

## Zarządzanie sieciowymi systemami operacyjnymi II - moduł 1

### (Zadania do samodzielnej realizacji)

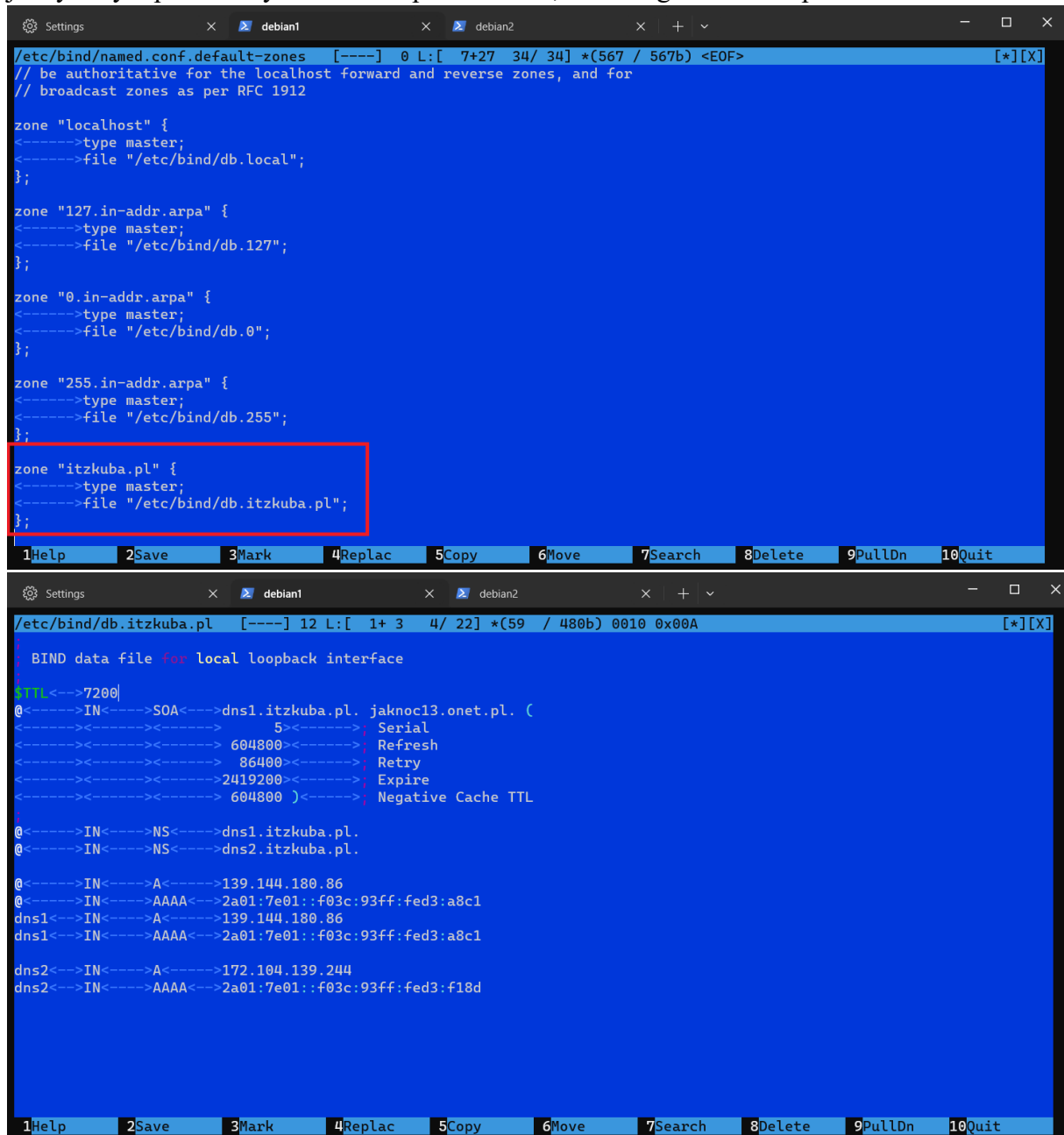
3 dowolne serwery VPS posiadające publiczny adres IPv4, oraz adres IPv6 unikalny globalny:

Serwer DNS	Adres IPv4	Adres IPv6
Debian1	139.144.180.86	2a01:7e01::f03c:93ff:fed3:a8c1
Debian2	172.104.139.244	2a01:7e01::f03c:93ff:fed3:f18d
Debian3	139.162.173.26	2a01:7e01::f03c:93ff:fed3:0874

Zarejestrować/wykupić domenę *{wybierz\_co\_chcesz}.pl* (tutaj można wybrać sobie dowolną wolną w publicznym systemie DNS domenę z dowolną nazwą i dowolnym rozszerzeniem), która ma działać w publicznym systemie DNS.

Nazwa domeny	itzkuba.pl
Stan	Aktywna w DNS [REGISTERED]
Utworzona	2023.06.24 11:48:15
Ostatnia modyfikacja	2023.06.24 14:16:12
Koniec okresu rozliczeniowego	2024.06.24 11:48:15
Nazwy serwerów	dns1.itzkuba.pl [139.144.180.86] dns2.itzkuba.pl [172.104.139.244]
Abonent	dane niedostępne
Rejestrator	OVH SAS  2 Rue Kellermann  59100 Roubaix  Francja/France  +48.717500200  <a href="https://www.ovh.pl/abuse/">https://www.ovh.pl/abuse/</a>

Skonfigurować z wykorzystaniem dwóch dowolnych serwerów VPS (posiadających publiczny adres IPv4 oraz adres IPv6 unikalny globalny) zakupioną domenę DNS tak, aby na jednym była przechowywana strefa podstawowa, a na drugim strefa zapasowa.



```
/etc/bind/named.conf.default-zones [----] 0 L:[ 7+27 34/ 34] *(567 / 567b) <E0F> [*][X]
// be authoritative for the localhost forward and reverse zones, and for
// broadcast zones as per RFC 1912

zone "localhost" {
<----->type master;
<----->file "/etc/bind/db.localhost";
};

zone "127.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.127";
};

zone "0.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.0";
};

zone "255.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.255";
};

zone "itzkuba.pl" {
<----->type master;
<----->file "/etc/bind/db.itzkuba.pl";
};

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit

/etc/bind/db.itzkuba.pl [----] 12 L:[ 1+ 3 4/ 22] *(59 / 480b) 0010 0x00A [*][X]

BIND data file for local loopback interface

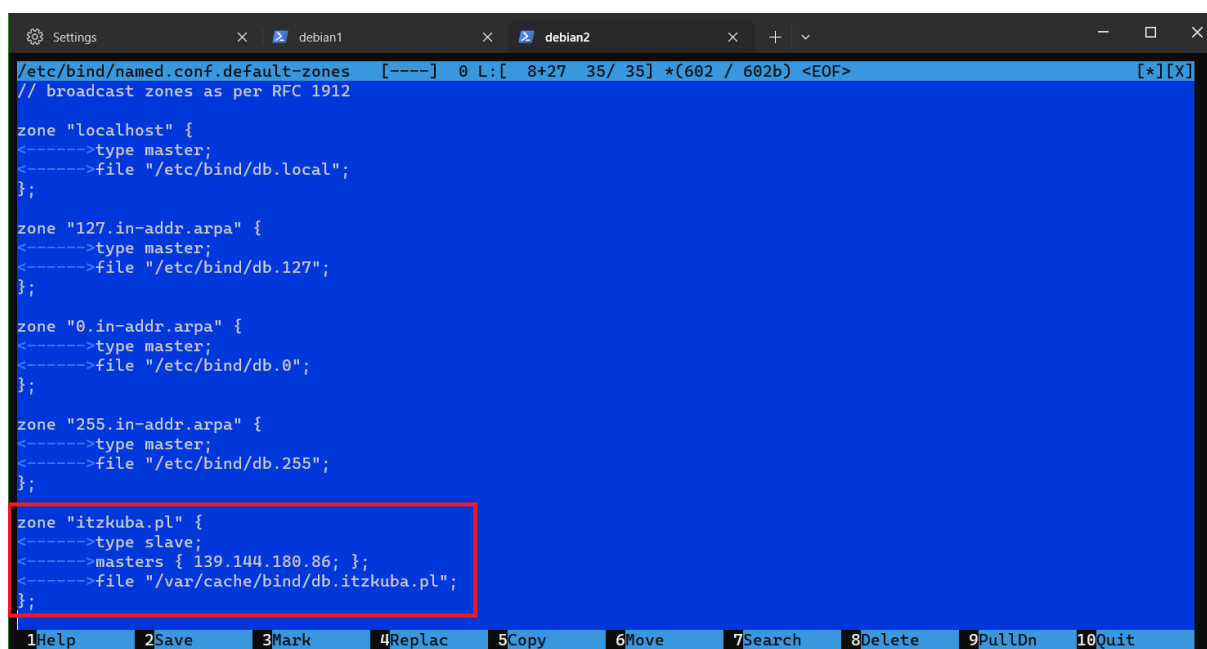
$TTL<-->7200
@<----->IN<----->SOA<----->dns1.itzkuba.pl. jaknoc13.onet.pl. (
<-----><-----><-----> 5<-----> Serial
<-----><-----><-----> 604800<-----> Refresh
<-----><-----><-----> 86400<-----> Retry
<-----><-----><-----> 2419200<-----> Expire
<-----><-----><-----> 604800 )<-----> Negative Cache TTL

@<----->IN<----->NS<----->dns1.itzkuba.pl.
@<----->IN<----->NS<----->dns2.itzkuba.pl.

@<----->IN<----->A<----->139.144.180.86
@<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
dns1<-->IN<----->A<----->139.144.180.86
dns1<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1

dns2<-->IN<----->A<----->172.104.139.244
dns2<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```



```
/etc/bind/named.conf.default-zones [-----] 0 L:[ 8+27 35/ 35] *(602 / 602b) <EOF> [*][X]
// broadcast zones as per RFC 1912

zone "localhost" {
<----->type master;
<----->file "/etc/bind/db.localhost";
};

zone "127.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.127";
};

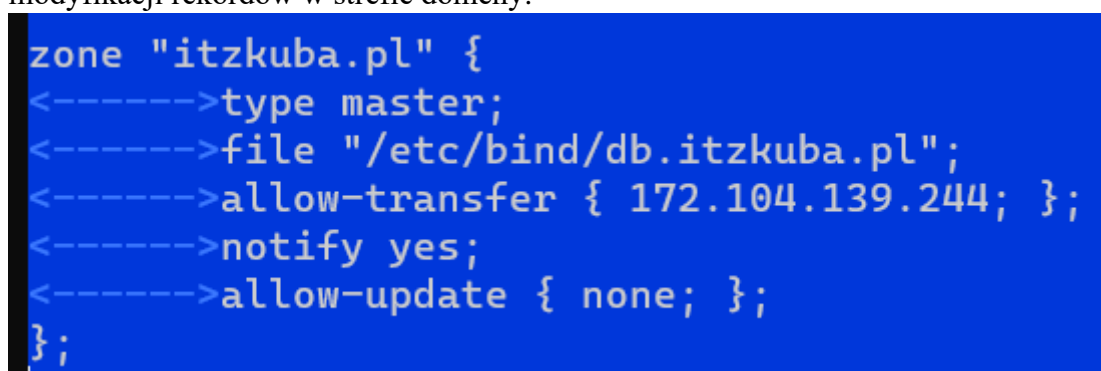
zone "0.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.0";
};

zone "255.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.255";
};

zone "itzkuba.pl" {
<----->type slave;
<----->masters { 139.144.180.86; };
<----->file "/var/cache/bind/db.itzkuba.pl";
};

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```

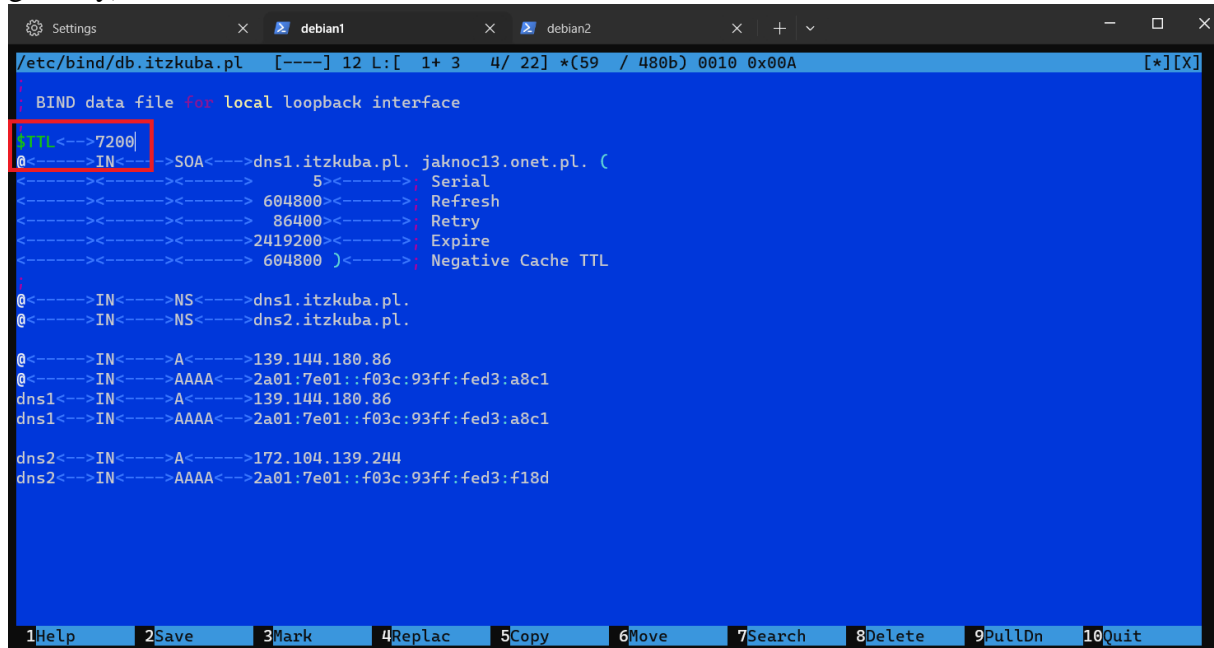
Skonfigurowanie podstawowego serwera DNS tak, aby automatycznie powiadamiał serwer podrzędny o zmianach dokonanych w strefie i uniemożliwiał nikomu poza serwerem podrzędnym transferu strefy, jak również uniemożliwiał żadnemu urządzeniu dynamicznej modyfikacji rekordów w strefie domeny.



```
zone "itzkuba.pl" {
<----->type master;
<----->file "/etc/bind/db.itzkuba.pl";
<----->allow-transfer { 172.104.139.244; };
<----->notify yes;
<----->allow-update { none; };
};
```

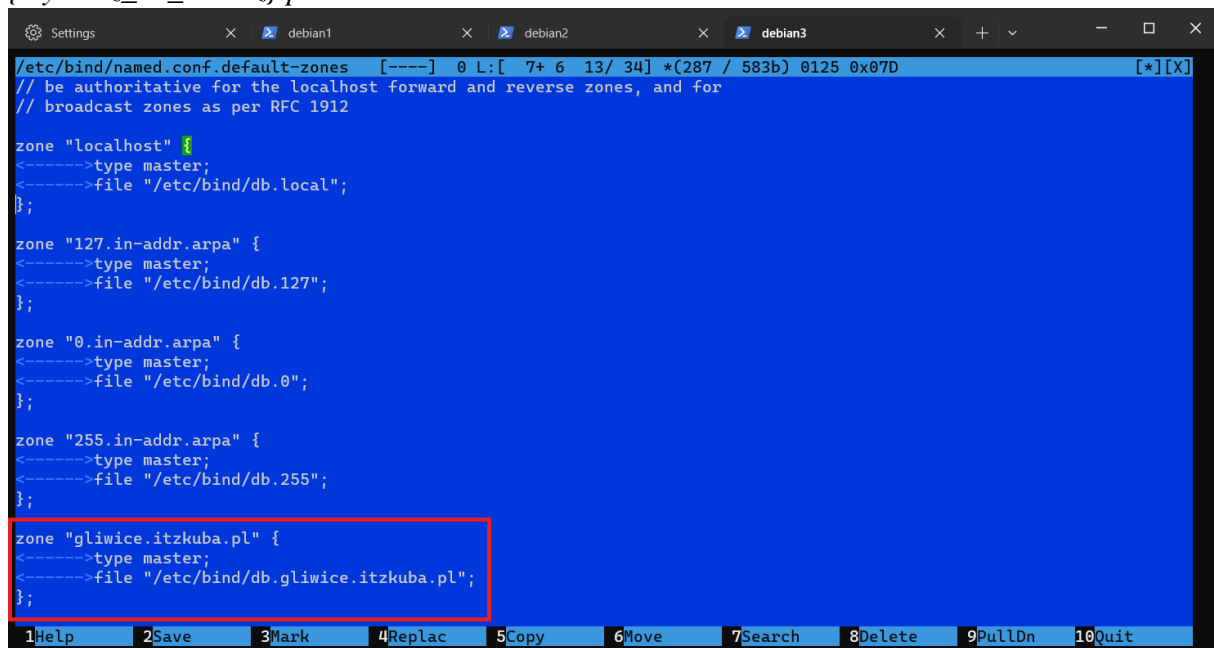
Skonfigurowanie podstawowego serwera DNS tak, aby rekordy które "trafią" do pamięci podręcznej klientów DNS (komputerów na których ktoś wpisał do jakiejś aplikacji naszą poddomenę), wygasły w tej pamięci podręcznej po 2 godzinach (czyli czas reakcji klientów w sieci, propagacji dokonanej zmiany w sieci, na dokonywane przez administratorów zmiany w ramach strefy, np. zmiana adresu IP dla poddomeny, ma być nie większy niż dwie

godziny).



```
/etc/bind/db.itzkuba.pl [----] 12 L:[ 1+ 3 4/ 22] *(59 / 480b) 0010 0x00A [*][X]
BIND data file for local loopback interface
TTL<-->7200
@<----->IN<----->SOA<----->dns1.itzkuba.pl. jaknoc13.onet.pl. (
<----->5<----->Serial
<----->604800<----->Refresh
<----->86400<----->Retry
<----->2419200<----->Expire
<----->604800<----->)<----->Negative Cache TTL
@<----->IN<----->NS<----->dns1.itzkuba.pl.
@<----->IN<----->NS<----->dns2.itzkuba.pl.
@<----->IN<----->A<----->139.144.180.86
@<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
dns1<----->IN<----->A<----->139.144.180.86
dns1<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
dns2<----->IN<----->A<----->172.104.139.244
dns2<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d
```

Skonfigurować z wykorzystaniem jednego dowolnego serwera VPS (posiadającego publiczny adres IPv4 oraz adres IPv6 unikalny globalny) tak, aby była na nim przechowywana strefa podstawowa domeny *gliwice.{wybierz\_co\_chcesz}.pl* (czyli chodzi o poddomenę "gliwice" dla wybranej wcześniej dowolnej domeny z dowolnym rozszerzeniem), a następnie skonfigurować dla niej delegację domeny w ramach strefy podstawowej *{wybierz\_co\_chcesz}.pl*.



```
/etc/bind/named.conf.default-zones [----] 0 L:[ 7+ 6 13/ 34] *(287 / 583b) 0125 0x07D [*][X]
// be authoritative for the localhost forward and reverse zones, and for
// broadcast zones as per RFC 1912
zone "localhost" {
<----->type master;
<----->file "/etc/bind/db.localhost";
};
zone "127.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.127";
};
zone "0.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.0";
};
zone "255.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.255";
};
zone "gliwice.itzkuba.pl" {
<----->type master;
<----->file "/etc/bind/db.gliwice.itzkuba.pl";
};
```

```
Settings  X  debian1  X  debian2  X  debian3  X  +  -  X
/etc/bind/db.gliwice.itzkuba.pl  [----]  0 L:[ 1+19 20/ 20] *(467 / 467b) <EOF>  [*][X]

BIND data file for local loopback interface

TTL<-->7200
@<----->IN<----->SOA<----->dns3.gliwice.itzkuba.pl. jaknoc13.onet.pl. (
<-----><-----><-----> 3<-----> Serial
<-----><-----><-----> 604800<-----> Refresh
<-----><-----><-----> 86400<-----> Retry
<-----><-----><-----> 2419200<-----> Expire
<-----><-----><-----> 604800 )<-----> Negative Cache TTL

@<----->IN<----->NS<----->dns3.gliwice.itzkuba.pl.
@<----->IN<----->A<----->139.162.173.26
@<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:0874

dns3<-->IN<----->A<----->139.162.173.26
dns3<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:0874
www<-->IN<----->A<----->139.162.173.26
www<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:0874

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit

X  debian1  X  debian2  X  debian3  X  +  -  X
/etc/bind/db.itzkuba.pl  [----]  31 L:[ 2+14 16/ 29] *(329 / 702b) 0046 0x02E  [*][X]

BIND data file for local loopback interface

TTL<-->7200
@<----->IN<----->SOA<----->dns1.itzkuba.pl. jaknoc13.onet.pl. (
<-----><-----><-----> 6<-----> Serial
<-----><-----><-----> 604800<-----> Refresh
<-----><-----><-----> 86400<-----> Retry
<-----><-----><-----> 2419200<-----> Expire
<-----><-----><-----> 604800 )<-----> Negative Cache TTL

@<----->IN<----->NS<----->dns1.itzkuba.pl.
@<----->IN<----->NS<----->dns2.itzkuba.pl.
gliwice.itzkuba.pl<----->IN<----->NS<----->dns3.gliwice

@<----->IN<----->A<----->139.144.180.86
@<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
dns1<-->IN<----->A<----->139.144.180.86
dns1<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
www<-->IN<----->A<----->139.144.180.86
www<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1

dns2<-->IN<----->A<----->172.104.139.244
dns2<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d

dns3.gliwice<-->IN<----->A<----->139.162.173.26
dns3.gliwice<-->IN<----->A<----->2a01:7e01::f03c:93ff:fed3:0874
www.gliwice<-->IN<----->CNAME<----->dns3.gliwice

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```

Na wszystkich serwerach VPS, poza serwerem podstawowym dla domeny *{wybierz\_co\_chcesz}.pl*, należy wyłączyć możliwość obsługi zapytań rekursywnych, dla wszystkich za wyjątkiem własnego komputera.

```
debian1  x  debian2  x  debian3  x  +  v  -  □  ×
/etc/bind/named.conf.options  [----]  30 L:[ 1+22  23/ 27]  *(842 / 883b) 0010 0x00A  [*][X]
options {
<----->directory "/var/cache/bind";

<----->// If there is a firewall between you and nameservers you want
<----->// to talk to, you may need to fix the firewall to allow multiple
<----->// ports to talk.  See http://www.kb.cert.org/vuls/id/800113

<----->// If your ISP provided one or more IP addresses for stable.
<----->// nameservers, you probably want to use them as forwarders...
<----->// Uncomment the following block, and insert the addresses replacing
<----->// the all-0's placeholder.

<----->// forwarders {
<----->// <----->0.0.0.0;
<----->// };

<----->//=====
<----->// If BIND logs error messages about the root key being expired,
<----->// you will need to update your keys.  See https://www.isc.org/bind-keys
<----->//=====
<----->dnssec-validation auto;

<----->listen-on-v6 { any; };|

<----->allow-recursion { PRYWATNE IP };
};

1Help  2Save  3Mark  4Replac  5Copy  6Move  7Search  8Delete  9PullDn  10Quit
```

\*konfiguracja jest taka sama dla obu serwerów (debian2 i debian3)

Skonfigurować na serwerze utrzymującym podstawową strefę dla domeny *gliwice.{wybierz\_co\_chcesz}.pl*, dodatkowo strefę podstawową dla lokalnej domeny DNS "*{nazwisko}.pl*" i następnie skonfigurować na serwerze utrzymującym podstawową strefę domeny *{wybierz\_co\_chcesz}.pl* usługę warunkowego przesyłania dalej na potrzeby tej domeny "*{nazwisko}.pl*" (tak, aby jeżeli ktoś wyśle zapytanie DNS dotyczące dowolnej domeny DNS "*{nazwisko}.pl*" do serwera utrzymującego podstawową strefę domeny *{wybierz\_co\_chcesz}.pl*, to aby tenże potrafił w sposób właściwy obsłużyć to zapytanie).

```
debian1  x  debian2  x  debian3  x  +  v  -  □  ×
/etc/bind/named.conf.default-zones  [----]  2 L:[ 13+26  39/ 40]  *(686 / 687b) 0010 0x00A  [*][X]
};

zone "127.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.127";
};

zone "0.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.0";
};

zone "255.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.255";
};

zone "gliwice.itzkuba.pl" {
<----->type master;
<----->file "/etc/bind/db.gliwice.itzkuba.pl";
};

zone "nocon.pl" {
<----->type master;
<----->file "/etc/bind/db.nocon.pl";
<----->allow-transfer { 139.144.180.86; };
};

1Help  2Save  3Mark  4Replac  5Copy  6Move  7Search  8Delete  9PullDn  10Quit
```

```
debian1  debian2  debian3  +  -  X
/etc/bind/db.nocon.pl  [----] 29 L:[ 1+11 12/ 16] *(232 / 301b) 0046 0x02E  [*][X]

; BIND data file for local loopback interface

$TTL<-->7200
@<----->IN<----->SOA<----->nocon.pl. jaknoc13.onet.pl. (
<-----><-----><----->      2<----->      Serial
<-----><-----><----->      604800<----->      Refresh
<-----><-----><----->      86400<----->      Retry
<-----><-----><----->      2419200<----->      Expire
<-----><-----><----->      604800 )<----->      Negative Cache TTL

@<----->IN<----->NS<----->nocon.pl.
@<----->IN<----->A<----->139.162.173.26
@<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:0874

1Help  2Save  3Mark  4Replac  5Copy  6Move  7Search  8Delete  9PullDn  10Quit
```

```
debian1  debian2  debian3  +  -  X
/etc/bind/named.conf.default-zones  [----] 39 L:[ 15+25 40/ 42] *(709 / 713b) 0010 0x00A  [*][X]

zone "127.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.127";
};

zone "0.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.0";
};

zone "255.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.255";
};

zone "itzkuba.pl" {
<----->type master;
<----->file "/etc/bind/db.itzkuba.pl";
<----->allow-transfer { 172.104.139.244; };
<----->notify yes;
<----->allow-update { none; };
};

zone "nocon.pl" {
<----->type forward;
<----->forwarders { 139.162.173.26; };
};

1Help  2Save  3Mark  4Replac  5Copy  6Move  7Search  8Delete  9PullDn  10Quit
```

Utworzyć w ramach tejże domeny *{wybierz\_co\_chcesz}.pl* oraz *www.{wybierz\_co\_chcesz}.pl* nakierowane na adres IPv4 oraz IPv6 serwera VPS ze strefą podstawową.

```
debian1  x  debian2  x  debian3  x  +  v  -  □  ×
/etc/bind/db.itzkuba.pl  [----]  0 L:[ 2+26 28/ 29] *(668 / 702b) 0119 0x077  [*][X]
BIND data file /etc/bind/db.itzkuba.pl for local loopback interface

TTL<-->7200
@<-->IN<-->SOA<-->dns1.itzkuba.pl. jaknoc13.onet.pl. (
<--><--><--><--><--> 6<--><--><--><--><--> Serial
<--><--><--><--><--> 604800<--><--><--><--><--> Refresh
<--><--><--><--><--> 86400<--><--><--><--><--> Retry
<--><--><--><--><--> 2419200<--><--><--><--><--> Expire
<--><--><--><--><--> 604800 )<--><--><--><--><--> Negative Cache TTL

@<-->IN<-->NS<-->dns1.itzkuba.pl.
@<-->IN<-->NS<-->dns2.itzkuba.pl.
gliwice.itzkuba.pl<-->IN<-->NS<-->dns3.gliwice

@<-->IN<-->A<-->139.144.180.86
@<-->IN<-->AAAA<-->2a01:7e01::f03c:93ff:fed3:a8c1
dns1<-->IN<-->A<-->139.144.180.86
dns1<-->IN<-->AAAA<-->2a01:7e01::f03c:93ff:fed3:a8c1
www<-->IN<-->A<-->139.144.180.86
www<-->IN<-->AAAA<-->2a01:7e01::f03c:93ff:fed3:a8c1

dns2<-->IN<-->A<-->172.104.139.244
dns2<-->IN<-->AAAA<-->2a01:7e01::f03c:93ff:fed3:f18d

dns3.gliwice<-->IN<-->A<-->139.162.173.26
dns3.gliwice<-->IN<-->A<-->2a01:7e01::f03c:93ff:fed3:0874
www.gliwice<-->IN<-->CNAME<-->dns3.gliwice

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```

Utworzyć w ramach tejże domeny *sklep.{wybierz\_co\_chcesz}.pl* nakierowane w ramach mechanizmu pseudo-loadbalancingu na adres IPv4 oraz IPv6 obydwu serwerów VPS (ze strefą podstawową i zapasową).

```
debian1  x  debian2  x  debian3  x  +  v  -  □  ×
/etc/bind/db.itzkuba.pl  [----]  31 L:[ 7+ 9 16/ 34] *(329 / 846b) 0046 0x02E  [*][X]
<--><--><--><--><--> 604800<--><--><--><--><--> Refresh
<--><--><--><--><--> 86400<--><--><--><--><--> Retry
<--><--><--><--><--> 2419200<--><--><--><--><--> Expire
<--><--><--><--><--> 604800 )<--><--><--><--><--> Negative Cache TTL

@<-->IN<-->NS<-->dns1.itzkuba.pl.
@<-->IN<-->NS<-->dns2.itzkuba.pl.
gliwice.itzkuba.pl<-->IN<-->NS<-->dns3.gliwice

@<-->IN<-->A<-->139.144.180.86
@<-->IN<-->AAAA<-->2a01:7e01::f03c:93ff:fed3:a8c1
dns1<-->IN<-->A<-->139.144.180.86
dns1<-->IN<-->AAAA<-->2a01:7e01::f03c:93ff:fed3:a8c1
www<-->IN<-->A<-->139.144.180.86
www<-->IN<-->AAAA<-->2a01:7e01::f03c:93ff:fed3:a8c1

dns2<-->IN<-->A<-->172.104.139.244
dns2<-->IN<-->AAAA<-->2a01:7e01::f03c:93ff:fed3:f18d

sklep<-->IN<-->A<-->139.144.180.86
sklep<-->IN<-->AAAA<-->2a01:7e01::f03c:93ff:fed3:a8c1
sklep<-->IN<-->A<-->172.104.139.244
sklep<-->IN<-->AAAA<-->2a01:7e01::f03c:93ff:fed3:f18d

dns3.gliwice<-->IN<-->A<-->139.162.173.26
dns3.gliwice<-->IN<-->A<-->2a01:7e01::f03c:93ff:fed3:0874
www.gliwice<-->IN<-->CNAME<-->dns3.gliwice

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```

Utworzyć w ramach tejże domeny *{wybierz\_co\_chcesz}.pl* nakierowane na adres na adres IPv4 oraz IPv6 serwera VPS ze strefą zapasową, na potrzeby usługi poczty elektronicznej



(czyli zakładając, że w późniejszym czasie zostanie tam też uruchomiony serwer pocztowy).

```
debian1  x  debian2  x  debian3  x  +  v  -  □  x
/etc/bind/db.itzkuba.pl  [----] 39 L: [ 11+21 32/ 38] *(783 / 945b) 0010 0x00A  [*][X]

@<----->IN<----->NS<----->dns1.itzkuba.pl.
@<----->IN<----->NS<----->dns2.itzkuba.pl.
gliwice.itzkuba.pl<----->IN<----->NS<----->dns3.gliwice

@<----->IN<----->A<----->139.144.180.86
@<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
dns1<----->IN<----->A<----->139.144.180.86
dns1<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
www<----->IN<----->A<----->139.144.180.86
www<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1

dns2<----->IN<----->A<----->172.104.139.244
dns2<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d

sklep<----->IN<----->A<----->139.144.180.86
sklep<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
sklep<----->IN<----->A<----->172.104.139.244
sklep<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d

@<----->IN<----->MX<----->10<----->mail.itzkuba.pl.
mail<----->IN<----->A<----->172.104.139.244
mail<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d

dns3.gliwice<----->IN<----->A<----->139.162.173.26
dns3.gliwice<----->IN<----->A<----->2a01:7e01::f03c:93ff:fed3:0874
www.gliwice<----->IN<----->CNAME<----->dns3.gliwice

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```

Utworzyć w ramach tejże domeny *gliwice.{wybierz\_co\_chcesz}.pl* oraz *www.gliwice.{wybierz\_co\_chcesz}.pl* nakierowane na adres IPv4 oraz IPv6 serwera VPS ze strefą podstawową dla domeny *gliwice.{wybierz\_co\_chcesz}.pl*.

```
debian1  x  debian2  x  debian3  x  +  v  -  □  x
/etc/bind/db.itzkuba.pl  [----] 39 L: [ 11+21 32/ 38] *(783 / 945b) 0010 0x00A  [*][X]

@<----->IN<----->NS<----->dns1.itzkuba.pl.
@<----->IN<----->NS<----->dns2.itzkuba.pl.
gliwice.itzkuba.pl<----->IN<----->NS<----->dns3.gliwice

@<----->IN<----->A<----->139.144.180.86
@<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
dns1<----->IN<----->A<----->139.144.180.86
dns1<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
www<----->IN<----->A<----->139.144.180.86
www<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1

dns2<----->IN<----->A<----->172.104.139.244
dns2<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d

sklep<----->IN<----->A<----->139.144.180.86
sklep<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
sklep<----->IN<----->A<----->172.104.139.244
sklep<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d

@<----->IN<----->MX<----->10<----->mail.itzkuba.pl.
mail<----->IN<----->A<----->172.104.139.244
mail<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d

dns3.gliwice<----->IN<----->A<----->139.162.173.26
dns3.gliwice<----->IN<----->A<----->2a01:7e01::f03c:93ff:fed3:0874
www.gliwice<----->IN<----->CNAME<----->dns3.gliwice

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```

Dokonać takiej konfiguracji na serwerze utrzymującym podstawową strefę domeny *gliwice.{wybierz\_co\_chcesz}.pl*, aby własny komputer w domu korzystał z osobnej konfiguracji strefy dla w/w domeny (np. nazwa *gliwice.{wybierz\_co\_chcesz}.pl* oraz *www.gliwice.{wybierz\_co\_chcesz}.pl* mają być nakierowane na adres IP: *1.1.1.1*) niż wszystkie pozostałe komputery i nie były dla niego również obsługiwane zapytania rekursywne.

```
/etc/bind/named.conf.default-zones [----] 24 L:[ 1+ 0 1/ 54] *(24 / 907b) 0032 0x020 [*][X]
// prime the server with knowledge of the root servers
view "pierwszy" {
<----->match-clients { any; };

zone "." {
<----->type hint;
<----->file "/usr/share/dns/root.hints";
};
};

view "drugi" {
<----->match-clients { IP; };
<----->allow-recursion { none; };

zone "gliwice.itzkuba.pl" {
<----->type master;
<----->file "/etc/bind/external.gliwice.itzkuba.pl";
};
};

// be authoritative for the localhost forward and reverse zones, and for
// broadcast zones as per RFC 1912

zone "localhost" {
<----->type master;
<----->file "/etc/bind/db.local";
};
};

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit

/etc/bind/external.gliwice.itzkuba.pl [----] 3 L:[ 1+14 15/ 16] *(290 / 304b) 0009 0x009 [*][X]
BIND data file for local loopback interface

TTL<-->7200
@<----->IN<----->SOA<----->itzkuba.pl. jaknoc13.onet.pl. (
<-----><-----><-----> 6<-----> Serial
<-----><-----><-----> 604800<-----> Refresh
<-----><-----><-----> 86400<-----> Retry
<-----><-----><-----> 2419200<-----> Expire
<-----><-----><-----> 604800 )<-----> Negative Cache TTL

@<----->IN<----->NS<----->dns3.gliwice.itzkuba.pl.
@<----->IN<----->A<----->1.1.1.1
dns3<-->IN<----->A<----->1.1.1.1
www<-->IN<----->A<----->1.1.1.1

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```

Zweryfikować prawidłowe działanie utworzonych domen w strefach i dokonanej konfiguracji.

Na zrzutach ekranu w powyższych zadaniach pojawia się błąd w linii: *dns3.gliwice<->IN<->A<->2a01:7e01::f03c:93ff:fed3:a8c1* pliku */etc/bind/named.conf.default-zones*. Omyłkowo przyporządkowałem rekord A do adresu IPv6. Skorygowana wersja to: *dns3.gliwice<->IN<->AAAA<->2a01:7e01::f03c:93ff:fed3:a8c1*.

Połączeni z itzkuba.pl:

```
> server 1.1.1.1
Default Server:  one.one.one.one
Address:  1.1.1.1

> itzkuba.pl
Server:  one.one.one.one
Address:  1.1.1.1

Non-authoritative answer:
Name:    itzkuba.pl
Addresses:  2a01:7e01::f03c:93ff:fed3:a8c1
            139.144.180.86

> www.itzkuba.pl
Server:  one.one.one.one
Address:  1.1.1.1

Non-authoritative answer:
Name:    www.itzkuba.pl
Addresses:  2a01:7e01::f03c:93ff:fed3:a8c1
            139.144.180.86
```

```
C:\Users\lenovo>ping itzkuba.pl

Pinging itzkuba.pl [139.144.180.86] with 32 bytes of data:
Reply from 139.144.180.86: bytes=32 time=37ms TTL=53
Reply from 139.144.180.86: bytes=32 time=36ms TTL=53
Reply from 139.144.180.86: bytes=32 time=38ms TTL=53
Reply from 139.144.180.86: bytes=32 time=37ms TTL=53

Ping statistics for 139.144.180.86:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 36ms, Maximum = 38ms, Average = 37ms

C:\Users\lenovo>ping www.itzkuba.pl

Pinging www.itzkuba.pl [139.144.180.86] with 32 bytes of data:
Reply from 139.144.180.86: bytes=32 time=45ms TTL=53
Reply from 139.144.180.86: bytes=32 time=35ms TTL=53
Reply from 139.144.180.86: bytes=32 time=38ms TTL=53
Reply from 139.144.180.86: bytes=32 time=36ms TTL=53

Ping statistics for 139.144.180.86:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 35ms, Maximum = 45ms, Average = 38ms
```

Połączenie z Gliwice.itzkuba.pl:

```
> server 8.8.4.4
Default Server:  dns.google
Address:  8.8.4.4

> www.gliwice.itzkuba.pl
Server:  dns.google
Address:  8.8.4.4

Non-authoritative answer:
Name:     dns3.gliwice.itzkuba.pl
Addresses: 2a01:7e01::f03c:93ff:fed3:874
           139.162.173.26
Aliases:  www.gliwice.itzkuba.pl
```

```
> server 139.162.173.26
Default Server:  26.173.162.139.in-addr.arpa
Address:  139.162.173.26

> www.gliwice.itzkuba.pl
Server:  26.173.162.139.in-addr.arpa
Address:  139.162.173.26

Name:     www.gliwice.itzkuba.pl
Addresses: 2a01:7e01::f03c:93ff:fed3:874
           139.162.173.26

> www.gliwice.itzkuba.pl
Server:  26.173.162.139.in-addr.arpa
Address:  139.162.173.26

Name:     www.gliwice.itzkuba.pl
Addresses: 2a01:7e01::f03c:93ff:fed3:874
           139.162.173.26
```

Połączenia z poddomenami:

- sklep:

```
> server 9.9.9.9
Default Server: [9.9.9.9]
Address: 9.9.9.9

> sklep.itzkuba.pl
Server: [9.9.9.9]
Address: 9.9.9.9

Non-authoritative answer:
Name: sklep.itzkuba.pl
Addresses: 2a01:7e01::f03c:93ff:fed3:a8c1
           2a01:7e01::f03c:93ff:fed3:f18d
           139.144.180.86
           172.104.139.244

> server 8.8.8.8
Default Server: dns.google
Address: 8.8.8.8

> sklep.itzkuba.pl
Server: dns.google
Address: 8.8.8.8

Non-authoritative answer:
Name: sklep.itzkuba.pl
Addresses: 2a01:7e01::f03c:93ff:fed3:f18d
           2a01:7e01::f03c:93ff:fed3:a8c1
           172.104.139.244
           139.144.180.86
```

\*widoczny pseudo-loadbalancing

- mail:

```
> mail.itzkuba.pl
Server: dns.google
Address: 8.8.8.8

Non-authoritative answer:
Name: mail.itzkuba.pl
Addresses: 2a01:7e01::f03c:93ff:fed3:f18d
           172.104.139.244
```

Połączenia z innymi serwerami:

```
> server 8.26.56.26
Default Server: ns1.recursive.dnsbycomodo.com
Address: 8.26.56.26
```

```
> dns1.itzkuba.pl
Server: ns1.recursive.dnsbycomodo.com
Address: 8.26.56.26
```

```
Non-authoritative answer:
Name: dns1.itzkuba.pl
Addresses: 2a01:7e01::f03c:93ff:fed3:a8c1
          139.144.180.86
```

```
> dns2.itzkuba.pl
Server: ns1.recursive.dnsbycomodo.com
Address: 8.26.56.26
```

```
Non-authoritative answer:
Name: dns2.itzkuba.pl
Addresses: 2a01:7e01::f03c:93ff:fed3:f18d
          172.104.139.244
```

```
> dns3.gliwice.itzkuba.pl
Server: ns1.recursive.dnsbycomodo.com
Address: 8.26.56.26
```

```
Non-authoritative answer:
Name: dns3.gliwice.itzkuba.pl
Addresses: 2a01:7e01::f03c:93ff:fed3:874
          139.162.173.26
```

```
> server 185.228.168.168
Default Server: family-filter-dns.cleanbrowsing.org
Address: 185.228.168.168
```

```
> itzkuba.pl
Server: family-filter-dns.cleanbrowsing.org
Address: 185.228.168.168
```

```
Non-authoritative answer:
Name: itzkuba.pl
Addresses: 2a01:7e01::f03c:93ff:fed3:a8c1
          139.144.180.86
```

```
> www.itzkuba.pl
Server: family-filter-dns.cleanbrowsing.org
Address: 185.228.168.168
```

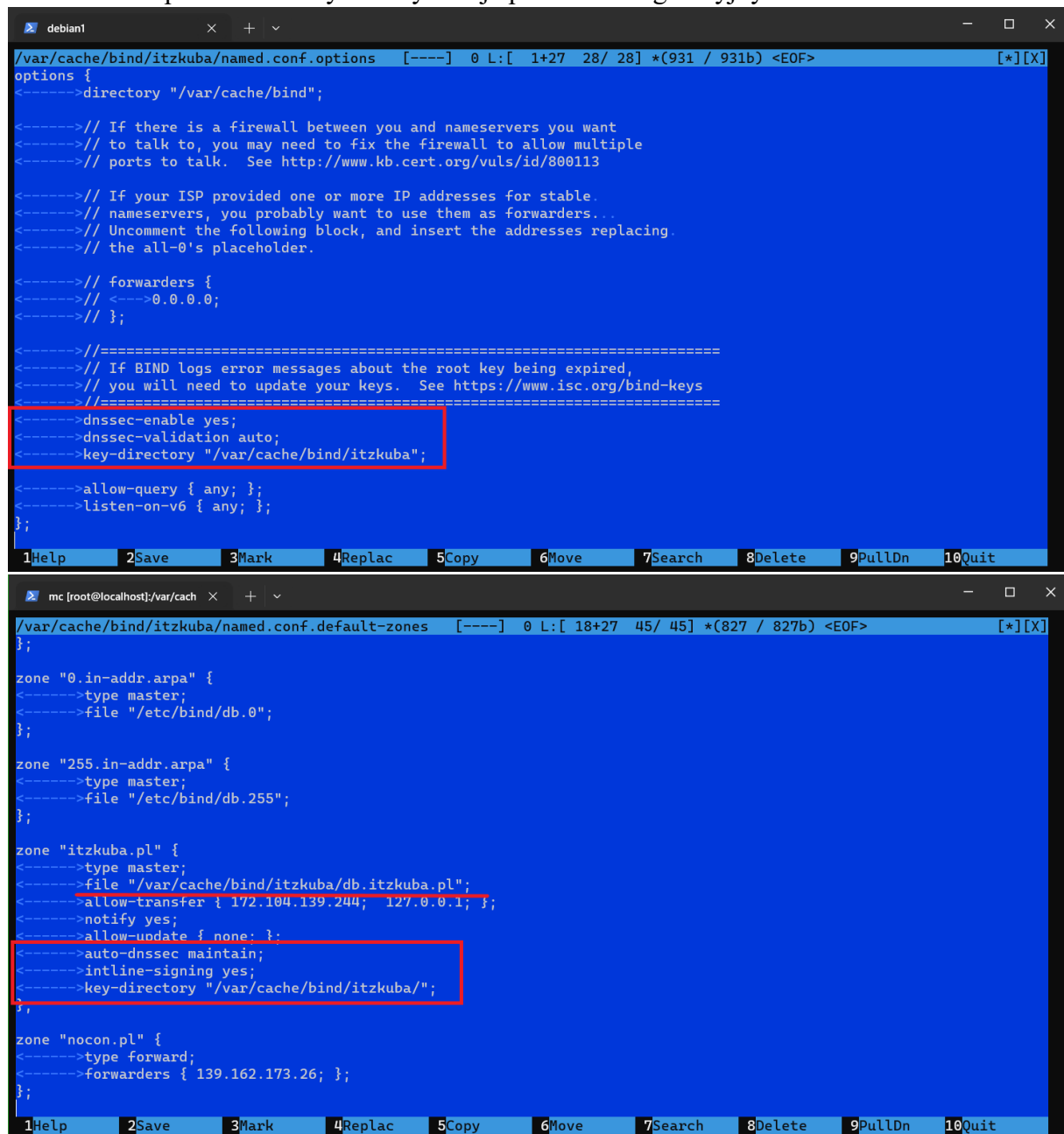
```
Non-authoritative answer:
Name: www.itzkuba.pl
Addresses: 2a01:7e01::f03c:93ff:fed3:a8c1
          139.144.180.86
```

## Zarządzanie sieciowymi systemami operacyjnymi II - moduł 1 (Zadanie z gwiazdką)

Dla skonfigurowanej domeny zarejestrowanej w publicznym systemie DNS, należy skonfigurować pełną obsługę DNSSEC, ze zgłoszonym do operatora rekordem DS i z wdrożoną automatyczną rotacją kluczy ZSK - obsługa DNSSEC ma zostać zrealizowana zarówno dla domeny głównej *{wybierz\_co\_chcesz}.pl* jak również delegowanej domeny *gliwice.{wybierz\_co\_chcesz}.pl*.

### Debian1

Przeniesienie plików domeny i modyfikacja plików konfiguracyjnych:



```
/var/cache/bind/itzkuba/named.conf.options [----] 0 L: [ 1+27 28/ 28] *(931 / 931b) <EOF> [*][X]
options {
<----->directory "/var/cache/bind";

<----->// If there is a firewall between you and nameservers you want
<----->// to talk to, you may need to fix the firewall to allow multiple
<----->// ports to talk. See http://www.kb.cert.org/vuls/id/800113

<----->// If your ISP provided one or more IP addresses for stable.
<----->// nameservers, you probably want to use them as forwarders...
<----->// Uncomment the following block, and insert the addresses replacing
<----->// the all-0's placeholder.

<----->// forwarders {
<----->// <---->0.0.0.0;
<----->// };

<----->//=====
<----->// If BIND logs error messages about the root key being expired,
<----->// you will need to update your keys. See https://www.isc.org/bind-keys
<----->//=====
<----->dnssec-enable yes;
<----->dnssec-validation auto;
<----->key-directory "/var/cache/bind/itzkuba";

<----->allow-query { any; };
<----->listen-on-v6 { any; };
};

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit

/var/cache/bind/itzkuba/named.conf.default-zones [----] 0 L: [ 18+27 45/ 45] *(827 / 827b) <EOF> [*][X]
};

zone "0.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.0";
};

zone "255.in-addr.arpa" {
<----->type master;
<----->file "/etc/bind/db.255";
};

zone "itzkuba.pl" {
<----->type master;
<----->file "/var/cache/bind/itzkuba/db.itzkuba.pl";
<----->allow-transfer { 172.104.139.244; 127.0.0.1; };
<----->notify yes;
<----->allow-update { none; };
<----->auto-dnssec maintain;
<----->intline-signing yes;
<----->key-directory "/var/cache/bind/itzkuba/";
};

zone "nocon.pl" {
<----->type forward;
<----->forwarders { 139.162.173.26; };
};

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```

## Utworzenie kluczy i nadanie uprawnień:

```
root@localhost:~# cd /var/cache/bind/itzkuba/
root@localhost:/var/cache/bind/itzkuba# dnssec-keygen -a ECDSAP256SHA256 -3 itzkuba.pl
Generating key pair.
Kitzkuba.pl.+013+19870
root@localhost:/var/cache/bind/itzkuba# dnssec-keygen -f KSK -a ECDSAP256SHA256 -3 itzkuba.pl
Generating key pair.
Kitzkuba.pl.+013+41136

root@localhost:~# chmod -R 760 /var/cache/bind/*
root@localhost:~# chown -R bind:bind /var/cache/bind/*
```

## Ustawienie dat ważności klucza i jego usunięcia oraz wygenerowanie jego następców:

```
root@localhost:/var/cache/bind/itzkuba# cat Kitzkuba.pl.+013+19870.key
; This is a zone-signing key, keyid 19870, for itzkuba.pl.
; Created: 20230625153226 (Sun Jun 25 15:32:26 2023)
; Publish: 20230625153226 (Sun Jun 25 15:32:26 2023)
; Activate: 20230625153226 (Sun Jun 25 15:32:26 2023)
itzkuba.pl. IN DNSKEY 256 3 13 9xKEz2r6zV/PoIevjez3JLPidqY9a3nBsC7M8jKJx9LV0qVofXWv8X8p uIEHtM6HBLQIGXWCWwqz7LXiH4WuQ==
root@localhost:/var/cache/bind/itzkuba# dnssec-keygen -S Kitzkuba.pl.+013+19870.key -I +5mo -D +7mo
dnssec-keygen: fatal: Key itzkuba.pl/ECDSAP256SHA256/19870 has no inactivation date.
You must use dnssec-settime -I to set one before generating a successor.
root@localhost:/var/cache/bind/itzkuba# dnssec-settime -I +4mo -D +6mo Kitzkuba.pl.+013+19870.key
dnssec-settime: warning: Permissions on the file ./Kitzkuba.pl.+013+19870.private have changed from 0760 to 0600 as a result of this operation.
./Kitzkuba.pl.+013+19870.key
./Kitzkuba.pl.+013+19870.private
root@localhost:/var/cache/bind/itzkuba# cat Kitzkuba.pl.+013+19870.key
; This is a zone-signing key, keyid 19870, for itzkuba.pl.
; Created: 20230625153226 (Sun Jun 25 15:32:26 2023)
; Publish: 20230625153226 (Sun Jun 25 15:32:26 2023)
; Activate: 20230625153226 (Sun Jun 25 15:32:26 2023)
; Inactive: 20231023154645 (Mon Oct 23 15:46:45 2023)
; Delete: 20231221154645 (Fri Dec 22 15:46:45 2023)
itzkuba.pl. IN DNSKEY 256 3 13 9xKEz2r6zV/PoIevjez3JLPidqY9a3nBsC7M8jKJx9LV0qVofXWv8X8p uIEHtM6HBLQIGXWCWwqz7LXiH4WuQ==
root@localhost:/var/cache/bind/itzkuba# dnssec-keygen -S Kitzkuba.pl.+013+19870.key -I +6mo -D +8mo
Generating key pair.
Kitzkuba.pl.+013+18013
root@localhost:/var/cache/bind/itzkuba# dnssec-keygen -S Kitzkuba.pl.+013+18013.key -I +8mo -D +9mo
Generating key pair.
Kitzkuba.pl.+013+43673
root@localhost:/var/cache/bind/itzkuba#
```

## Konfiguracja pliku strefy:

```
debian1
/var/cache/bind/itzkuba/db.itzkuba.pl [----] 32 L: [ 1+ 5 6/ 42] *(152 /1189b) 0047 0x02F [*][X]

BIND data file for local loopback interface

$TTL 7200
$INCLUDE /var/cache/bind/itzkuba/Kitzkuba.pl.+013+19870.key
$INCLUDE /var/cache/bind/itzkuba/Kitzkuba.pl.+013+41136.key
$INCLUDE /var/cache/bind/itzkuba/Kitzkuba.pl.+013+18013.key
$INCLUDE /var/cache/bind/itzkuba/Kitzkuba.pl.+013+43673.key
@<----->IN<----->SOA<----->dns1.itzkuba.pl. jaknoc13.onet.pl. (
<-----><-----><-----> 10<-----><-----> Serial
<-----><-----><-----> 604800<-----><-----> Refresh
<-----><-----><-----> 86400<-----><-----> Retry
<-----><-----><-----> 2419200<-----><-----> Expire
<-----><-----><-----> 604800 )<-----><-----> Negative Cache TTL

@<----->IN<----->NS<----->dns1.itzkuba.pl.
@<----->IN<----->NS<----->dns2.itzkuba.pl.
gliwice.itzkuba.pl<----->IN<----->NS<----->dns3.gliwice

@<----->IN<----->A<----->139.144.180.86
@<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
dns1<----->IN<----->A<----->139.144.180.86
dns1<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
www<----->IN<----->A<----->139.144.180.86
www<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1

dns2<----->IN<----->A<----->172.104.139.244
dns2<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```



### Debian3:

```
<----->dnssec-enable yes;
<----->dnssec-validation auto;
<----->key-directory "/var/cache/bind/itzkuba";
<----->allow-query { any; };
<----->listen-on-v6 { any; };

zone "gliwice.itzkuba.pl" {
<----->type master;
<----->file "/var/cache/bind/itzkuba/db.gliwice.itzkuba.pl";
<----->auto-dnssec maintain;
<----->inline-signing yes;
<----->key-directory "/var/cache/bind/itzkuba";
};
```

```
root@localhost:/var/cache/bind/itzkuba# dnssec-keygen -a ECDSA256SHA256 -3 gliwice.itzkuba.pl
Generating key pair.
Kgliwice.itzkuba.pl.+013+23704
root@localhost:/var/cache/bind/itzkuba# dnssec-keygen -f KSK -a ECDSA256SHA256 -3 gliwice.itzkuba.pl
Generating key pair.
Kgliwice.itzkuba.pl.+013+11161
```

```
root@localhost:~# chmod 760 /var/cache/bind/itzkuba/*
root@localhost:~# chown bind:bind /var/cache/bind/itzkuba/*
```

```
root@localhost:~# dnssec-settime -I +4mo -D +5mo /var/cache/bind/itzkuba/Kgliwice.itzkuba.pl.+013+23704.key
dnssec-settime: warning: Permissions on the file /var/cache/bind/itzkuba/Kgliwice.itzkuba.pl.+013+23704.private have changed from 0760 to 0600 as a result of this operation.
/var/cache/bind/itzkuba/Kgliwice.itzkuba.pl.+013+23704.key
/var/cache/bind/itzkuba/Kgliwice.itzkuba.pl.+013+23704.private
root@localhost:~# cat /var/cache/bind/itzkuba/Kgliwice.itzkuba.pl.+013+23704.key
; This is a zone-signing key, keyid 23704, for gliwice.itzkuba.pl.
; Created: 20230625172321 (Sun Jun 25 17:23:21 2023)
; Publish: 20230625172321 (Sun Jun 25 17:23:21 2023)
; Activate: 20230625172321 (Sun Jun 25 17:23:21 2023)
; Inactive: 20231023173617 (Mon Oct 23 17:36:17 2023)
; Delete: 20231122173617 (Wed Nov 22 17:36:17 2023)
gliwice.itzkuba.pl. IN DNSKEY 256 3 13 jMj6PqqvXumWquts4IvwnLLZc5n0W0esIY8XthUOE6DRf5RTZVl1oIEl CQdk3FAHdiVNRHQoHBaEifmG
G50Eiw==
```

```
root@localhost:~# dnssec-keygen -S /var/cache/bind/itzkuba/Kgliwice.itzkuba.pl.+013+23704.key -I +8mo -D +9mo
Generating key pair.
Kgliwice.itzkuba.pl.+013+28995
root@localhost:~#
```

```
debian1  x  debian3  x  +  v  -  □  x
/var/cache/bind/itzkuba/db.gliwice.itzkuba.pl  [----] 31 L: [ 1+ 8 9/ 23] *(328 / 671b) 0009 0x009  [*][X]

BIND data file for local loopback interface

$TTL<-->7200
$INCLUDE /var/cache/bind/itzkuba/kgliwice.itzkuba.pl.+013+23704.key
$INCLUDE /var/cache/bind/itzkuba/kgliwice.itzkuba.pl.+013+11161.key
$INCLUDE /var/cache/bind/itzkuba/kgliwice.itzkuba.pl.+013+28995.key
@<----->IN<----->SOA<----->dns3.gliwice.itzkuba.pl. jaknoc13.onet.pl. (
<-----><-----><-----> 5<-----> Serial
<-----><-----><-----> 604800<-----> Refresh
<-----><-----><-----> 86400<-----> Retry
<-----><-----><-----> 2419200<-----> Expire
<-----><-----><-----> 604800 )<-----> Negative Cache TTL

@<----->IN<----->NS<----->dns3.gliwice.itzkuba.pl.
@<----->IN<----->A<----->139.162.173.26
@<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:0874

dns3<-->IN<----->A<----->139.162.173.26
dns3<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:0874
www<-->IN<----->A<----->139.162.173.26
www<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:0874

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit

debian1  x  debian3  x  +  v  -  □  x
/var/cache/bind/itzkuba/db.itzkuba.pl  [-M--] 0 L: [ 17+17 34/ 44] *(970 / 1291b) 0010 0x00A  [*][X]
@<----->IN<----->NS<----->dns2.itzkuba.pl.
gliwice.itzkuba.pl<----->IN<----->NS<----->dns3.gliwice

@<----->IN<----->A<----->139.144.180.86
@<----->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
dns1<-->IN<----->A<----->139.144.180.86
dns1<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
www<-->IN<----->A<----->139.144.180.86
www<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1

dns2<-->IN<----->A<----->172.104.139.244
dns2<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d

sklep<-->IN<----->A<----->139.144.180.86
sklep<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:a8c1
sklep<-->IN<----->A<----->172.104.139.244
sklep<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d

@<----->IN<----->MX<----->10<----->mail.itzkuba.pl.
mail<-->IN<----->A<----->172.104.139.244
mail<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:f18d

dns3.gliwice<-->IN<----->A<----->139.162.173.26
dns3.gliwice<-->IN<----->AAAA<----->2a01:7e01::f03c:93ff:fed3:0874
www.gliwice<-->IN<----->CNAME<----->dns3.gliwice

gliwice.itzkuba.pl<----->IN<----->DS<----->11161<-->13<----->2<----->FF71827B7C1646238C5D5AA09F16CADB85B776DB96678F33722E9766

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```

## Weryfikacja wdrożenia:

```
root@localhost:~# dig dnskey itzkuba.pl

;<<>> DiG 9.16.37-Debian <<>> dnskey itzkuba.pl
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 65506
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;itzkuba.pl. IN DNSKEY

;; ANSWER SECTION:
itzkuba.pl. 7200 IN DNSKEY 257 3 13 pJ2XmFhRvZKj3av/jGE2CYkCkGaSWDsWgGEql+08aIIXyF/z1EYDG3cv uFc050
RiUb/Lxc8tKkCiDdHmFS6wrg==
itzkuba.pl. 7200 IN DNSKEY 256 3 13 9xKEz2r6zV/PoIevjez3JLPidqY9a3nBsC7M8jKJx9LV0qVofXWv8X8p uIEHtM
6HBLQiqXWCWwqz7LxiH4WuQ=

;; Query time: 0 msec
;; SERVER: 139.162.133.5#53(139.162.133.5)
;; WHEN: Sun Jun 25 19:52:22 UTC 2023
;; MSG SIZE rcvd: 199
```

```
root@localhost:~# dig +dnssec www.itzkuba.pl

; <<>> DiG 9.16.37-Debian <<>> +dnssec www.itzkuba.pl
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 15349
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: do; udp: 4096
;; QUESTION SECTION:
;www.itzkuba.pl.                IN      A

;; ANSWER SECTION:
www.itzkuba.pl.                7200    IN      A      139.144.180.86
www.itzkuba.pl.                7200    IN      RRSIG   A 13 3 7200 20230712003419 20230625174446 19870 itzkuba.pl. AjgLYt6rDKHi
AvKEtdT5CsjG0GsXyAZngkYg1EGjeUoErA4SI4wxamt5 zamDloEV06ZNbnIgv/HTnEskbe1ucA==

;; Query time: 0 msec
;; SERVER: 139.162.133.5#53(139.162.133.5)
;; WHEN: Sun Jun 25 20:00:22 UTC 2023
;; MSG SIZE rcvd: 165
```

Key Tag	Flaga	Algorytm	Klucz publiczny zakodowany w base64)	
Możesz dodać nowy wpis, klikając na ten przycisk.				
Key Tag *	Flaga *	Algorytm: *	Klucz publiczny (zakodowany w base64): *	
<input type="text" value="41136"/>	<input type="text" value="257 - Key Signing Ke"/>	<input type="text" value="13 - ECDSAP256SHA"/>	<div><div><div>Z95LDAC13A1A00ZDA1A00J4095578D</div><div>02C3835A949C7158B1CCFCCC06B54B</div><div>0BAF</div></div><div></div><div></div></div>	