

# Trabalho Prático Nº.3 – Protocolos da Camada de Transporte - Grupo PL1 - 6

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## 1 Questões e Respostas

- A Qual o conteúdo do ficheiro `/etc/resolv.conf` e para que serve essa informação?

Este ficheiro serve para indicar o servidor a que as queries do DNS serão feitas. Contém a diretiva *nameserver* que informa ao *host* qual o servidor DNS que vai usar, a diretiva *search* que permite que dispositivos de domínios diferentes conectem-se pelos seus *hostnames* e uma série de opções. Neste caso as queries são feitas a 127.0.0.53 (LocalHost), que serão aceites pelo *systemd-resolved* que irá encaminhar os pedidos para os servidores certos.

```
# 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 trust-ad
search lan
```

Figura 1: Conteúdo do ficheiro `/etc/resolv.conf`

B Os servidores **www.di.uminho.pt.** e **www.europa.eu.** têm endereços IPv6? Se sim, quais?

O servidor **www.di.uminho.pt.** não possui endereço IPv6 e o servidor **www.europa.eu.** possui os endereços 2a01:7080:14:100::666:25 e 2a01:7080:24:100::666:25.

```
; <<>> DiG 9.16.1-Ubuntu <<>> AAAA www.di.uminho.pt.
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 39833
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;www.di.uminho.pt.          IN      AAAA

;; ANSWER SECTION:
www.di.uminho.pt.      14400   IN      CNAME   www5.di.uminho.pt.

;; Query time: 68 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: dom nov 14 17:26:13 WET 2021
;; MSG SIZE rcvd: 64
```

Figura 2: www.di.uminho.pt.

```
; <<>> DiG 9.16.1-Ubuntu <<>> AAAA www.europa.eu.
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 7816
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;www.europa.eu.          IN      AAAA

;; ANSWER SECTION:
www.europa.eu.      600     IN      CNAME   ip-europa.ec.europa.eu.
ip-europa.ec.europa.eu. 299     IN      AAAA    2a01:7080:14:100::666:25
ip-europa.ec.europa.eu. 299     IN      AAAA    2a01:7080:24:100::666:25

;; Query time: 160 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: dom nov 14 17:26:46 WET 2021
;; MSG SIZE rcvd: 125
```

Figura 3: www.europa.eu.

C Quais os servidores de nomes definidos para os domínios: "gov.pt." e "."?

Os servidores de nome para "gov.pt." são:  
*europe1.dnsnode.net.*, *ns02.fccn.pt.*, *a.dns.pt.*, *dns1.gov.pt.* e *nsp.dnsnode.net.*

Já os servidores de nome para "." são:  
*a.root-servers.net.*, *b.root-servers.net.*, *d.root-servers.net.*, *c.root-servers.net.*,  
*e.root-servers.net.*, *l.root-servers.net.*, *h.root-servers.net.*, *i.root-servers.net.*,  
*k.root-servers.net.*, *m.root-servers.net.*, *g.root-servers.net.*, *j.root-servers.net.*  
e *f.root-servers.net.*

```
;; <<>> DiG 9.16.1-Ubuntu <<>> NS gov.pt
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 61147
;; flags: qr rd ra; QUERY: 1, ANSWER: 5, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
gov.pt.                                IN      NS

;; ANSWER SECTION:
gov.pt.      169      IN      NS      europe1.dnsnode.net.
gov.pt.      169      IN      NS      ns02.fccn.pt.
gov.pt.      169      IN      NS      a.dns.pt.
gov.pt.      169      IN      NS      dns1.gov.pt.
gov.pt.      169      IN      NS      nsp.dnsnode.net.

;; Query time: 20 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: dom nov 14 18:28:49 WET 2021
;; MSG SIZE rcvd: 149
```

Figura 4: gov.pt.

```
;; <<>> DiG 9.16.1-Ubuntu <<>> NS .
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 12502
;; flags: qr rd ra; QUERY: 1, ANSWER: 13, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
.                                IN      NS

;; ANSWER SECTION:
.      60521    IN      NS      a.root-servers.net.
.      60521    IN      NS      b.root-servers.net.
.      60521    IN      NS      d.root-servers.net.
.      60521    IN      NS      c.root-servers.net.
.      60521    IN      NS      e.root-servers.net.
.      60521    IN      NS      l.root-servers.net.
.      60521    IN      NS      h.root-servers.net.
.      60521    IN      NS      i.root-servers.net.
.      60521    IN      NS      k.root-servers.net.
.      60521    IN      NS      m.root-servers.net.
.      60521    IN      NS      g.root-servers.net.
.      60521    IN      NS      j.root-servers.net.
.      60521    IN      NS      f.root-servers.net.

;; Query time: 12 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: dom nov 14 18:29:50 WET 2021
;; MSG SIZE rcvd: 239
```

Figura 5: root (".")

D Existe o domínio **efiko.academy**? Com base na informação obtida do DNS, nomeadamente os registos associados a esse nome, diga se o considera um **host** ou um **domínio de nomes**.

**efiko.academy**. é um domínio e, de acordo com as duas imagens abaixo, podemos considerar que é um **domínio de nomes**.

```
; <<>> DiG 9.16.1-Ubuntu <<>> SOA efiko.academy.
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 10427
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;efiko.academy.                IN      SOA

;; ANSWER SECTION:
efiko.academy.      3600    IN      SOA      ns3.combell.net. hostmaster.efiko.academy. 2021033008 10800 3600 604800 40000

;; Query time: 156 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: sáb nov 20 23:09:08 WET 2021
;; MSG SIZE rcvd: 104
```

Figura 6: \$ dig SOA efiko.academy.

E Qual é o servidor DNS primário definido para o domínio **gov.pt**? Este servidor primário (*master*) aceita queries recursivas? Porquê?

O servidor primário DNS está definido em **dnssec.gov.pt**. (tal como se pode verificar na figura 8). Este aceita queries recursivas, uma vez que uma das *flags* ativadas é **ra** (*recursive answer*).

```
; <<>> DiG 9.16.1-Ubuntu <<>> SOA gov.pt.
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 53467
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;gov.pt.                      IN      SOA

;; ANSWER SECTION:
gov.pt.      589     IN      SOA      dnssec.gov.pt. dns.ceger.gov.pt. 2019072064 18000 7200 2419200 86400

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: dom nov 14 19:58:02 WET 2021
;; MSG SIZE rcvd: 88
```

Figura 7: Acesso a gov.pt. através do dig

F Obtenha uma resposta "autoritativa" para a questão anterior.

De acordo com a figura 9, podemos obter um resposta "autoritativa" se interrogar-mos o servidor de nomes *dns1.gov.pt.*. Nos interrogamos este servidor pois o servidor de nomes primario que o dominio *gov.pt.* mostra no SOA não existe.

```
; <<>> DiG 9.16.1-Ubuntu <<>> SOA gov.pt @dns1.gov.pt.
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 41373
;; flags: qr aa rd; QUERY: 1, ANSWER: 1, AUTHORITY: 5, ADDITIONAL: 2
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;gov.pt.                                IN      SOA

;; ANSWER SECTION:
gov.pt.                                600     IN      SOA      dnssec.gov.pt. dns.ceger.gov.pt. 2019072096 18000 7200 2419200 86400

;; AUTHORITY SECTION:
gov.pt.                                600     IN      NS       dns1.gov.pt.
gov.pt.                                600     IN      NS       nsp.dnsnode.net.
gov.pt.                                600     IN      NS       ns02.fccn.pt.
gov.pt.                                600     IN      NS       a.dns.pt.
gov.pt.                                600     IN      NS       europe1.dnsnode.net.

;; ADDITIONAL SECTION:
dns1.gov.pt.                            600     IN      A        193.47.185.3

;; Query time: 48 msec
;; SERVER: 193.47.185.3#53(193.47.185.3)
;; WHEN: sáb nov 20 23:02:14 WET 2021
;; MSG SIZE rcvd: 218
```

Figura 8: \$ dig SOA gov.pt @dns1.gov.pt.

G Onde são entregues as mensagens de correio eletrónico dirigidas a **marcelo@presidencia.pt**?

As mensagens dirigidas a **marcelo@presidencia.pt** são entregues em **mail1.presidencia.pt.** e em **mail2.presidencia.pt.** .

```
; <<>> DiG 9.16.1-Ubuntu <<>> presidencia.pt MX
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 42258
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;presidencia.pt.                IN      MX

;; ANSWER SECTION:
presidencia.pt.      86400   IN      MX      10 mail2.presidencia.pt.
presidencia.pt.      86400   IN      MX      50 mail1.presidencia.pt.

;; Query time: 36 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: dom nov 14 20:25:32 WET 2021
;; MSG SIZE rcvd: 87
```

Figura 9: \$ dig presidencia.pt MX

H Que informação é possível obter, via DNS, acerca de **gov.pt**?

De acordo com a figura 12 é possível obter do DNS os NS e SOA de **gov.pt**.. Além disso, através da query ANY, é possível encontrar registos RRSIG, TXT, NSEC3PARAM, DNSKEY e DS. Não é possível observá-los na mesma figura porque no momento de tirar a *printscreen* a query ANY não nos mostrava todos os *records*.

```
; <<>> DiG 9.16.1-Ubuntu <<>> SOA gov.pt @a.dns.pt.
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 33027
;; flags: qr aa rd; QUERY: 1, ANSWER: 1, AUTHORITY: 5, ADDITIONAL: 2
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 1232
;; COOKIE: 08b79718d538ebd5a87eb64961997a9286dc131d0420b42e (good)
;; QUESTION SECTION:
;gov.pt.                                IN      SOA

;; ANSWER SECTION:
gov.pt.                                600     IN      SOA      dnssec.gov.pt. dns.ceger.gov.pt. 2019072096 18000 7200 2419200 86400

;; AUTHORITY SECTION:
gov.pt.                                600     IN      NS       dns1.gov.pt.
gov.pt.                                600     IN      NS       nsp.dnsnode.net.
gov.pt.                                600     IN      NS       europe1.dnsnode.net.
gov.pt.                                600     IN      NS       ns02.fccn.pt.
gov.pt.                                600     IN      NS       a.dns.pt.

;; ADDITIONAL SECTION:
dns1.gov.pt.                            600     IN      A        193.47.185.3

;; Query time: 8 msec
;; SERVER: 2a04:6d80::1#53(2a04:6d80::1)
;; WHEN: sáb nov 20 22:45:38 WET 2021
;; MSG SIZE rcvd: 246
```

Figura 10: \$ dig SOA gov.pt @a.dns.pt.

Conseguimos interrogar o DNS acerca do endereço IPv6 2001:690:2080:8005::38 usando o comando `dig` que nos dá o nome que este IPv6 tem associado a ele (*smtp01.fcn.pt*). No caso de haver problemas de contacto com o IP acima escrito, descobrimos que o nome do contacto do responsável por ele é *hostmaster.fcn.pt*, através do SOA da zona *fcn.pt*.

```
;; <<<> DiG 9.16.1-Ubuntu <<<> -x 2001:690:2080:8005::38
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 40719
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:: udp: 65494
;; QUESTION SECTION:
;8.3.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.5.0.0.8.0.8.0.2.0.9.6.0.1.0.0.2.ip6.arpa. IN PTR

;; ANSWER SECTION:
8.3.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.5.0.0.8.0.8.0.2.0.9.6.0.1.0.0.2.ip6.arpa. 3526 IN PTR smtp01.fccn.pt.

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: qua nov 17 11:48:22 WET 2021
;; MSG SIZE rcvd: 129
```

Figura 11: `$ dig -x 2001:690:2080:8005::38`

```
;; <<>> DiG 9.16.1-Ubuntu <<>> SOA fccn.pt
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 37672
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags;; udp: 65494
;; QUESTION SECTION:
;fccn.pt.                IN      SOA

;; ANSWER SECTION:
fccn.pt.                86400   IN      SOA      ns01.fccn.pt. hostmaster.fccn.pt. 2021111801 21600 7200 1209600 300

;; Query time: 64 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: sáb nov 20 22:38:36 WET 2021
;; MSG SIZE rcvd: 88
```

Figura 12: \$ dig SOA fccn.pt



J Os secundários usam um mecanismo designado por "**Transferência de zona**" para se atualizarem automaticamente a partir do primário, usando os parâmetros definidos no Record do tipo **SOA** do domínio. Descreve sucintamente esse mecanismo com base num exemplo concreto (ex: **uminho.pt**).

Uma **transferência de zona** é o processo de envio de dados de DNS de um *servidor primário* para um *servidor secundário*. O registo **SOA** (aquele que armazena informações sobre um domínio) é transferido em primeiro lugar. O número de série informa ao servidor secundário se a sua versão precisa de ser atualizada. As transferências de zona são efetuadas através do protocolo **TCP**.

```
; <<>> DiG 9.16.1-Ubuntu <<>> SOA uminho.pt.
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 25696
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;uminho.pt.                IN      SOA

;; ANSWER SECTION:
uminho.pt.                14400   IN      SOA      dns.uminho.pt. servicos.scom.uminho.pt. 2021111501 14400 7200 1209600 300

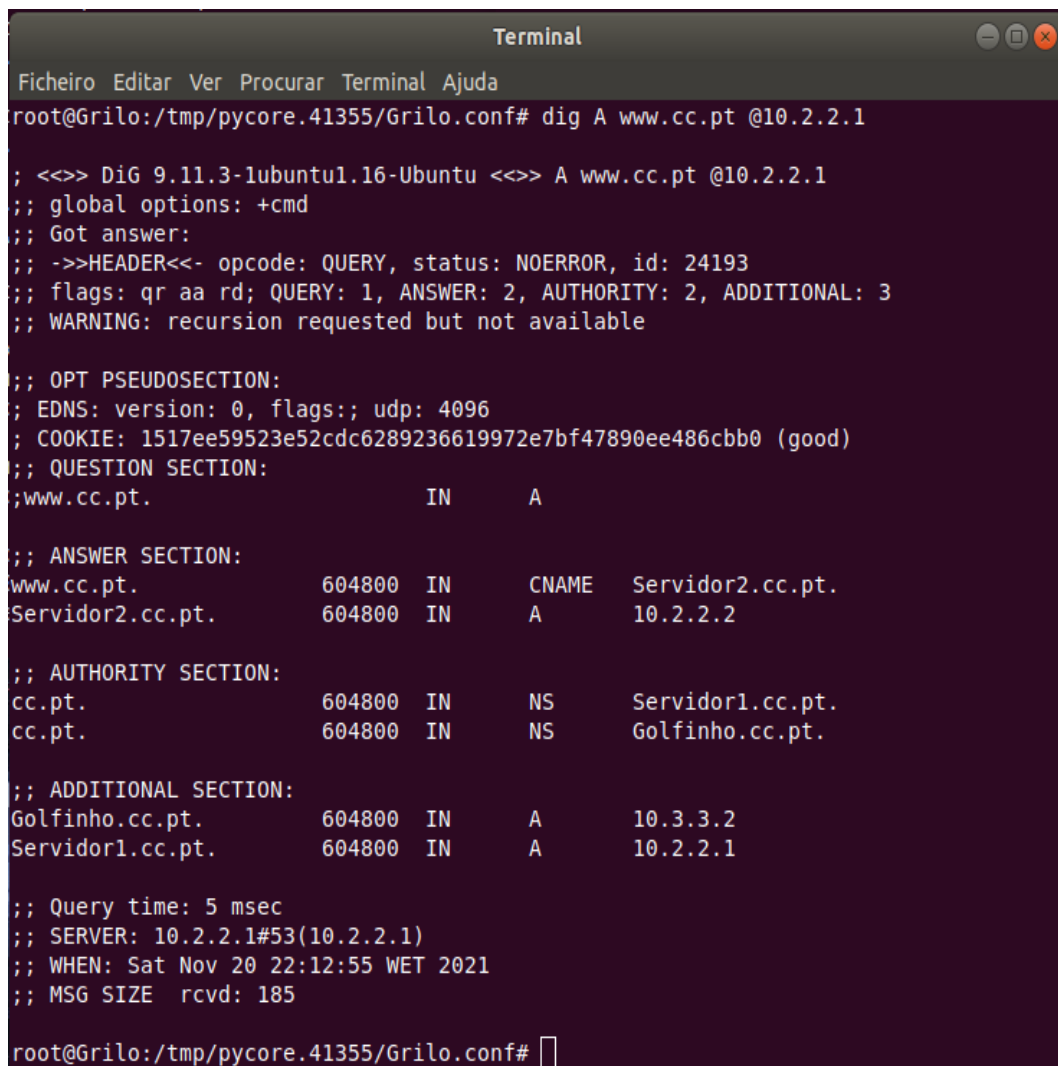
;; Query time: 32 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: sáb nov 20 22:49:25 WET 2021
;; MSG SIZE rcvd: 92
```

Figura 13: \$ dig SOA uminho.pt.

No exemplo da figura 15, podemos identificar:

- o servidor primário (*MNAME*): dns.uminho.pt.;
- o endereço de e-mail do administrador (*RNAME*): servicos.scom.uminho.pt.;
- o número de série: 2021111501;
- o REFRESH (tempo em segundos em que os servidores secundários devem esperar antes de pedir aos servidores primários o registo SOA para ver se ele foi atualizado): 14400;
- o RETRY(tempo em segundos em que um servidor deve esperar para pedir que um servidor primário faça uma nova atualização, caso ultrapasse o valor de REFRESH): 7200;
- o EXPIRE (tempo em segundos em que um servidor deve esperar para poder deixar de responder às queries vindas do servidor primário): 1209600.
- o TTL (Time to live) (tempo em segundos onde o DNS guarda uma query na cache até pedir uma nova): 300.

## 2 Demonstração de Funcionamento



```
Terminal
Ficheiro Editar Ver Procurar Terminal Ajuda
root@Grilo:/tmp/pycore.41355/Grilo.conf# dig A www.cc.pt @10.2.2.1

; <<>> DiG 9.11.3-lubuntu1.16-Ubuntu <<>> A www.cc.pt @10.2.2.1
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 24193
;; flags: qr aa rd; QUERY: 1, ANSWER: 2, AUTHORITY: 2, ADDITIONAL: 3
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 1517ee59523e52cdc6289236619972e7bf47890ee486cbb0 (good)
;; QUESTION SECTION:
;www.cc.pt.                IN      A

;; ANSWER SECTION:
www.cc.pt.                 604800  IN      CNAME   Servidor2.cc.pt.
Servidor2.cc.pt.          604800  IN      A        10.2.2.2

;; AUTHORITY SECTION:
cc.pt.                     604800  IN      NS       Servidor1.cc.pt.
cc.pt.                     604800  IN      NS       Golfinho.cc.pt.

;; ADDITIONAL SECTION:
Golfinho.cc.pt.            604800  IN      A        10.3.3.2
Servidor1.cc.pt.           604800  IN      A        10.2.2.1

;; Query time: 5 msec
;; SERVER: 10.2.2.1#53(10.2.2.1)
;; WHEN: Sat Nov 20 22:12:55 WET 2021
;; MSG SIZE rcvd: 185

root@Grilo:/tmp/pycore.41355/Grilo.conf#
```

Figura 14: Comando `$dig A www.cc.pt @10.2.2.1`.

```
Terminal
Ficheiro Editar Ver Procurar Terminal Ajuda
root@Grilo:/tmp/pycore.41355/Grilo.conf# dig A www.cc.pt @10.3.3.2

; <<>> DiG 9.11.3-lubuntu1.16-Ubuntu <<>> A www.cc.pt @10.3.3.2
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 6942
;; flags: qr aa rd; QUERY: 1, ANSWER: 2, AUTHORITY: 2, ADDITIONAL: 3
;; WARNING: recursion requested but not available
;
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 4da6688e45fe3122e41f106e619973d31401306b4d0c56e6 (good)
;; QUESTION SECTION:
;www.cc.pt.                IN      A

;; ANSWER SECTION:
www.cc.pt.                 604800  IN      CNAME   Servidor2.cc.pt.
Servidor2.cc.pt.          604800  IN      A        10.2.2.2

;; AUTHORITY SECTION:
cc.pt.                     604800  IN      NS       Servidor1.cc.pt.
cc.pt.                     604800  IN      NS       Golfinho.cc.pt.

;; ADDITIONAL SECTION:
Golfinho.cc.pt.           604800  IN      A        10.3.3.2
Servidor1.cc.pt.          604800  IN      A        10.2.2.1

;; Query time: 5 msec
;; SERVER: 10.3.3.2#53(10.3.3.2)
;; WHEN: Sat Nov 20 22:16:51 WET 2021
;; MSG SIZE rcvd: 185

root@Grilo:/tmp/pycore.41355/Grilo.conf#
```

Figura 15: Comando \$dig A www.cc.pt @10.3.3.2.

```
Terminal
Ficheiro Editar Ver Procurar Terminal Ajuda
root@Grilo:/tmp/pycore.41355/Grilo.conf# dig ANY cc.pt @10.2.2.1

; <<>> DiG 9.11.3-lubuntu1.16-Ubuntu <<>> ANY cc.pt @10.2.2.1
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 33041
;; flags: qr aa rd; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 3
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 3857938f205a8efe02fa1b3d61996ec73646f1adbd3ead94 (good)
;; QUESTION SECTION:
;cc.pt.                IN      ANY

;; ANSWER SECTION:
cc.pt.                604800 IN      SOA     ns.cc.pt. g06pl01.cc.pt. 41 5 20
200 604800
cc.pt.                604800 IN      NS      Servidor1.cc.pt.
cc.pt.                604800 IN      NS      Golfinho.cc.pt.

;; ADDITIONAL SECTION:
Golfinho.cc.pt.      604800 IN      A       10.3.3.2
Servidor1.cc.pt.     604800 IN      A       10.2.2.1

;; Query time: 5 msec
;; SERVER: 10.2.2.1#53(10.2.2.1)
;; WHEN: Sat Nov 20 21:55:19 WET 2021
;; MSG SIZE rcvd: 188

root@Grilo:/tmp/pycore.41355/Grilo.conf#
```

Figura 16: Comando `$dig ANY cc.pt @10.2.2.1`.

```
Terminal
Ficheiro Editar Ver Procurar Terminal Ajuda
root@Grilo:/tmp/pycore.41355/Grilo.conf# dig ANY cc.pt @10.3.3.2

; <<>> DiG 9.11.3-lubuntu1.16-Ubuntu <<>> ANY cc.pt @10.3.3.2
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 44781
;; flags: qr aa rd; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 3
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 2bf2fb5190d3912192b1f41761996eaa8f62a5963ed33744 (good)
;; QUESTION SECTION:
;cc.pt.                IN      ANY

;; ANSWER SECTION:
cc.pt.                604800 IN      SOA     ns.cc.pt. g06pl01.cc.pt. 41 5 20
200 604800
cc.pt.                604800 IN      NS      Servidor1.cc.pt.
cc.pt.                604800 IN      NS      Golfinho.cc.pt.

;; ADDITIONAL SECTION:
Golfinho.cc.pt.      604800 IN      A       10.3.3.2
Servidor1.cc.pt.     604800 IN      A       10.2.2.1

;; Query time: 5 msec
;; SERVER: 10.3.3.2#53(10.3.3.2)
;; WHEN: Sat Nov 20 21:54:50 WET 2021
;; MSG SIZE rcvd: 188

root@Grilo:/tmp/pycore.41355/Grilo.conf#
```

Figura 17: Comando \$dig ANY cc.pt @10.3.3.2.

```
Terminal
Ficheiro Editar Ver Procurar Terminal Ajuda
root@Grilo:/tmp/pycore.41355/Grilo.conf# dig ANY imap.cc.pt @10.2.2.1

; <<>> DiG 9.11.3-lubuntu1.16-Ubuntu <<>> ANY imap.cc.pt @10.2.2.1
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 45390
;; flags: qr aa rd; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 4
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: da712c333c32e4c6f6528065619971b6adef218c01b59c03 (good)
;; QUESTION SECTION:
;imap.cc.pt.                IN      ANY

;; ANSWER SECTION:
imap.cc.pt.                604800  IN      MX      20 Servidor3.cc.pt.

;; AUTHORITY SECTION:
cc.pt.                     604800  IN      NS      Golfinho.cc.pt.
cc.pt.                     604800  IN      NS      Servidor1.cc.pt.

;; ADDITIONAL SECTION:
Servidor3.cc.pt.           604800  IN      A       10.2.2.3
Golfinho.cc.pt.            604800  IN      A       10.3.3.2
Servidor1.cc.pt.           604800  IN      A       10.2.2.1

;; Query time: 5 msec
;; SERVER: 10.2.2.1#53(10.2.2.1)
;; WHEN: Sat Nov 20 22:07:50 WET 2021
;; MSG SIZE rcvd: 188

root@Grilo:/tmp/pycore.41355/Grilo.conf#
```

Figura 18: Comando `$dig ANY imap.cc.pt @10.2.2.1`.

```
Terminal
Ficheiro Editar Ver Procurar Terminal Ajuda
root@Grilo:/tmp/pycore.41355/Grilo.conf# dig ANY pop.cc.pt @10.2.2.1

;; <<>> DiG 9.11.3-lubuntu1.16-Ubuntu <<>> ANY pop.cc.pt @10.2.2.1
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 49726
;; flags: qr aa rd; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 4
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:: udp: 4096
;; COOKIE: 818a6be3a2632fd743bea268619971792b55c47a7492e158 (good)
;; QUESTION SECTION:
;pop.cc.pt.                IN      ANY
;

;; ANSWER SECTION:
pop.cc.pt.                604800  IN      MX      20 Servidor3.cc.pt.

;; AUTHORITY SECTION:
cc.pt.                    604800  IN      NS      Golfinho.cc.pt.
cc.pt.                    604800  IN      NS      Servidor1.cc.pt.

;; ADDITIONAL SECTION:
Servidor3.cc.pt.          604800  IN      A        10.2.2.3
Golfinho.cc.pt.           604800  IN      A        10.3.3.2
Servidor1.cc.pt.          604800  IN      A        10.2.2.1

;; Query time: 211 msec
;; SERVER: 10.2.2.1#53(10.2.2.1)
;; WHEN: Sat Nov 20 22:06:49 WET 2021
;; MSG SIZE rcvd: 187

root@Grilo:/tmp/pycore.41355/Grilo.conf#
```

Figura 19: Comando `$dig ANY pop.cc.pt @10.2.2.1`.

```
Terminal
Ficheiro Editar Ver Procurar Terminal Ajuda
root@Grilo:/tmp/pycore.41355/Grilo.conf# dig ANY mail.cc.pt @10.2.2.1

; <<>> DiG 9.11.3-1ubuntu1.16-Ubuntu <<>> ANY mail.cc.pt @10.2.2.1
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 9268
;; flags: qr aa rd; QUERY: 1, ANSWER: 2, AUTHORITY: 2, ADDITIONAL: 5
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 1f240dfad0cbd32922bce65d61996f3b29589e88c35da635 (good)
;; QUESTION SECTION:
;mail.cc.pt.                IN      ANY

;; ANSWER SECTION:
mail.cc.pt.                604800  IN      MX      20 Servidor3.cc.pt.
mail.cc.pt.                604800  IN      MX      10 Servidor2.cc.pt.

;; AUTHORITY SECTION:
cc.pt.                     604800  IN      NS      Servidor1.cc.pt.
cc.pt.                     604800  IN      NS      Golfinho.cc.pt.

;; ADDITIONAL SECTION:
Servidor2.cc.pt.           604800  IN      A       10.2.2.2
Servidor3.cc.pt.           604800  IN      A       10.2.2.3
Golfinho.cc.pt.            604800  IN      A       10.3.3.2
Servidor1.cc.pt.           604800  IN      A       10.2.2.1

;; Query time: 5 msec
;; SERVER: 10.2.2.1#53(10.2.2.1)
;; WHEN: Sat Nov 20 21:57:15 WET 2021
;; MSG SIZE rcvd: 230

root@Grilo:/tmp/pycore.41355/Grilo.conf#
```

Figura 20: Comando `$dig ANY mail.cc.pt @10.2.2.1`.



```
Terminal
Ficheiro Editar Ver Procurar Terminal Ajuda
root@Grilo:/tmp/pycore.41355/Grilo.conf# dig ANY mail.cc.pt @10.3.3.2

; <<>> DiG 9.11.3-1ubuntu1.16-Ubuntu <<>> ANY mail.cc.pt @10.3.3.2
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 57483
;; flags: qr aa rd; QUERY: 1, ANSWER: 2, AUTHORITY: 2, ADDITIONAL: 5
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 42560e6ac1034322c32b1b0161996fa47d2bab6ae36fd030 (good)
;; QUESTION SECTION:
;mail.cc.pt.                IN      ANY

;; ANSWER SECTION:
mail.cc.pt.                604800  IN      MX      10 Servidor2.cc.pt.
mail.cc.pt.                604800  IN      MX      20 Servidor3.cc.pt.

;; AUTHORITY SECTION:
cc.pt.                     604800  IN      NS      Golfinho.cc.pt.
cc.pt.                     604800  IN      NS      Servidor1.cc.pt.

;; ADDITIONAL SECTION:
Servidor2.cc.pt.          604800  IN      A       10.2.2.2
Servidor3.cc.pt.          604800  IN      A       10.2.2.3
Golfinho.cc.pt.           604800  IN      A       10.3.3.2
Servidor1.cc.pt.          604800  IN      A       10.2.2.1

;; Query time: 5 msec
;; SERVER: 10.3.3.2#53(10.3.3.2)
;; WHEN: Sat Nov 20 21:59:00 WET 2021
;; MSG SIZE rcvd: 230

root@Grilo:/tmp/pycore.41355/Grilo.conf#
```

Figura 21: Comando `$dig ANY mail.cc.pt @10.3.3.2`.

```
Terminal
Ficheiro Editar Ver Procurar Terminal Ajuda

root@Grilo:/tmp/pycore.41355/Grilo.conf# dig PTR 1.3.3.10.in-addr.arpa. @10.2.2.1

; <<>> DiG 9.11.3-lubuntu1.16-Ubuntu <<>> PTR 1.3.3.10.in-addr.arpa. @10.2.2.1
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 31916
;; flags: qr aa rd; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 3
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 2abdbdfe8d64a1d2f3ac42ad6199739cc1d5ab4d3d8b8063 (good)
;; QUESTION SECTION:
;1.3.3.10.in-addr.arpa.      IN      PTR

;; ANSWER SECTION:
1.3.3.10.in-addr.arpa.  604800 IN      PTR      Orca.cc.pt.

;; AUTHORITY SECTION:
3.3.10.in-addr.arpa.   604800 IN      NS       Golfinho.cc.pt.
3.3.10.in-addr.arpa.   604800 IN      NS       Servidor1.cc.pt.

;; ADDITIONAL SECTION:
Golfinho.cc.pt.        604800 IN      A        10.3.3.2
Servidor1.cc.pt.       604800 IN      A        10.2.2.1

;; Query time: 5 msec
;; SERVER: 10.2.2.1#53(10.2.2.1)
;; WHEN: Sat Nov 20 22:15:56 WET 2021
;; MSG SIZE rcvd: 181

root@Grilo:/tmp/pycore.41355/Grilo.conf#
```

Figura 22: Comando `$dig PTR 1.3.3.10.in-addr.arpa. @10.2.2.1.`

```
Terminal
Ficheiro Editar Ver Procurar Terminal Ajuda

<5/Grilo.conf# dig PTR 1.3.3.10.in-addr.arpa. @10.3.3.2

;; <<>> DiG 9.11.3-lubuntu1.16-Ubuntu <<>> PTR 1.3.3.10.in-addr.arpa. @10.3.3.2
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 46774
;; flags: qr aa rd; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 3
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: c82729843e9b1be784fee2b9619973f7c29303f621e35510 (good)
;; QUESTION SECTION:
;1.3.3.10.in-addr.arpa.      IN      PTR

;; ANSWER SECTION:
1.3.3.10.in-addr.arpa.  604800 IN      PTR      Orca.cc.pt.

;; AUTHORITY SECTION:
3.3.10.in-addr.arpa.    604800 IN      NS       Servidor1.cc.pt.
3.3.10.in-addr.arpa.    604800 IN      NS       Golfinho.cc.pt.

;; ADDITIONAL SECTION:
Golfinho.cc.pt.        604800 IN      A        10.3.3.2
Servidor1.cc.pt.       604800 IN      A        10.2.2.1

;; Query time: 5 msec
;; SERVER: 10.3.3.2#53(10.3.3.2)
;; WHEN: Sat Nov 20 22:17:27 WET 2021
;; MSG SIZE rcvd: 181

root@Grilo:/tmp/pycore.41355/Grilo.conf#
```

Figura 23: Comando `$dig PTR 1.3.3.10.in-addr.arpa. @10.3.3.2.`

```
Terminal
Ficheiro Editar Ver Procurar Terminal Ajuda

root@Grilo:/tmp/pycore.41355/Grilo.conf# dig PTR 2.2.2.10.in-addr.arpa. @10.2.2.1

; <<>> DiG 9.11.3-lubuntu1.16-Ubuntu <<>> PTR 2.2.2.10.in-addr.arpa. @10.2.2.1
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 54957
;; flags: qr aa rd; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 3
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 4096
;; COOKIE: 2218d2e76f91a4b040ec9d0f619973781a8e17ece01a12de (good)
;; QUESTION SECTION:
2.2.2.10.in-addr.arpa.      IN      PTR

;; ANSWER SECTION:
2.2.2.10.in-addr.arpa.  604800 IN      PTR      Servidor2.cc.pt.

;; AUTHORITY SECTION:
2.2.10.in-addr.arpa.    604800 IN      NS       Servidor1.cc.pt.
2.2.10.in-addr.arpa.    604800 IN      NS       Golfinho.cc.pt.

;; ADDITIONAL SECTION:
Golfinho.cc.pt.         604800 IN      A        10.3.3.2
Servidor1.cc.pt.        604800 IN      A        10.2.2.1

;; Query time: 5 msec
;; SERVER: 10.2.2.1#53(10.2.2.1)
;; WHEN: Sat Nov 20 22:15:20 WET 2021
;; MSG SIZE rcvd: 186

root@Grilo:/tmp/pycore.41355/Grilo.conf#
```

Figura 24: Comando `$dig PTR 2.2.2.10.in-addr.arpa. @10.2.2.1.`

```
Terminal
Ficheiro Editar Ver Procurar Terminal Ajuda

<rilo.conf# dig PTR 2.2.2.10.in-addr.arpa. @10.3.3.2

;; <<>> DiG 9.11.3-lubuntu1.16-Ubuntu <<>> PTR 2.2.2.10.in-addr.arpa. @10.3.3.2
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 16805
;; flags: qr aa rd; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 3
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 4096
;; COOKIE: 438167ca63402158112992cb619974587e5675348066193d (good)
;; QUESTION SECTION:
2.2.2.10.in-addr.arpa.      IN      PTR

;; ANSWER SECTION:
2.2.2.10.in-addr.arpa.  604800 IN      PTR      Servidor2.cc.pt.

;; AUTHORITY SECTION:
2.2.10.in-addr.arpa.    604800 IN      NS       Golfinho.cc.pt.
2.2.10.in-addr.arpa.    604800 IN      NS       Servidor1.cc.pt.

;; ADDITIONAL SECTION:
Golfinho.cc.pt.         604800 IN      A        10.3.3.2
Servidor1.cc.pt.        604800 IN      A        10.2.2.1

;; Query time: 5 msec
;; SERVER: 10.3.3.2#53(10.3.3.2)
;; WHEN: Sat Nov 20 22:19:04 WET 2021
;; MSG SIZE rcvd: 186

root@Grilo:/tmp/pycore.41355/Grilo.conf#
```

Figura 25: Comando `$dig PTR 2.2.2.10.in-addr.arpa. @10.3.3.2.`