Mestrado de Redes e Serviços de Comunicação

Redes IP

Relatório do Trabalho Prático de Endereçamento IP

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- 1ª Parte

Esquema de Endereçamento da rede da Empresa XPTO tendo disponível o bloco de endereços 200.31.16.0 – 200.31.31.0 :

1. **Rede dos Servidores**

   Necessários 63 pontos de acesso + Endereço de rede + Endereço de Broadcast + Endereço para o Router (Default Gateway) = 66 IP´s

   128 endereços $\Rightarrow$ 2^7 bits $\Rightarrow$ Mascara de 25 bits

   Rede: 200.31.16.0/25
   Mascara: 255.255.255.128
   Endereço de Rede: 200.31.16.0
   Endereço de Broadcast: 200.31.16.127

2. **Rede da Loja 1**

   Necessários 20 pontos de acesso + Endereço de rede + Endereço de Broadcast + Endereço para o Router (Default Gateway) = 23 IP´s

   32 endereços $\Rightarrow$ 2^5 bits $\Rightarrow$ Mascara de 27 bits

   Rede: 200.31.16.128/27
   Mascara: 255.255.255.224
   Endereço de Rede: 200.31.16.128
   Endereço de Broadcast: 200.31.16.159

3. **Rede da Loja 2**

   Necessários 20 pontos de acesso + Endereço de rede + Endereço de Broadcast + Endereço para o Router (Default Gateway) = 23 IP´s

   32 endereços $\Rightarrow$ 2^5 bits $\Rightarrow$ Mascara de 27 bits

   Rede: 200.31.16.160/27
   Mascara: 255.255.255.224
   Endereço de Rede: 200.31.16.160
   Endereço de Broadcast: 200.31.16.191

4. **Rede do Armazém 1**

   Necessários 7 pontos de acesso + Endereço de rede + Endereço de Broadcast + Endereço para o Router (Default Gateway) = 9 IP´s

16 endereços ⇒ 2^4 bits ⇒ Mascara de 28 bits

Rede: 200.31.16.192/28
Mascara: 255.255.255.240
Endereço de Rede: 200.31.16.192
Endereço de Broadcast: 200.31.16.207

5. **Rede do Armazém 2**

Necessários 7 pontos de acesso + Endereço de rede + Endereço de Broadcast + Endereço para o Router (Default Gateway) = 9 IP´s

16 endereços ⇒ 2^4 bits ⇒ Mascara de 28 bits

Rede: 200.31.16.208/28
Mascara: 255.255.255.240
Endereço de Rede: 200.31.16.208
Endereço de Broadcast: 200.31.16.223

6. **Rede Exterior**

Necessários 3 Endereços + Endereço de rede + Endereço de Broadcast + Endereço para o Router (Default Gateway) = 5 IP´s

8 endereços ⇒ 2^3 bits ⇒ Mascara de 29 bits

Rede: 200.31.16.224/28
Mascara: 255.255.255.240
Endereço de Rede: 200.31.16.224
Endereço de Broadcast: 200.31.16.231

- 2ª Parte

Serviço DNS para a rede da empresa XPTO com o domínio **xpto.pt**:

O serviço de DNS, ou melhor, de resolução de endereços normalmente está associado ao pacote do BIND:

Named.conf - Servidor Primário

```
// This is the primary configuration file for the BIND DNS server named.
//
// Please read /usr/share/doc/bind/README.Debian for information on the
// structure of BIND configuration files in Debian for BIND versions 8.2.1
// and later, *BEFORE* you customize this configuration file.
//

options {
        directory "/var/named";

        // If there is a firewall between you and nameservers you want
        // to talk to, you might need to uncomment the query-source
        // directive below.  Previous versions of BIND always asked
        // questions using port 53, but BIND 8.1 and later use an
unprivileged
        // port by default.

        // query-source address * port 53;
```

```
        // 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 {
        192.168.103.223;
        };
};

// reduce log verbosity on issues outside our control
logging {
        category lame-servers { null; };
        category cname { null; };
};

// prime the server with knowledge of the root servers
zone "." {
         type hint;
         file "/etc/bind/db.root";
};

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

zone "localhost" {
         type master;
         file "/var/named/for.local";
};

zone "127.in-addr.arpa" {
         type master;
         file "/var/named/back.local";
};

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

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

// add entries for other zones below here

zone "xpto.pt" {
        type master;
        file "/var/named/for.xpto.pt";
};

zone "16.31.200.in-addr.arpa" {
        type master;
        file "/var/named/back.xpto.pt";
};
```

Named.conf - Servidor Secundário

```
// This is the primary configuration file for the BIND DNS server named.
//
// Please read /usr/share/doc/bind/README.Debian for information on the
// structure of BIND configuration files in Debian for BIND versions 8.2.1
// and later, *BEFORE* you customize this configuration file.
//
options {
        directory "/var/named";

        // If there is a firewall between you and nameservers you want
        // to talk to, you might need to uncomment the query-source
        // directive below.  Previous versions of BIND always asked
        // questions using port 53, but BIND 8.1 and later use an
unprivileged
        // port by default.
        // query-source address * port 53;
       // 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 {
       192.168.103.223;
       };
};
// reduce log verbosity on issues outside our control
logging {
       category lame-servers { null; };
       category cname { null; };
};
// prime the server with knowledge of the root servers
zone "." {
        type hint;
        file "/etc/bind/db.root";
};
// be authoritative for the localhost forward and reverse zones, and for
// broadcast zones as per RFC 1912

zone "localhost" {
        type master;
        file "/var/named/for.local";
};

zone "127.in-addr.arpa" {
        type master;
        file "/var/named/back.local;
};

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

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

```
// add entries for other zones below here

zone "xpto.pt" {
       type slave;
       file "/var/named/for.xpto.pt";
};

zone "16.31.200.in-addr.arpa" {
       type slave;
       file "/var/named/back.xpto.pt";
};
```

É necessário definir 2 zonas:

- Zona de localhost (forward e reverse)
- Zona da empresa XPTO (forward e reverse)

Localhost:

Ficheiro do forward (for.local)

```
; BIND data file for local loopback interface
;
$TTL  604800
@     IN    SOA   localhost. root.localhost. (
                        1           ; Serial
                   604800           ; Refresh
                    86400           ; Retry
                  2419200           ; Expire
                   604800 )   ; Negative Cache TTL

@     IN    NS    localhost.
@     IN    A     127.0.0.1
```

Ficheiro de Reverse (back.local)

```
; BIND reverse data file for local loopback interface
;
$TTL  604800
@     IN    SOA   localhost. root.localhost. (
                        1           ; Serial
                   604800           ; Refresh
                    86400           ; Retry
                  2419200           ; Expire
                   604800 )         ; Negative Cache TTL
;
@     IN    NS    localhost.
1     IN    PTR   localhost.
```

Empresa XPTO:

Ficheiro do forward (for.xpto.pt)

```
@            IN      SOA     tux42.netlab.fe.up.pt. pfvieira.fe.up.pt.
(
                        200106091 ; Serial
                        28800     ; Refresh
                        7200      ; Retry
                        72000     ; Expire
                        86400 )   ; Minimum TTL
;
; Name servers
;
xpto.pt.                IN      NS      tux42.netlab.fe.up.pt.
xpto.pt.                IN      NS      tux41.netlab.fe.up.pt.

;Rede de Servidores

serv-stocks.xpto.pt.                IN      A               200.31.16.1
serv-rechum.xpto.pt.                IN      A               200.31.16.2
serv-cont.xpto.pt.                  IN      A               200.31.16.3
gw-serv.xpto.pt.                    IN      A               200.31.16.126

;Rede Exterior

serv-ext.xpto.pt.                   IN      A               200.31.16.225
gw-ext.xpto.pt.                     IN      A               200.31.16.230
gw-ext.xpto.pt.                     IN      A               200.31.16.229

;Loja 1

loj1-maq1.xpto.pt.                  IN      A               200.31.16.129
loj1-maq2.xpto.pt.                  IN      A               200.31.16.130
loj1-maq3.xpto.pt.                  IN      A               200.31.16.131
gw-loja1.xpto.pt.                   IN      A               200.31.16.158

;Loja 2

loj2-maq1.xpto.pt.                  IN      A               200.31.16.161
loj2-maq2.xpto.pt.                  IN      A               200.31.16.162
loj2-maq3.xpto.pt.                  IN      A               200.31.16.163
gw-loja2.xpto.pt.                   IN      A               200.31.16.190

;Armazem 1

armaz1-maq1.xpto.pt.                IN      A               200.31.16.193
armaz1-maq2.xpto.pt.                IN      A               200.31.16.194
armaz1-maq3.xpto.pt.                IN      A               200.31.16.195
gw-armaz1.xpto.pt.                  IN      A               200.31.16.1

;Armazem 2

armaz2-maq1.xpto.pt.                IN      A               200.31.16.209
armaz2-maq2.xpto.pt.                IN      A               200.31.16.210
armaz2-maq3.xpto.pt.                IN      A               200.31.16.211
gw-armaz2.xpto.pt.                  IN      A               200.31.16.222
```

Ficheiro de Reverse (back.xpto.pt)

```
; Data file for reverse address to hostname.
;
@       IN      SOA     tux42.netlab.fe.up.pt.pt. pfvieira.fe.up.pt. (
                        200106091 ; Serial
                        28800     ; Refresh
                        7200      ; Retry
                        604800    ; Expires
                        86400 )   ; Minimum TTL

;
; Name servers
;
16.31.200.in-addr.arpa.  IN   NS      tux42.netlab.fe.up.pt.
16.31.200.in-addr.arpa.  IN   NS      tux41.netlab.fe.up.pt.


;Rede de Servidores

1.16.31.200.in-addr.arpa        IN      PTR             serv-stocks.xpto.pt.
2.16.31.200.in-addr.arpa        IN      PTR             serv-rechum.xpto.pt.
3.16.31.200.in-addr.arpa        IN      PTR             serv-cont.xpto.pt.
1.16.31.200.in-addr.arpa        IN      PTR             gw-serv-e0.xpto.pt.

;Rede de Exterior

225.16.31.200.in-addr.arpa        IN      PTR             serv-ext.xpto.pt.
230.16.31.200.in-addr.arpa        IN      PTR             gw-ext-e0.xpto.pt.
229.16.31.200.in-addr.arpa        IN      PTR             gw-ext.e1.xpto.pt.


;Loja 1

129.16.31.200.in-addr.arpa        IN      PTR             loj1-maq1.xpto.pt.
130.16.31.200.in-addr.arpa        IN      PTR             loj1-maq2.xpto.pt.
131.16.31.200.in-addr.arpa        IN      PTR             loj1-maq3.xpto.pt.
158.16.31.200.in-addr.arpa        IN      PTR             gw-loj1-e0.xpto.pt.

;Loja 2

161.16.31.200.in-addr.arpa        IN      PTR             loj2-maq1.xpto.pt.
162.16.31.200.in-addr.arpa        IN      PTR             loj2-maq2.xpto.pt.
163.16.31.200.in-addr.arpa        IN      PTR             loj2-maq3.xpto.pt.
190.16.31.200.in-addr.arpa        IN      PTR             gw-loj2-e0.xpto.pt.


;Armazem 1

193.16.31.200.in-addr.arpa        IN      PTR             armaz1-maq1.xpto.pt.
194.16.31.200.in-addr.arpa        IN      PTR             armaz1-maq2.xpto.pt.
195.16.31.200.in-addr.arpa        IN      PTR             armaz1-maq3.xpto.pt.
206.16.31.200.in-addr.arpa        IN      PTR             gw-armaz1-e0.xpto.pt.


;Armazem 2

209.16.31.200.in-addr.arpa        IN      PTR             armaz2-maq1.xpto.pt.
210.16.31.200.in-addr.arpa        IN      PTR             armaz2-maq2.xpto.pt.
211.16.31.200.in-addr.arpa        IN      PTR             armaz2-maq3.xpto.pt.
222.16.31.200.in-addr.arpa        IN      PTR             gw-armaz2-e0.xpto.pt.
```

Finalmente foi editado o ficheiro resolv.conf no qual dissemos quais os name servers existentes na rede qual o domínio ao qual ele respondia.

```
nameserver 192.169.103.221

domain xpto.pt
nameserver 127.0.0.1
nameserver 172.1.16.42
```

Foram feitos testes para verificar o bom funcionamento do Servidor utilizando os seguintes comandos:

- **ndc [stop|start|reload]** para parar, reinicializar ou recarregar o servidor DNS.
- **tail –f syslog -** verificação do bom funcionamento do DNS
- **nslookup** para resolver endereços existentes no domínio xpto.
- **host** para resolver os pedidos de reverse.
- **ndc trace** seguido de **tail –f named.run** para verificar se os pedidos de DNS estão a ser resolvidos correctamente.