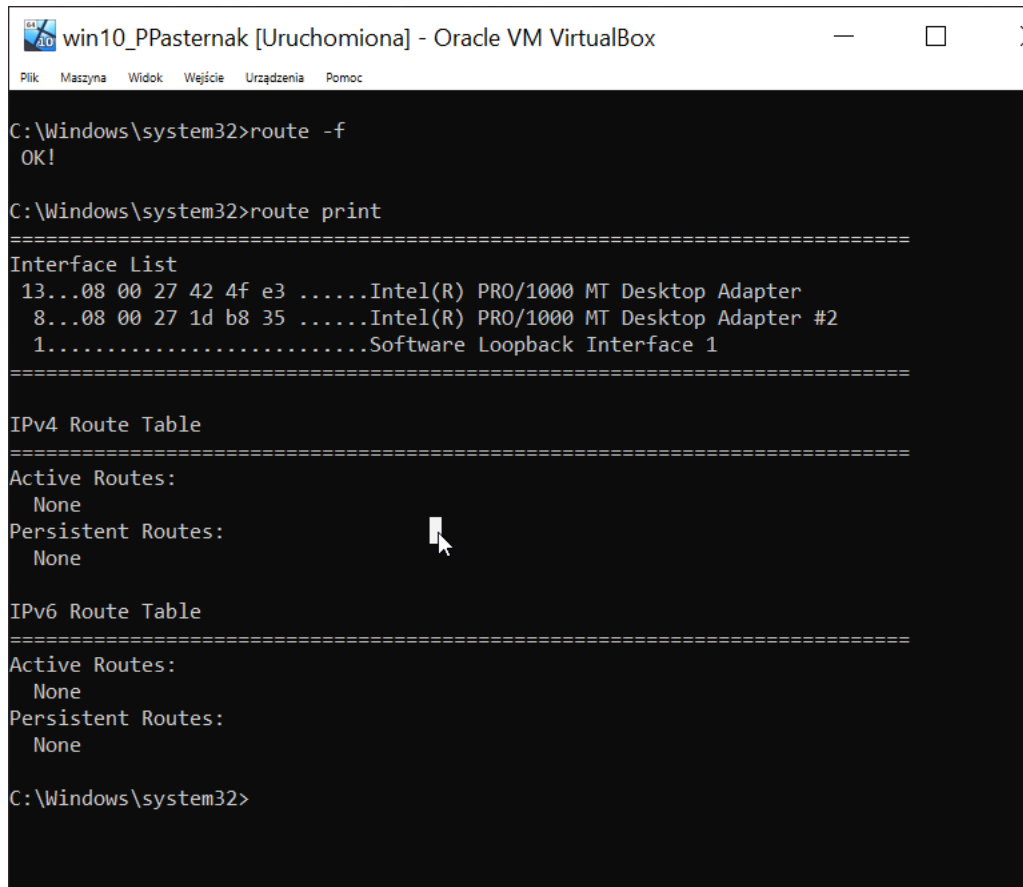
```
C:\Windows\system32>route print

=====
Interface List
13...08 00 27 42 4f e3 .....Intel(R) PRO/1000 MT Desktop Adapter
8...08 00 27 1d b8 35 .....Intel(R) PRO/1000 MT Desktop Adapter #2
1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination        Netmask          Gateway           Interface        Metric
0.0.0.0                    0.0.0.0          10.0.3.2          10.0.3.15        25
10.0.3.0                   255.255.255.0    On-link          10.0.3.15        281
10.0.3.15                  255.255.255.255  On-link          10.0.3.15        281
10.0.3.255                 255.255.255.255  On-link          10.0.3.15        281
127.0.0.0                  255.0.0.0        On-link          127.0.0.1        331
127.0.0.1                  255.255.255.255  On-link          127.0.0.1        331
127.255.255.255           255.255.255.255  On-link          127.0.0.1        331
169.254.0.0                255.255.0.0      On-link          169.254.138.66   281
169.254.138.66            255.255.255.255  On-link          169.254.138.66   281
169.254.255.255           255.255.255.255  On-link          169.254.138.66   281
224.0.0.0                  240.0.0.0        On-link          127.0.0.1        331
224.0.0.0                  240.0.0.0        On-link          169.254.138.66   281
224.0.0.0                  240.0.0.0        On-link          10.0.3.15        281
255.255.255.255           255.255.255.255  On-link          127.0.0.1        331
255.255.255.255           255.255.255.255  On-link          169.254.138.66   281
255.255.255.255           255.255.255.255  On-link          10.0.3.15        281
=====
```

- pozostałe możliwości

- -f --- czyści tablice routingu



```
C:\Windows\system32>route -f
OK!

C:\Windows\system32>route print
=====
Interface List
13...08 00 27 42 4f e3 .....Intel(R) PRO/1000 MT Desktop Adapter
8...08 00 27 1d b8 35 .....Intel(R) PRO/1000 MT Desktop Adapter #2
1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
    None
Persistent Routes:
    None

IPv6 Route Table
=====
Active Routes:
    None
Persistent Routes:
    None

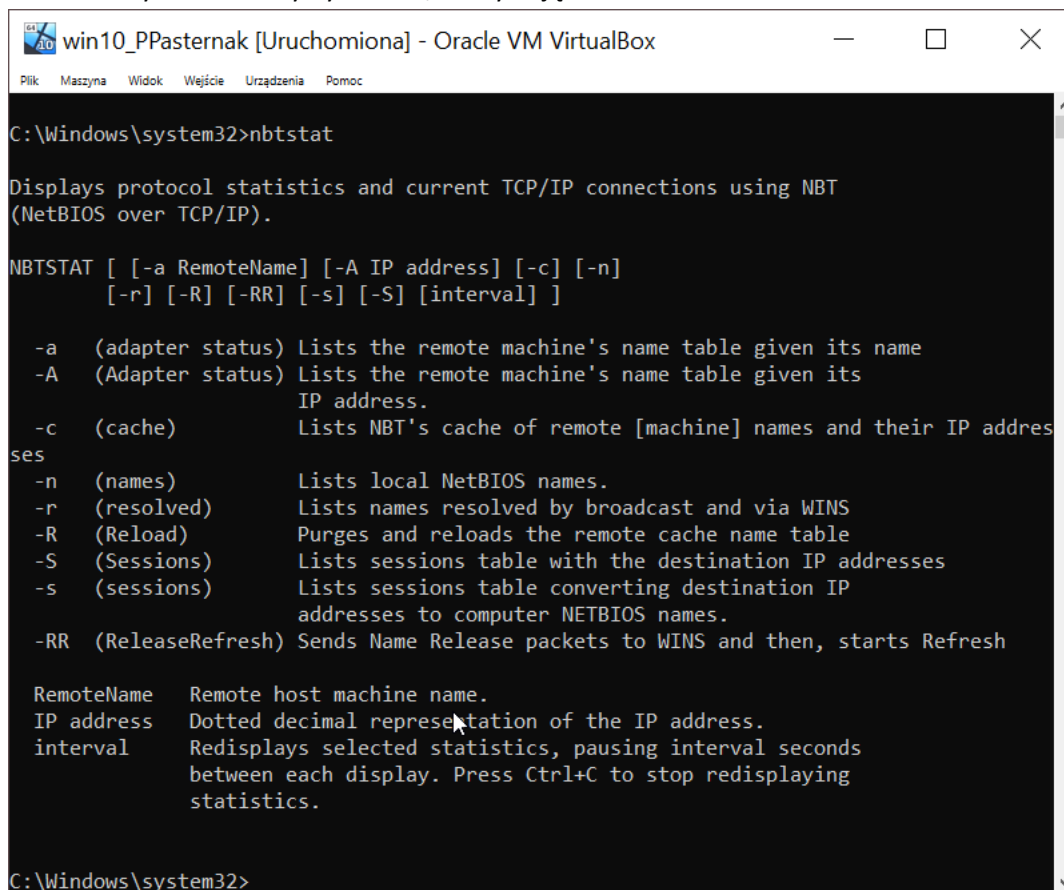
C:\Windows\system32>
```

- -p

-p Jeśli użyte z poleceniem ADD, trasa pozostaje trwała przy kolejnych uruchomieniach systemu. Domyslnie trasy nie są zachowywane przy ponownym uruchomieniu systemu. Ignorowane dla wszystkich pozostałych poleceń, które zawsze mają wpływ na odpowiednie trasy trwałe. Opcja ta nie jest obsługiwana w systemie Windows 95.

- Ipv4 --- wymusza ipv4
- Ipv6 --- wymusza ipv6
- Add --- dodaje nową trasę routingu
- Route change – zmienia istniejące trasy routingu, a dokładnie ich bramę i/lub metrykę.

k) Nbtstat - wyświetla statystyki TVCP/IP używając NetBios



```

C:\Windows\system32>nbtstat

Displays protocol statistics and current TCP/IP connections using NBT
(NetBIOS over TCP/IP).

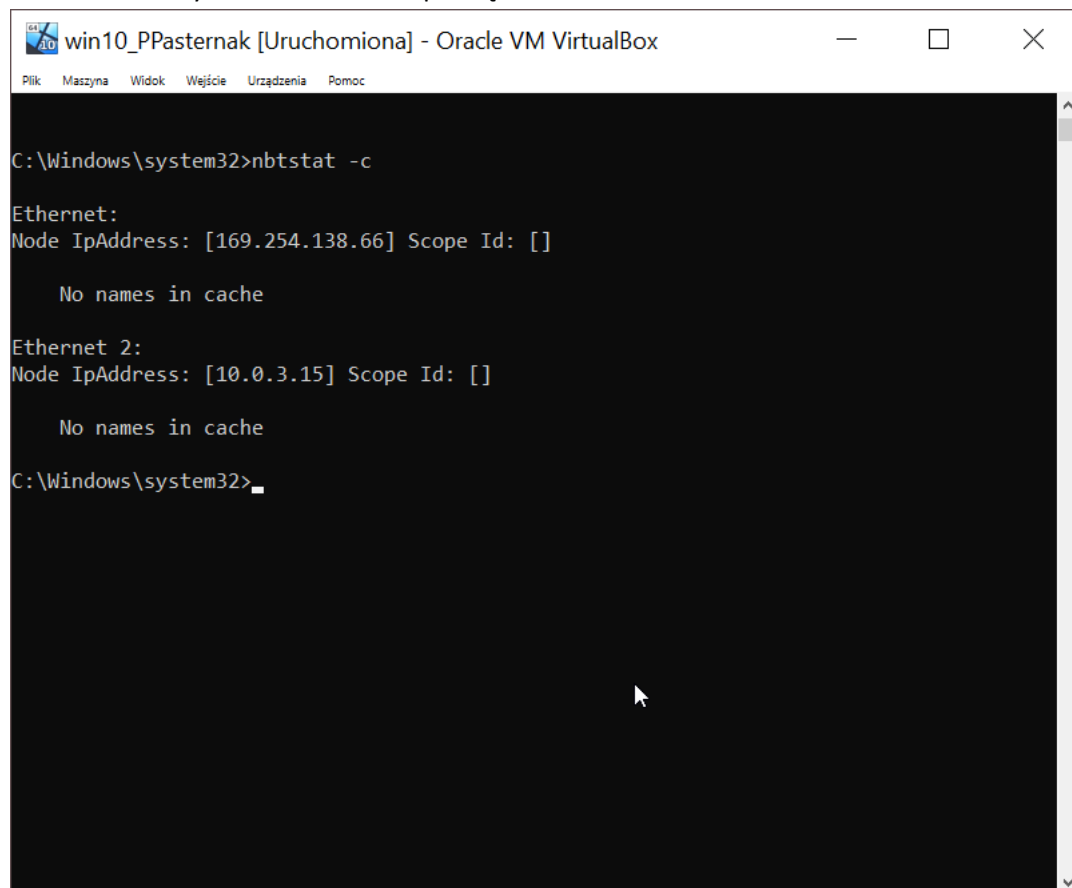
NBTSTAT [ [-a RemoteName] [-A IP address] [-c] [-n]
          [-r] [-R] [-RR] [-s] [-S] [interval] ]

-a (adapter status) Lists the remote machine's name table given its name
-A (Adapter status) Lists the remote machine's name table given its
                      IP address.
-c (cache)           Lists NBT's cache of remote [machine] names and their IP addresses
-n (names)           Lists local NetBIOS names.
-r (resolved)        Lists names resolved by broadcast and via WINS
-R (Reload)          Purges and reloads the remote cache name table
-S (Sessions)        Lists sessions table with the destination IP addresses
-s (sessions)        Lists sessions table converting destination IP
                      addresses to computer NETBIOS names.
-RR (ReleaseRefresh) Sends Name Release packets to WINS and then, starts Refresh

RemoteName  Remote host machine name.
IP address  Dotted decimal representation of the IP address.
interval    Redisplays selected statistics, pausing interval seconds
            between each display. Press Ctrl+C to stop redisplaying
            statistics.

C:\Windows\system32>
    
```

- o nbtstat -c --- wyświetla zawartość pamięci cache NBT



```
C:\Windows\system32>nbtstat -c

Ethernet:
Node IpAddress: [169.254.138.66] Scope Id: []

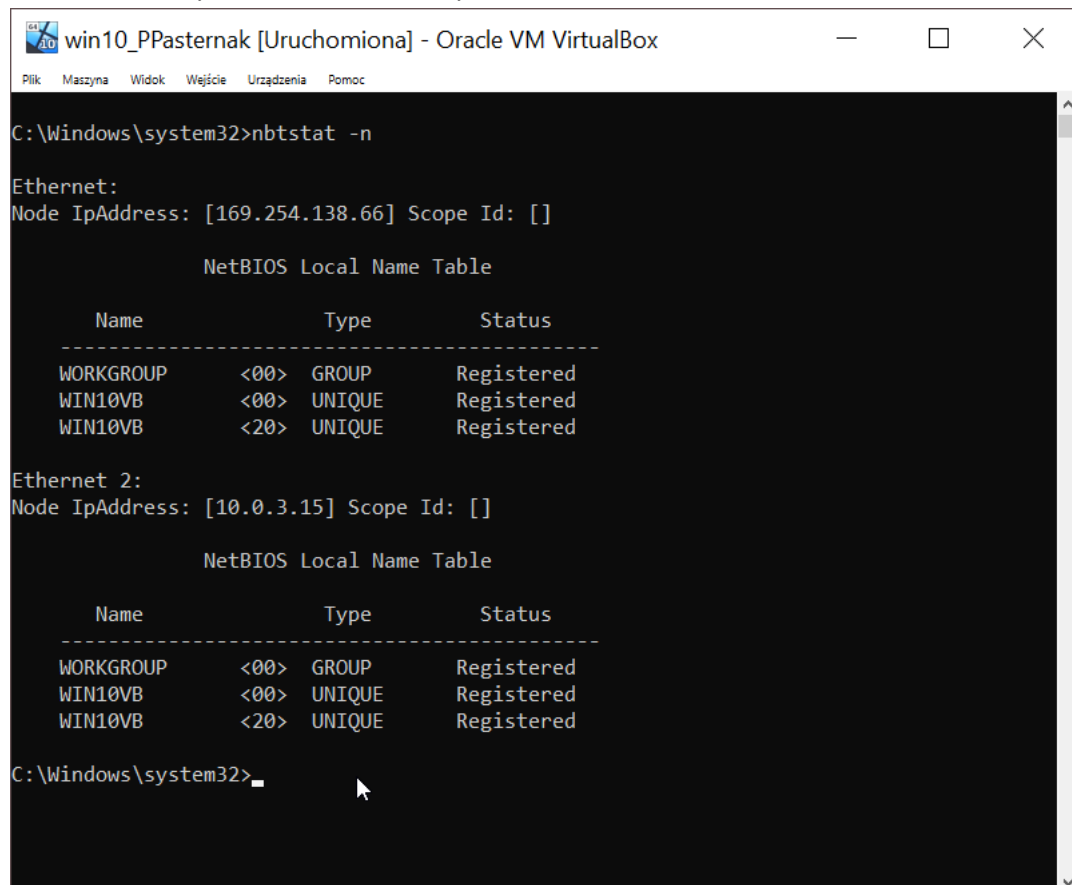
    No names in cache

Ethernet 2:
Node IpAddress: [10.0.3.15] Scope Id: []

    No names in cache

C:\Windows\system32>
```

- o nbtstat -n --- wyświetla lokalne nazwy netbios



```
C:\Windows\system32>nbtstat -n

Ethernet:
Node IpAddress: [169.254.138.66] Scope Id: []

    NetBIOS Local Name Table

    Name                Type                Status
    -----
    WORKGROUP             <00> GROUP             Registered
    WIN10VB                <00> UNIQUE            Registered
    WIN10VB                <20> UNIQUE            Registered

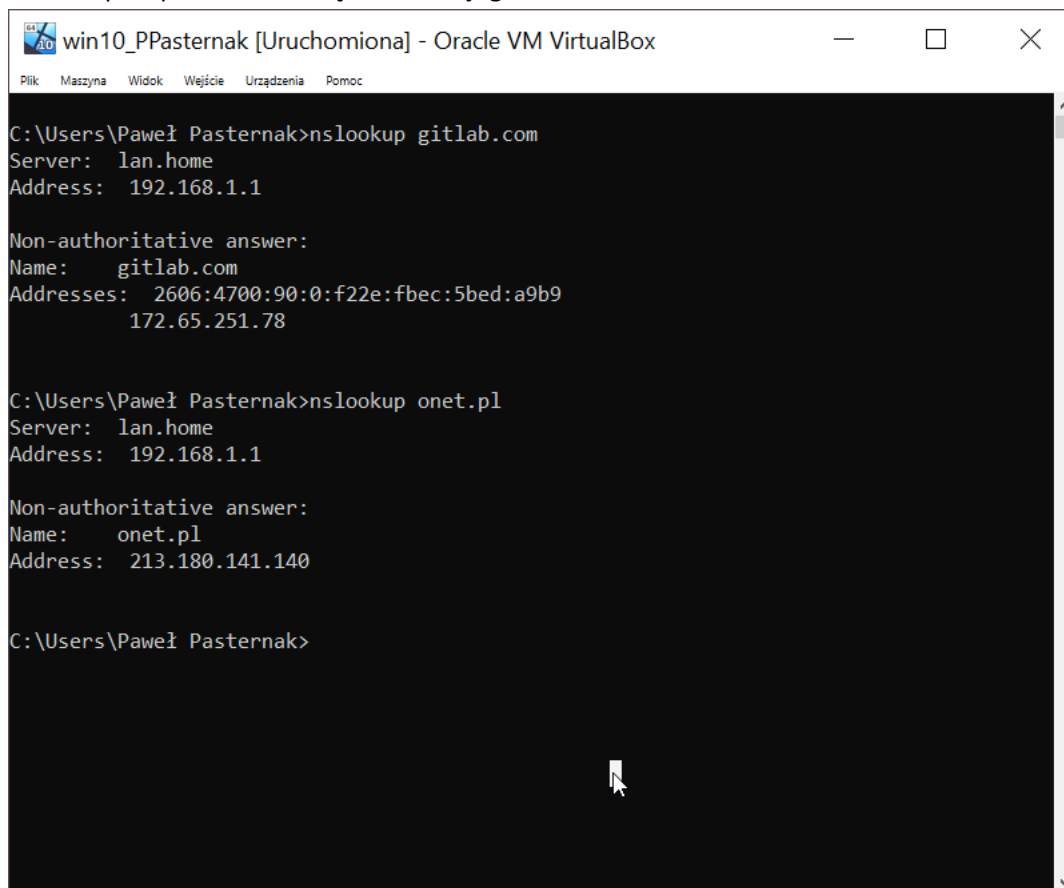
Ethernet 2:
Node IpAddress: [10.0.3.15] Scope Id: []

    NetBIOS Local Name Table

    Name                Type                Status
    -----
    WORKGROUP             <00> GROUP             Registered
    WIN10VB                <00> UNIQUE            Registered
    WIN10VB                <20> UNIQUE            Registered

C:\Windows\system32>
```

l) Nslookup – sprawdza nazwę serwera i jego IP



```
C:\Users\Paweł Pasternak>nslookup gitlab.com
Server: lan.home
Address: 192.168.1.1

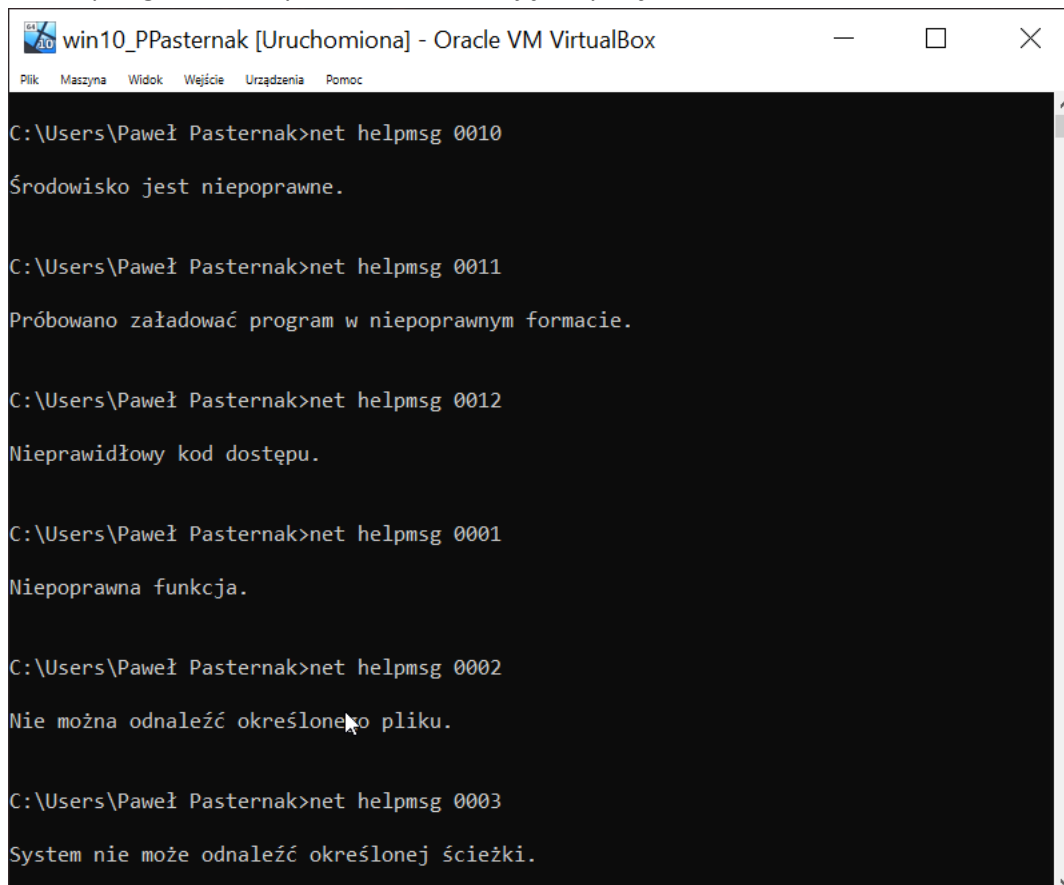
Non-authoritative answer:
Name: gitlab.com
Addresses: 2606:4700:90:0:f22e:fbec:5bed:a9b9
          172.65.251.78

C:\Users\Paweł Pasternak>nslookup onet.pl
Server: lan.home
Address: 192.168.1.1

Non-authoritative answer:
Name: onet.pl
Address: 213.180.141.140

C:\Users\Paweł Pasternak>
```

m) net helpmsg 0010 --- wyświetla co oznaczają kody błędów



```
C:\Users\Paweł Pasternak>net helpmsg 0010
Środowisko jest niepoprawne.

C:\Users\Paweł Pasternak>net helpmsg 0011
Próbowano załadować program w niepoprawnym formacie.

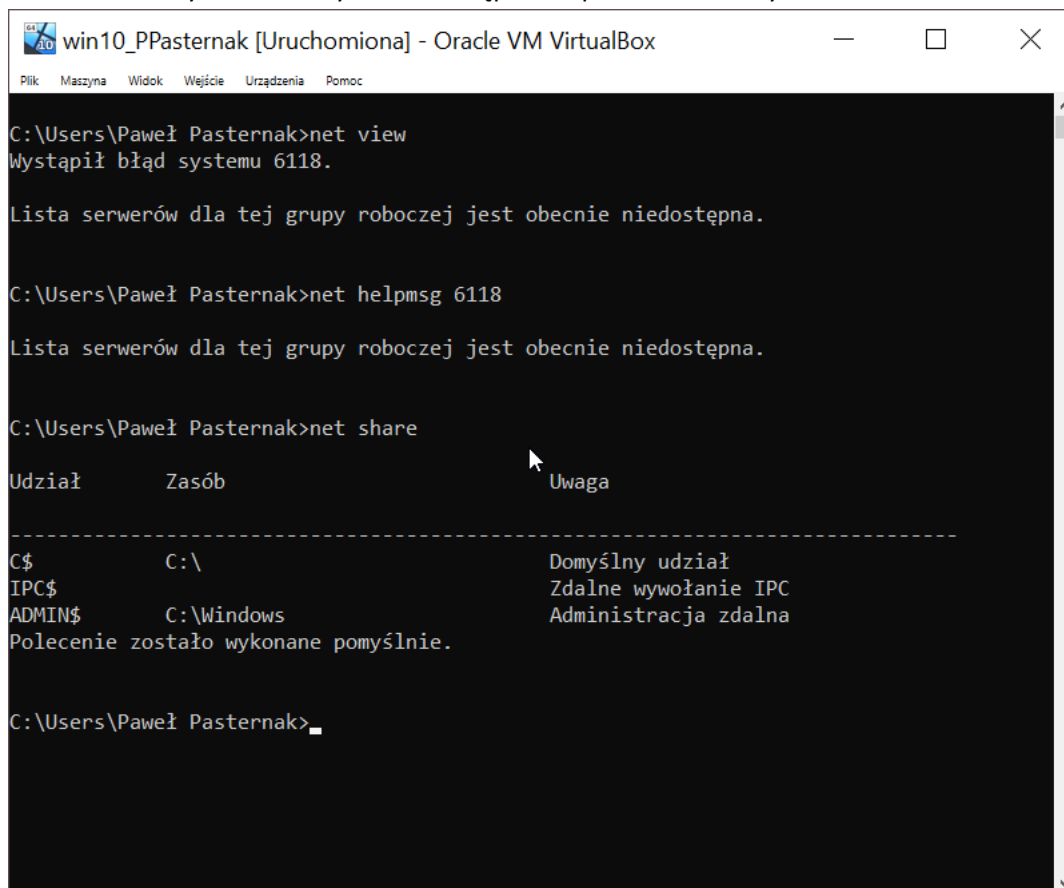
C:\Users\Paweł Pasternak>net helpmsg 0012
Nieprawidłowy kod dostępu.

C:\Users\Paweł Pasternak>net helpmsg 0001
Niepoprawna funkcja.

C:\Users\Paweł Pasternak>net helpmsg 0002
Nie można odnaleźć określonego pliku.

C:\Users\Paweł Pasternak>net helpmsg 0003
System nie może odnaleźć określonej ścieżki.
```

- n) net view --- służy do uzyskania informacji o danych komputerach w sieci
- o) net share --- Wyświetla wszystkie udostępniane przez nas zasoby w sieci



```
C:\Users\Paweł Pasternak>net view
Wystąpił błąd systemu 6118.

Lista serwerów dla tej grupy roboczej jest obecnie niedostępna.

C:\Users\Paweł Pasternak>net helpmsg 6118
Lista serwerów dla tej grupy roboczej jest obecnie niedostępna.

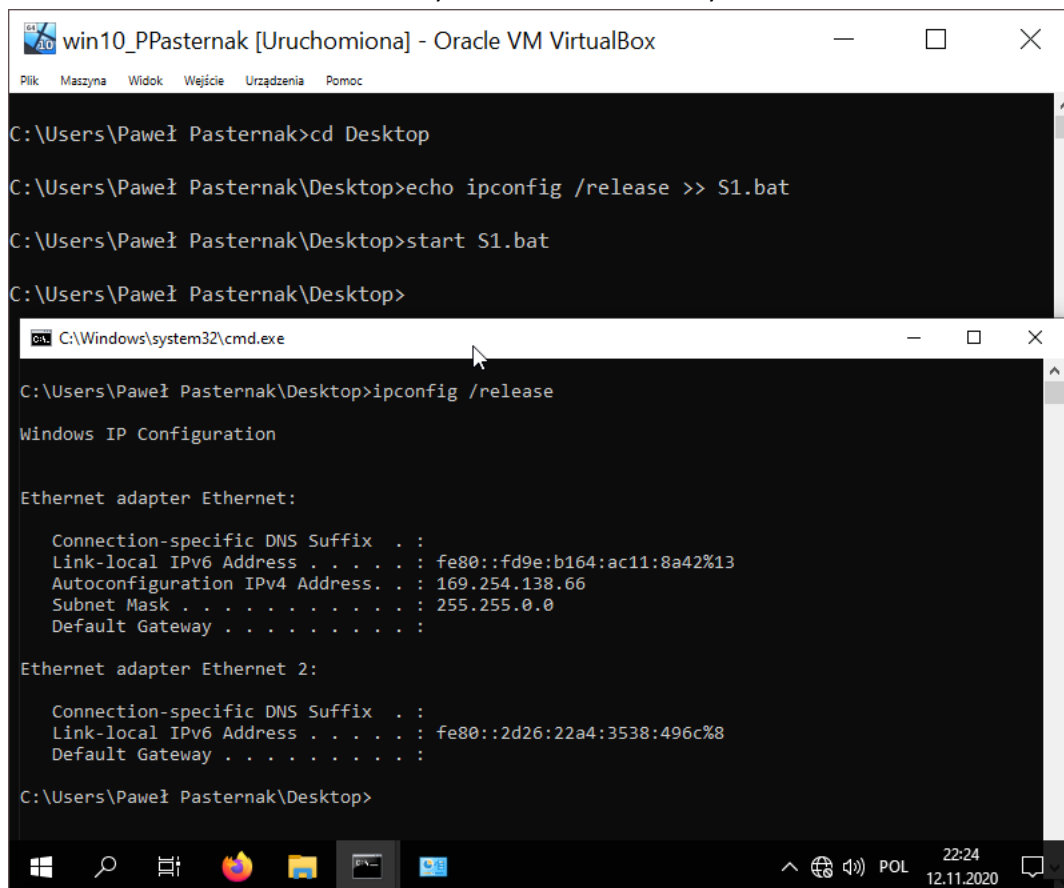
C:\Users\Paweł Pasternak>net share

Udział          Zasób          Uwaga
-----
C$              C:\            Domyślny udział
IPC$            C:\            Zdalne wywołanie IPC
ADMIN$          C:\Windows     Administracja zdalna
Polecenie zostało wykonane pomyślnie.

C:\Users\Paweł Pasternak>
```

7. Napisz skrypty których zadaniem będzie

- a) S1.bat – zwalnianie adresów na wszystkich kartach sieciowych



The screenshot shows a Windows 10 virtual machine window titled "win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox". The taskbar at the bottom includes icons for Start, Search, Task View, Firefox, File Explorer, and the Virtual Machine application. The command prompt window shows the following commands and output:

```
C:\Users\Paweł Pasternak>cd Desktop
C:\Users\Paweł Pasternak\Desktop>echo ipconfig /release >> S1.bat
C:\Users\Paweł Pasternak\Desktop>start S1.bat
C:\Users\Paweł Pasternak\Desktop>
```

A second command prompt window is open, showing the output of the command:

```
C:\Users\Paweł Pasternak\Desktop>ipconfig /release
Windows IP Configuration

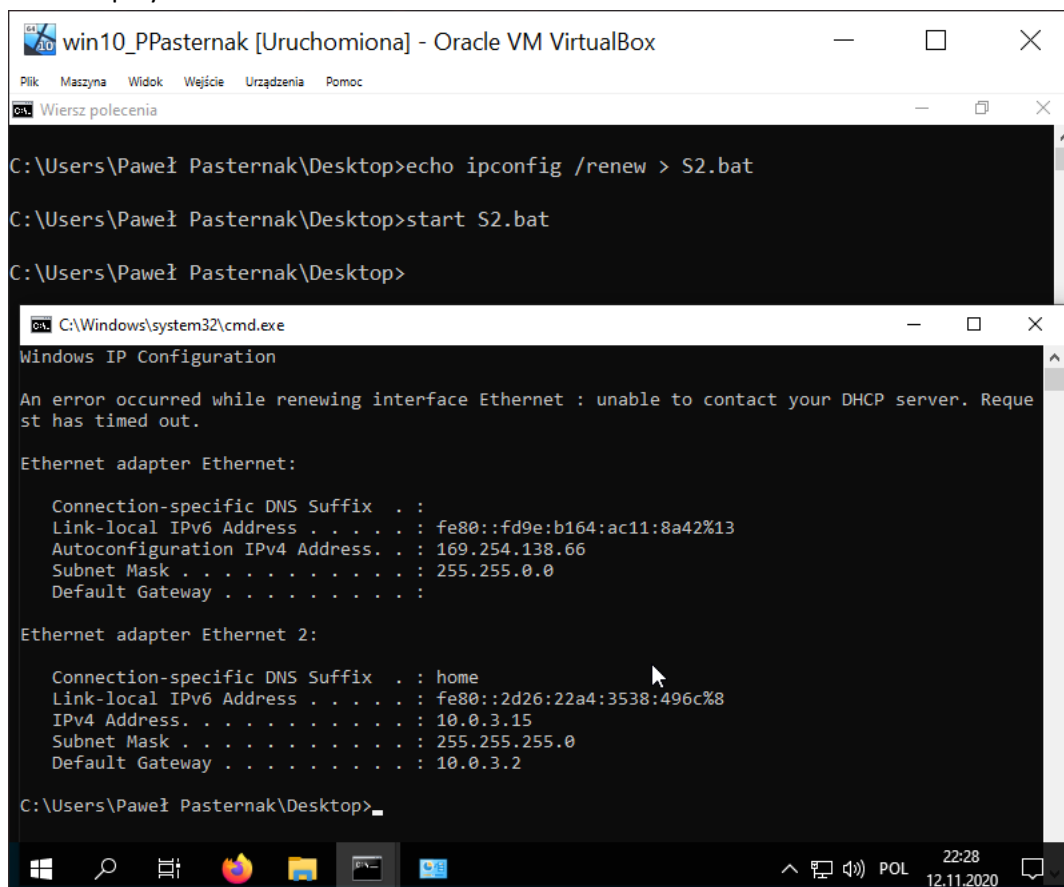
Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::fd9e:b164:ac11:8a42%13
    Autoconfiguration IPv4 Address. . : 169.254.138.66
    Subnet Mask . . . . . : 255.255.0.0
    Default Gateway . . . . . : 

Ethernet adapter Ethernet 2:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::2d26:22a4:3538:496c%8
    Default Gateway . . . . . :
```

- b) S2.bat – przydzielanie na nowo adresów DHCP



The screenshot shows the same Windows 10 virtual machine window. The command prompt window shows the following commands and output:

```
C:\Users\Paweł Pasternak\Desktop>echo ipconfig /renew > S2.bat
C:\Users\Paweł Pasternak\Desktop>start S2.bat
C:\Users\Paweł Pasternak\Desktop>
```

A second command prompt window is open, showing the output of the command:

```
C:\Users\Paweł Pasternak\Desktop>ipconfig /renew
Windows IP Configuration

An error occurred while renewing interface Ethernet : unable to contact your DHCP server. Request has timed out.

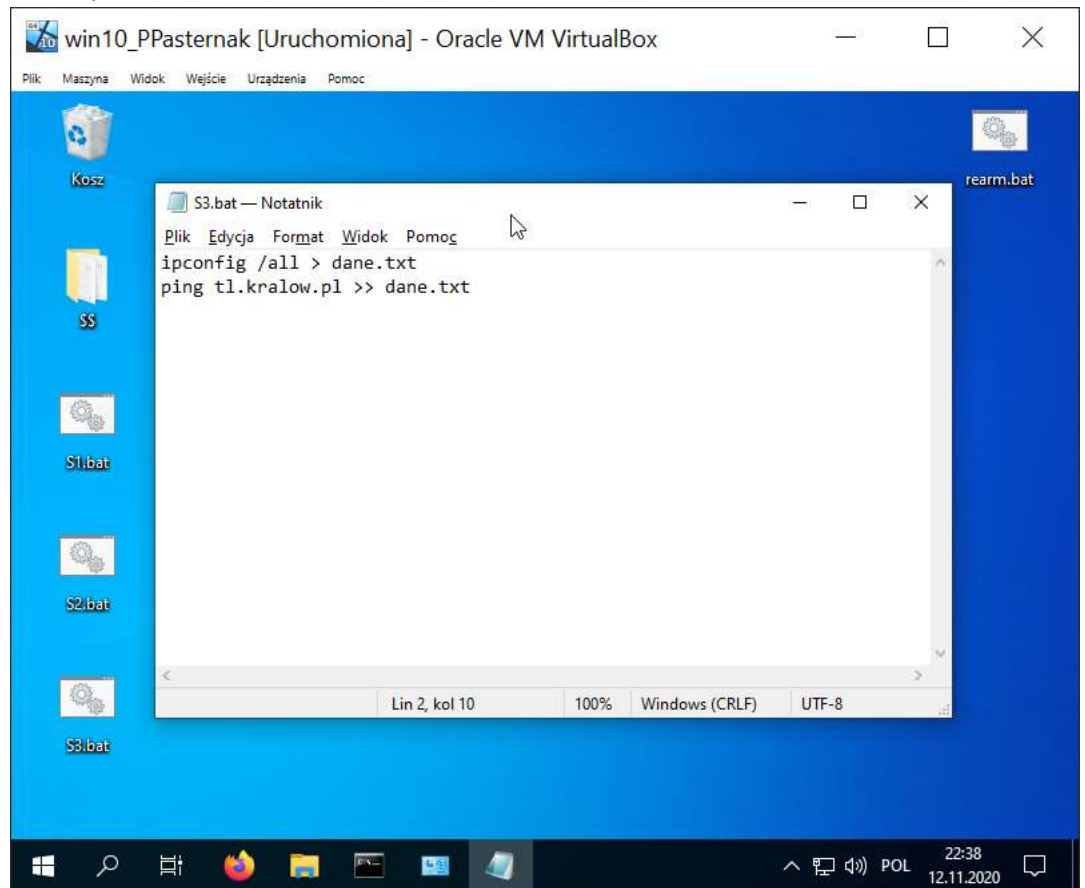
Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::fd9e:b164:ac11:8a42%13
    Autoconfiguration IPv4 Address. . : 169.254.138.66
    Subnet Mask . . . . . : 255.255.0.0
    Default Gateway . . . . . : 

Ethernet adapter Ethernet 2:

    Connection-specific DNS Suffix  . : home
    Link-local IPv6 Address . . . . . : fe80::2d26:22a4:3538:496c%8
    IPv4 Address. . . . . : 10.0.3.15
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.0.3.2
```

- c) S3.bat – zapisanie informacji do pliku o nazwie dane.txt
- o informacji o konfiguracji kart sieciowych
 - o wyniku polecenia ping Tl.krakow.pl
 - o screeny



win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox

Plik Maszyna Widok Wejście Urządzenia Pomoc

Wiersz polecenia

```
C:\Users\Paweł Pasternak\Desktop>start S3.bat
```

```
C:\Windows\system32\cmd.exe
```

```
C:\Users\Paweł Pasternak\Desktop>ipconfig /all 1>dane.txt
```

```
C:\Users\Paweł Pasternak\Desktop>ping t1.krakow.pl 1>>dane.txt
```

dane.txt — Notatnik

Plik Edycja Format Widok Pomoc

```
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : czwartek, 12 listopada 2020 22:28:26
Lease Expires . . . . . : piątek, 13 listopada 2020 22:28:12
Default Gateway . . . . . : 10.0.3.2
DHCP Server . . . . . : 10.0.3.2
DHCPv6 IAID . . . . . : 302514215
DHCPv6 Client DUID. . . . . : 00-01-00-01-26-FB-F8-39-08-00-27-42-4F-E3
DNS Servers . . . . . : 192.168.1.1
NetBIOS over Tcpip. . . . . : Enabled
```

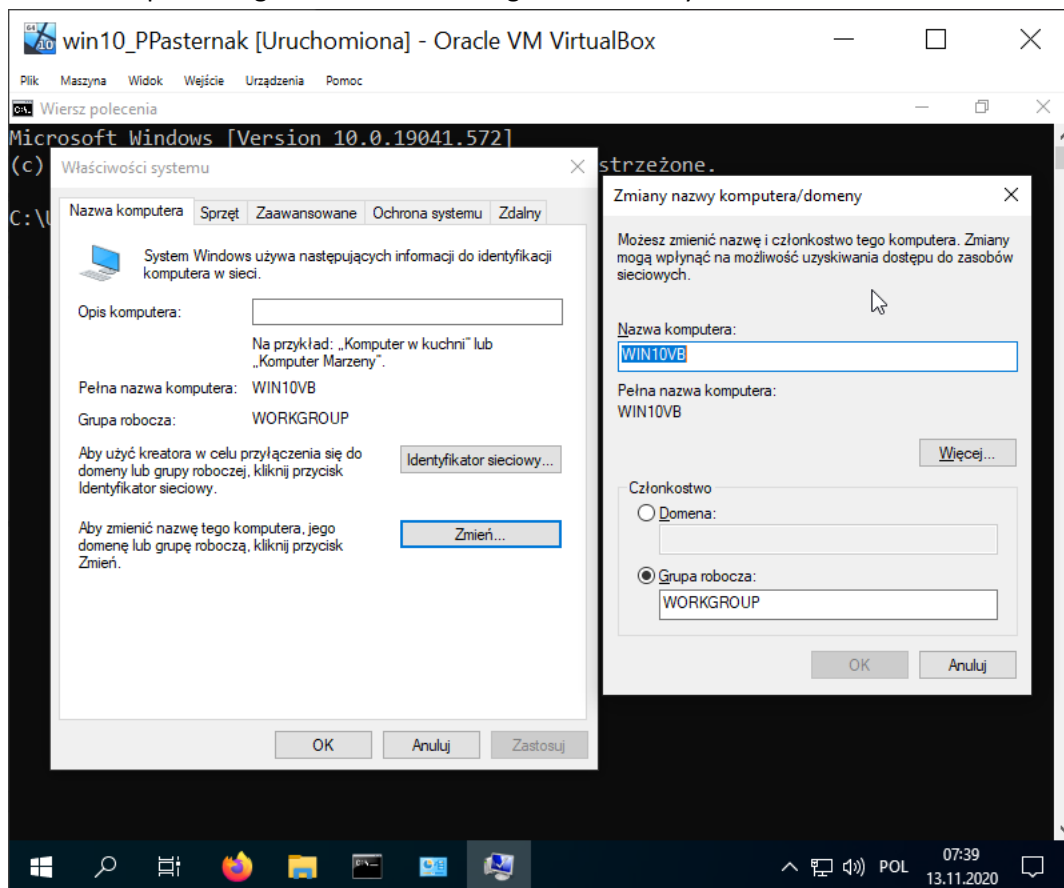
```
Pinging t1.krakow.pl [77.79.247.174] with 32 bytes of data:
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
Reply from 77.79.247.174: bytes=32 time=13ms TTL=57
```

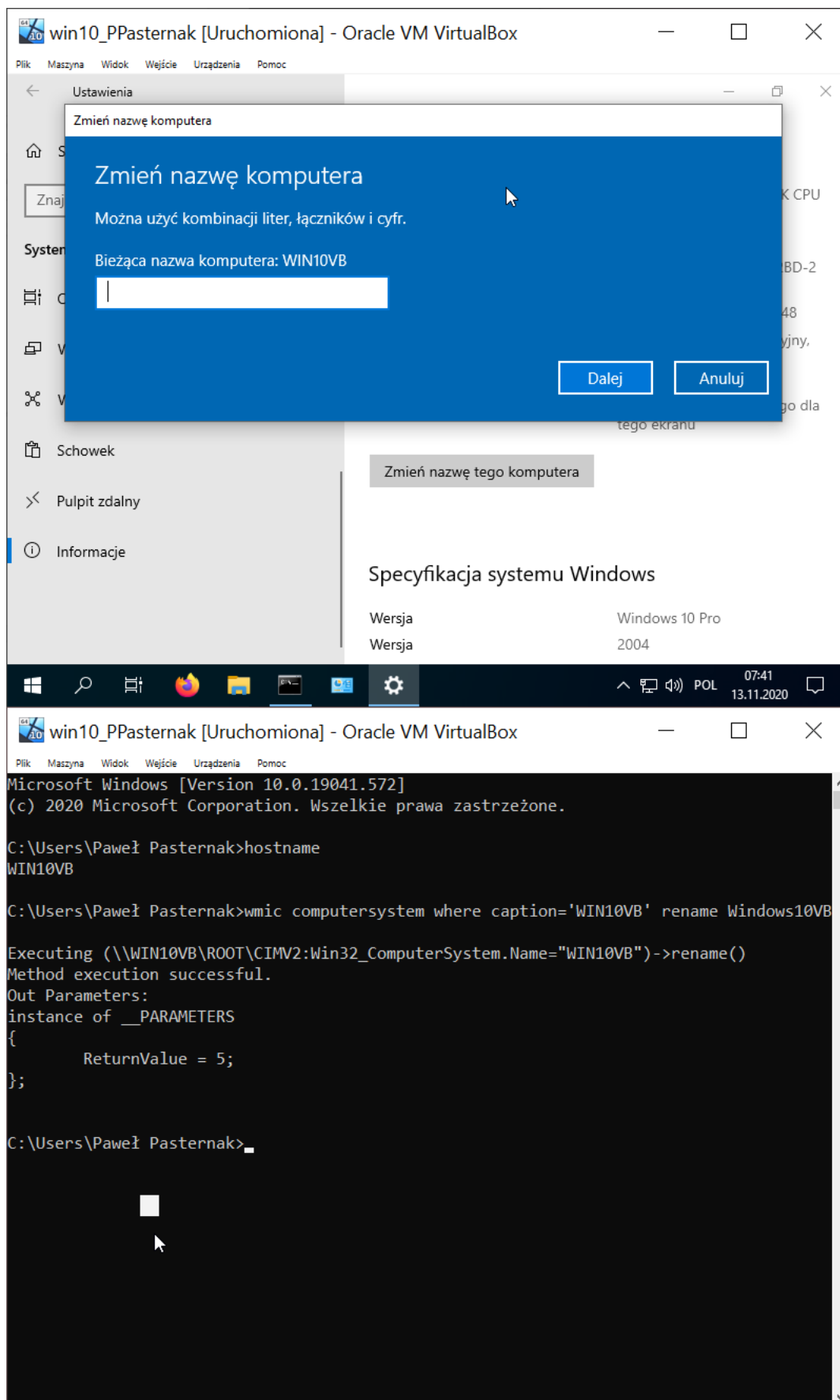
Lin 1, kol 1 100% Windows (CRLF) ANSI

22:39 12.11.2020

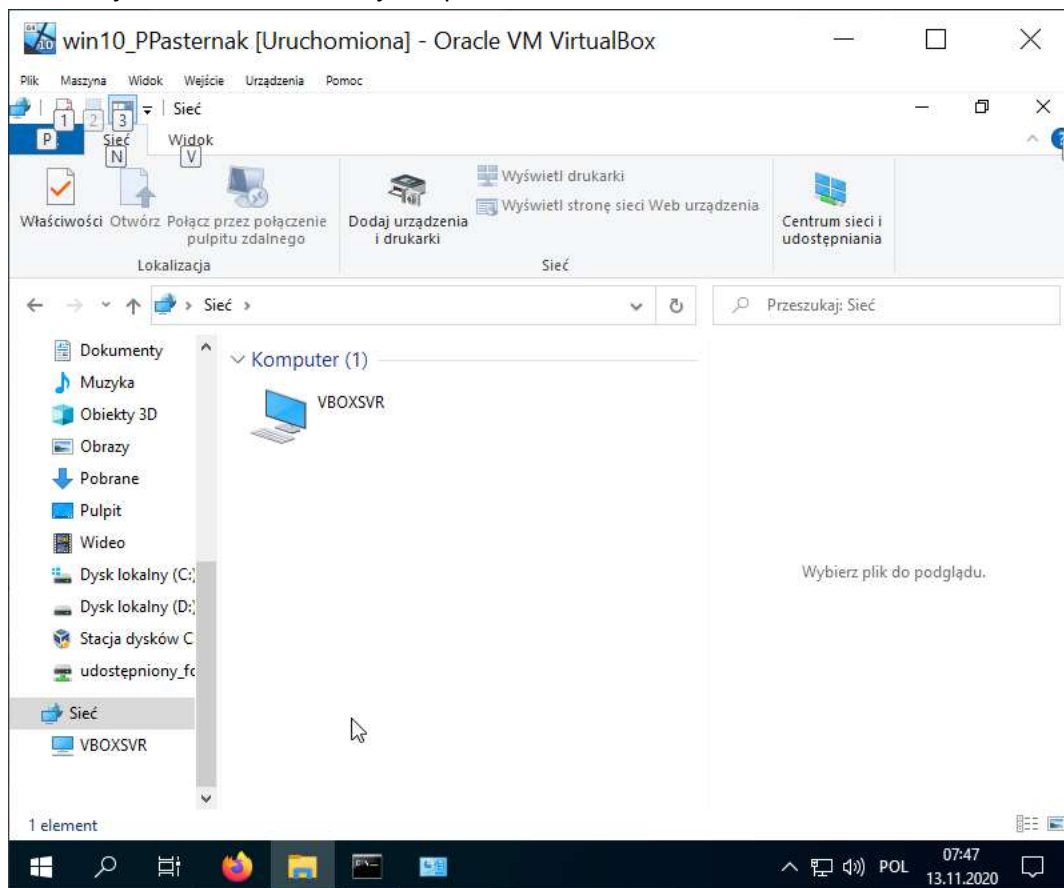
8. Warunki jakie powinny być spełnione by możliwa była komunikacja w sieci

a) Nazwa komputera – gdzie można zmienić gdzie można wyświetlić

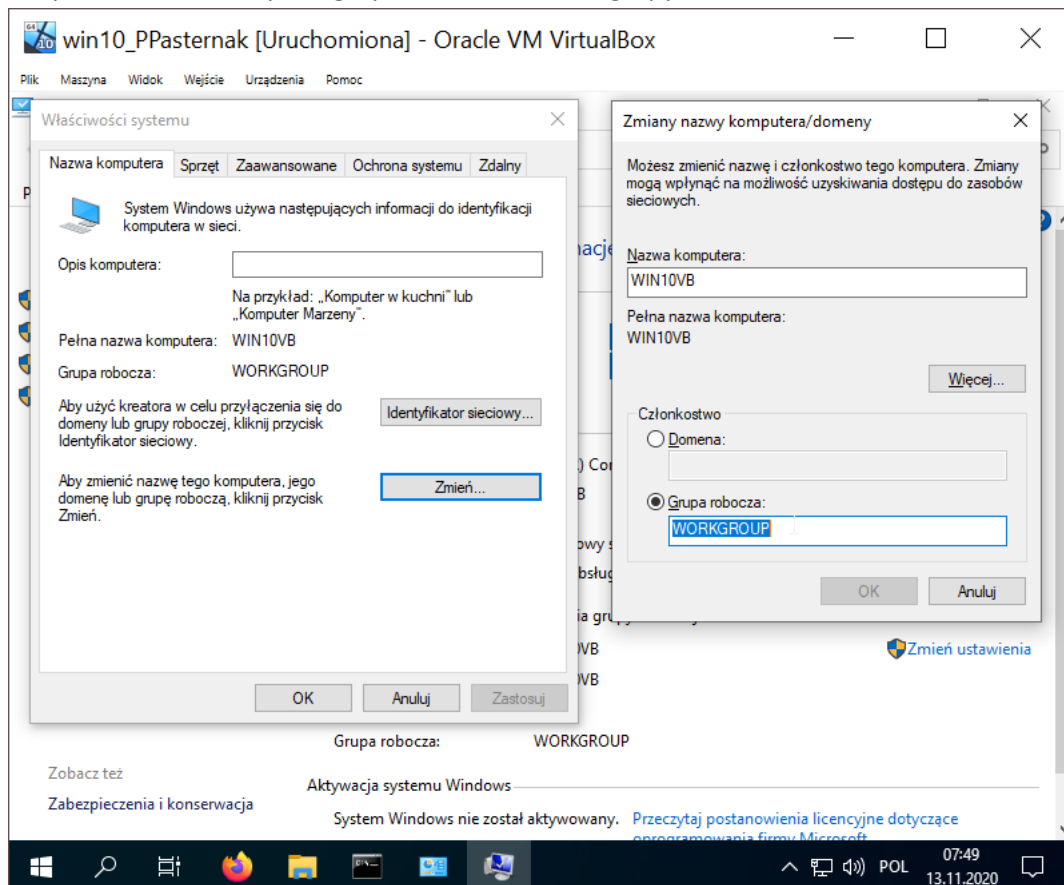




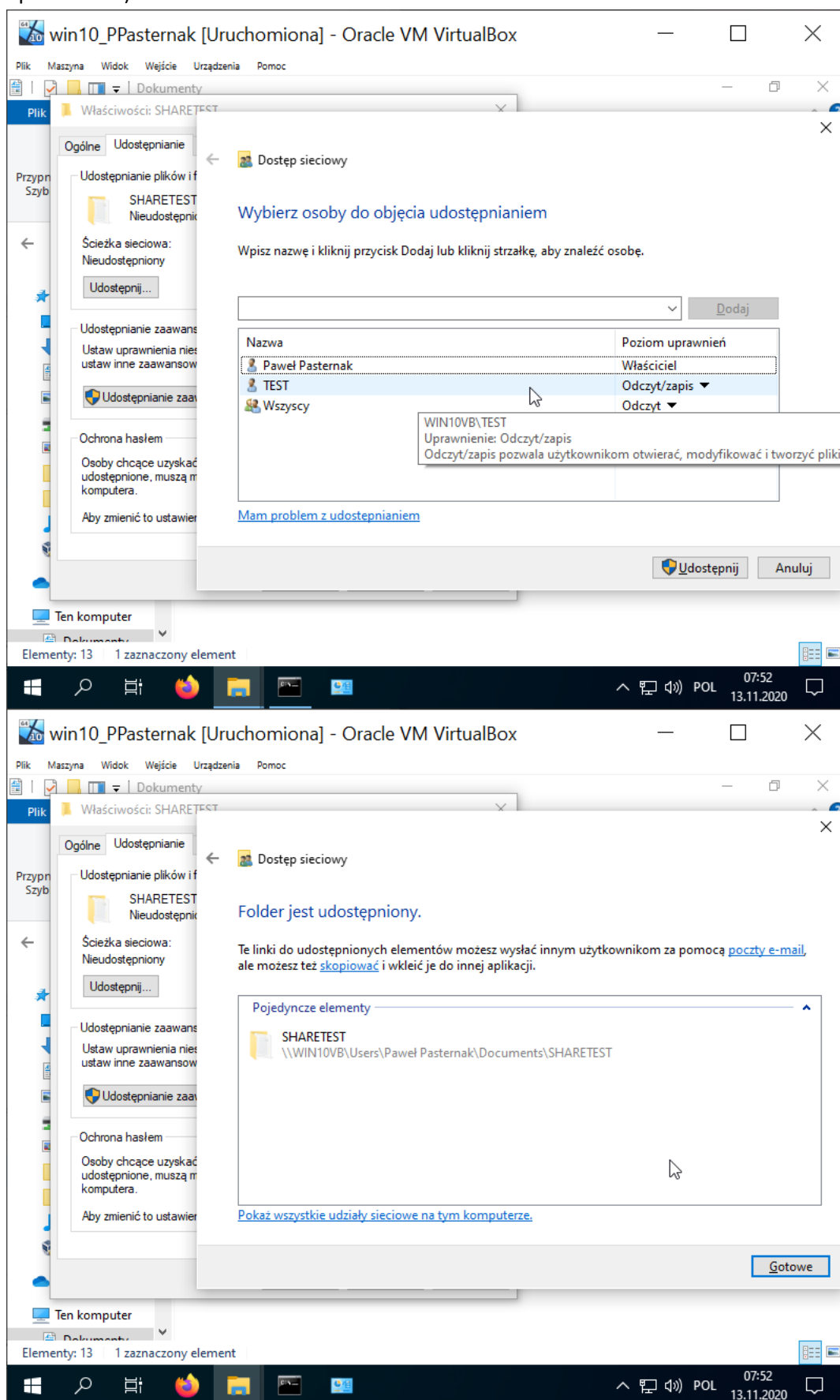
b) Lokalizacja elementu Sieć – mój komputer



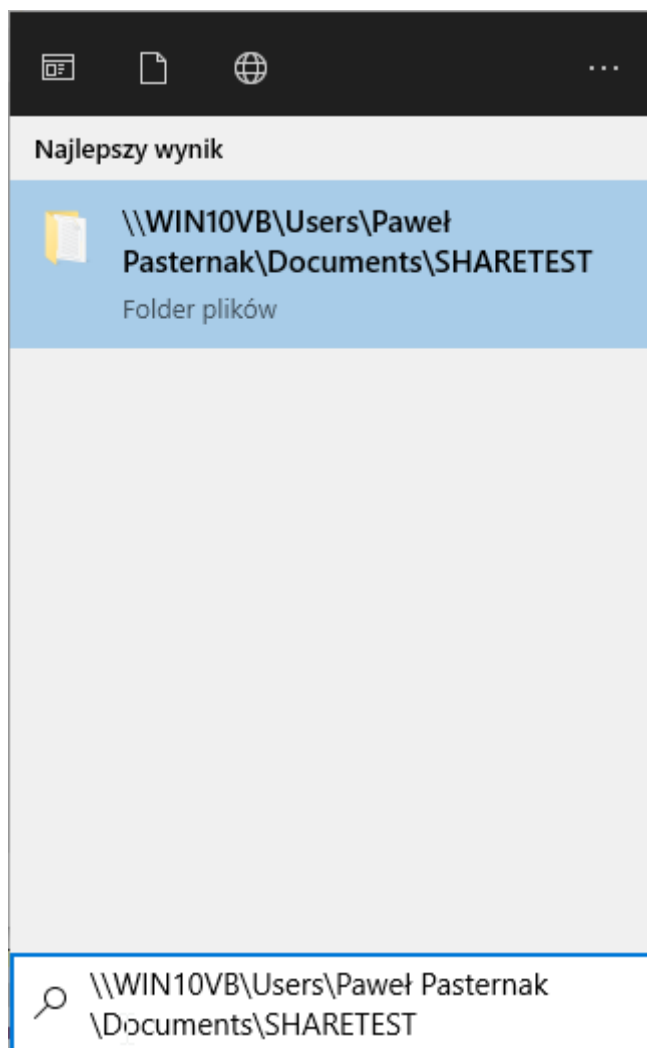
c) Grupa robocza – domyślna grupa robocza, zmiana grupy



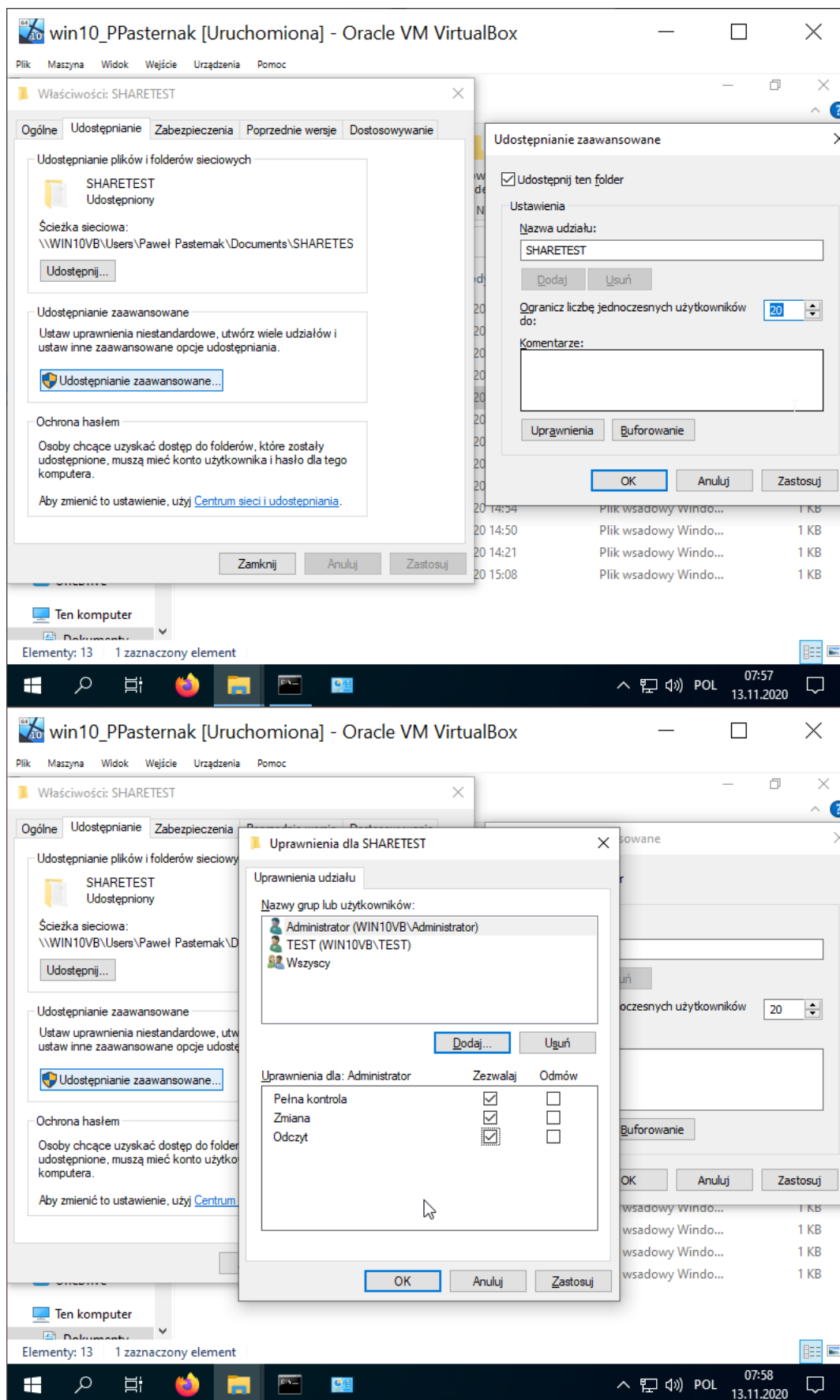
- d) Udostępnianie proste (przeznaczenie, ścieżka udostępnionego zasobu możliwe uprawnienia)

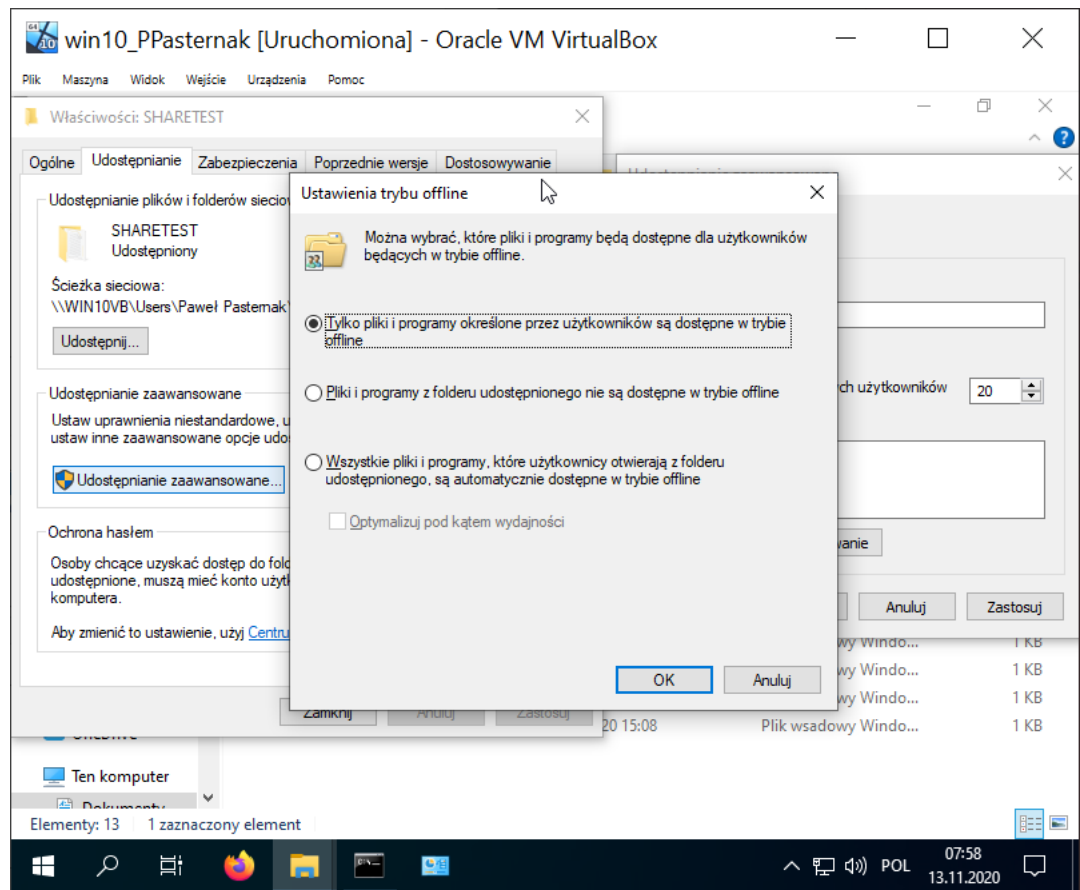


To jest po to, aby szybko udostępnić folder w sieci, nie ma zbytnio dużo uprawnień, i ścieżka to jest zwykle nazwa_komputera i potem ścieżka do tego pliku na dysku.

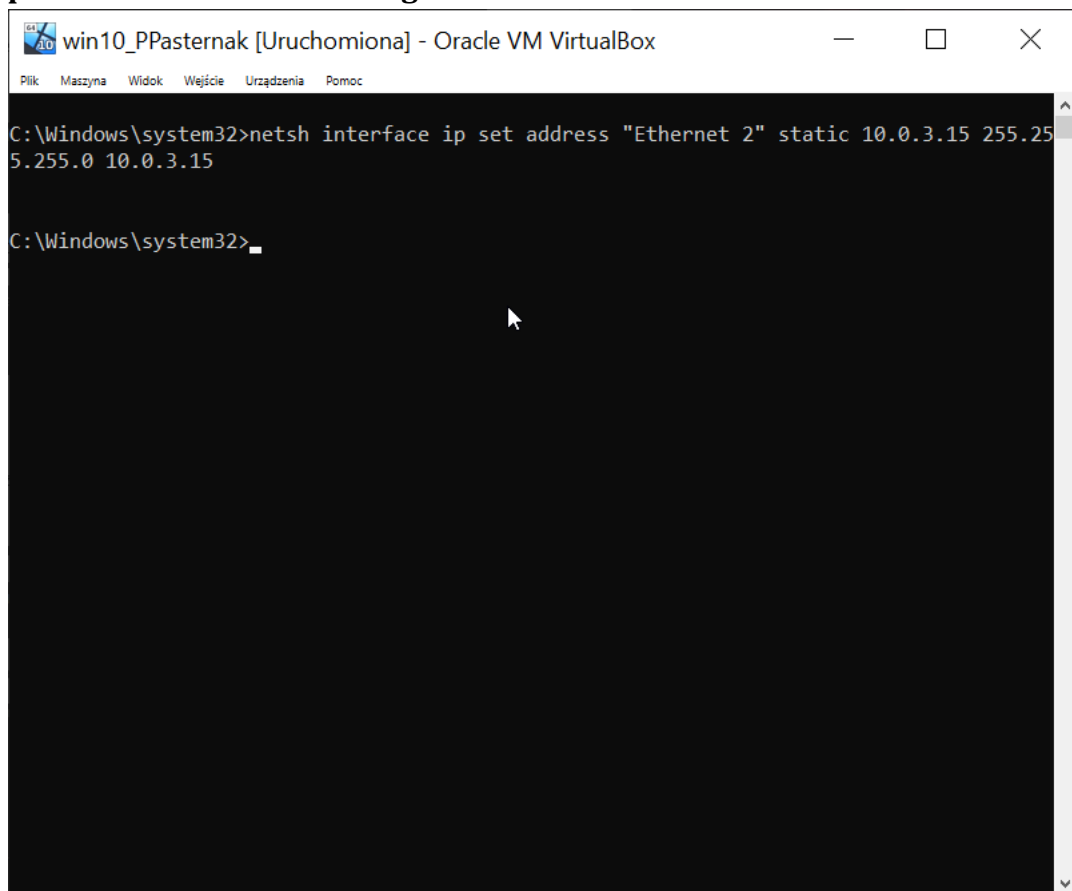


- e) Udostępnianie zaawansowane (przeznaczenie, ścieżka udostępnionego zasobu możliwe uprawnienia dodatkowe możliwości)





9. Ustawianie statycznego adresu IP na jednej karcie sieciowej za pomocą polecenia 10.0.0.X maska zgodna z adresem

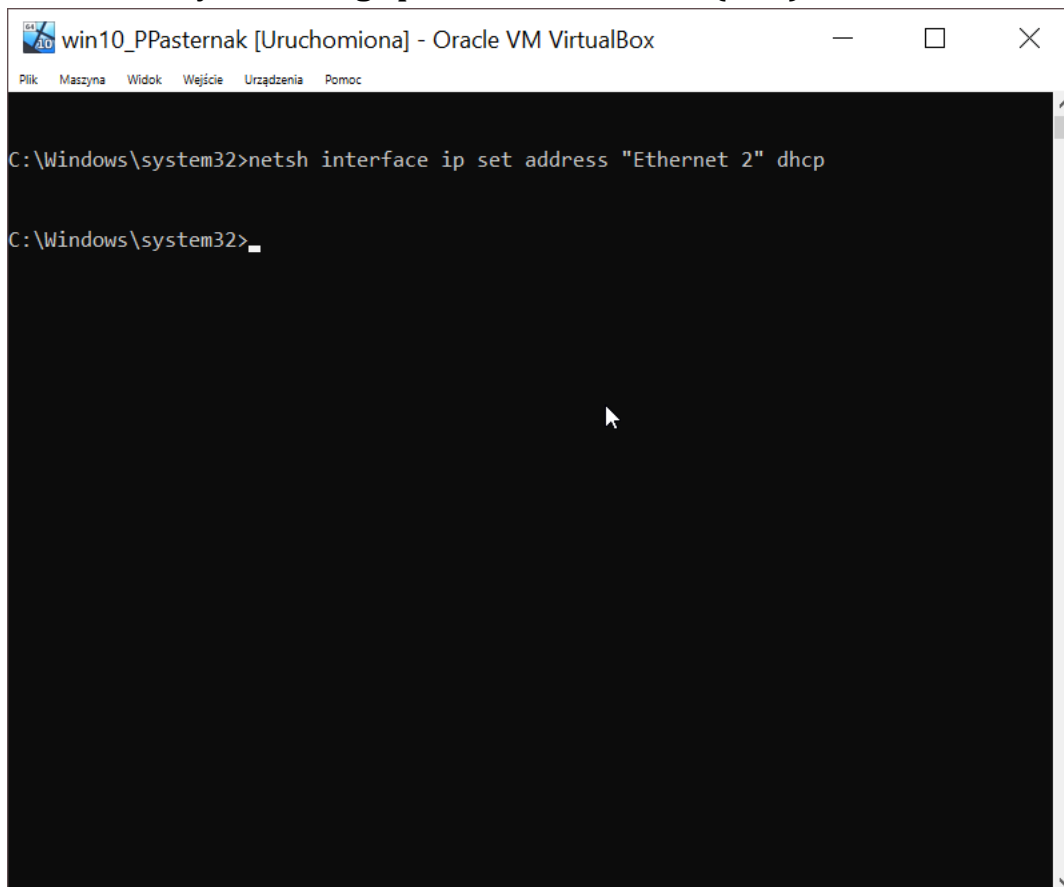


The screenshot shows a Windows command prompt window titled "win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox". The window has a menu bar with "Plik", "Maszyna", "Widok", "Wejście", "Urządzenia", and "Pomoc". The command prompt shows the following text:

```
C:\Windows\system32>netsh interface ip set address "Ethernet 2" static 10.0.3.15 255.255.255.0 10.0.3.15
```

The cursor is positioned at the end of the command line, ready for the next input.

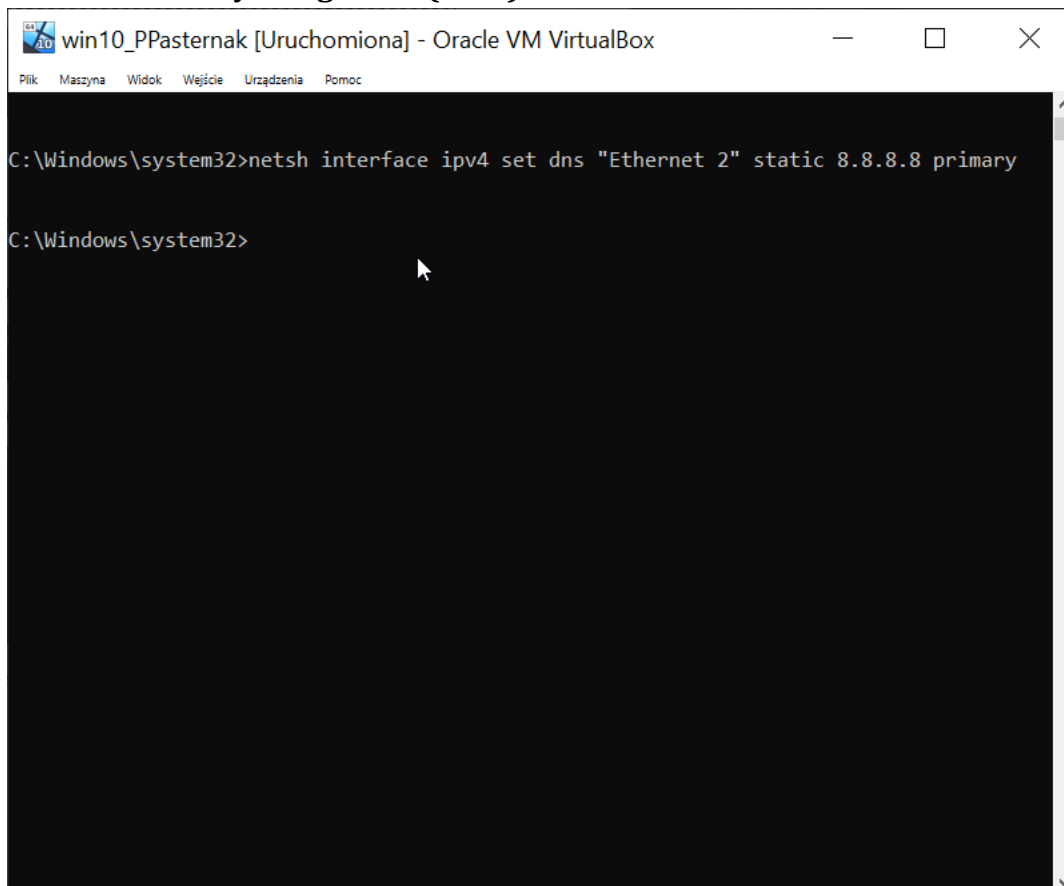
10. Ustawienie dynamicznego pobierania adresu IP (cmd)



The screenshot shows a Windows command prompt window titled "win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox". The window has a menu bar with "Plik", "Maszyna", "Widok", "Wejście", "Urządzenia", and "Pomoc". The command prompt shows the command `C:\Windows\system32>netsh interface ip set address "Ethernet 2" dhcp` being entered. The prompt then moves to the next line, `C:\Windows\system32>`, with a cursor at the end.

```
C:\Windows\system32>netsh interface ip set address "Ethernet 2" dhcp  
  
C:\Windows\system32>
```

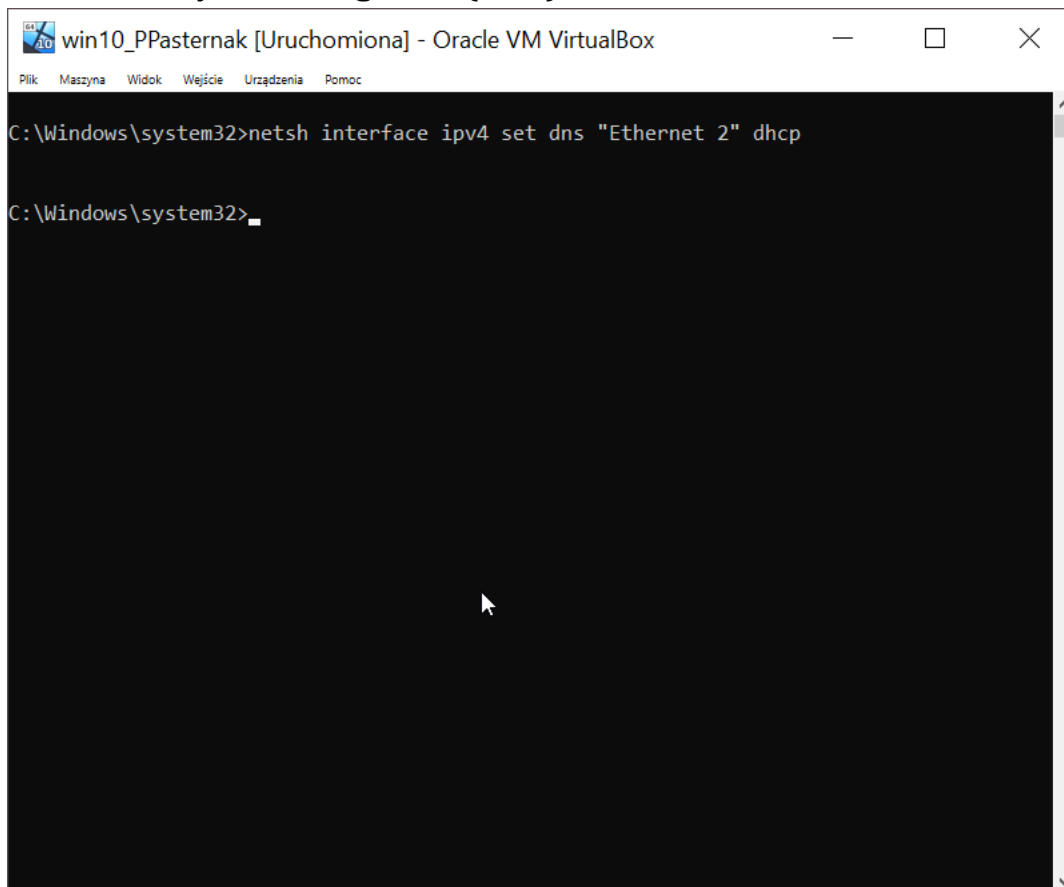
11. Ustawianie statycznego DNS (CMD)



The screenshot shows a Windows command prompt window titled "win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox". The window has a menu bar with "Plik", "Maszyna", "Widok", "Wejście", "Urządzenia", and "Pomoc". The command prompt shows the command `C:\Windows\system32>netsh interface ipv4 set dns "Ethernet 2" static 8.8.8.8 primary` being entered. The prompt then moves to the next line, `C:\Windows\system32>`, with a cursor at the end.

```
C:\Windows\system32>netsh interface ipv4 set dns "Ethernet 2" static 8.8.8.8 primary  
  
C:\Windows\system32>
```

12. Ustawianie dynamicznego DNS (CMD)

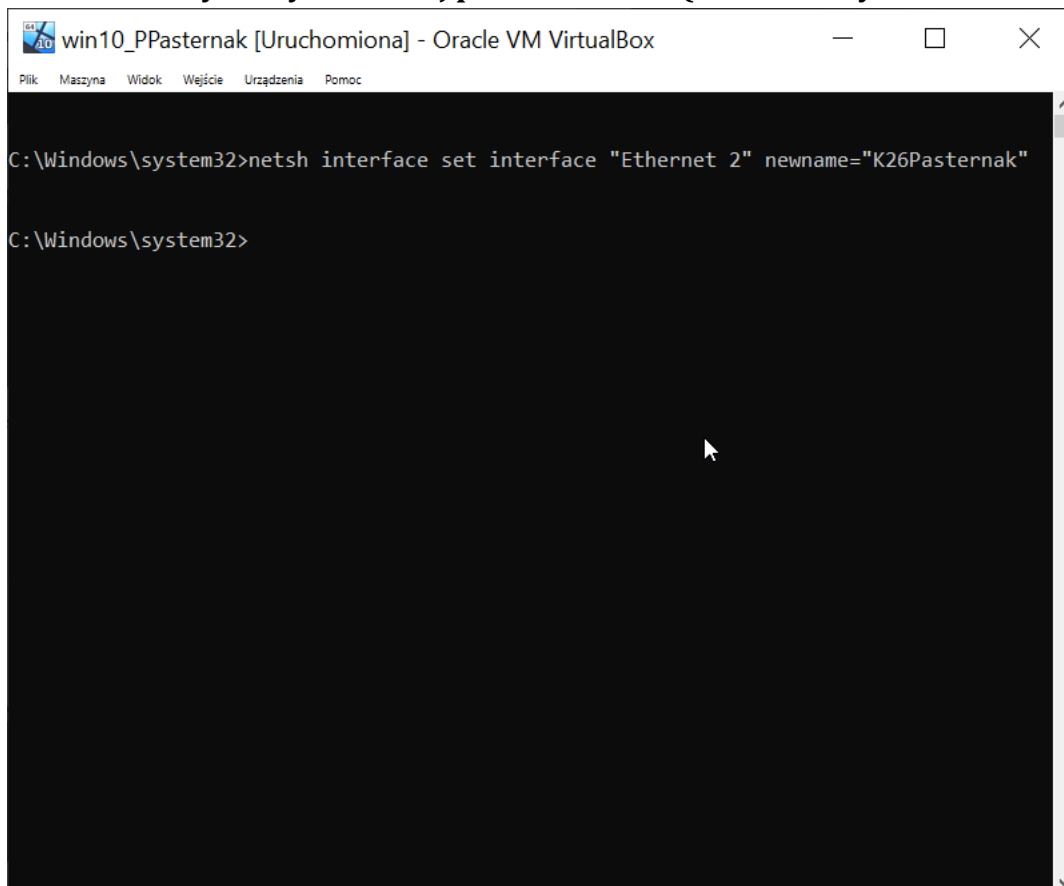


```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

C:\Windows\system32>netsh interface ipv4 set dns "Ethernet 2" dhcp

C:\Windows\system32>
```

13. Zmiana nazwy karty sieciowej polecenie CMD (nazwa karty K1Nazwisko)

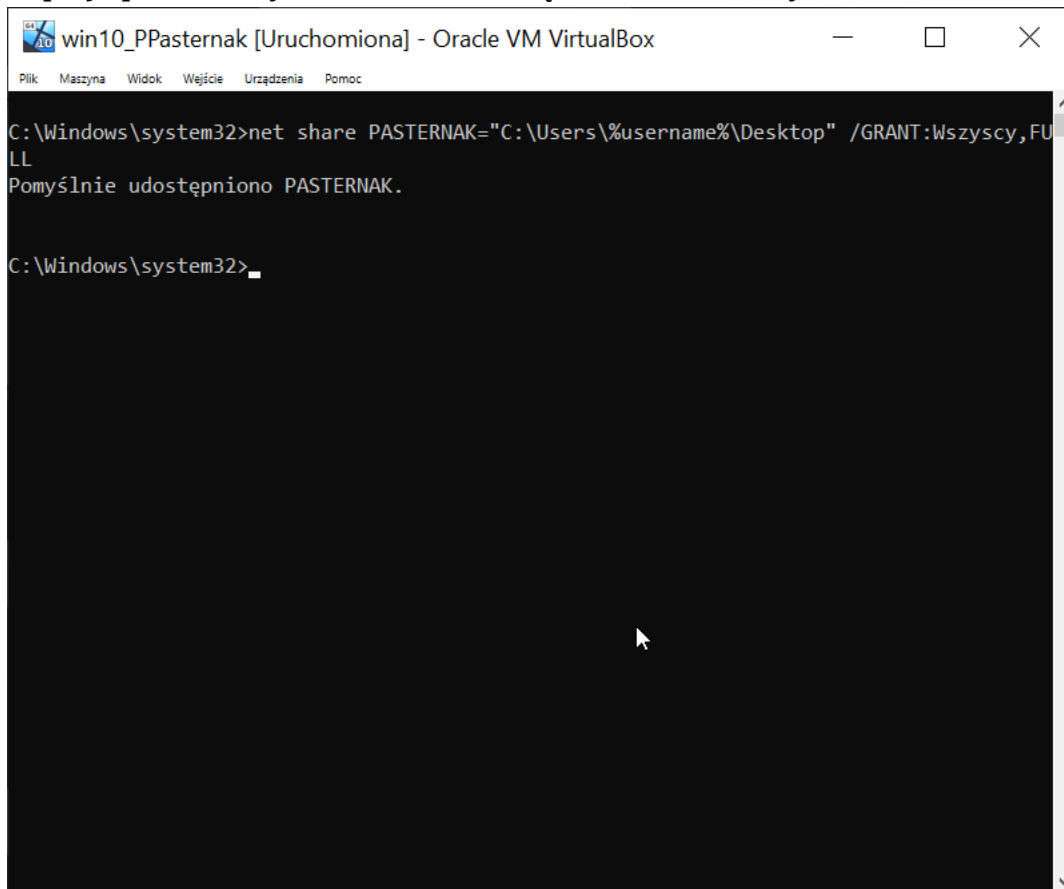


```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc

C:\Windows\system32>netsh interface set interface "Ethernet 2" newname="K26Pasternak"

C:\Windows\system32>
```

**14. Udostępnianie zasobu w sieci (CMD) plik na pulpicie nazwa zasobu
NAZWISKO (jak wprowadzić użytkowników oraz uprawnienia Odczyt
Zapis) sprawdź czy możesz dostać się do zasobów innych osób w klasie**

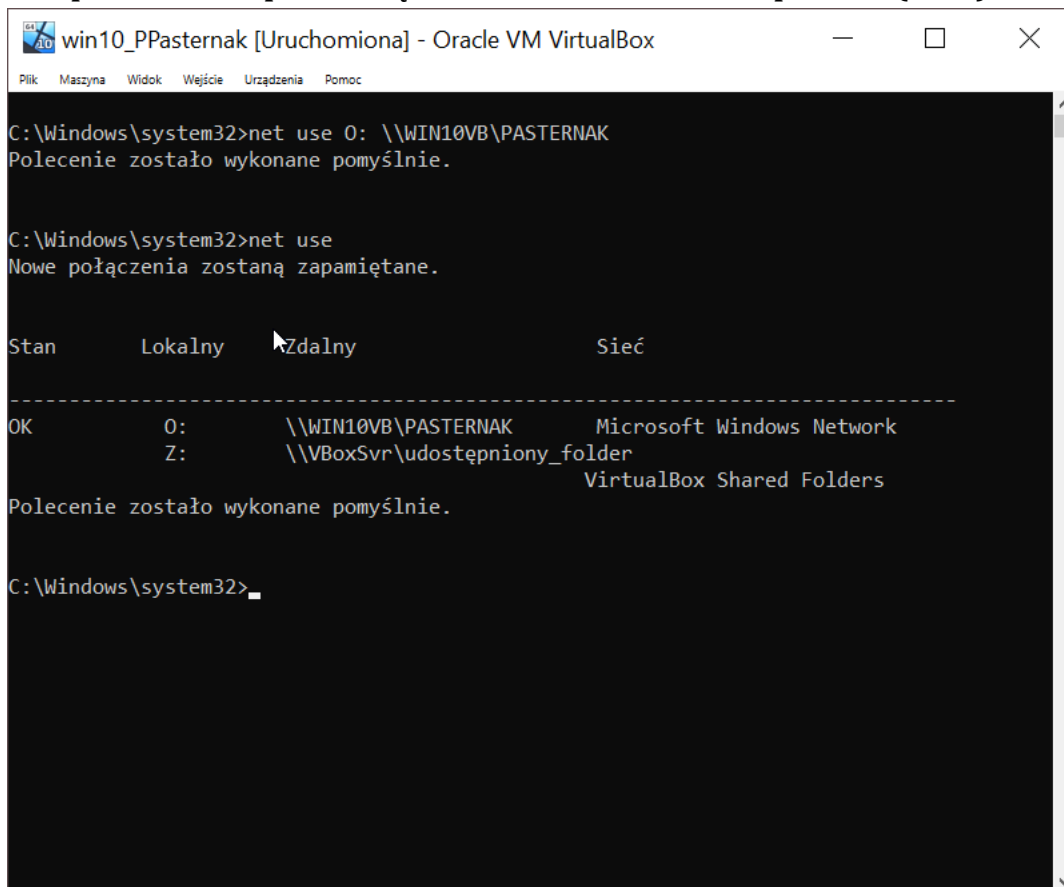


```
win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Węjtcie Urządzenia Pomoc

C:\Windows\system32>net share PASTERNAK="C:\Users\%username%\Desktop" /GRANT:Wszyscy,FULL
Pomyślnie udostępniono PASTERNAK.

C:\Windows\system32>
```

15. Zmapować zasób pod literą alfabetu O na moim komputerze (CMD)



```
C:\Windows\system32>net use O: \\WIN10VB\PASTERNAK
Polecenie zostało wykonane pomyślnie.

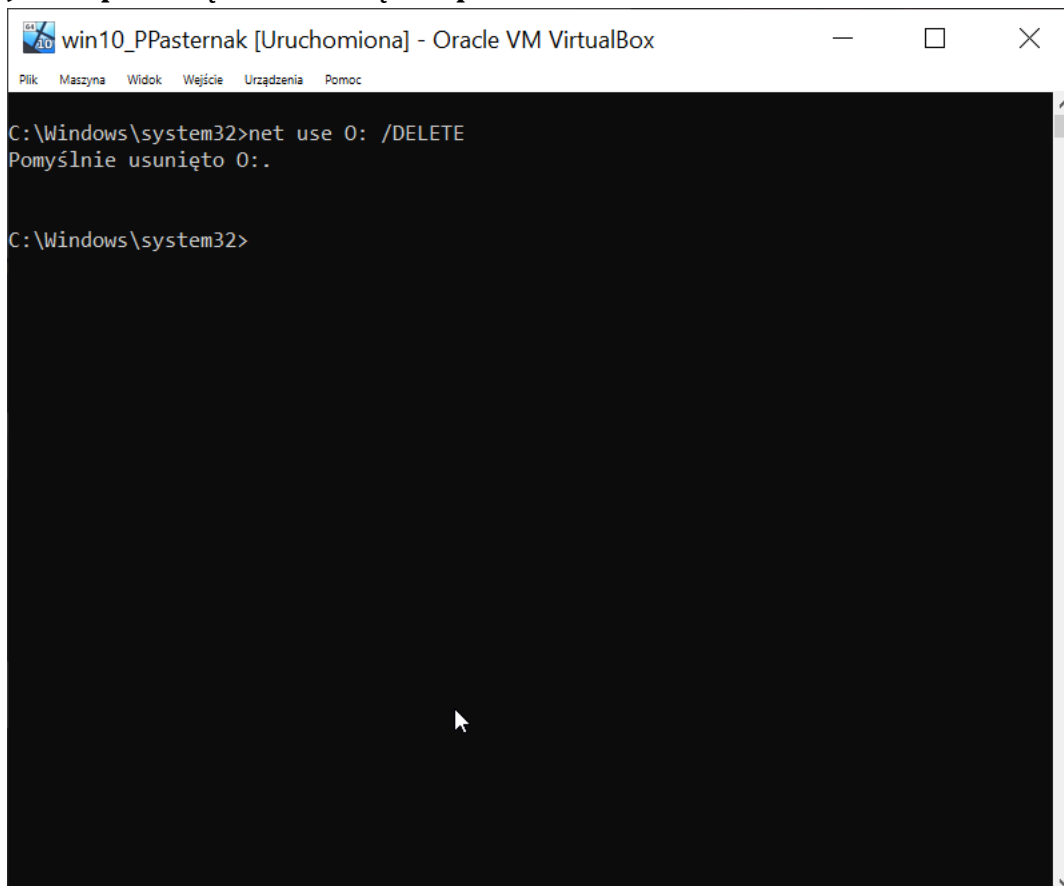
C:\Windows\system32>net use
Nowe połączenia zostaną zapamiętane.

Stan          Lokalny      Zdalny          Sieć
-----
OK            O:          \\WIN10VB\PASTERNAK    Microsoft Windows Network
              Z:          \\VBoxSvr\udostępniony_folder    VirtualBox Shared Folders

Polecenie zostało wykonane pomyślnie.

C:\Windows\system32>
```

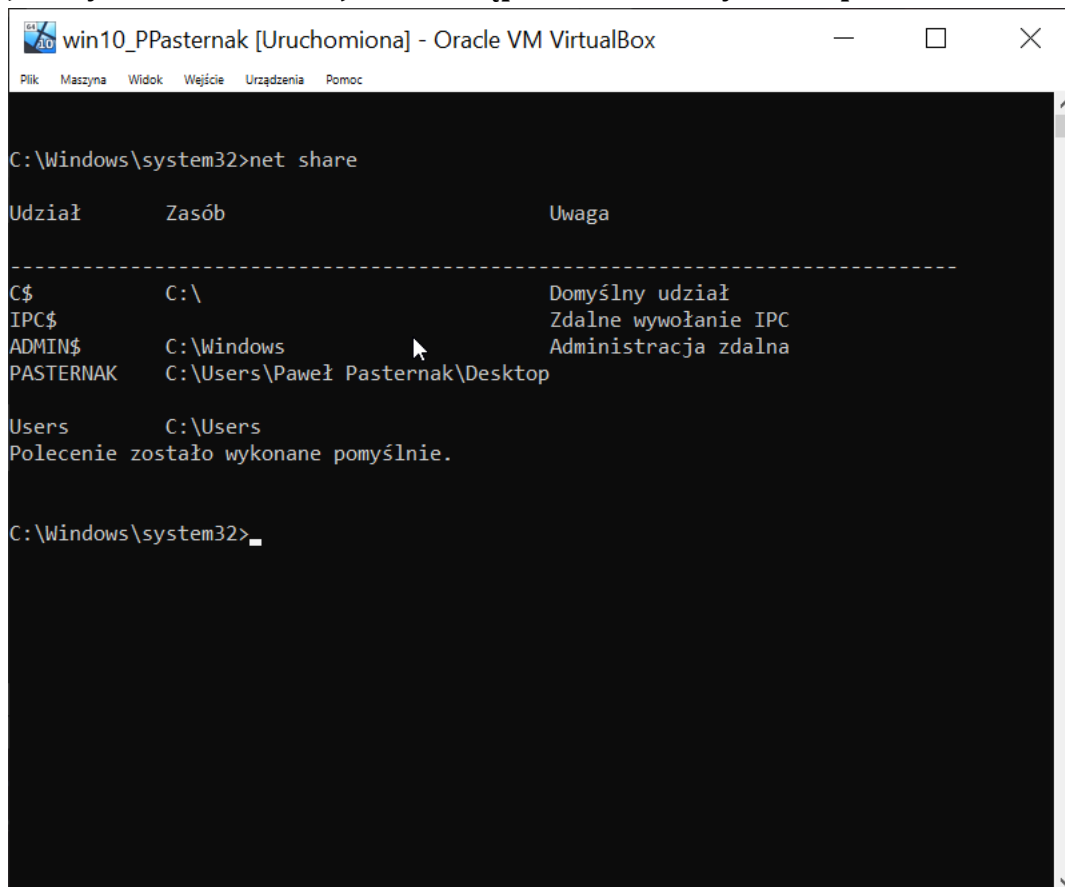
16. Jak za pomocą CMD usunąć mapowanie zasobu



```
C:\Windows\system32>net use O: /DELETE
Pomyślnie usunięto O:..

C:\Windows\system32>
```

17. Jak wyświetlić CMD co jest udostępniane na Naszym komputerze

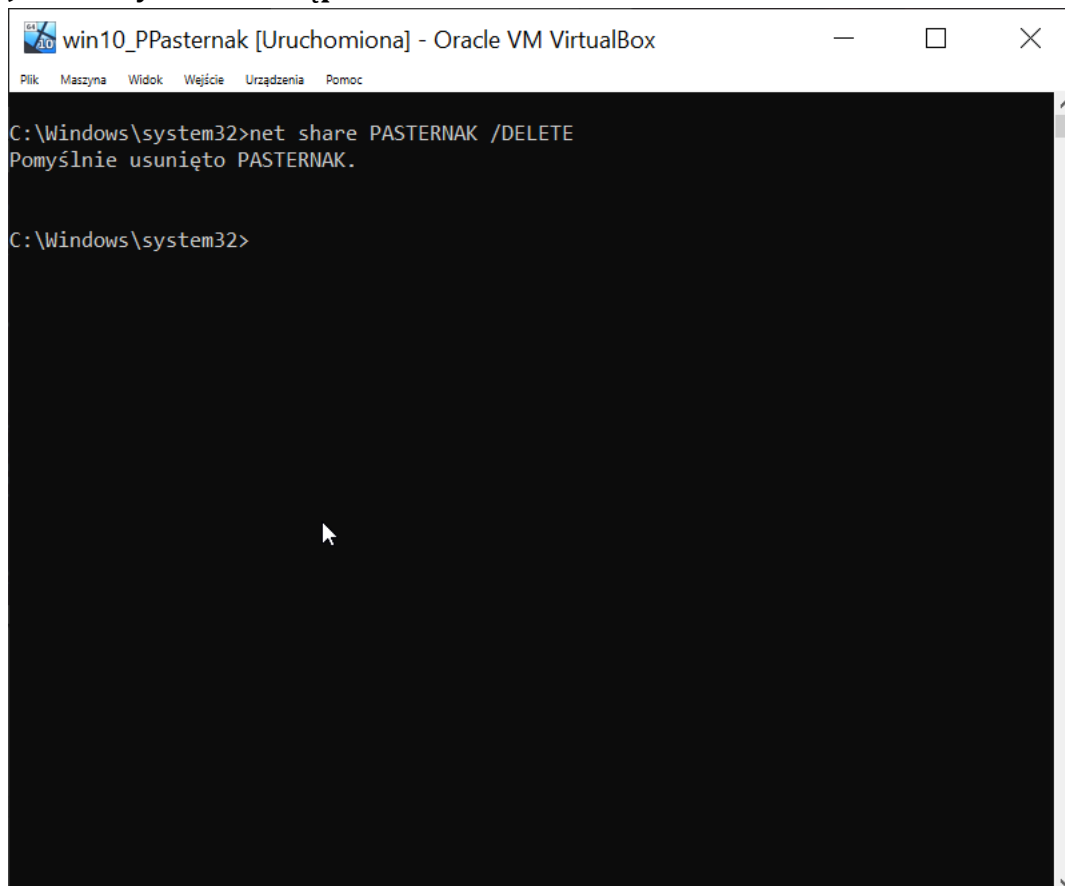


The screenshot shows a Windows command prompt window titled "win10_PPasternak [Uruchomiona] - Oracle VM VirtualBox". The command prompt is at the C:\Windows\system32 directory. The command "net share" has been executed, displaying a table of active shares.

Udział	Zasób	Uwaga
C\$	C:\	Domyślny udział
IPC\$		Zdalne wywołanie IPC
ADMIN\$	C:\Windows	Administracja zdalna
PASTERNAK	C:\Users\Paweł Pasternak\Desktop	
Users	C:\Users	

Below the table, the message "Polecenie zostało wykonane pomyślnie." is displayed. The command prompt is now at the C:\Windows\system32> prompt.

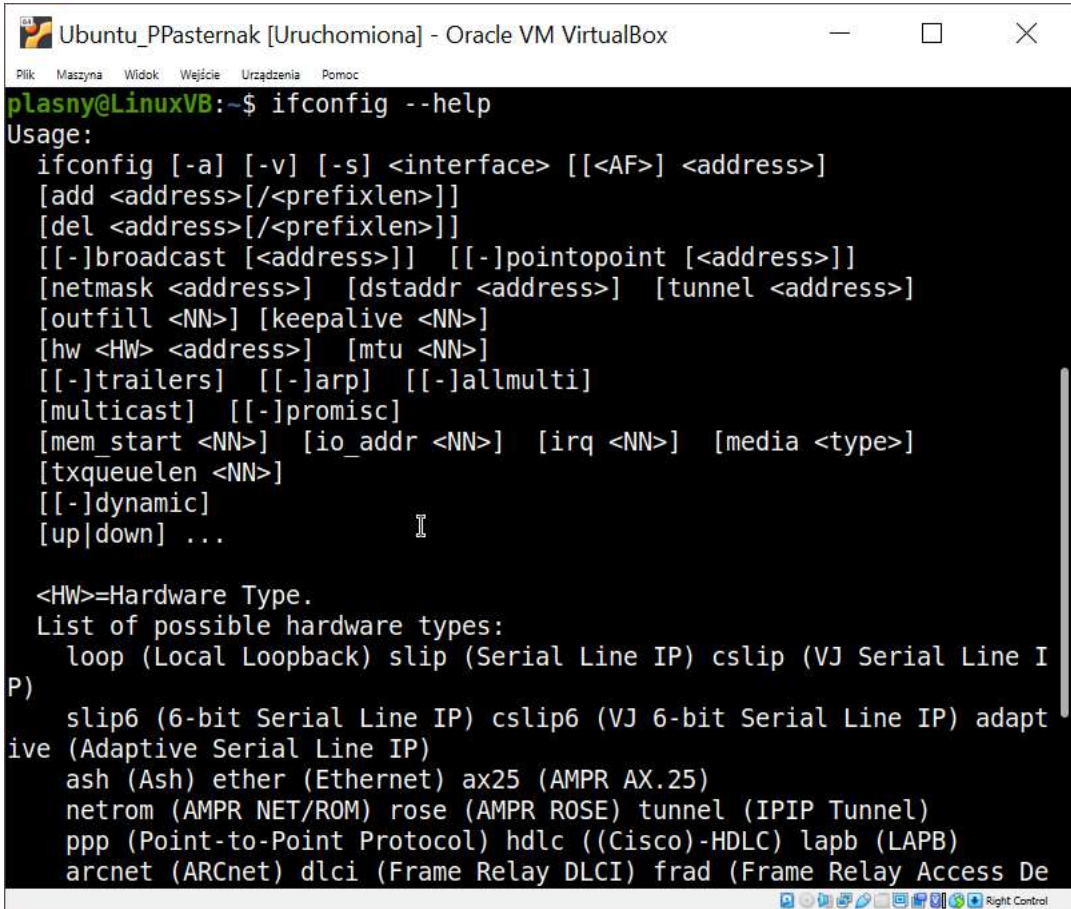
18. Jak zatrzymać udostępnianie CMD



The screenshot shows the same Windows command prompt window. The command "net share PASTERNAK /DELETE" has been executed, resulting in the message "Pomyślnie usunięto PASTERNAK." The command prompt is now at the C:\Windows\system32> prompt.

19. Jakie polecenia sieciowe obowiązują w linuxie opisz pokaż działanie

a)



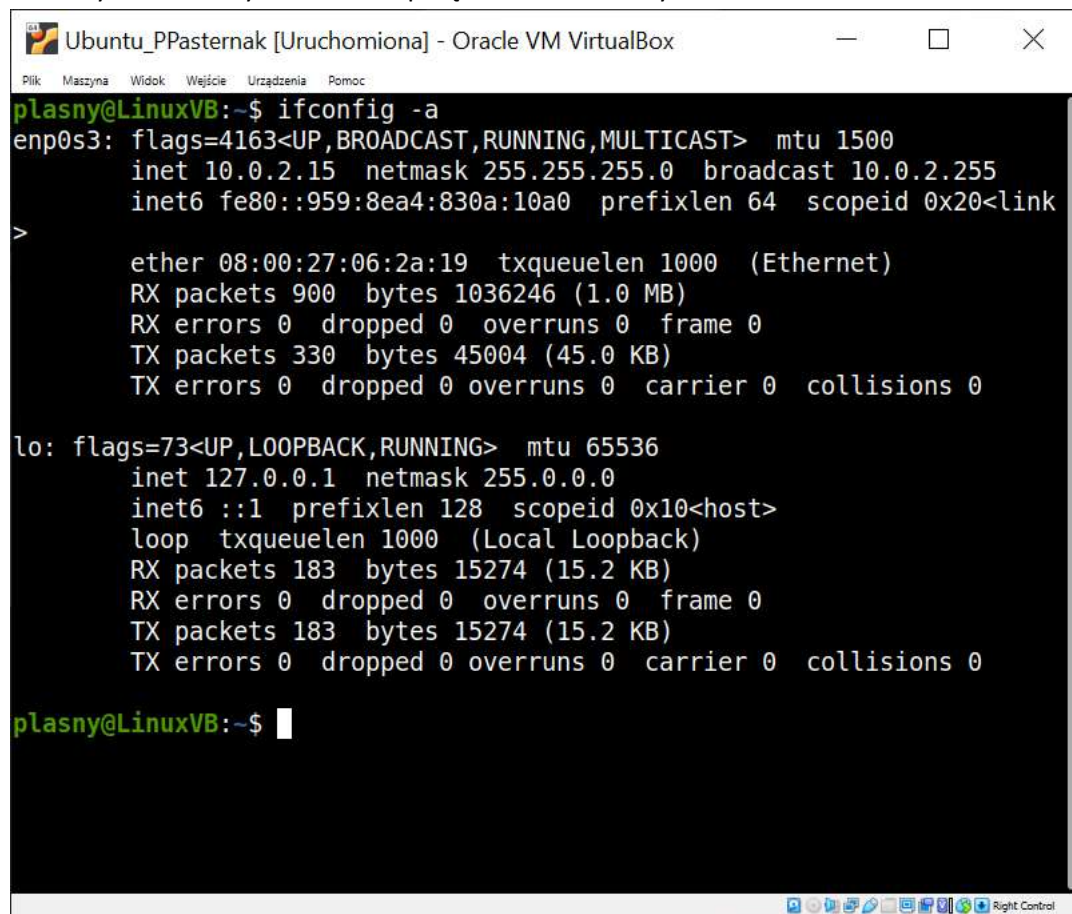
```

pilasny@LinuxVB:~$ ifconfig --help
Usage:
  ifconfig [-a] [-v] [-s] <interface> [[<AF>] <address>]
  [add <address>[/<prefixlen>]]
  [del <address>[/<prefixlen>]]
  [[-]broadcast [<address>]] [[-]pointopoint [<address>]]
  [netmask <address>] [dstaddr <address>] [tunnel <address>]
  [outfill <NN>] [keepalive <NN>]
  [hw <HW> <address>] [mtu <NN>]
  [[-]trailers] [[-]arp] [[-]allmulti]
  [multicast] [[-]promisc]
  [mem_start <NN>] [io_addr <NN>] [irq <NN>] [media <type>]
  [txqueuelen <NN>]
  [[-]dynamic]
  [up|down] ...

<HW>=Hardware Type.
List of possible hardware types:
  loop (Local Loopback) slip (Serial Line IP) cslip (VJ Serial Line I
P)
  slip6 (6-bit Serial Line IP) cslip6 (VJ 6-bit Serial Line IP) adapt
ive (Adaptive Serial Line IP)
  ash (Ash) ether (Ethernet) ax25 (AMPR AX.25)
  netrom (AMPR NET/ROM) rose (AMPR ROSE) tunnel (IPIP Tunnel)
  ppp (Point-to-Point Protocol) hdlc ((Cisco)-HDLC) lapb (LAPB)
  arcnet (ARCnet) dlci (Frame Relay DLCI) frad (Frame Relay Access De
  
```

Ifconfig to ipconfig połączony z netsh. Można tam wyświetlić dane o kartach sieciowych i je konfigurować. Ma dużo funkcji, a najważniejsze to:

- o -a --- wyświetla wszystkie dane o połączeniach sieciowych

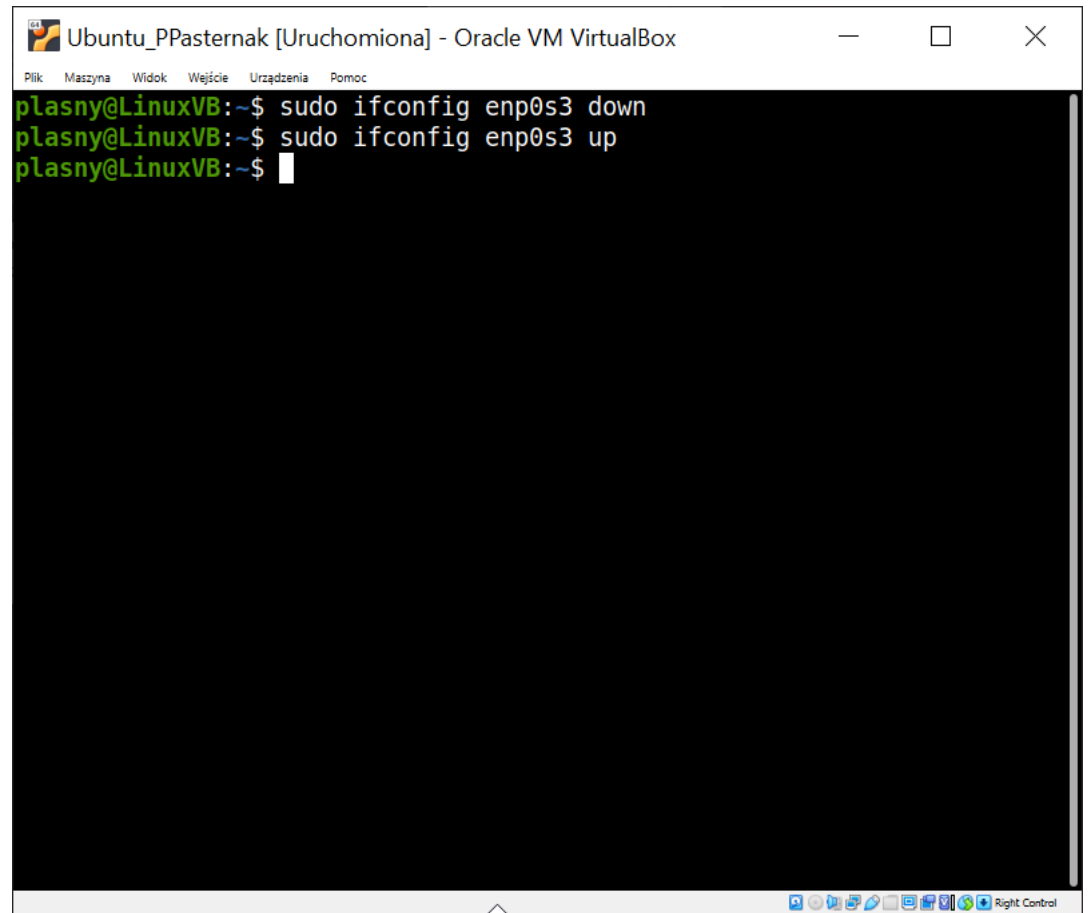


```
Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc
plasny@LinuxVB:~$ ifconfig -a
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::959:8ea4:830a:10a0 prefixlen 64 scopeid 0x20<link>
    >
    ether 08:00:27:06:2a:19 txqueuelen 1000 (Ethernet)
    RX packets 900 bytes 1036246 (1.0 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 330 bytes 45004 (45.0 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 183 bytes 15274 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 183 bytes 15274 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

plasny@LinuxVB:~$
```

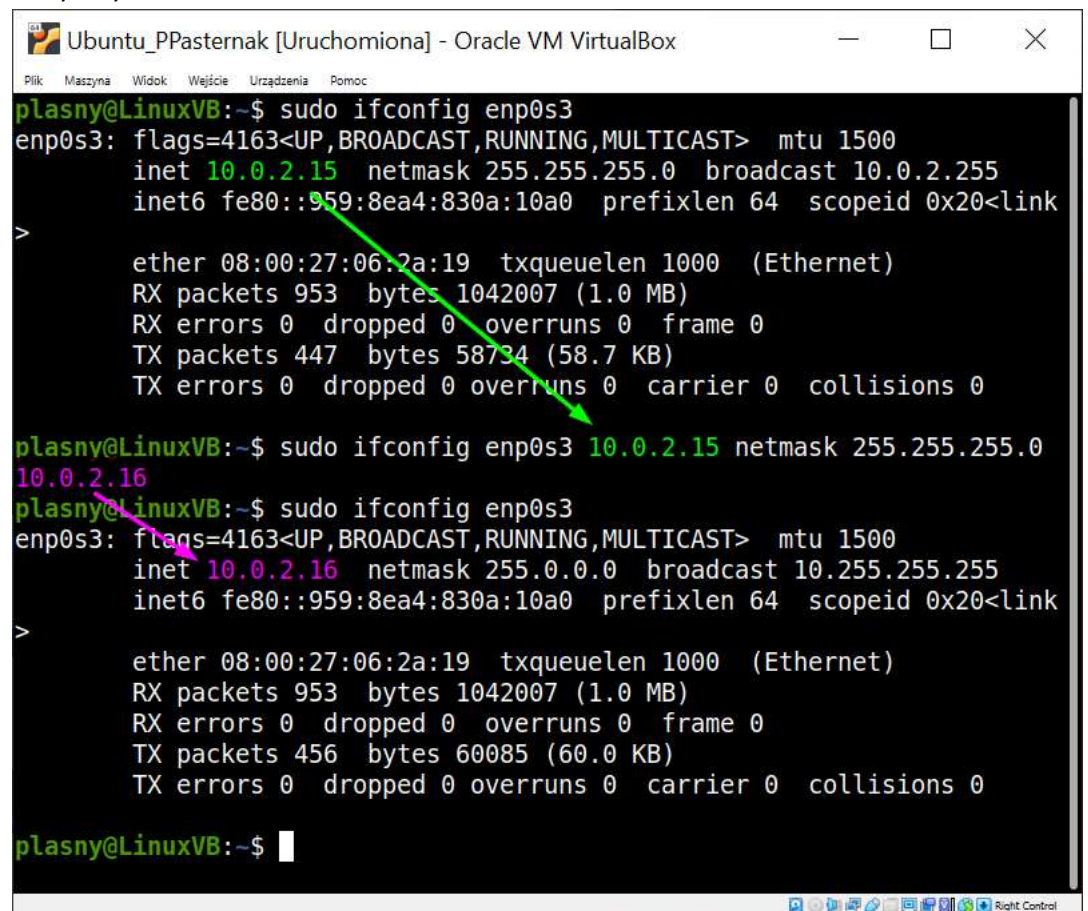
- up i down – są podobne do ipconfig /release i ipconfig /renew



The screenshot shows a terminal window titled "Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox". The terminal has a menu bar with "Plik", "Maszyna", "Widok", "Wejście", "Urządzenia", and "Pomoc". The prompt is "plasny@LinuxVB:~\$". The commands entered are "sudo ifconfig enp0s3 down" and "sudo ifconfig enp0s3 up". The terminal background is black, and the text is green. A vertical scrollbar is visible on the right side of the terminal area. At the bottom of the window, there is a taskbar with various icons and a "Right Control" button.

```
plasny@LinuxVB:~$ sudo ifconfig enp0s3 down
plasny@LinuxVB:~$ sudo ifconfig enp0s3 up
plasny@LinuxVB:~$
```

o statyczny adres IP



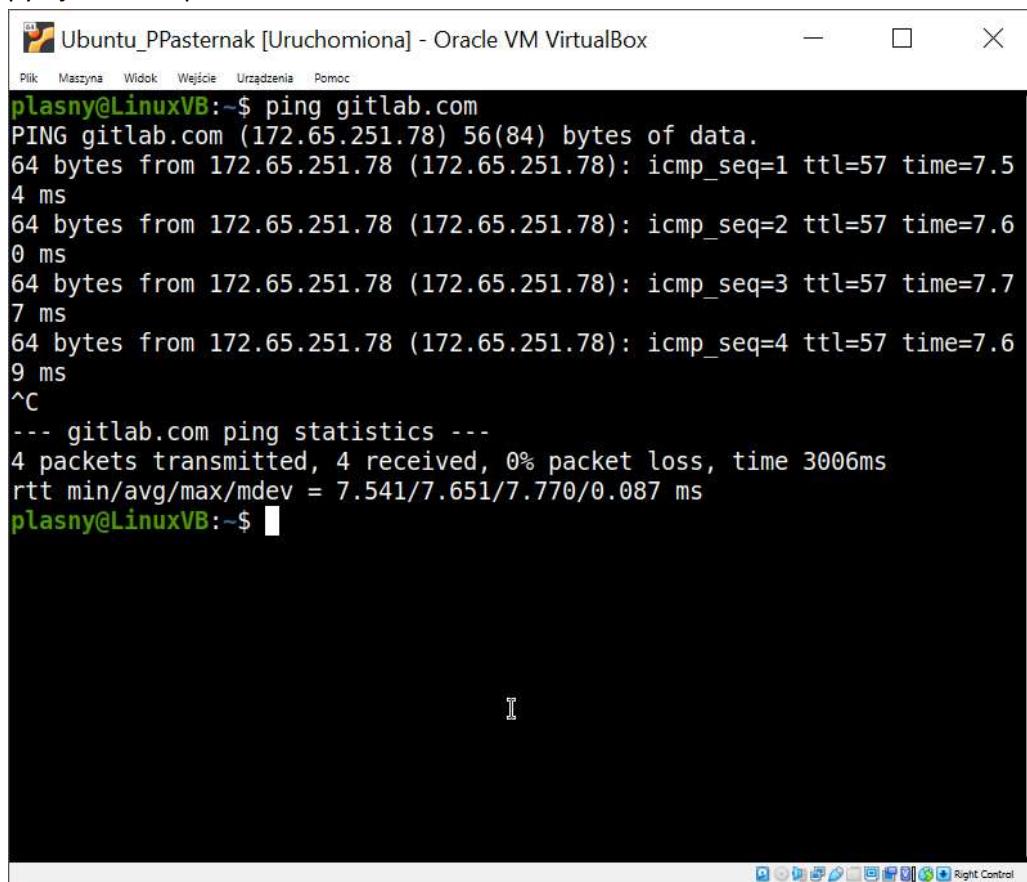
The screenshot shows a terminal window titled "Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox". The user "plasny" is at the prompt. The first command is `sudo ifconfig enp0s3`, which shows the current configuration of the `enp0s3` interface. The IP address is `10.0.2.15` with a netmask of `255.255.255.0`. The second command is `sudo ifconfig enp0s3 10.0.2.15 netmask 255.255.255.0`, which sets the static IP. The third command is `sudo ifconfig enp0s3`, which shows the updated configuration with the IP address `10.0.2.16`. A green arrow points from the first `10.0.2.15` to the second `10.0.2.15` in the second command. A pink arrow points from the first `10.0.2.16` to the second `10.0.2.16` in the third command.

```
plasny@LinuxVB:~$ sudo ifconfig enp0s3
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::959:8ea4:830a:10a0 prefixlen 64 scopeid 0x20<link>
>
    ether 08:00:27:06:2a:19 txqueuelen 1000 (Ethernet)
    RX packets 953 bytes 1042007 (1.0 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 447 bytes 58734 (58.7 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

plasny@LinuxVB:~$ sudo ifconfig enp0s3 10.0.2.15 netmask 255.255.255.0
10.0.2.16
plasny@LinuxVB:~$ sudo ifconfig enp0s3
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.16 netmask 255.0.0.0 broadcast 10.255.255.255
    inet6 fe80::959:8ea4:830a:10a0 prefixlen 64 scopeid 0x20<link>
>
    ether 08:00:27:06:2a:19 txqueuelen 1000 (Ethernet)
    RX packets 953 bytes 1042007 (1.0 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 456 bytes 60085 (60.0 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

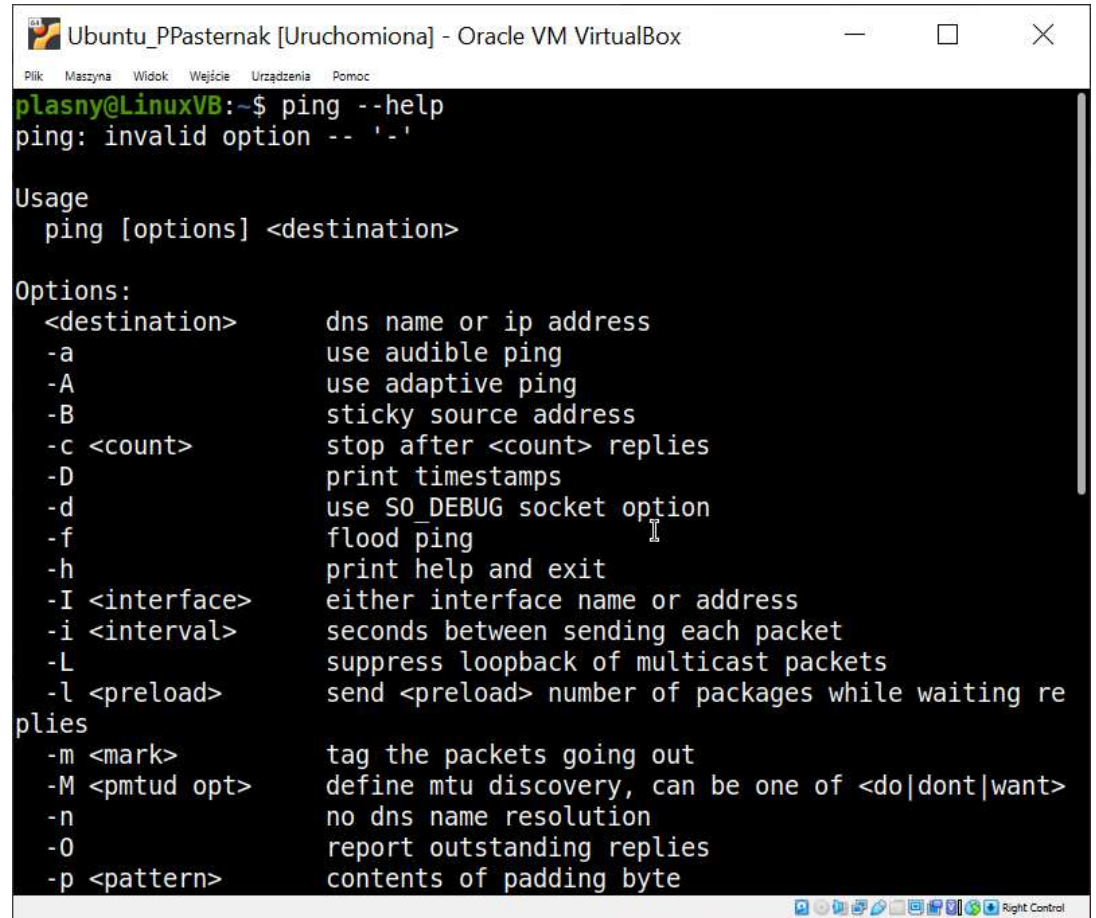
plasny@LinuxVB:~$
```

- b) ping ---Działa tak samo jak w Windowsie, tylko domyślnie mamy parametr -t, czyli pyta do czasu przerwania.



```
Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc
plasny@LinuxVB:~$ ping gitlab.com
PING gitlab.com (172.65.251.78) 56(84) bytes of data.
64 bytes from 172.65.251.78 (172.65.251.78): icmp_seq=1 ttl=57 time=7.54 ms
64 bytes from 172.65.251.78 (172.65.251.78): icmp_seq=2 ttl=57 time=7.60 ms
64 bytes from 172.65.251.78 (172.65.251.78): icmp_seq=3 ttl=57 time=7.77 ms
64 bytes from 172.65.251.78 (172.65.251.78): icmp_seq=4 ttl=57 time=7.69 ms
^C
--- gitlab.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3006ms
rtt min/avg/max/mdev = 7.541/7.651/7.770/0.087 ms
plasny@LinuxVB:~$
```

o -help

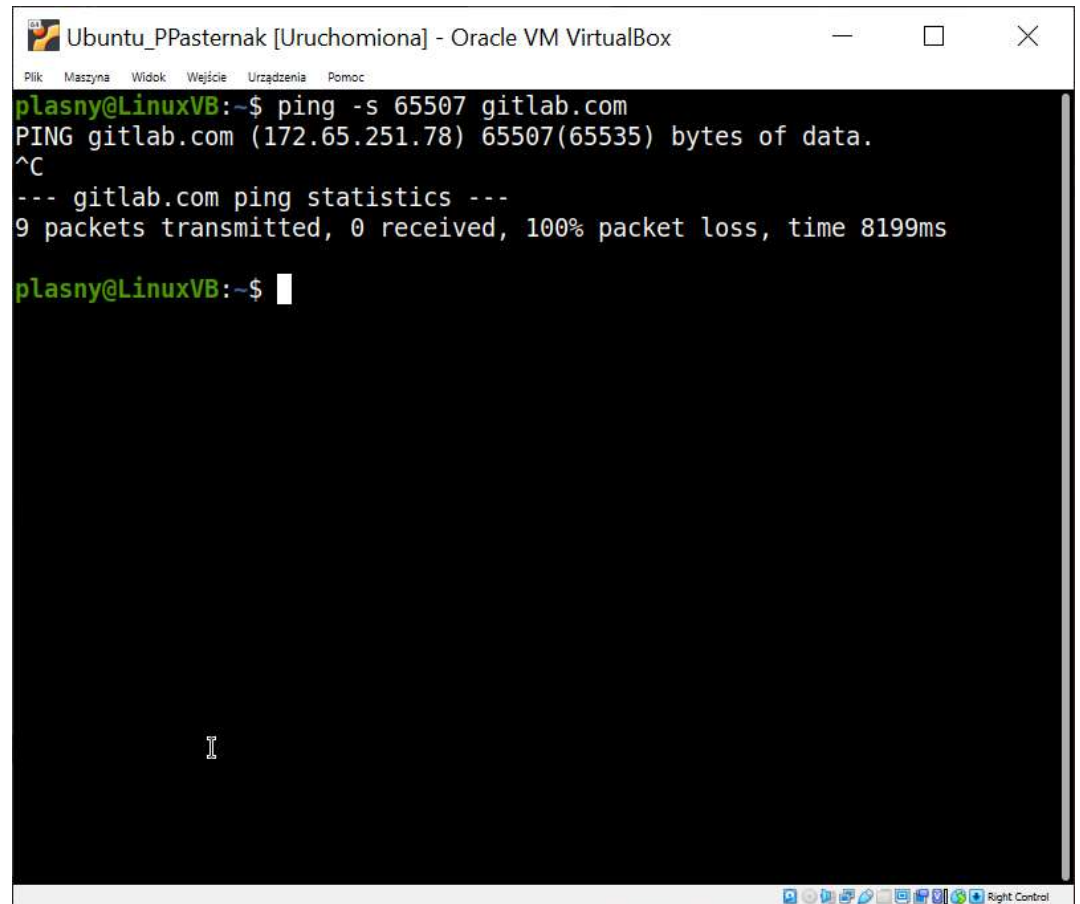


```
Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc
plasny@LinuxVB:~$ ping --help
ping: invalid option -- '-'

Usage
  ping [options] <destination>

Options:
  <destination>      dns name or ip address
  -a                 use audible ping
  -A                 use adaptive ping
  -B                 sticky source address
  -c <count>         stop after <count> replies
  -D                 print timestamps
  -d                 use SO_DEBUG socket option
  -f                 flood ping
  -h                 print help and exit
  -I <interface>     either interface name or address
  -i <interval>       seconds between sending each packet
  -L                 suppress loopback of multicast packets
  -l <preload>        send <preload> number of packages while waiting re
plies
  -m <mark>           tag the packets going out
  -M <pmtud opt>      define mtu discovery, can be one of <do|dont|want>
  -n                 no dns name resolution
  -O                 report outstanding replies
  -p <pattern>        contents of padding byte
```

- o -s – wielkość pakietu



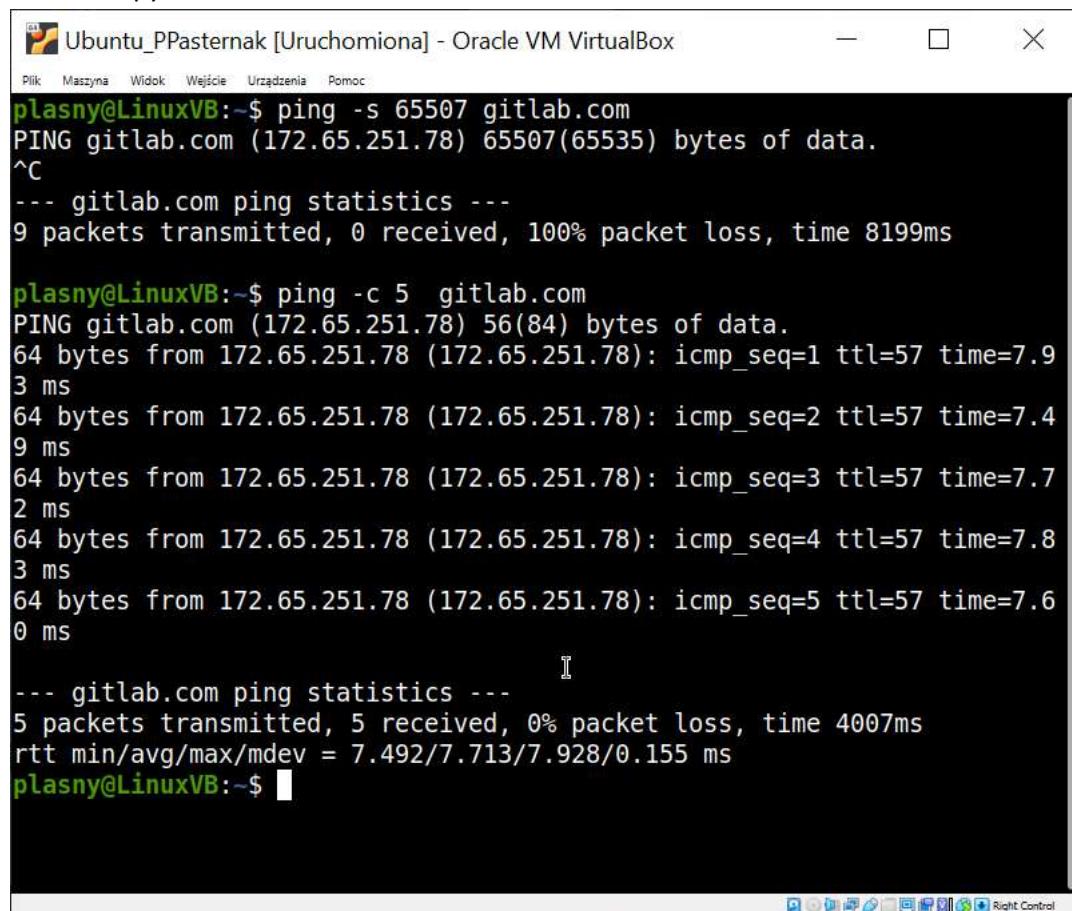
The screenshot shows a terminal window titled "Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox". The terminal output is as follows:

```
plasny@LinuxVB:~$ ping -s 65507 gitlab.com
PING gitlab.com (172.65.251.78) 65507(65535) bytes of data.
^C
--- gitlab.com ping statistics ---
9 packets transmitted, 0 received, 100% packet loss, time 8199ms

plasny@LinuxVB:~$
```

The terminal window has a menu bar with "Plik", "Maszyna", "Widok", "Wejście", "Urządzenia", and "Pomoc". The bottom status bar shows various icons and the text "Right Control".

- o -c- ilość zapytań

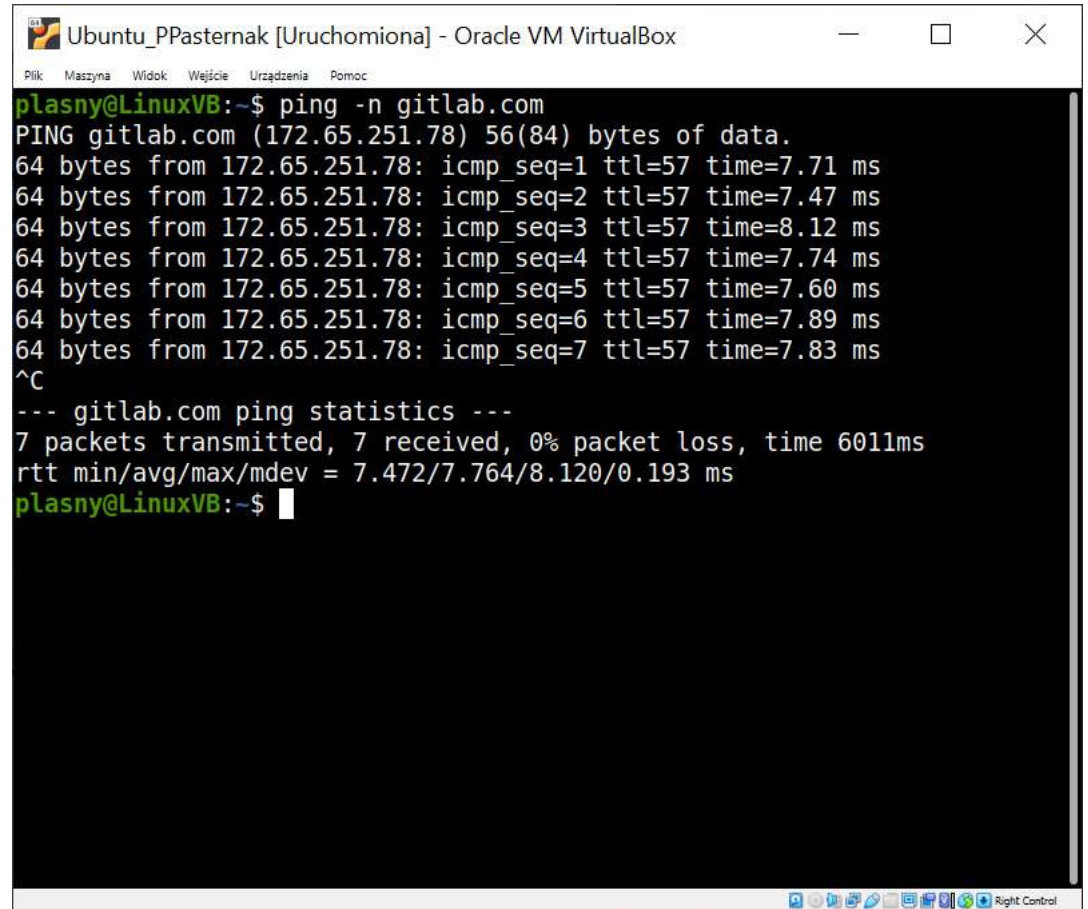


```
Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc
plasny@LinuxVB:~$ ping -s 65507 gitlab.com
PING gitlab.com (172.65.251.78) 65507(65535) bytes of data.
^C
--- gitlab.com ping statistics ---
9 packets transmitted, 0 received, 100% packet loss, time 8199ms

plasny@LinuxVB:~$ ping -c 5 gitlab.com
PING gitlab.com (172.65.251.78) 56(84) bytes of data.
64 bytes from 172.65.251.78 (172.65.251.78): icmp_seq=1 ttl=57 time=7.93 ms
64 bytes from 172.65.251.78 (172.65.251.78): icmp_seq=2 ttl=57 time=7.49 ms
64 bytes from 172.65.251.78 (172.65.251.78): icmp_seq=3 ttl=57 time=7.72 ms
64 bytes from 172.65.251.78 (172.65.251.78): icmp_seq=4 ttl=57 time=7.83 ms
64 bytes from 172.65.251.78 (172.65.251.78): icmp_seq=5 ttl=57 time=7.60 ms

--- gitlab.com ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4007ms
rtt min/avg/max/mdev = 7.492/7.713/7.928/0.155 ms
plasny@LinuxVB:~$
```

- o -n -bez pokazywania nazw dns



```
Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc
plasny@LinuxVB:~$ ping -n gitlab.com
PING gitlab.com (172.65.251.78) 56(84) bytes of data.
64 bytes from 172.65.251.78: icmp_seq=1 ttl=57 time=7.71 ms
64 bytes from 172.65.251.78: icmp_seq=2 ttl=57 time=7.47 ms
64 bytes from 172.65.251.78: icmp_seq=3 ttl=57 time=8.12 ms
64 bytes from 172.65.251.78: icmp_seq=4 ttl=57 time=7.74 ms
64 bytes from 172.65.251.78: icmp_seq=5 ttl=57 time=7.60 ms
64 bytes from 172.65.251.78: icmp_seq=6 ttl=57 time=7.89 ms
64 bytes from 172.65.251.78: icmp_seq=7 ttl=57 time=7.83 ms
^C
--- gitlab.com ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6011ms
rtt min/avg/max/mdev = 7.472/7.764/8.120/0.193 ms
plasny@LinuxVB:~$
```

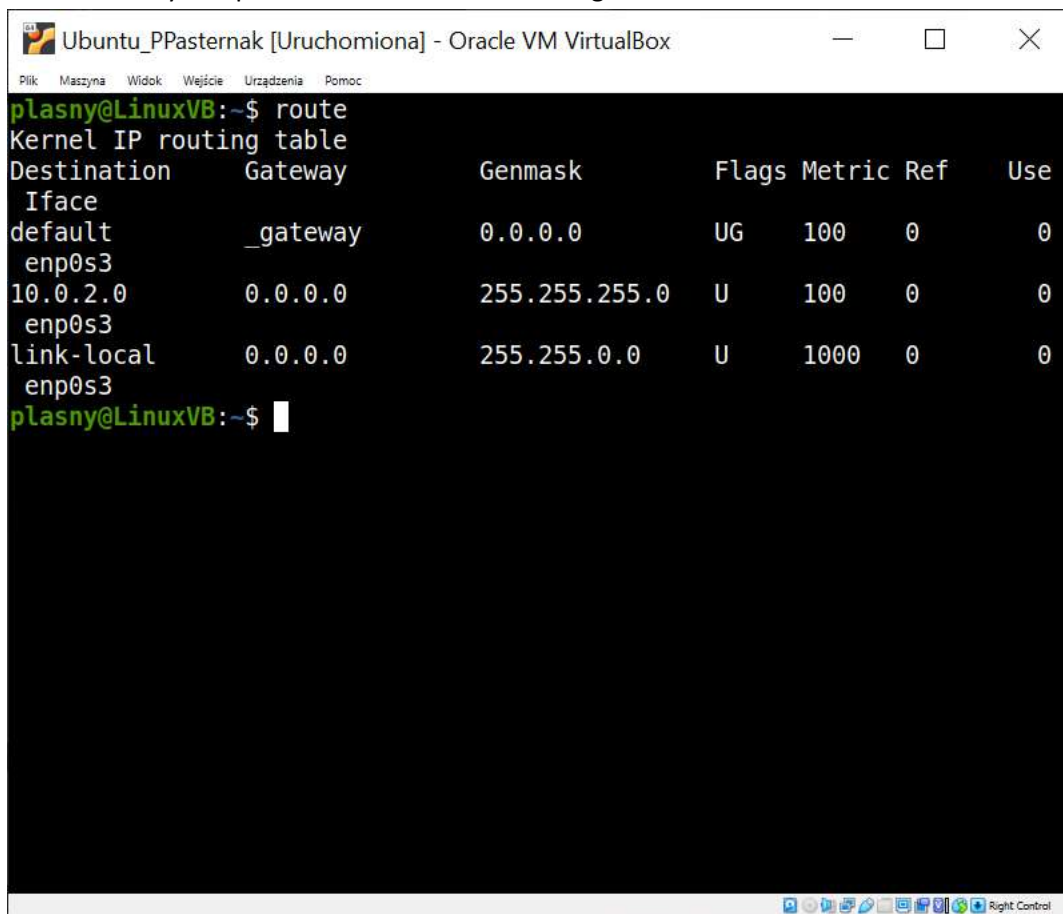
- c) Tracerout --- Śledzi trasę pakietów

- d) Mtr --- Odpowiednik polecenia pathping. Sprawdza trasę pakietów i przy okazji testuje połączenia.

```

My traceroute [v0.93]
LinuxVB (10.0.2.15) 2020-11-13T09:15:40+0100
Keys: Help Display mode Restart statistics Order of fields quit
t
Host Loss% Snt Last Avg Best Wrst StDev
1. _gateway 0.0% 6 0.2 0.2 0.2 0.3 0.0
2. lan.home 0.0% 6 0.8 0.8 0.8 0.9 0.0
3. kra-bng2.tpnet.pl 0.0% 6 43.4 10.4 2.4 43.4 16.2
4. kra-r2.tpnet.pl 0.0% 6 2.4 2.7 2.4 3.1 0.3
5. 195.116.35.93 0.0% 6 7.6 9.1 7.4 16.6 3.7
6. 217.98.245.54 0.0% 6 8.3 8.1 7.7 8.6 0.3
7. cloudflare-20.gw.opentr 0.0% 6 10.6 12.2 10.6 17.6 2.7
8. 172.65.251.78 0.0% 5 7.6 7.7 7.5 8.0 0.2
  
```

e) Route --- Służy do sprawdzenia i konf. Tras routingu



The screenshot shows a terminal window titled "Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox". The user "plasny@LinuxVB" has executed the command "route". The output displays the kernel IP routing table with columns: Destination, Gateway, Genmask, Flags, Metric, Ref, and Use. The table lists three routes: a default route via the _gateway on interface enp0s3, a route to 10.0.2.0 via 0.0.0.0 on enp0s3, and a link-local route to 10.0.2.0 via 0.0.0.0 on enp0s3.

```
plasny@LinuxVB:~$ route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use
Iface
default _gateway 0.0.0.0 UG 100 0 0
enp0s3
10.0.2.0 0.0.0.0 255.255.255.0 U 100 0 0
enp0s3
link-local 0.0.0.0 255.255.0.0 U 1000 0 0
enp0s3
plasny@LinuxVB:~$
```

f) Netstat --- Wyświetla l. połączeń

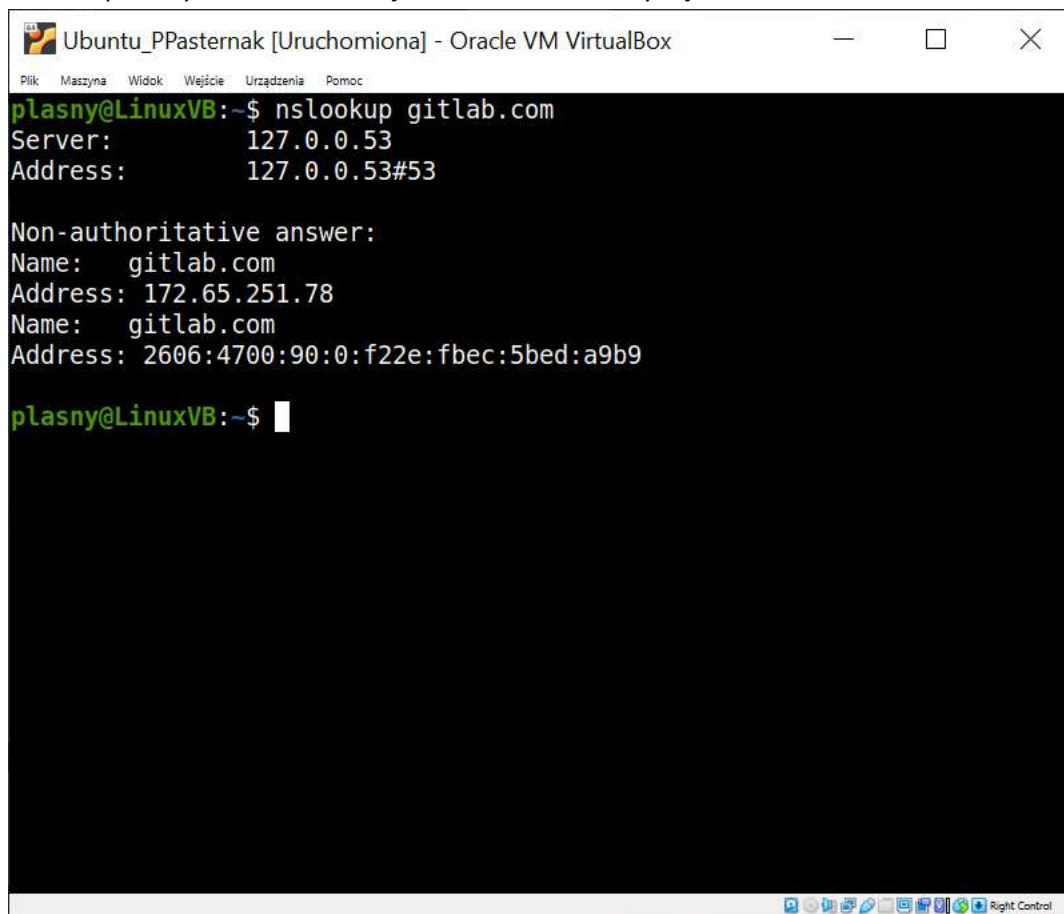
```

Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc
plasny@LinuxVB:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 LinuxVB:bootpc          _gateway:bootps        ESTABLISHED

Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags               Type                   State                  I-Node   Path
unix    2      [ ]                   DGRAM                  -
/journal/syslog
unix   16      [ ]                   DGRAM                  -
/journal/dev-log
unix    8      [ ]                   DGRAM                  -
/journal/socket
unix    2      [ ]                   DGRAM                  -
00/systemd/notify
unix    3      [ ]                   DGRAM                  -
/notify
unix    3      [ ]                   STREAM                 CONNECTED               28821
unix    3      [ ]                   STREAM                 CONNECTED               25513
nux/X0
unix    3      [ ]                   STREAM                 CONNECTED               24711
00/bus
unix    3      [ ]                   STREAM                 CONNECTED               24231
stem_bus_socket
unix    3      [ ]                   STREAM                 CONNECTED               21046
/run/dbus/sy

```

g) Nslookup --- wyświetla informacje o serwerze na którym jest strona



```
Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox
Plik Maszyna Widok Wejście Urządzenia Pomoc
plasny@LinuxVB:~$ nslookup gitlab.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   gitlab.com
Address: 172.65.251.78
Name:   gitlab.com
Address: 2606:4700:90:0:f22e:fbec:5bed:a9b9

plasny@LinuxVB:~$
```

20. Jak oznaczane są interfejsy sieciowe w Linuxie

Klasyczne oznaczenia kart sieciowych:

W systemie Linux interfejsy sieciowe oznaczamy za pomocą skrótów

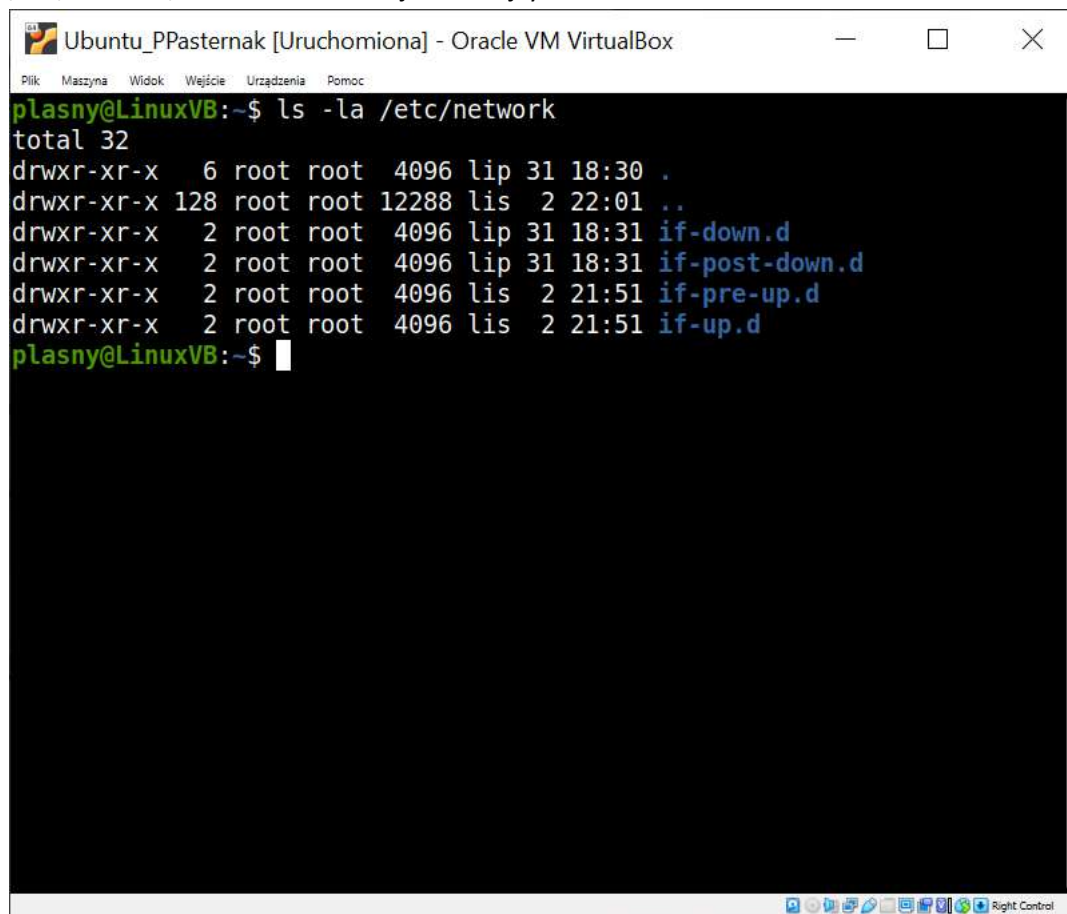
- 1) eth0 - pierwsza karta sieciowa
- 2) eth1 - druga karta sieciowa
- 3) eth0:1 drugi interfejs sieciowy urządzenia fizycznego eth0
- itd..

Ale w Ubuntu od wersji 15.04 istnieje inny sposób oznaczania kart. Podział:

- 1) Nazwy zawierające numery indeksowe dostarczone przez oprogramowanie układowe / BIOS dla urządzeń pokładowych (przykład: eno1)
- 2) Nazwy zawierające numery indeksowe gniazda PCI Express typu hotplug dostarczone przez oprogramowanie układowe / BIOS (przykład: ens1)
- 3) Nazwy uwzględniające fizyczne / geograficzne położenie złącza sprzętu (przykład: enp2s0)
- 4) Nazwy zawierające adresy MAC interfejsów (przykład: enx78e7d1ea46da)

21. Jakie pliki konfiguracyjne dotyczą interfejsu sieciowego Linux

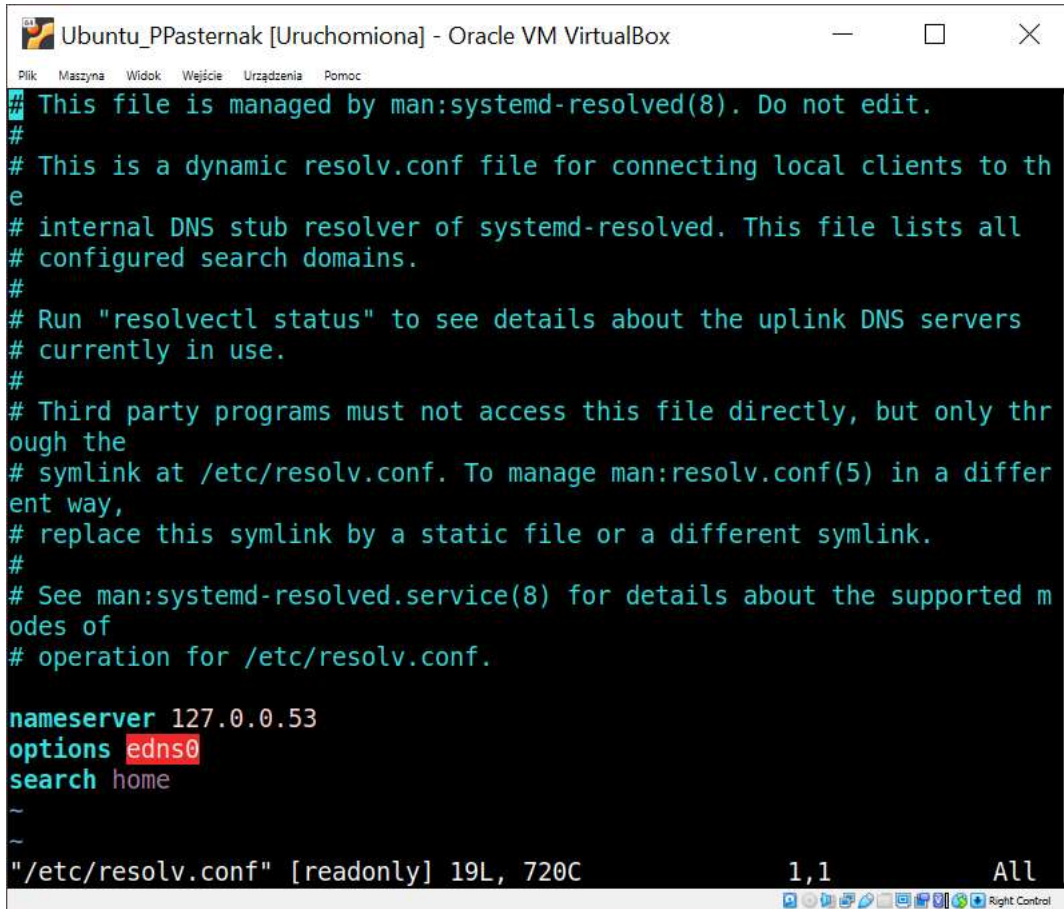
/etc/network/interfaces- Definiuje interfejsy sieciowe.



The screenshot shows a terminal window titled "Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox". The terminal displays the command `ls -la /etc/network` and its output. The output lists the files in the `/etc/network` directory, including `.`, `..`, `if-down.d`, `if-post-down.d`, `if-pre-up.d`, and `if-up.d`. The prompt is `plasny@LinuxVB:~$`.

```
plasny@LinuxVB:~$ ls -la /etc/network
total 32
drwxr-xr-x  6 root root  4096 lip 31 18:30 .
drwxr-xr-x 128 root root 12288 lis  2 22:01 ..
drwxr-xr-x  2 root root  4096 lip 31 18:31 if-down.d
drwxr-xr-x  2 root root  4096 lip 31 18:31 if-post-down.d
drwxr-xr-x  2 root root  4096 lis  2 21:51 if-pre-up.d
drwxr-xr-x  2 root root  4096 lis  2 21:51 if-up.d
plasny@LinuxVB:~$
```

/etc/resolv.conf- Adresy serwerów DNS.



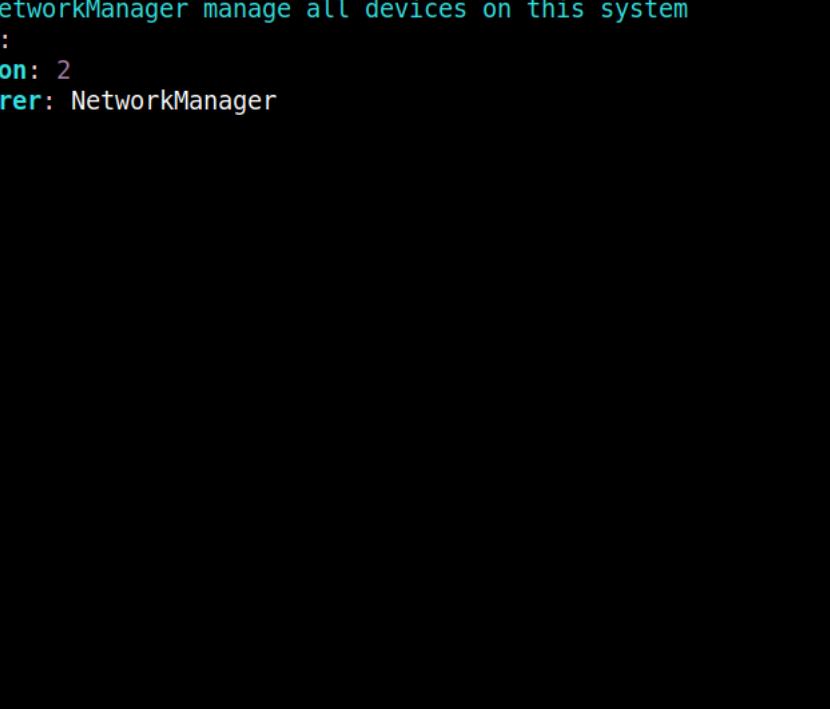
The screenshot shows a terminal window titled "Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox". The terminal displays the contents of the `/etc/resolv.conf` file. The text is as follows:

```
## This file is managed by man:systemd-resolved(8). Do not edit.
#
# This is a dynamic resolv.conf file for connecting local clients to the
# internal DNS stub resolver of systemd-resolved. This file lists all
# configured search domains.
#
# Run "resolvectl status" to see details about the uplink DNS servers
# currently in use.
#
# Third party programs must not access this file directly, but only through the
# symlink at /etc/resolv.conf. To manage man:resolv.conf(5) in a different way,
# replace this symlink by a static file or a different symlink.
#
# See man:systemd-resolved.service(8) for details about the supported modes of
# operation for /etc/resolv.conf.

nameserver 127.0.0.53
options edns0
search home
~
~
"/etc/resolv.conf" [readonly] 19L, 720C
```

The terminal window has a menu bar with "Plik", "Maszyna", "Widok", "Wejście", "Urządzenia", and "Pomoc". The status bar at the bottom shows "1,1" and "All".

/etc/netplan/*.yaml- W nowych wersjach Ubuntu, ten plik zastąpił pierwszy.



Ubuntu_PPasternak [Uruchomiona] - Oracle VM VirtualBox

Plik Maszyna Widok Wejście Urządzenia Pomoc

```
# Let NetworkManager manage all devices on this system
network:
  version: 2
  renderer: NetworkManager
```

<ork-manager-all.yaml" [readonly] 4L, 104C 1,1 All

<https://bellard.org/jslinux/>

<https://bellard.org/jslinux/vm.html?cpu=riscv64&url=https://bellard.org/jslinux/fedora25-riscv.cfg>

<https://autellinux.com/2013/09/04/online-simulator-in-linux-practice-linux-commands/>