Kolegium Nauk Przyrodniczych
Uniwersytet Rzeszowski

Przedmiot:

Sieci komputerowe

Przygotowanie środowiska uruchomieniowego PXE, pozwalającego na bezpośrednie uruchamianie systemów z sieci komputerowej

Wykonał:

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Prowadzący: Mgr inż. Jarosław Szkoła

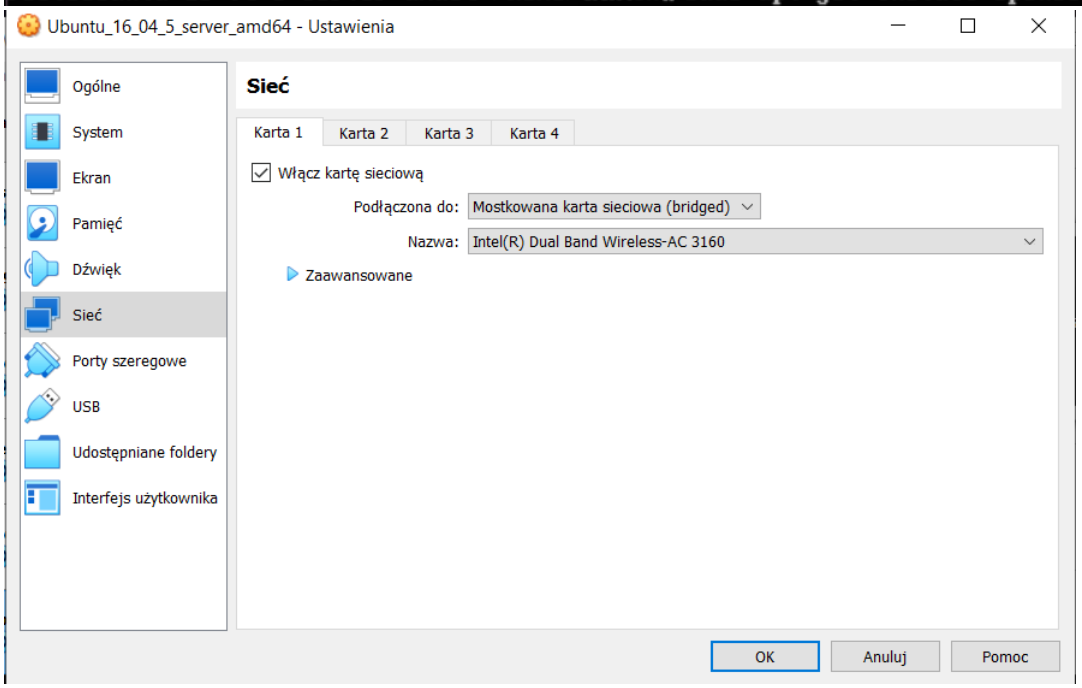
Rzeszów 2023

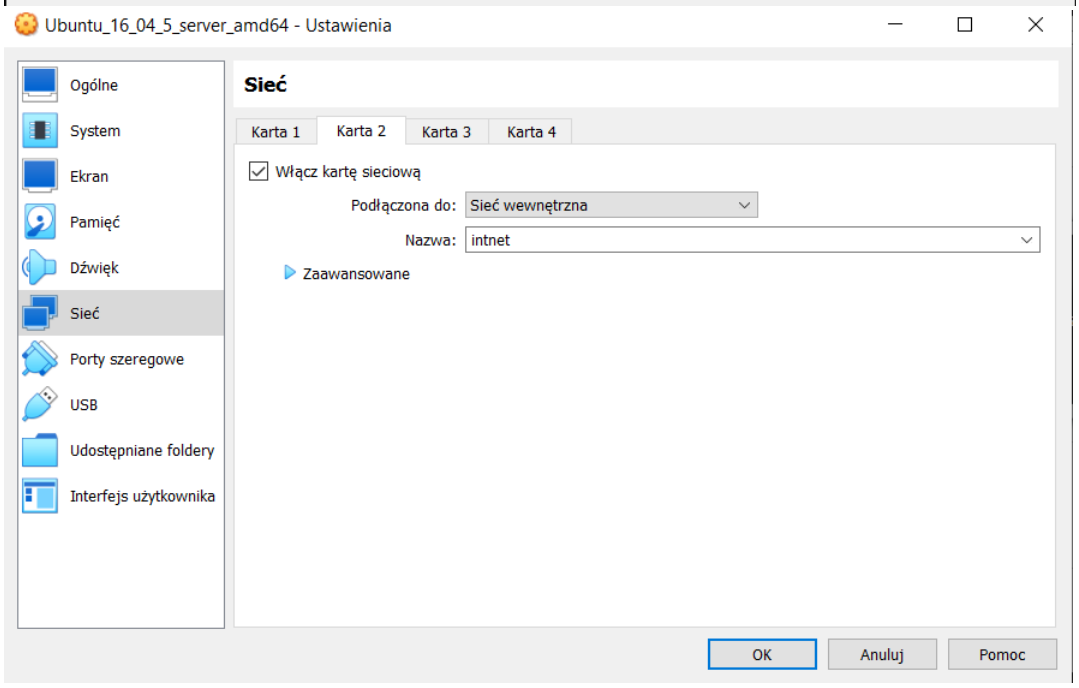
1. **Przygotuj konfigurację serwera PXE, która pozwala na instalację wybranego systemu operacyjnego typu Linux, z wykorzystaniem instalatora sieciowego. Proces instalacji powinien przebiegał automatycznie, bez potrzeby interakcji z użytkownikiem. Po zainstalowaniu systemu operacyjnego, maszyna z nowym systemem powinna został automatycznie wyłączona. Instalator powinien automatycznie zainstalował wybrany kompilator języka C/C++ oraz serwer SSH.**

Instalujemy oprogramowanie SSH.

```
admin@Ubuntu-16-04-5-server-amd64:~$ su
Password:
root@Ubuntu-16-04-5-server-amd64:/home/admin#
```

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# sudo apt-get install openssh-server
```





Uzyskujemy adres IP za pomocą polecenia "ip a".

```
admin@Ubuntu-16-04-5-server-amd64:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state l
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc p
000
    link/ether 08:00:27:6d:96:ae brd ff:ff:ff:ff:ff:ff
    inet 192.168.0.17/24 brd 192.168.0.255 scope global enp0s
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe6d:96ae/64 scope link
       valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state D(
    link/ether 08:00:27:6f:3f:f9 brd ff:ff:ff:ff:ff:ff
admin@Ubuntu-16-04-5-server-amd64:~$
```

Łączymy się przez SSH.

```
C:\Users\Admin>ssh admin@192.168.0.17
The authenticity of host '192.168.0.17 (192.168.0.17)' can't be established
ECDSA key fingerprint is SHA256:6/HkFPFVzBKTITHEuj/XT70PlzAOpXyAe+iIm0DDzy8c.
Are you sure you want to continue connecting (yes/no/[fingerprint])? y
Please type 'yes', 'no' or the fingerprint: yes
Warning: Permanently added '192.168.0.17' (ECDSA) to the list of known hosts.
admin@192.168.0.17's password:
Welcome to Ubuntu 16.04.5 LTS (GNU/Linux 4.4.0-131-generic x86 64)

 * Documentation:  https://help.ubuntu.com/
 * Management:     https://andscape.canonical.com/
 * Support:        https://ubuntu.com/advantage
New release '18.04.6 LTS' available
Run 'do-release-upgrade' to upgrade to it.
```

Przechodzimy do konta administratora (root).

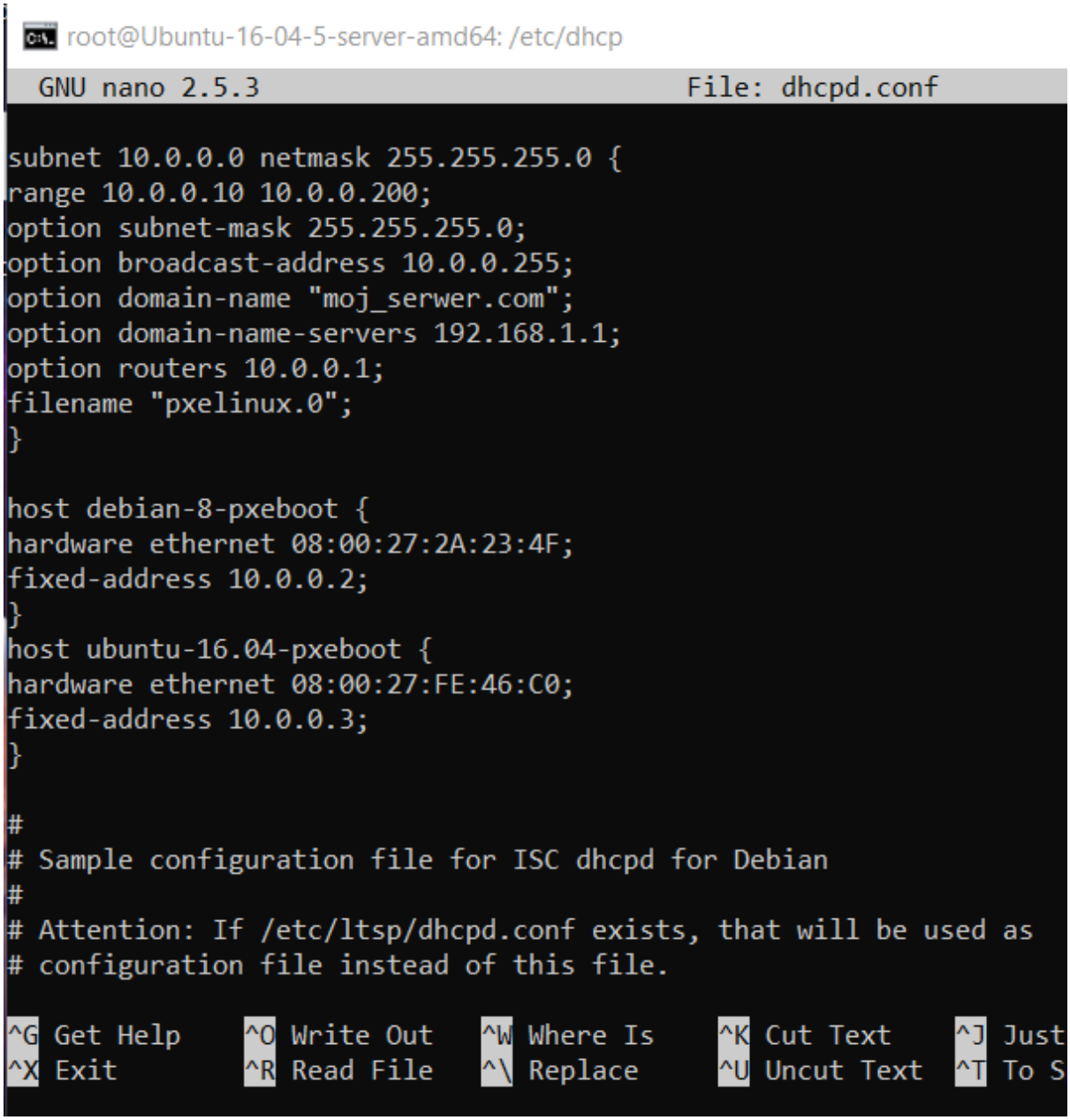
```
admin@Ubuntu-16-04-5-server-amd64:~$ su
Password:
root@Ubuntu-16-04-5-server-amd64:/home/admin#
```

Instalujemy serwer TFTPD.

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# apt-get install -y tftpd-hpa
```

Instalujemy serwer DHCP.

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# apt-get install -y isc-dhcp-server
root@Ubuntu-16-04-5-server-amd64:/home/admin# cd /etc/dhcp
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp#
```



Naciskamy "Ctrl + O".

```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# ifconfig
enp0s3    Link encap:Ethernet  HWaddr 08:00:27:6d:96:ae
          inet addr:192.168.0.17  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::a00:27ff:fe6d:96ae/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:4580 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1069 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:825608 (825.6 KB)  TX bytes:131188 (131.1 KB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:161 errors:0 dropped:0 overruns:0 frame:0
          TX packets:161 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:11889 (11.8 KB)  TX bytes:11889 (11.8 KB)
```

```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# ifconfig enp0s8 10.0.0.1
```

```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:6d:96:ae brd ff:ff:ff:ff:ff:ff
    inet 192.168.0.17/24 brd 192.168.0.255 scope global enp0s3
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe6d:96ae/64 scope link
       valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:6f:3f:f9 brd ff:ff:ff:ff:ff:ff
    inet 10.0.0.1/8 brd 10.255.255.255 scope global enp0s8
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe6f:3ff9/64 scope link
       valid_lft forever preferred_lft forever
```

```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# ifconfig enp0s8 10.0.0.1/24
```

```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:6d:96:ae brd ff:ff:ff:ff:ff:ff
    inet 192.168.0.17/24 brd 192.168.0.255 scope global enp0s3
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe6d:96ae/64 scope link
       valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:6f:3f:f9 brd ff:ff:ff:ff:ff:ff
    inet 10.0.0.1/24 brd 10.0.0.255 scope global enp0s8
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe6f:3ff9/64 scope link
       valid_lft forever preferred_lft forever
```

Uruchamiamy serwer.

```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# systemctl enable isc-dhcp-server
Synchronizing state of isc-dhcp-server.service with SysV init with /lib/systemd/systemd-sysv-install...
Executing /lib/systemd/systemd-sysv-install enable isc-dhcp-server
```

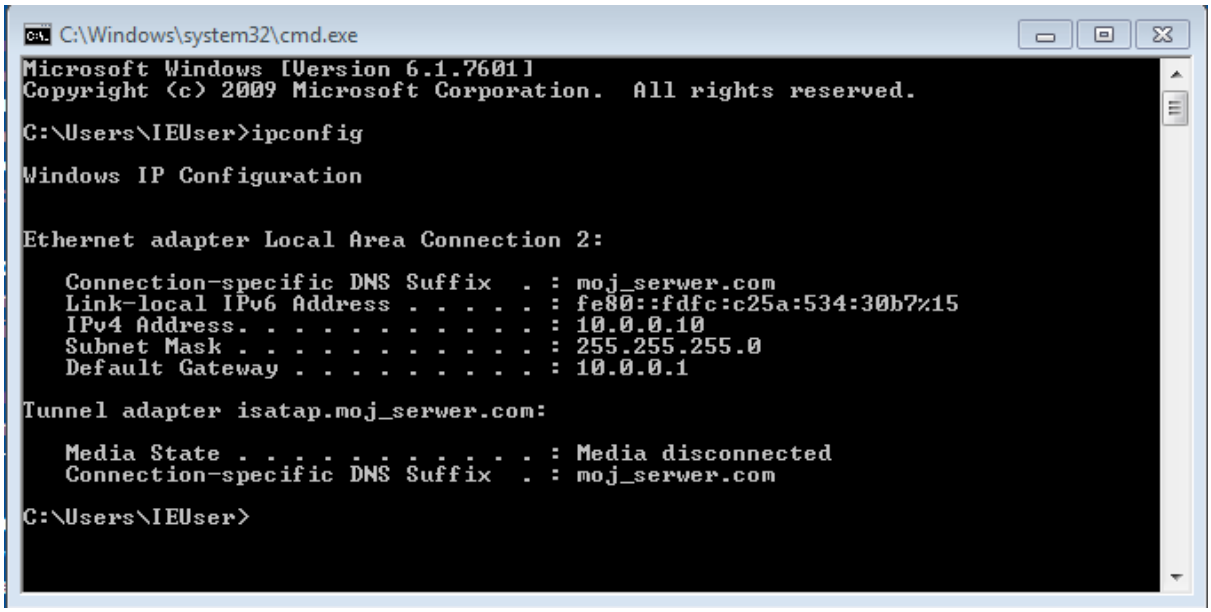
```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# systemctl restart isc-dhcp-server
```

Sprawdzamy, czy serwer działa poprawnie.

```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# systemctl status isc-dhcp-server
```

```
* isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2023-06-07 19:56:55 CEST; 29s ago
     Docs: man:dhcpd(8)
 Main PID: 1963 (dhcpd)
   CGroup: /system.slice/isc-dhcp-server.service
           `-1963 dhcpd -user dhcpd -group dhcpd -f -4 -pf /run/dhcp-server/dhcpd.pid -cf /etc/dhcp/dhcpd.conf
```

Logujemy się na innym urządzeniu, na przykład Windows 7, i sprawdzamy, czy serwer DHCP działa.



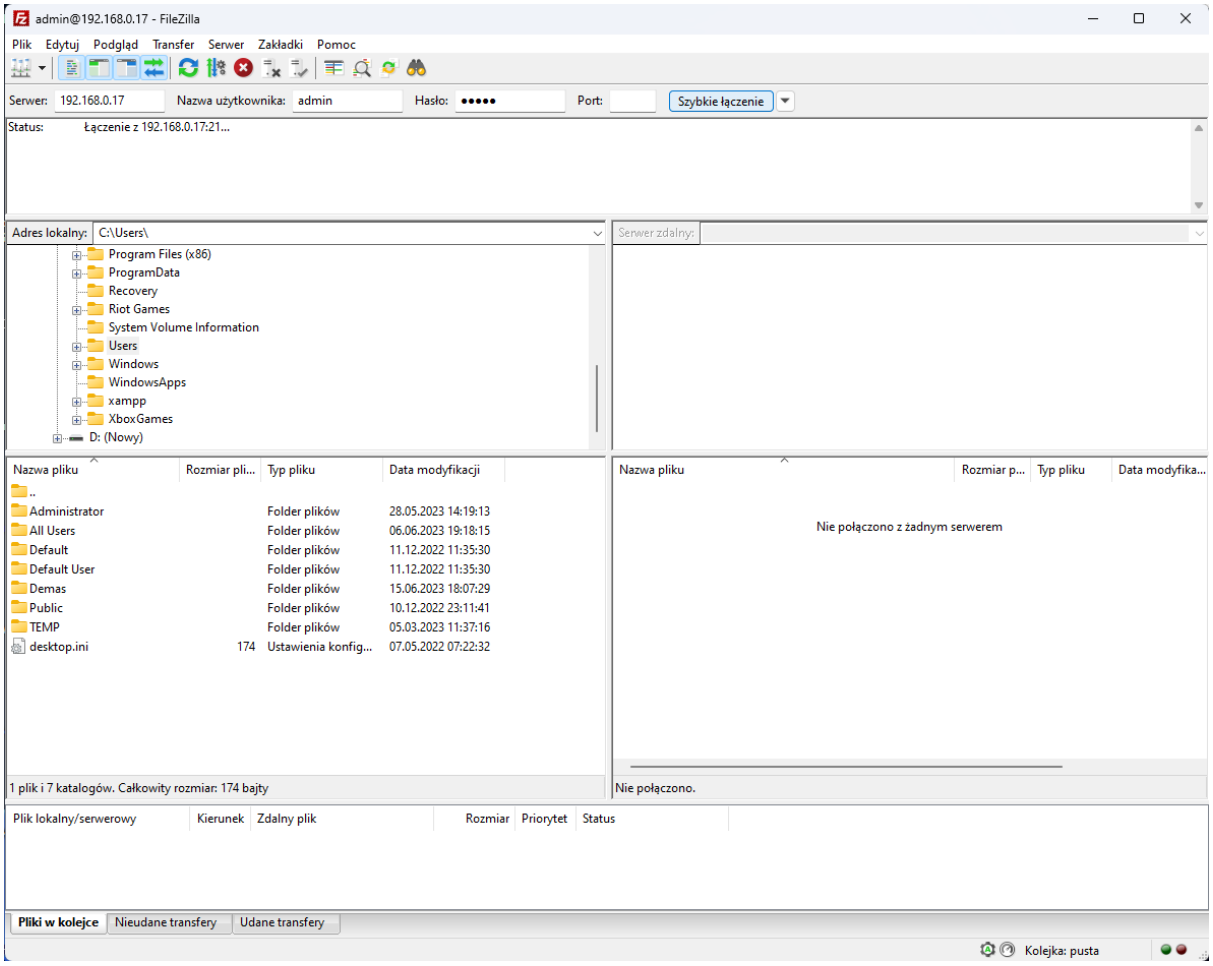
Instalujemy oprogramowanie FTP.

```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# sudo apt install vsftpd
```

```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# sudo systemctl start vsftpd
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# sudo systemctl enable vsftpd
Synchronizing state of vsftpd.service with SysV init with /lib/systemd/systemd-sysv-install...
Executing /lib/systemd/systemd-sysv-install enable vsftpd
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# sudo systemctl status vsftpd
* vsftpd.service - vsftpd FTP server
   Loaded: loaded (/lib/systemd/system/vsftpd.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2023-06-07 20:06:40 CEST; 1min 13s ago
 Main PID: 2454 (vsftpd)
   CGroup: /system.slice/vsftpd.service
           `-2454 /usr/sbin/vsftpd /etc/vsftpd.conf

Jun 07 20:06:40 Ubuntu-16-04-5-server-amd64 systemd[1]: Starting vsftpd FTP server...
Jun 07 20:06:40 Ubuntu-16-04-5-server-amd64 systemd[1]: Started vsftpd FTP server.
Jun 07 20:07:27 Ubuntu-16-04-5-server-amd64 systemd[1]: Started vsftpd FTP server.
```

Instalujemy klienta FTP dla systemu Windows, na przykład FileZilla.



Jeśli pliki nie są przesyłane do folderu, wykonujemy następujące kroki:

```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# sudo nano /etc/vsftpd.conf
```

```
# Uncomment this to enable any form of FTP write command.
write_enable=YES
```

```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# sudo systemctl restart vsftpd
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# sudo systemctl status vsftpd
* vsftpd.service - vsftpd FTP server
   Loaded: loaded (/lib/systemd/system/vsftpd.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2023-06-07 20:16:16 CEST; 14s ago
  Process: 2549 ExecStartPre=/bin/mkdir -p /var/run/vsftpd/empty (code=exited, status=0/SUCCESS)
 Main PID: 2553 (vsftpd)
   CGroup: /system.slice/vsftpd.service
           `-2553 /usr/sbin/vsftpd /etc/vsftpd.conf
```

Konfigurujemy obrazy systemowe typu netboot.

Pliki systemu Debian-8:

```
root@Ubuntu-16-04-5-server-amd64:/etc/dhcp# cd /home/admin
root@Ubuntu-16-04-5-server-amd64:/home/admin# mkdir debian-8-netboot
root@Ubuntu-16-04-5-server-amd64:/home/admin# tar zxf debian-8-netboo.tar.gz -C debian-8-netboot
root@Ubuntu-16-04-5-server-amd64:/home/admin# sudo cp -a debian-8-netboot/debian-installer $(tftpboot_dir)
cp: missing destination file operand after 'debian-8-netboot/debian-installer
Try 'cp --help' for more information.
root@Ubuntu-16-04-5-server-amd64:/home/admin# sudo cp -a debian-8-netboot/debian-installer /var/lib/tftpboot
```

Sprawdzamy, czy plik został skopiowany.

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# ls /var/lib/tftpboot
debian-installer
```

Pliki systemu Ubuntu-16_04:

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# mkdir ubuntu-16.04-netboot
root@Ubuntu-16-04-5-server-amd64:/home/admin# tar zxf ubuntu-16.04-netboot.tar.gz -C ubuntu-16.04-netboot
root@Ubuntu-16-04-5-server-amd64: /home/admin# sudo cp -a ubuntu-16.04-netboot/ubuntu-installer /var/lib/tftpboot
```

Sprawdzamy, czy plik został skopiowany.

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# ls /var/lib/tftpboot
debian-installer  ubuntu-installer
```

Konfigurujemy pxelinux.

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# sudo cp ubuntu-16.04-netboot/ubuntu-installer/amd64/pxelinux.0 /var/lib/tftpboot
root@Ubuntu-16-64-5-server-amd64:/home/admin# sudo cp ubuntu-16.04-netboot/ubuntu-installer/and64/boot-screens/ldlinux.c32 /var/lib/tftpboot
root@Ubuntu-16-04-5-server-amd64:/home/admin# sudo mkdir /var/lib/tftpboot/boot-screens
root@Ubuntu-16-04-5-server-amd64:/home/admin# sudo cp ubuntu-16.04-netboot/ubuntu-installer/amd64/boot-screens/libcom32.c32 /var/lib/tftpboot/boot-screens
root@Ubuntu-16-04-5-server-amd64:/home/admin# sudo cp ubuntu-16.04-netboot/ubuntu-installer/amd64/boot-screens/libutil.c32 /var/lib/tftpboot/boot-screens
root@Ubuntu-16-04-5-server-amd64:/home/admin# sudo cp ubuntu-16.04-netboot/ubuntu-installer/amd64/boot-screens/vesamenu.c32 /var/lib/tftpboot/boot-screens
root@Ubuntu-16-04-5-server-amd64:/home/admin# sudo mkdir /var/lib/tftpboot/pxelinux.cfe cd /var/lib/tftpboot/pxelinux.cfg
mkdir: cannot create directory '/var/lib/tftpboot/pxelinux.cfg': File exists
root@ubuntu-16-04-5-server-amd64:/home/admin# sudo mkdir /var/lib/tftpboot/pxelinux.cfg
mkdir: cannot create directory "/var/lib/tftpboot/pxelinux.cfg': File exists
root@Ubuntu-16-04-5-server-amd64:/home/admin# cd /var/lib/tftpboot/pxelinux.cfe
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/pxelinux.cfg# sudo In -s ../boot-screens/syslinux.cfg default
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/pxelinux.cfg#
```

boot-screens/syslinux.cfg:

```
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/pxelinux.cfg# cd ..
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot# ls
boot-screens  debian-installer  ldlinux.c32  pxelinux.0  pxelinux.cfg  ubuntu-installer
```

```
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot# cd boot-screens
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/boot-screens# ls
libcom32.c32  libutil.c32  vesamenu.c32
```

```
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/boot-screens# touch syslinux.cfg
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/boot-screens# ls
libcom32.c32  libutil.c32  syslinux.cfg  vesamenu.c32
```

```
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/boot-screens# nano syslinux.cfg
```

```
path boot-screens
include boot-screens/menu.cfg
default boot-screens/vesamenu.c32
prompt 0
timeout 100
```

boot-screens/menu.cfg:

```
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/boot-screens# touch menu.cfg
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/boot-screens# ls
libcom32.c32  libutil.c32  menu.cfg  syslinux.cfg  vesamenu.c32
```

```
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/boot-screens# nano menu.cfg
```

```
menu hshift 13
menu width 49
menu margin 8
menu tabmsg
menu title Installer boot menu
label auto-debian-8
menu label ^Debian 8 automated install
kernel debian-installer/amd64/linux
append auto=true priority=critical vga=788 initrd=debian-installer/amd64/initrd.gz
preseed/url=tftp://10.0.0.1/preseed/debian-8-preseed.cfg
label auto-ubuntu-16.04
menu label ^Ubuntu 16.04 automated install
kernel ubuntu-installer/amd64/linux
append auto=true priority=critical vga=788 initrd=ubuntu-installer/amd64/initrd.gz
preseed/url=tftp://10.0.0.1/preseed/ubuntu-16.04 preseed.cfg
preseed/interactive=false
menu begin debian-8
menu title Debian 8
label mainmenu
menu label ^Back..
menu exit
include debian-installer/amd64/boot-screens/menu.cfg
menu end
menu begin ubuntu-16.04
```

Pliki konfiguracyjne preseed:

```
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/boot-screens# sudo mkdir  /var/lib/tftpboot/preseed
```

```
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot# ls
boot-screens  debian-installer  ldlinux.c32  preseed  pxelinux.0  pxelinux.cfg  ubuntu-installer
```

Konfiguracja dla systemu Ubuntu 16.04:

```
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot# cd preseed
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/preseed# touch ubuntu-16.04-preseed.cfg
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/preseed# ls
ubuntu-16.04-preseed.cfg
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/preseed#
```

```
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/preseed# nano  /var/lib/tftpboot/preseed/ubuntu-16.04-preseed.cfg
```

```
d-i debian-installer/locale string en_US
d-i debian-installer/language string en
d-i debian-installer/country string JP
d-i keyboard-configuration/xkb-keymap select jp106
d-i passwd/user-fullname string
d-i passwd/username string ubuntu
d-i passwd/root-password password ubuntu
d-i passwd/root-password-again password ubuntu
d-i passwd/user-password password ubuntu
d-i passwd/user-password-again password ubuntu
d-i user-setup/allow-password-weak boolean true
d-i netcfg/choose_interface select auto
d-i netcfg/get_hostname string unassigned-hostname
d-i netcfg/get_domain string unassigned-domain
d-i mirror/country string manual
d-i mirror/http/hostname string http://jp.archive.ubuntu.com
d-i mirror/http/directory string /ubuntu
d-i mirror/http/proxy string
d-i clock-setup/utc boolean true
d-i clock-setup/ntp boolean true
d-i time/zone string Asia/Tokyo
d-i partman/confirm boolean true
d-i partman/choose_partition select finish
d-i partman/confirm_nooverwrite boolean true
```

Konfiguracja dla systemu Debian 8:

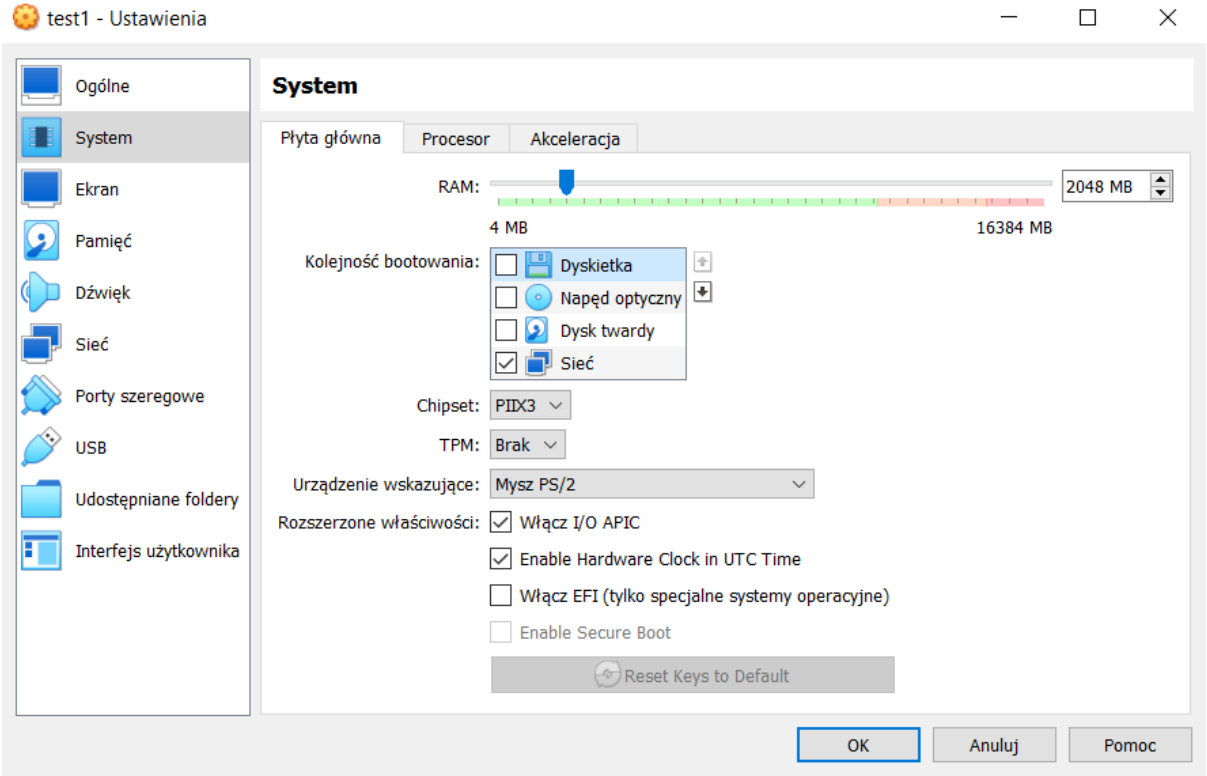
```
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/preseed# touch debian-8-preseed.cfg
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/preseed# ls
debian-8-preseed.cfg  ubuntu-16.04-preseed.cfg
```

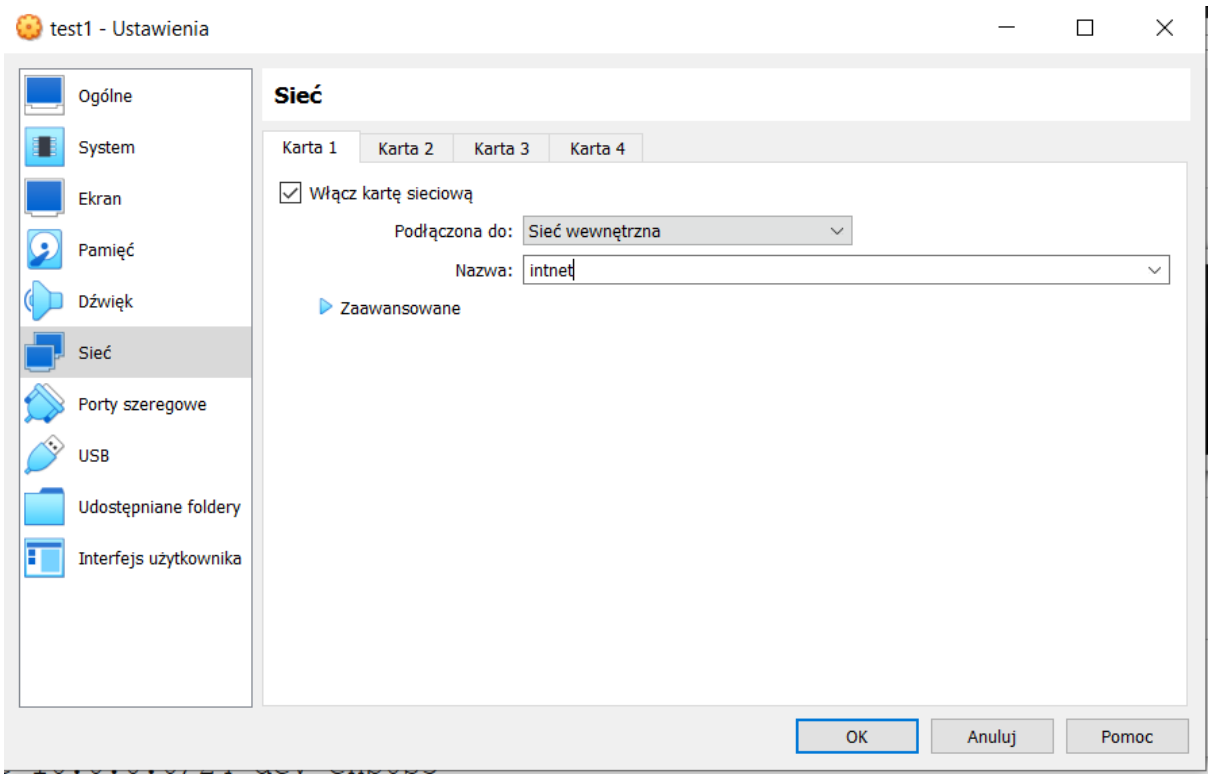
```
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/preseed# nano  /var/lib/tftpboot/preseed/debian-8-preseed.cfg
```

```
d-i debian-installer/locale string en_US
d-i debian-installer/language string en
d-i debian-installer/country string JP
d-i keyboard-configuration/xkb-keymap select jp106
d-i passwd/user-fullname string
d-i passwd/username string debian
d-i passwd/root-password password debian
d-i passwd/root-password-again password debian
d-i passwd/user-password password debian
d-i passwd/user-password-again password debian
d-i user-setup/allow-password-weak boolean true
d-i netcfg/choose_interface select auto
d-i netcfg/get_hostname string unassigned-hostname
d-i netcfg/get_domain string unassigned-domain
d-i mirror/country string manual
d-i mirror/http/hostname string ftp.jp.debian.org
d-i mirror/http/directory string /debian
d-i mirror/http/proxy string
d-i clock-setup/utc boolean true
d-i clock-setup/ntp boolean true
d-i time/zone string Asia/Tokyo
d-i partman/confirm boolean true
d-i partman/choose_partition select finish
d-i partman/confirm_nooverwrite boolean true
```

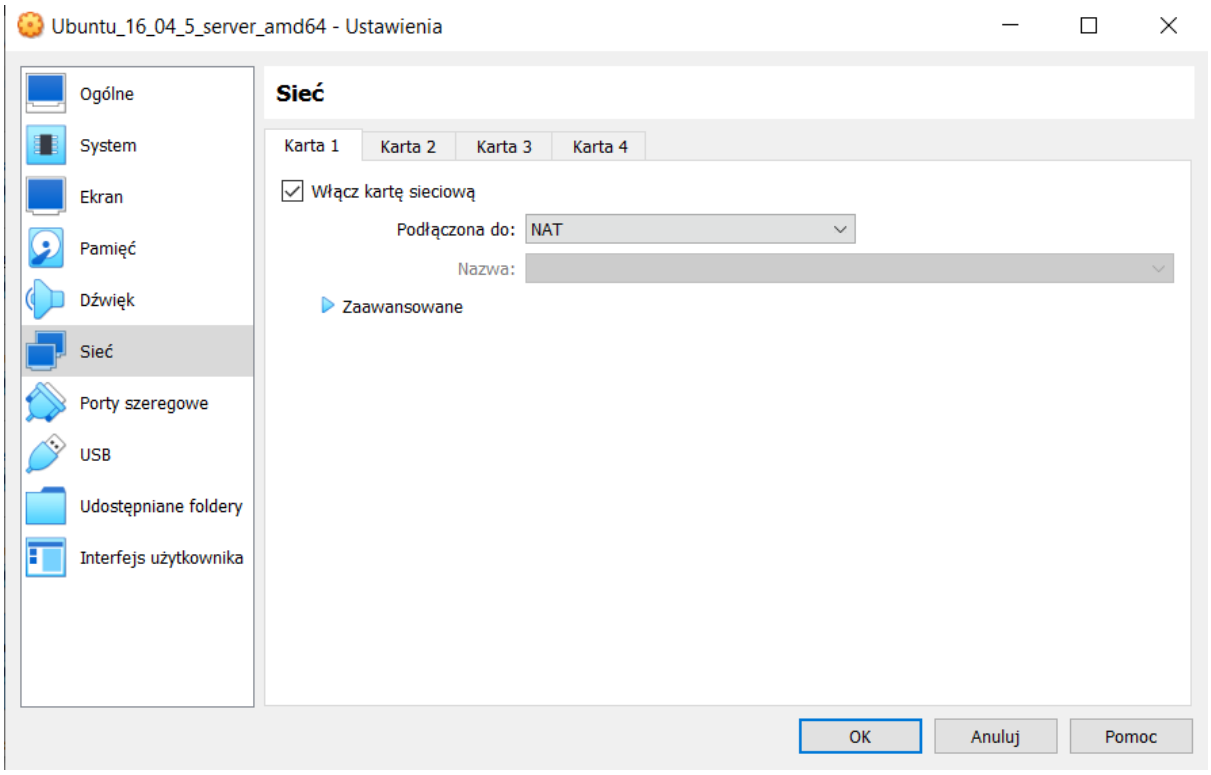
Testujemy działanie.

Tworzymy nową maszynę wirtualną z systemem Linux i konfigurujemy:



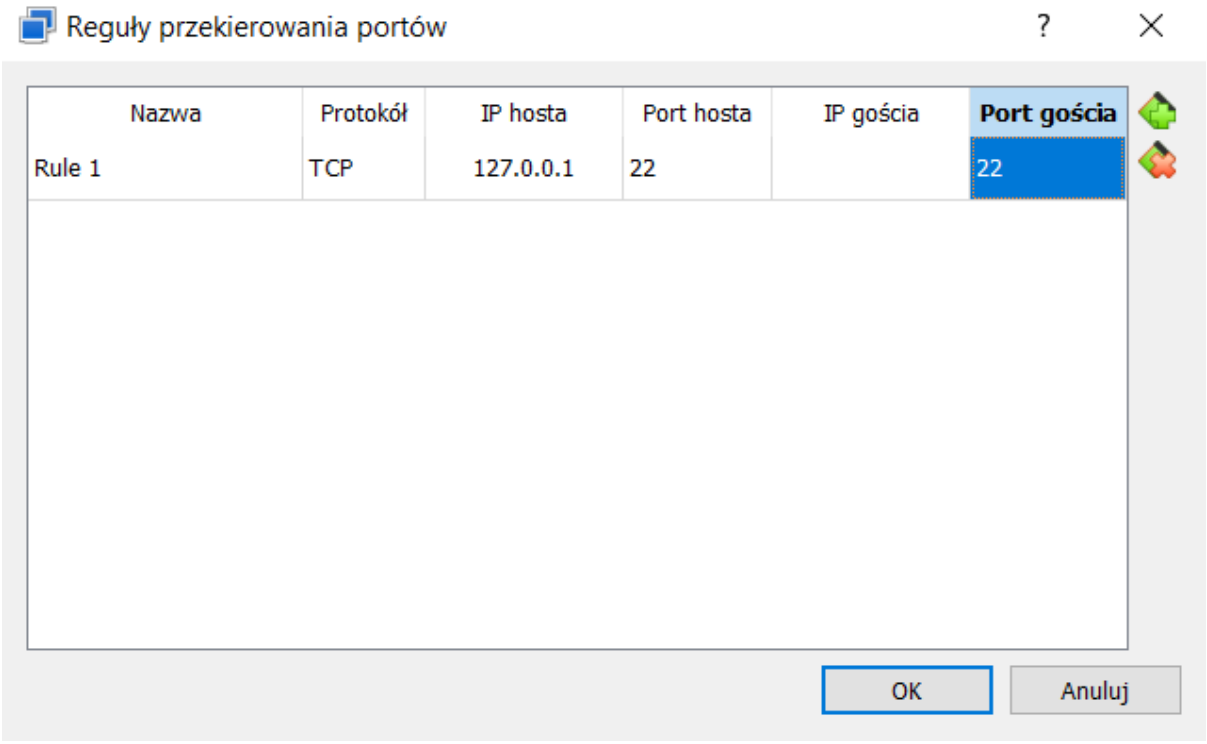


Konfigurujemy bramy sieciowej i mechanizm NAT.
W ustawieniach serwera:



IP hosta na localhost i porty gościa i hosta 22, ponieważ SSH działa na tych portach.

Przechodzimy do "Zaawansowane", "Przekierowanie portów" i konfigurujemy:



Ustawiamy IP hosta na localhost i porty gościa i hosta 22, ponieważ SSH działa na tych portach.
Logujemy się przez localhost.

```
C:\Users\Admin>ssh admin@127.0.0.1
The authenticity of host '127.0.0.1 (127.0.0.1)' can't be established
ECDSA key fingerprint is SHA256:6/HkFPFVzBKTITHEuj/XT70PlzAOpXyAe+iIm0DDzy8c.
Are you sure you want to continue connecting (yes/no/[fingerprint])? y
Please type 'yes', 'no' or the fingerprint: yes
Warning: Permanently added '127.0.0.1' (ECDSA) to the list of known hosts.
admin@127.0.0.1's password:
Welcome to Ubuntu 16.04.5 LTS (GNU/Linux 4.4.0-131-generic x86 64)

 * Documentation:  https://help.ubuntu.com/
 * Management:     https://andscape.canonical.com/
 * Support:        https://ubuntu.com/advantage
New release '18.04.6 LTS' available
Run 'do-release-upgrade' to upgrade to it.
```

```
admin@Ubuntu-16-04-5-server-amd64:~$ su
Password:
root@Ubuntu-16-04-5-server-amd64:/home/admin# ifconfig enp0s8 10.0.0.1/24
root@Ubuntu-16-04-5-server-amd64:/home/admin# ip a
1: lo: <LOOPBACK,UP, LOWER UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       validlft forever preferred lft forever
    inet6 ::1/128 scope host
       valid _lft forever preferredlft forever
2: enpØs3: <BROADCAST,MULTICAST,UP, LOWER UP> mtu 1500 qdisc pfifo fast state UP group default qlen 1000
    link/ether 08:00:27:6d:96:ae brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global enpos3
       valid_lft forever preferred lft forever
    inet6 fe80::a00:27ff:fe6d:96ae/64 scope link
       validlft forever preferred lft forever
3: enpØs8: <BROADCAST,MULTICAST,UP,LOWER UP> mtu 1500 qdisc pfifo fast state UP group default qlen 1000
    link/ether 08:00:27:6f:3f:f9 brd ff:ff:ff:ff:ff:ff
    inet 10.0.0.1/24 brd 10.0.0.255 scope global enpos8
       validlft forever preferred lft forever
    inet6 fe80::a00:27ff:fe6f:3ff9/64 scope link
       valid_lft forever preferred_lft forever
root@Ubuntu-16-04-5-server-amd64:/home/admin#
```

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# route add -net 10.0.0.0/24 dev enp0s8
root@Ubuntu-16-04-5-server-amd64:/home/admin# sysctl -w net.ipv4.ip forward-1
net.ipv4.ip forward = 1
root@Ubuntu-16-04-5-server-amd64:/home/admin# iptables -F
root@Ubuntu-16-04-5-server-amd64:/home/admin# iptables -t nat -F
root@Ubuntu-16-04-5-server-amd64:/home/admin# iptables -t nat -A POSTROUTING ! -d 10.0.0.0/24 -o enp0s3 -j SNAT --to-source 10.0.2.15
```

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# sudo systemctl restart *dhcp*
```

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# systemctl status *dhcp*
* isc-dhcp-server.service - ISC DHCP IPV4 server
   Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; vendor preset: enabled)
   Active: active (running) since Thu 2023-06-08 16:45:46 CEST; 12s ago
     Docs: man:dhcpd(8)
Main PID: 916 (dhcpd)
  CGroup: /system.slice/isc-dhcp-server.service
          `-916 dhcpd -user dhcpd -group dhcpd -f -4 -pf /run/dhcp-server/dhcpd.pid -cf /etc/dhcp/dhcpd.conf

Jun 08 16:45:46 Ubuntu-16-04-5-server-amd64 dhcpd[916]: Sending on  LPF/enp0s8/08:00:27:6f:3f:f9/10.0.0.0/24
Jun 08 16:45:46 Ubuntu-16-04-5-server-amd64 dhcpd[916]:
Jun 08 16:45:46 Ubuntu-16-04-5-server-amd64 dhcpd[916]: No subnet declaration for enp0s3 (10.0.2.15).
Jun 08 16:45:46 Ubuntu-16-04-5-server-amd64 dhcpd[916]: ** Ignoring requests on enp0s3. If this is not what
Jun 08 16:45:46 Ubuntu-16-04-5-server-amd64 dhcpd[916]:    you want, please write a subnet declaration
Jun 08 16:45:46 Ubuntu-16-04-5-server-amd64 dhcpd[916]:    in your dhcpd.conf file for the network segment
Jun 08 16:45:46 Ubuntu-16-04-5-server-amd64 dhcpd[916]:    to which interface enpos3 is attached. *
Jun 08 16:45:46 Ubuntu-16-04-5-server-amd64 dhcpd[916]:
Jun 08 16:45:46 Ubuntu-16-04-5-server-amd64 dhcpd[916]: Sending on  Socket/fallback/fallback-net
Jun 08 16:45:46 Ubuntu-16-04-5-server-amd64 dhcpd[916]: Server starting service.
```

Sprawdzamy, czy internet działa na maszynie. W tym celu używamy systemu Windows

```
C:\Users\IEUser>ipconfig /renew
```

i wykonujemy ping.

Dodajemy oprogramowanie SSH i GCC.

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# nano  /var/lib/tftpboot/preseed/ubuntu-16.04-preseed.cfg
```

```
d-i pkgsel/include string openssh-server gcc
```

Sprawdzamy, czy działają poprawnie.

Jeśli nie, wykonujemy instalację:

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# root@Ubuntu-16-04-5-server-amd64:/home/admin# apt install apache2
```

```
root@Ubuntu-16-04-5-server-amd64:/home/admin# cd /var/www
root@Ubuntu-16-04-5-server-amd64:/var/www# ls
html
root@Ubuntu-16-04-5-server-amd64:/var/www# cd html
root@Ubuntu-16-04-5-server-amd64:/var/www/html# ls
index.html
root@Ubuntu-16-04-5-server-amd64:/var/www/html# rm index.html
root@Ubuntu-16-04-5-server-amd64:/var/www/html# touch ubuntu-16.04-preseed.cfg
root@Ubuntu-16-04-5-server-amd64:/var/www/html# nano ubuntu-16.04-preseed.cfg
```

```
d-i netcfg/get_domain string unassigned-domain
d-i mirror/country string manual
d-i mirror/http/hostname string http://jp.archive.ubuntu.com
d-i mirror/http/directory string /ubuntu
d-i mirror/http/proxy string
d-i clock-setup/utc boolean true
d-i clock-setup/ntp boolean true
d-i time/zone string Asia/Tokyo
d-i partman/confirm boolean true
d-i partman/choose_partition select finish
d-i partman/confirm_nooverwrite boolean true
d-i partman-auto/disk string /dev/[sv]da
d-i partman-auto/method string lvm
d-i partman-auto/choose_recipe select atomic
d-i partman-lvm/device_remove_lvm boolean true
d-i partman-lvm/confirm boolean true
d-i partman-lvm/confirm_nooverwrite boolean true
d-i partman-auto-lvm/guided_size string max
d-i partman-partitioning/confirm_write_new_label boolean true
d-i grub-installer/grub2_instead_of_grub_legacy boolean true
d-i grub-installer/only_debian boolean true
d-i grub-installer/bootdev string /dev/[sv]da
d-i pkgsel/update-policy select none
d-i finish-install/reboot_in_progress note
d-i pkgsel/include string openssh-server gcc
```

```
root@Ubuntu-16-04-5-server-amd64:/var/www/html# mv ubuntu-16.04-preseed.cfg ubuntu-16.04-preseed.txt
root@Ubuntu-16-04-5-server-amd64:/var/www/html# ls
ubuntu-16.04-preseed.txt
```

```
root@Ubuntu-16-04-5-server-amd64:/var/www/html# root@Ubuntu-16-04-5-server-amd64:/var/www/html# cd /var/lib/tftpboot
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot# ls
boot-screens  debian-installer  ldlinux.c32  preseed  pxelinux.0  pxelinux.cfg  ubuntu-installer
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot# cd boot-screens/
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/boot-screens# ls
libcom32.c32  libutil.c32  menu.cfg  syslinux.cfg  vesamenu.c32
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/boot-screens# nano menu.cfg
root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/boot-screens# root@Ubuntu-16-04-5-server-amd64:/var/lib/tftpboot/boot-screens# nano menu.cfg
```

Zmieniony plik:

```
menu hshift 13
menu width 49
menu margin 8
menu tabmsg
menu title Installer boot menu
label auto-debian-8
menu label ^Debian 8 automated install
kernel debian-installer/amd64/linux
append auto=true priority=critical vga=788 initrd=debian-installer/amd64/initrd.gz preseed/url=http://10.0.0.1/debian-8-preseed.cfg
label auto-ubuntu-16.04
menu label ^Ubuntu 16.04 automated install
kernel ubuntu-installer/amd64/linux
append auto=true priority=critical vga=788 initrd=ubuntu-installer/amd64/initrd.gz preseed/url=http://10.0.0.1/ubuntu-16.04-preseed.txt
preseed/interactive=false
menu begin debian-8
menu title Debian 8
label mainmenu
menu label ^Back..
menu exit
include debian-installer/amd64/boot-screens/menu.cfg
menu end
menu begin ubuntu-16.04
menu title Ubuntu 16.04
label mainmenu
menu label ^Back..
menu exit
```

2. **Przedstaw konfigurację serwera PXE, która pozwala na uruchomienie przez sieć systemu na nośniku CD/DVD typu Live.**

   Zmieniamy zawartość pliku /var/lib/tftpboot/pxelinux.cfg

   ```
   DEFAULT live
   LABEL live
   MENU LABEL Ubuntu Live
   KERNEL vmlinuz
   APPEND initrd=initrd.lz boot=casper netboot=nfs nfsroot=10.0.0.1:/ubuntu-live.iso ro quiet splash --
   ```

3. **Przedstaw konfigurację serwera PXE, która pozwala na uruchamianie przez sieć systemu na nośniku typu dyskietka (floppy disk).**

   Zmieniamy zawartość pliku /var/lib/tftpboot/pxelinux.cfg

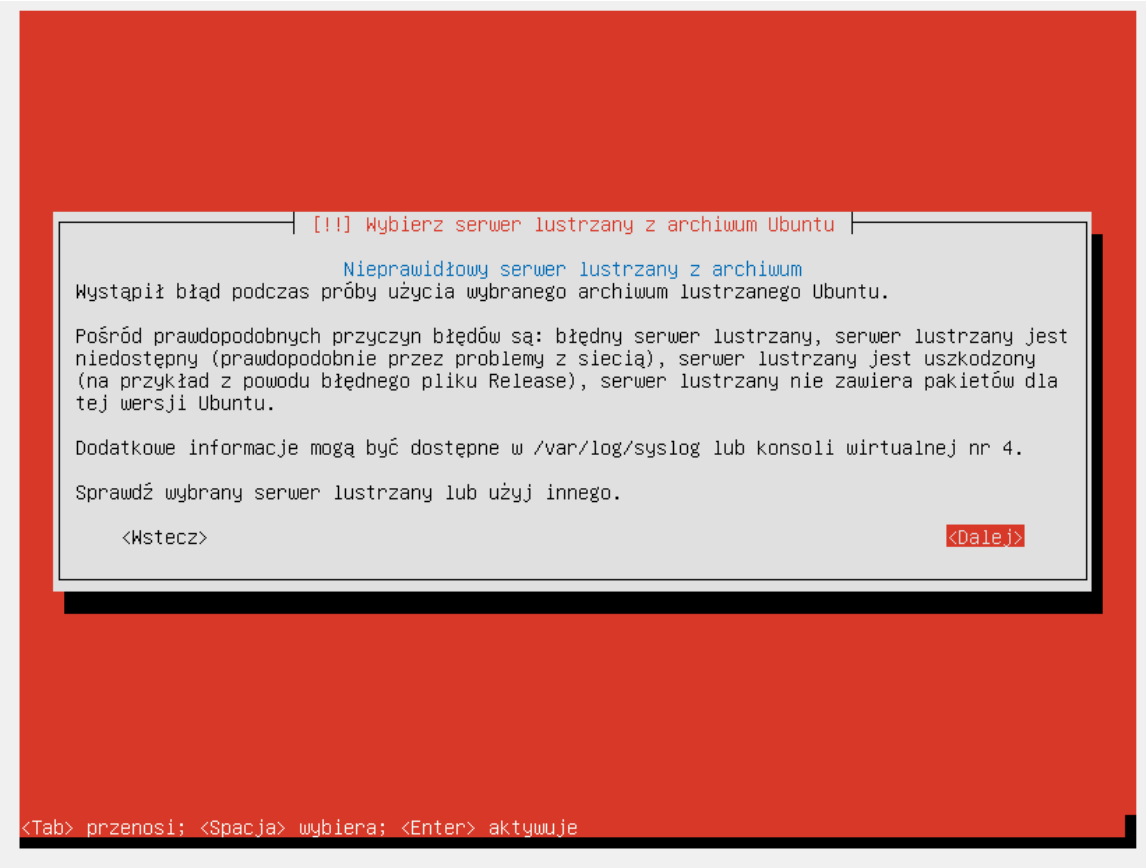
   ```
   DEFAULT floppy
   LABEL floppy
   MENU LABEL Floppy Disk
   KERNEL memdisk
   APPEND initrd=disk.img
   ```

4. **Wprowadź zmiany w pliku konfiguracyjnym serwera PXE, które pozwolą na uruchamianie systemu z pierwszego dostępnego dysku twardego.**

   Zmieniamy zawartość pliku /var/lib/tftpboot/pxelinux.cfg

   ```
   DEFAULT local
    PROMPT 0
    TIMEOUT 0
    LABEL local
    MENU LABEL Local Boot
    LOCALBOOT 0
   ```

Wnioski:
Występuje problem z pobieraniem serwera lustrzanego z archiwum Ubuntu.



Próbowałem zmienić zawartość plików ubuntu-16.04-preseed.txt oraz ubuntu-16.04-preseed.cfg na wymaganą konfigurację:

Opcje wyboru j^zyka i lokalizacji
d-i debian-installer/language string pl
d-i debian-installer/country string PL
d-i debian-installer/locale string pl_PL.UTF-8

Konfiguracja sieci
d-i netcfg/choose_interface select auto

Konfiguracja lustra
d-i mirror/country string PL
d-i mirror/http/hostname string pl.archive.ubuntu.com
d-i mirror/http/directory string /ubuntu

Autoryzacja i odbieranie aktualizacji pakietów
d-i apt-setup/restricted boolean true
d-i apt-setup/universe boolean true
d-i apt-setup/backports boolean true
d-i apt-setup/services-select multiselect security, updates
d-i apt-setup/security_host string security.ubuntu.com

```
# Konfiguracja użytkownika
d-i passwd/root-login boolean false
d-i passwd/make-user boolean true
d-i passwd/user-fullname string Nazwa Użytkownika
d-i passwd/username string nazwa_uzytkownika

# Partycjonowanie dysku
d-i partman-auto/method string lvm
d-i partman-auto-lvm/guided_size string max
d-i partman-auto/choose_recipe select atomic
d-i partman/default_filesystem string ext4

# Zainstalowane pakiety
tasksel tasksel/first multiselect standard, ubuntu-desktop

# Wybór no^nika rozruchowego
d-i grub-installer/only_debian boolean true
d-i grub-installer/with_other_os boolean true
d-i grub-installer/bootdev string /dev/sda

d-i pkgsel/include string openssh-server gcc

# Zako^czenie instalacji
d-i finish-install/reboot_in_progress note
```

Niemniej jednak, problem nadal nie został rozwiązany.
Próbowałem również zmieniać lokalizacje, z których pobierane były pliki serwera lustrzanego, ale to również nie przyniosło oczekiwanych rezultatów.