Serviços de Rede 1 –

Lesson 6 - Practices

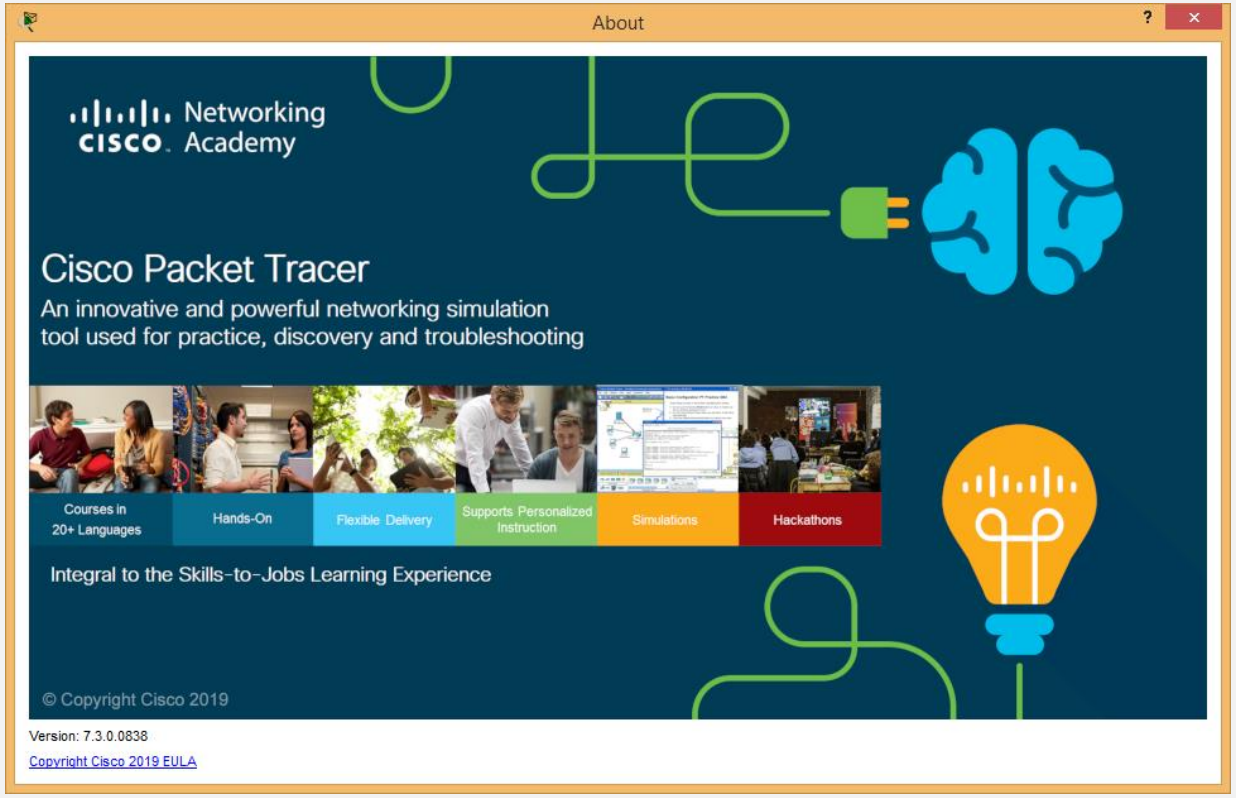
2019-2020

Instituto Politécnico de Coimbra

Departamento de Engenharia Informática

Pre - Requirements

- You have installed the Cisco Packet Tracer version 7.3.0



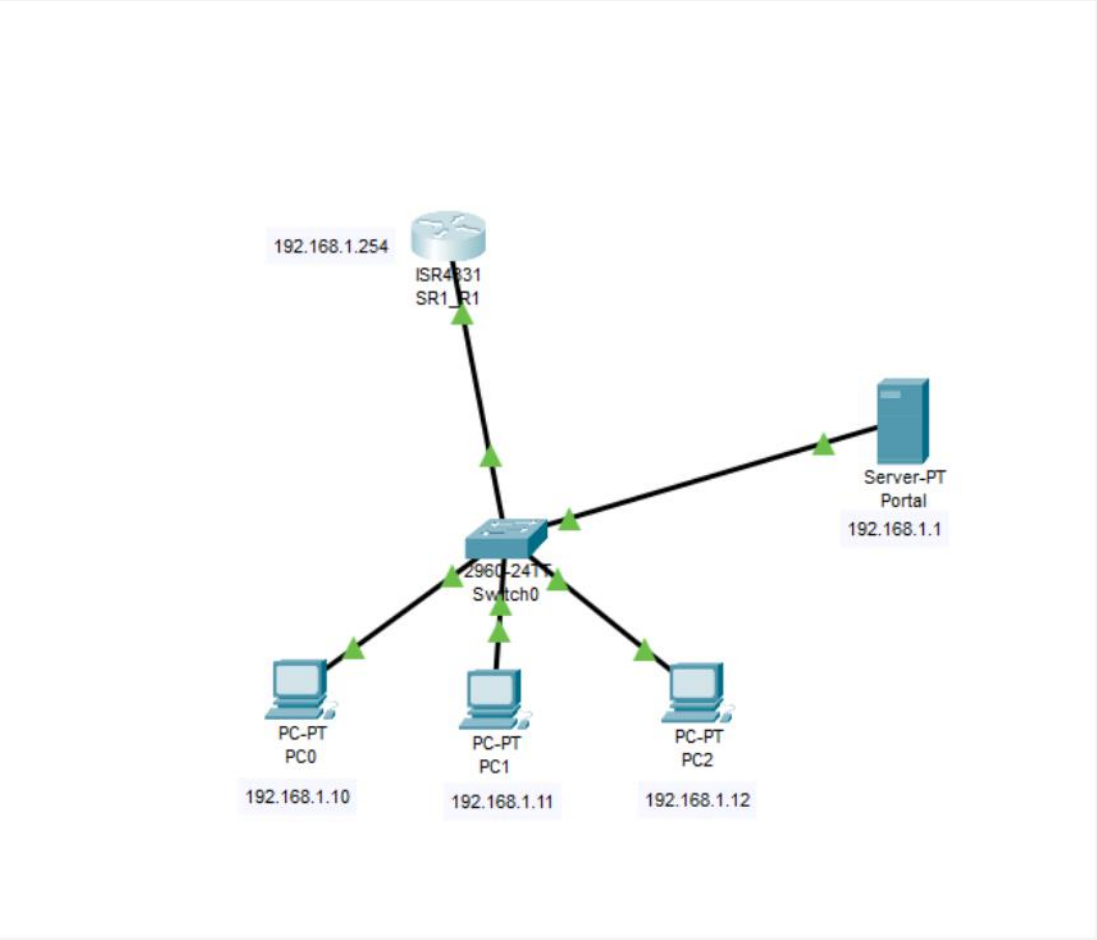
Proof of worksheet resolution

- After completing the resolution of the exercised, you must send by email to pgeirinh@isec.pt the two files resulting from the simulation.
- The files must have the following name:

  *First name_last name*_6_ex1 and *First name_last name*_6_ex2

Exercise 1 - Configure DNS on a router

Exercise 1


192.168.1.254
ISR4331
SR1_R1
Server-PT
Portal
192.168.1.1
2960-24TT
Switch0
PC-PT
PC0
192.168.1.10
PC-PT
PC1
192.168.1.11
PC-PT
PC2
192.168.1.12

Exercise 1

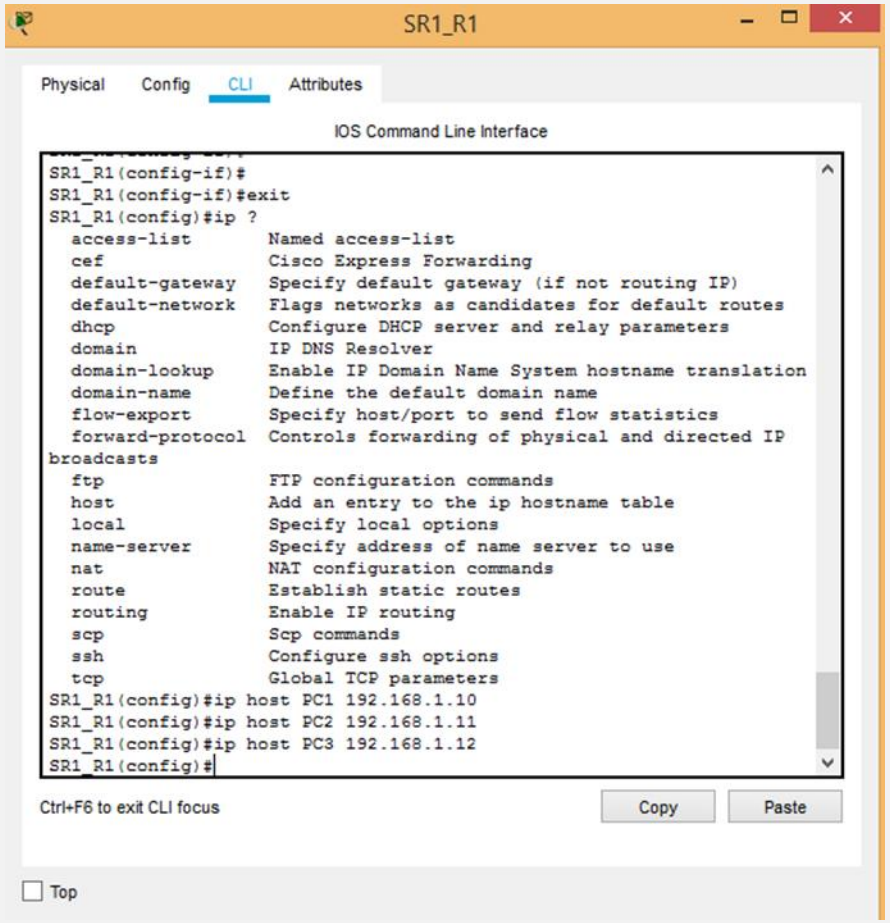
- Make the topology of the previous slide in the Packet Tracer simulator.
- The router name is SR1_R1 and the enable password is “sr1”.
- The IP addresses of the machines (PC, Server and Router) are defined in the drawing and are to be placed manually. The network is 192.168.1.0 / 24.
- Place the description on the Giga0 / 0/0 interface as “LAN Interface”.
- Disable on the router the possibility of it making DNS queries.
- Test the connectivity of the router to the PCs and to the server.
- Defines the possibility of reaching machines by name when on the router. Test that connection. **Note:** This is not having a DNS service….

Exercise 1

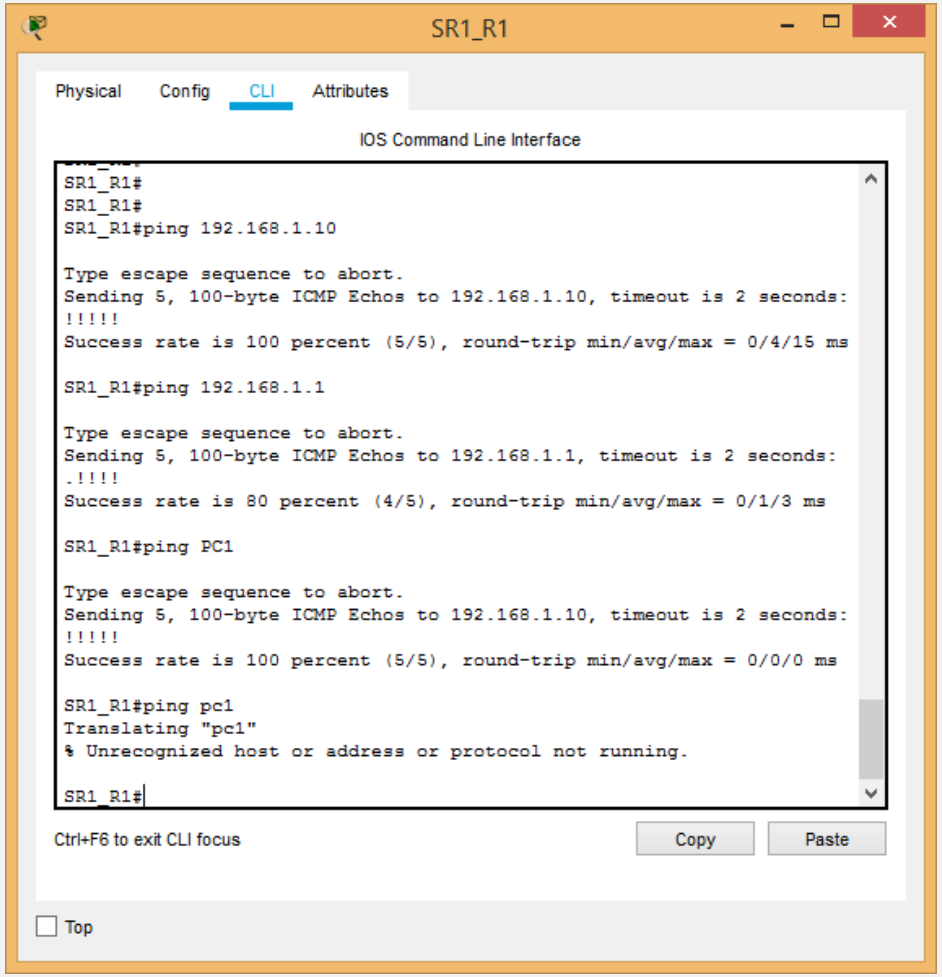
- Place the router as a DNS server on a PC. Enter simulation mode by activating only the display of DNS packages. What is up?
- Unfortunately, Packet Tracer does not have the command to enable the router as a DNS Server (ip dns server). So we have to find another solution….
- Save the file as *First name_last name*_6_ex1

How To

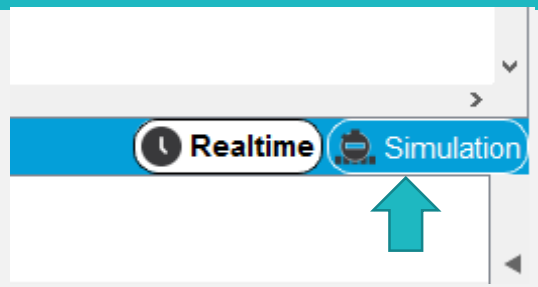
Placing hosts on a Router

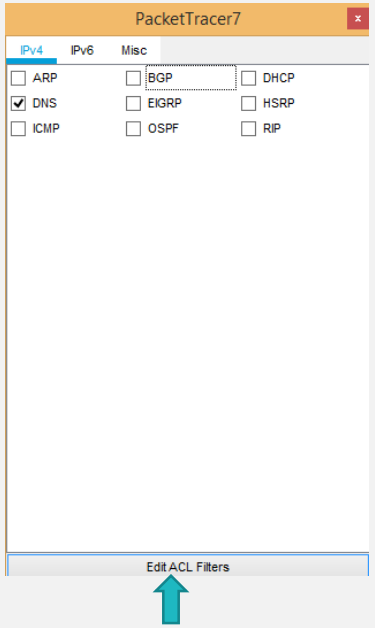


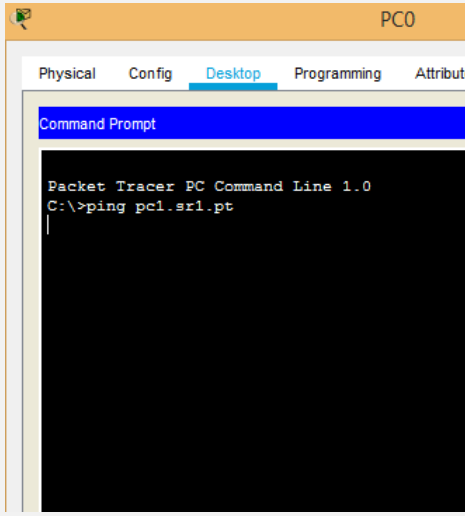
Test connectivity

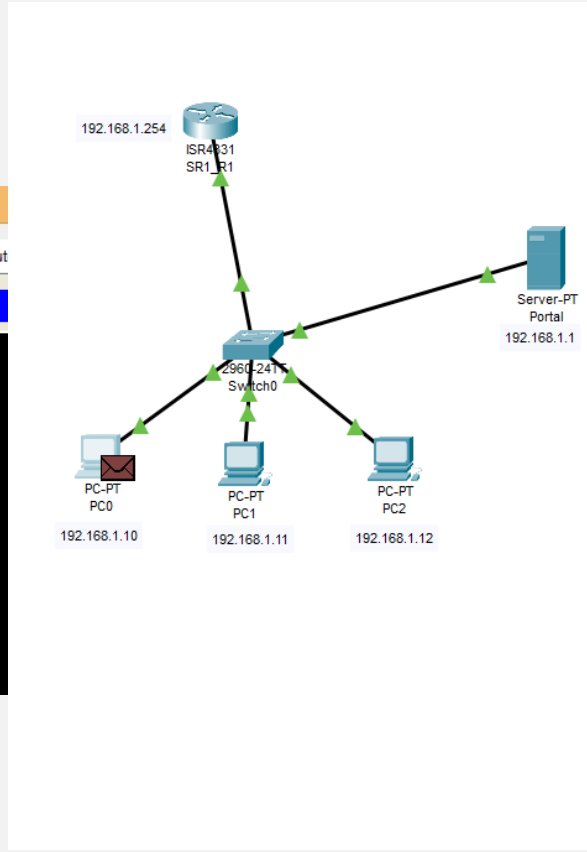


Simulation


Realtime
Simulation


PacketTracer7
IPv4
IPv6
Misc
ARP
BGP
DHCP
DNS
EIGRP
HSRP
ICMP
OSPF
RIP
Edit ACL Filters


PC0
Physical
Config
Desktop
Programming
Attribut
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ping pc1.sr1.pt


192.168.1.254
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SR1_R1
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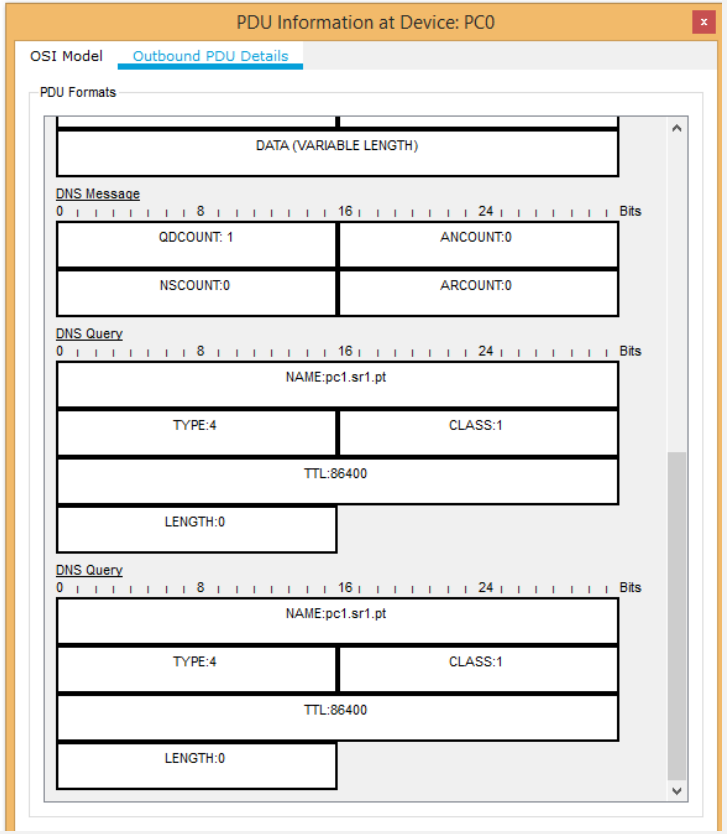
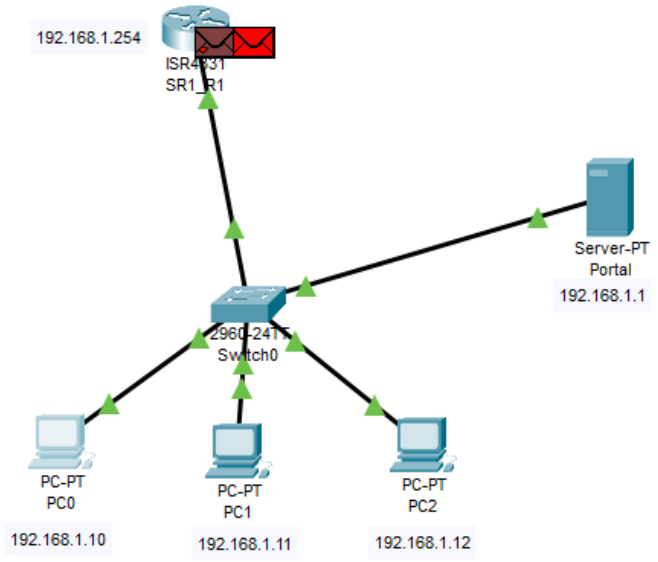
Portal
192.168.1.1
2960-24TT
Switch0
PC-PT
PC0
192.168.1.10
PC-PT
PC1
192.168.1.11
PC-PT
PC2
192.168.1.12


PDU Information at Device: PC0
OSI Model
Outbound PDU Details
PDU Formats
DATA (VARIABLE LENGTH)
DNS Message
0
8
16
24
Bits
QDCOUNT: 1
ANCOUNT:0
NSCOUNT:0
ARCOUNT:0
DNS Query
NAME:pc1.sr1.pt
TYPE:4
CLASS:1
TTL:86400
LENGTH:0
DNS Query
NAME:pc1.sr1.pt
TYPE:4
CLASS:1
TTL:86400
LENGTH:0

Simulation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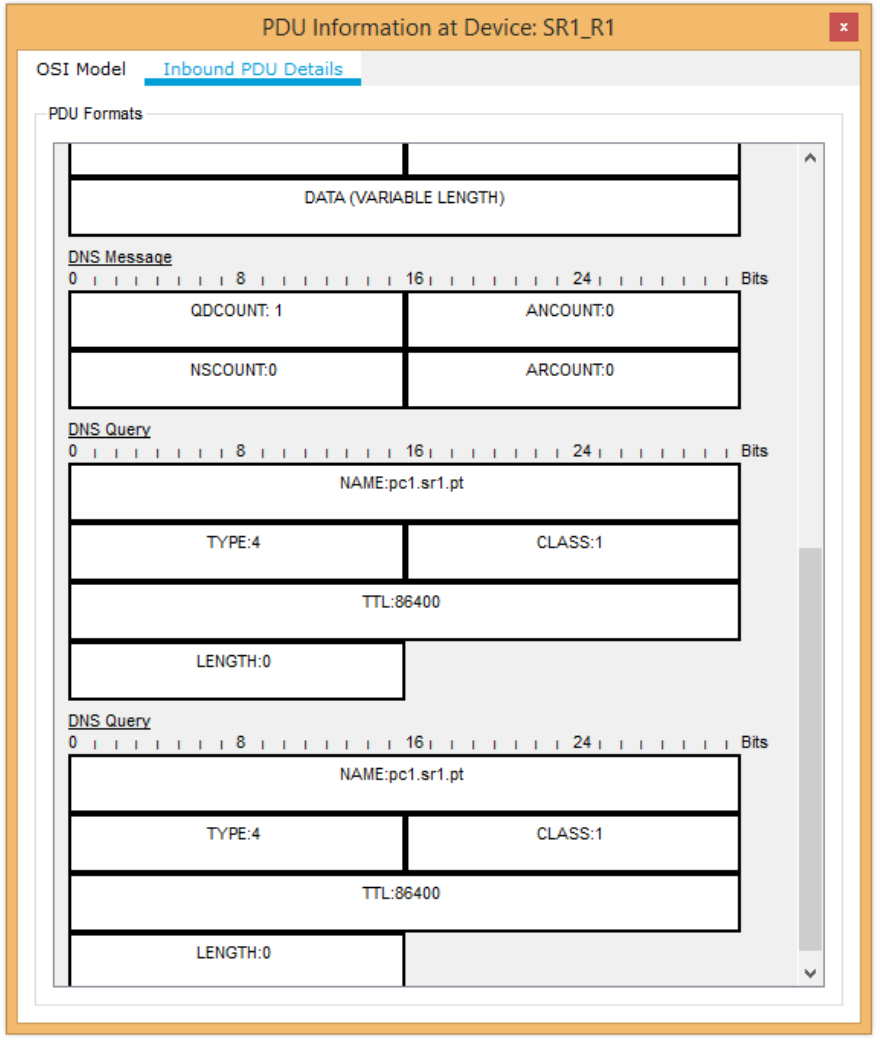
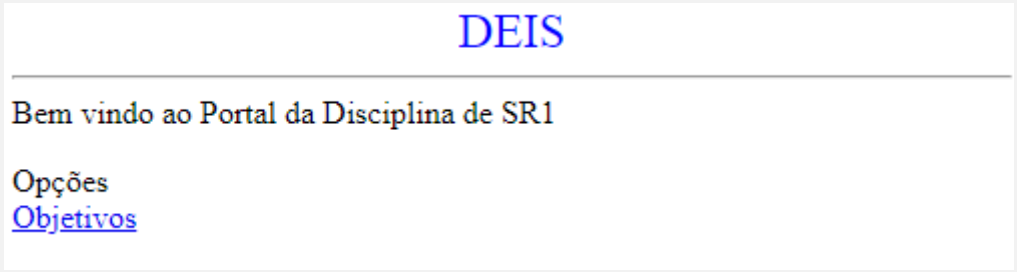
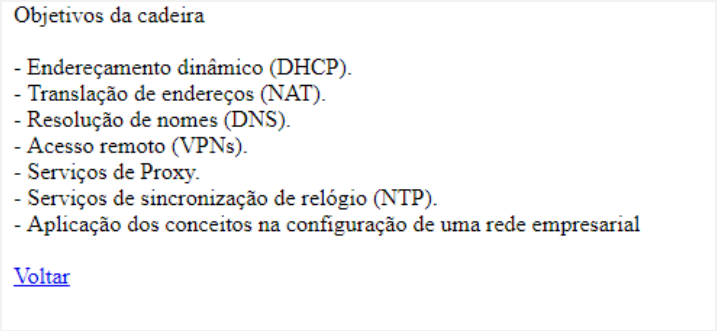

PDU Information at Device: SR1_R1
OSI Model
Inbound PDU Details
PDU Formats
DATA (VARIABLE LENGTH)
DNS Message
0 8 16 24 Bits
QDCOUNT: 1
ANCOUNT:0
NSCOUNT:0
ARCOUNT:0
DNS Query
0 8 16 24 Bits
NAME:pc1.sr1.pt
TYPE:4
CLASS:1
TTL:86400
LENGTH:0
DNS Query
0 8 16 24 Bits
NAME:pc1.sr1.pt
TYPE:4
CLASS:1
TTL:86400
LENGTH:0

Exercise 2 - Configuring DNS in Packet Tracer

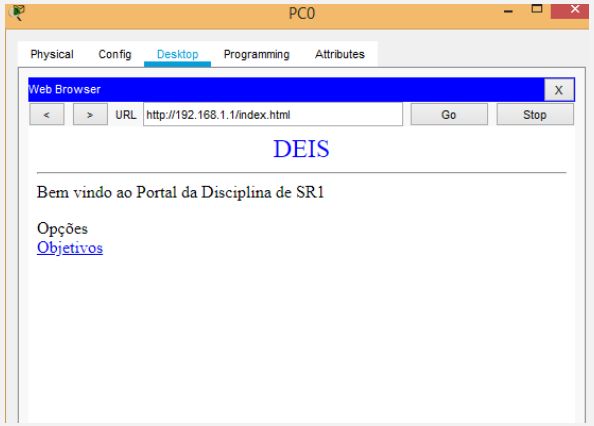
Exercise 2

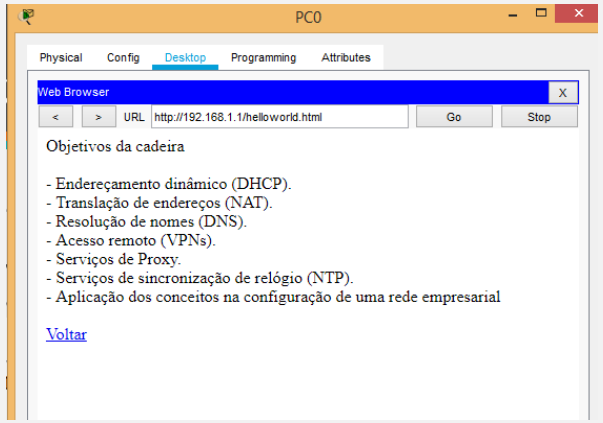
- Disable all www server services except HTTP.
- Configure the entry page so that it looks like this and the objectives page for the chair:





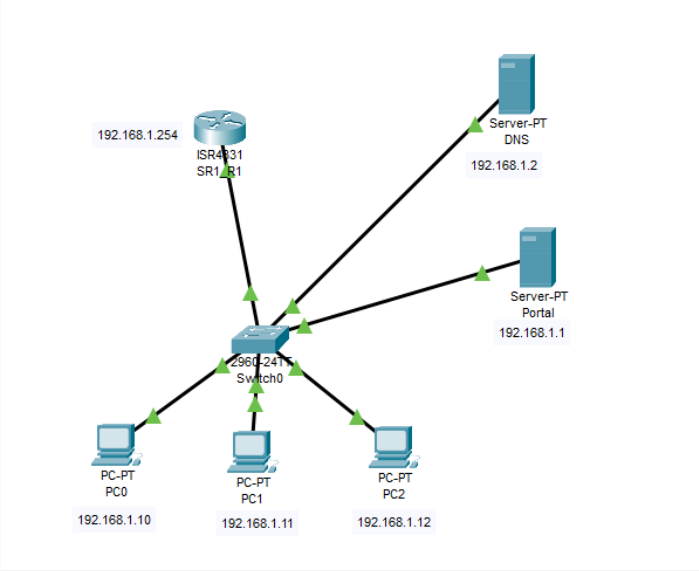
- Test a PC's access to this page





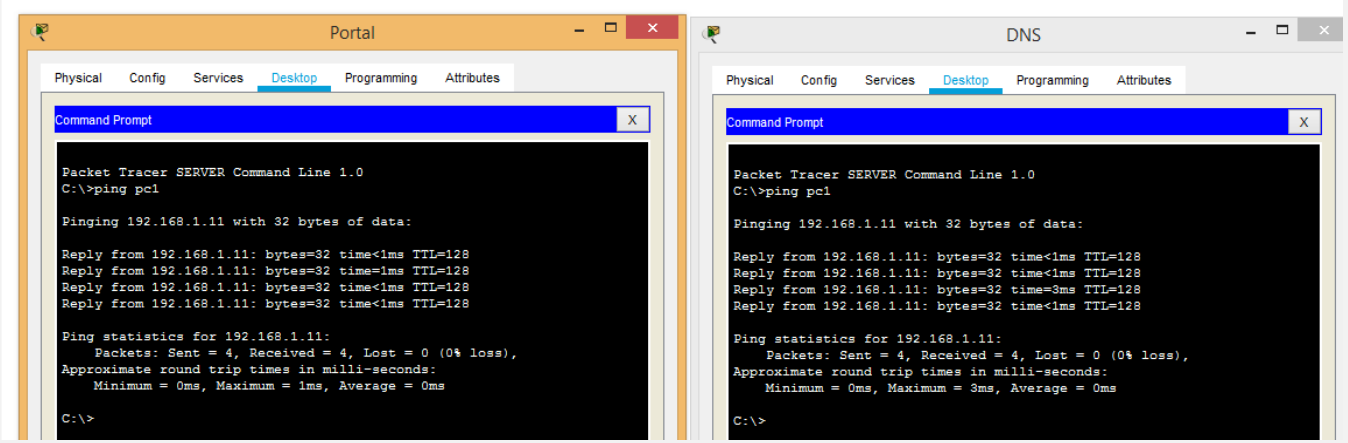
Exercise 2

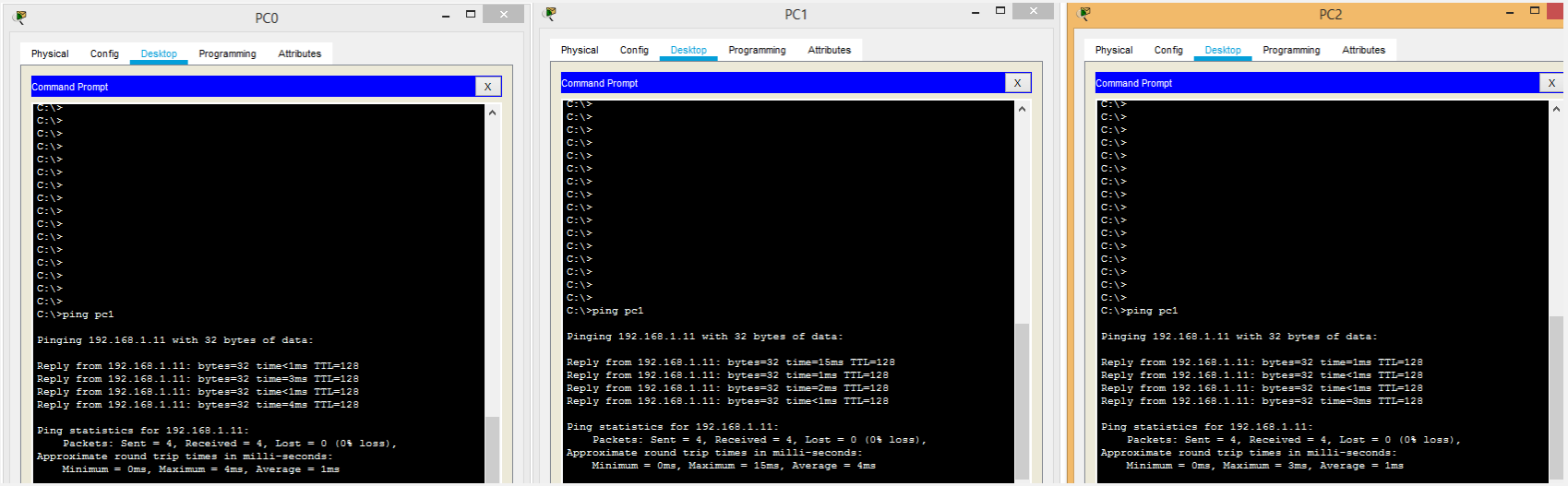
- Place a new server in the topology. It should be at 192.168.1.2 and with the DNS name
- Test your network connection.
- Disable all services on this new server except DNS.
- Add a type A record to the DNS server so that PC1 can be reached by name.



Exercise 2

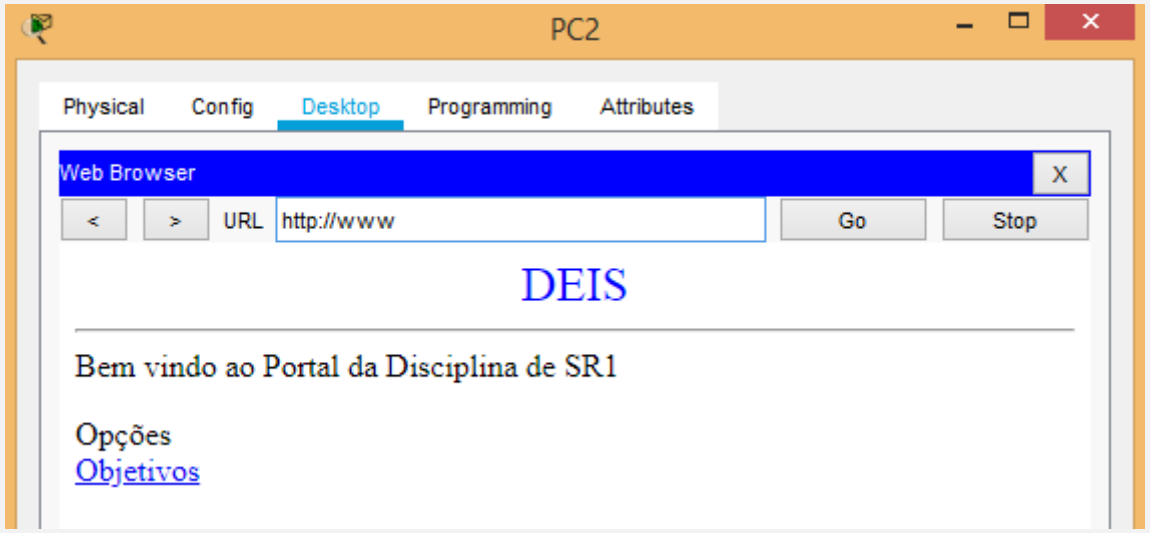
- Make the necessary changes to all machines on the network (PC and servers) so that you can reach PC1 by name. Test on everyone.





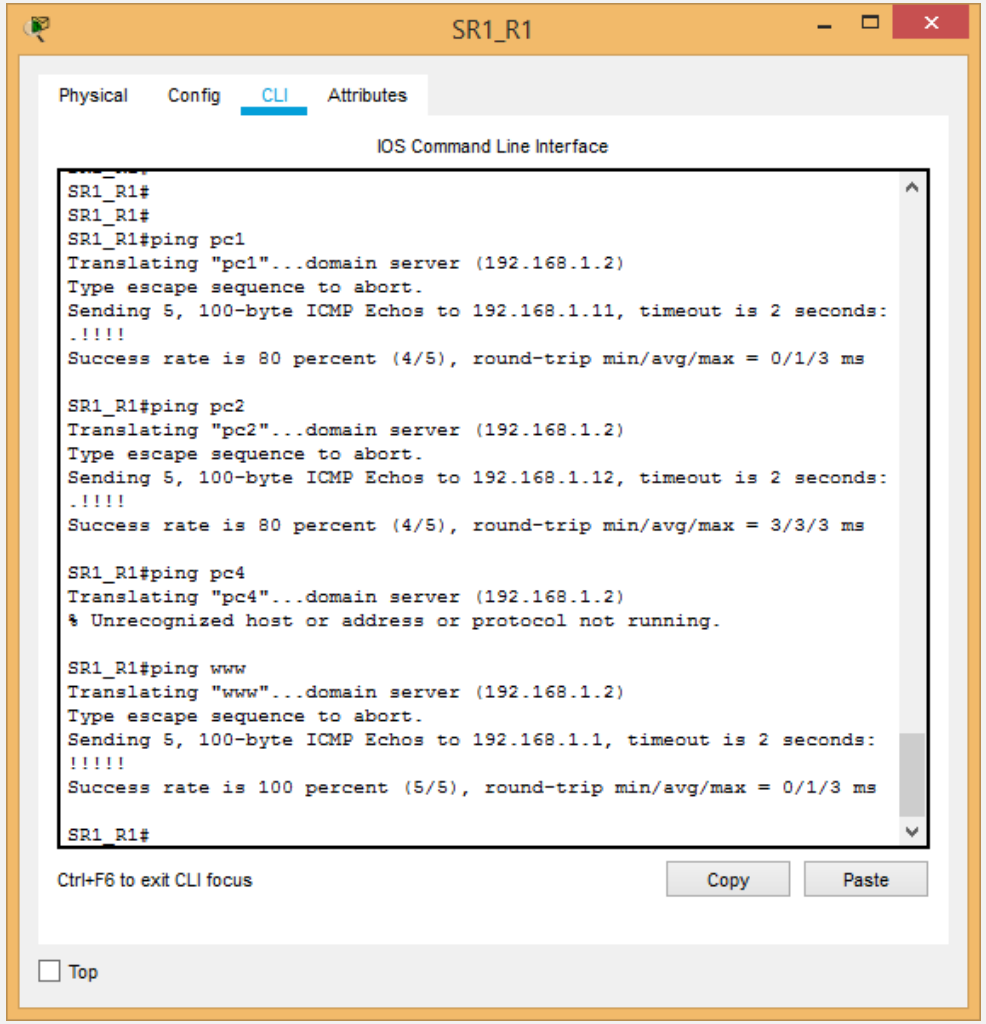
Exercise 2

- Configure your DNS server to be able to reach all devices on your network by name.
- Test if you can reach the www server by name.



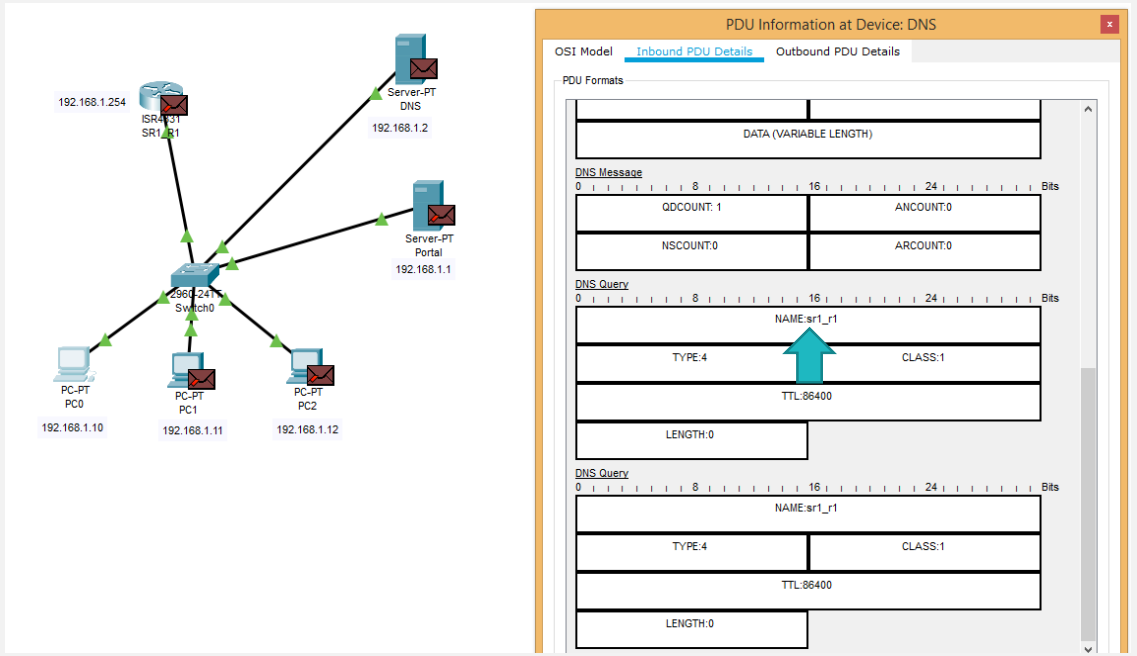
Exercise 2

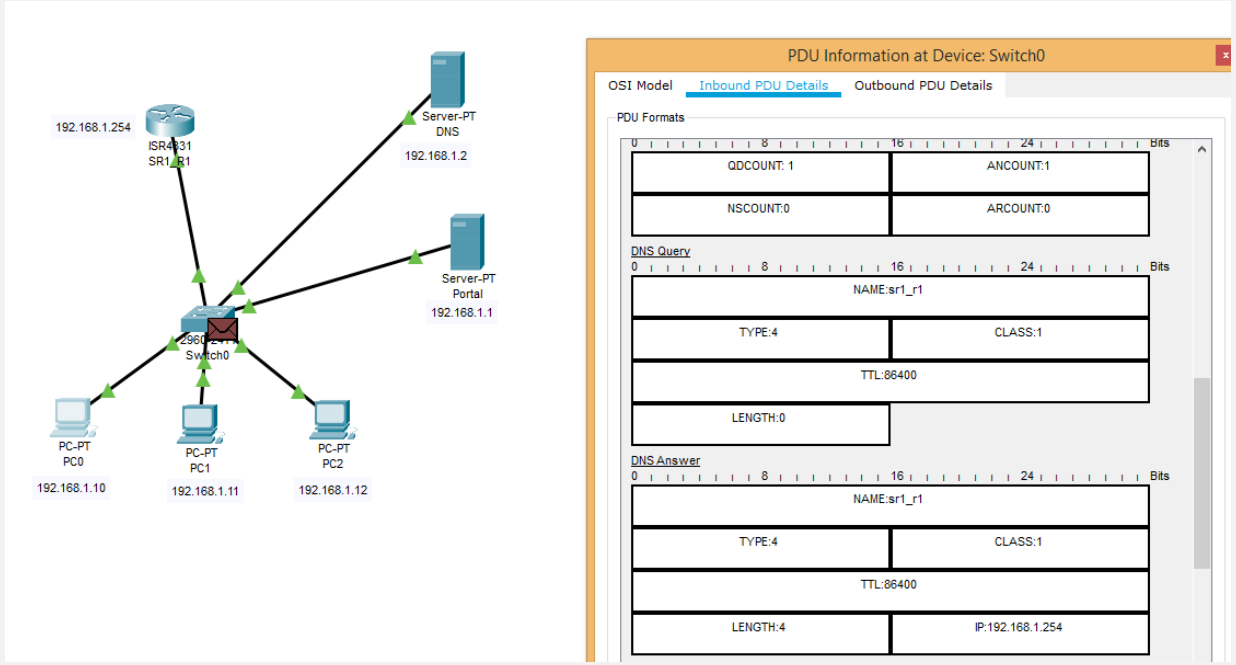
- Delete the settings from the hosts you had configured on your router. Enable the possibility for it to make DNS queries.
- Change the configuration of the router to use the 192.168.1.2 as a DNS server and thus be able to reach the machines on your network by name.



Exercise 2

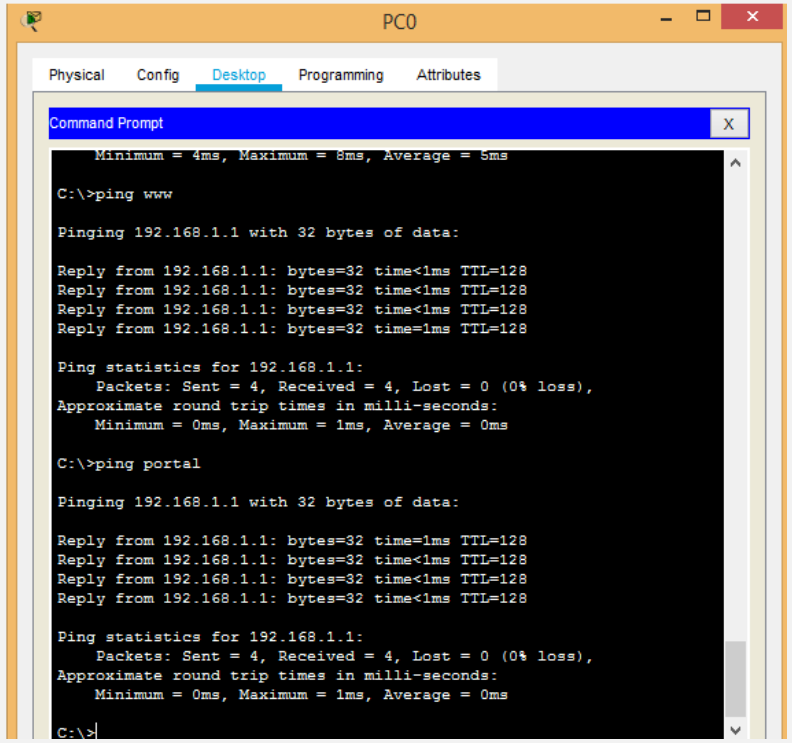
- Place a new record on your DNS server for the router (name SR1_R1).
- Enter simulation mode and analyze the resulting DNS packets when you ping PC0 to the Router by name.

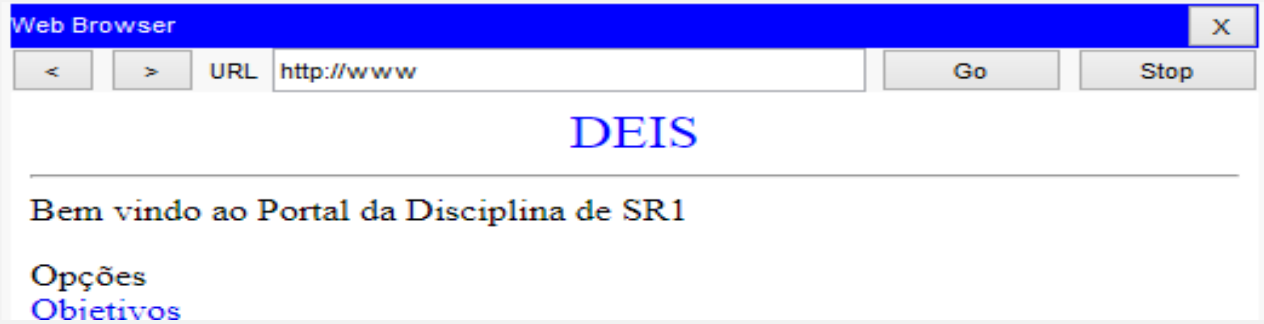


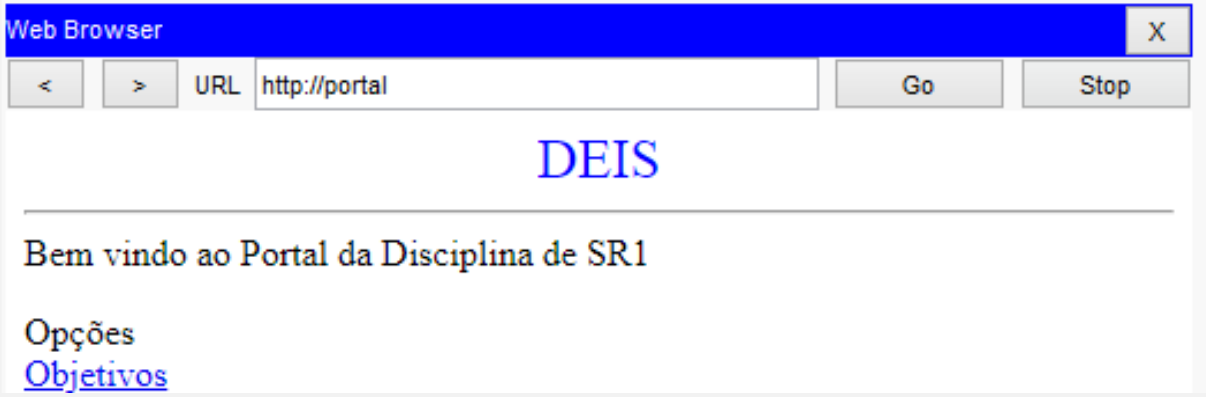


Exercise 2

- Make the necessary change to your DNS server so that the 192.168.1.1 server can be reached by the name of www and portal.







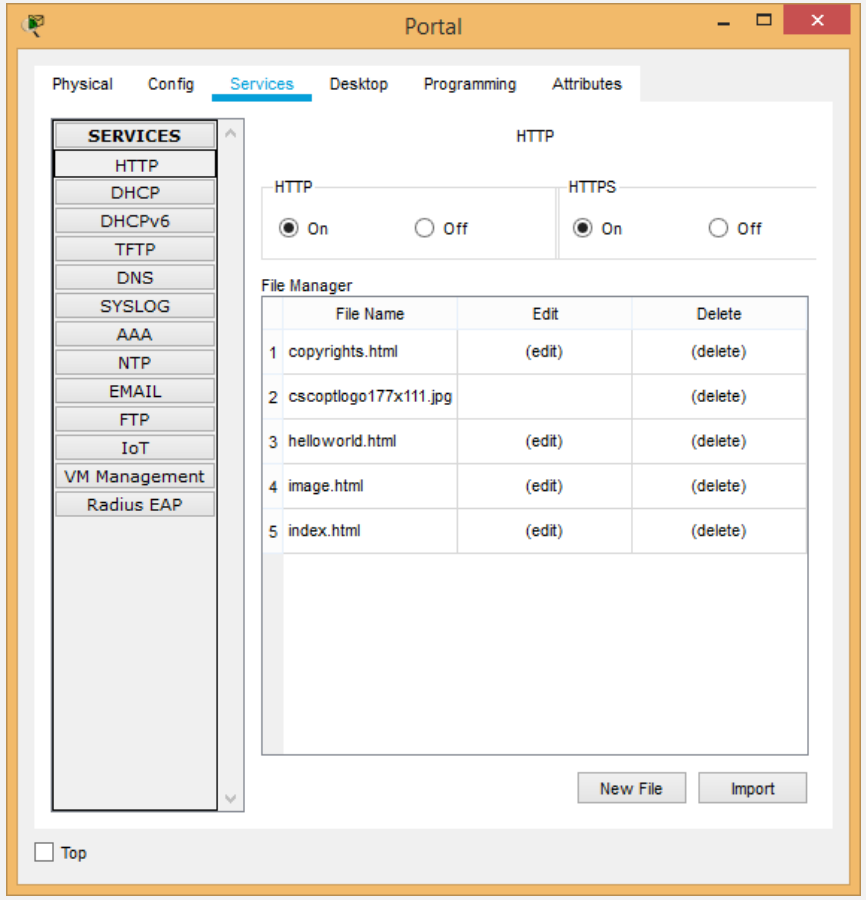
Exercise 2

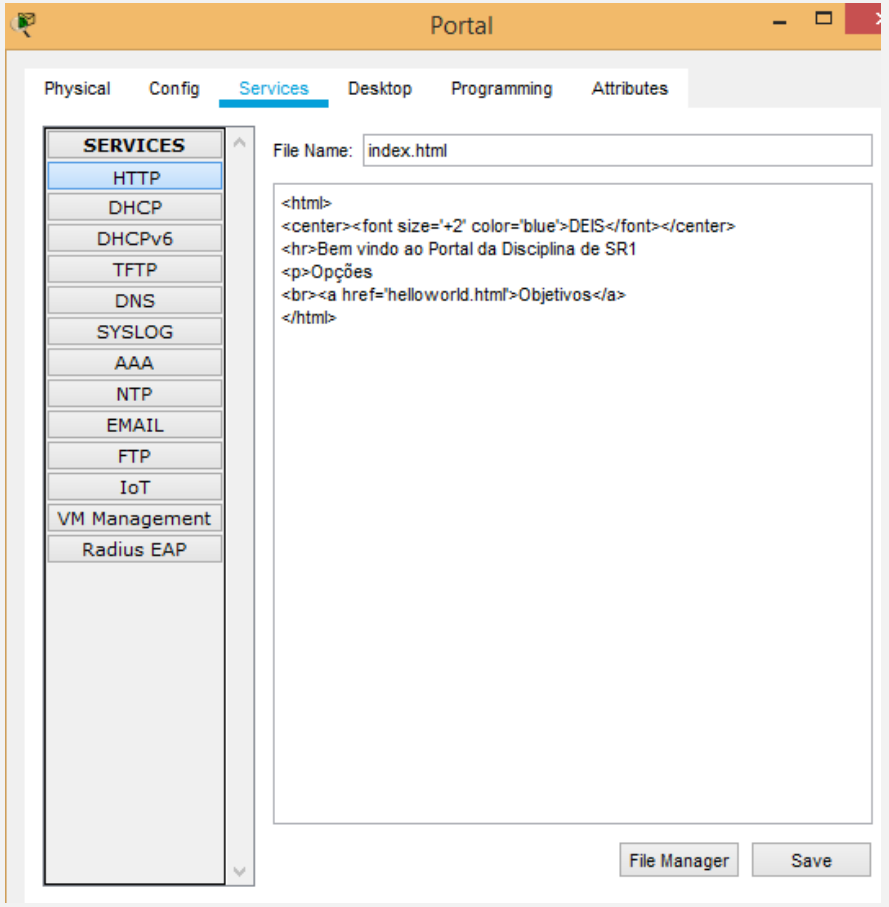
- Create the SOA record and fill in the typical values.
- Use the **nslooup** command on PC1 to see if your server is responding correctly:
  - Make a type A query and see what IP it indicates to PC0
  - Make a type A query and see which IP it indicates for the Portal
  - Make a type A query and see what IP it indicates for www
- Save the file as *First name_last name*_6_ex2

- Note: The nslookup command is very limited in Packet Tracer

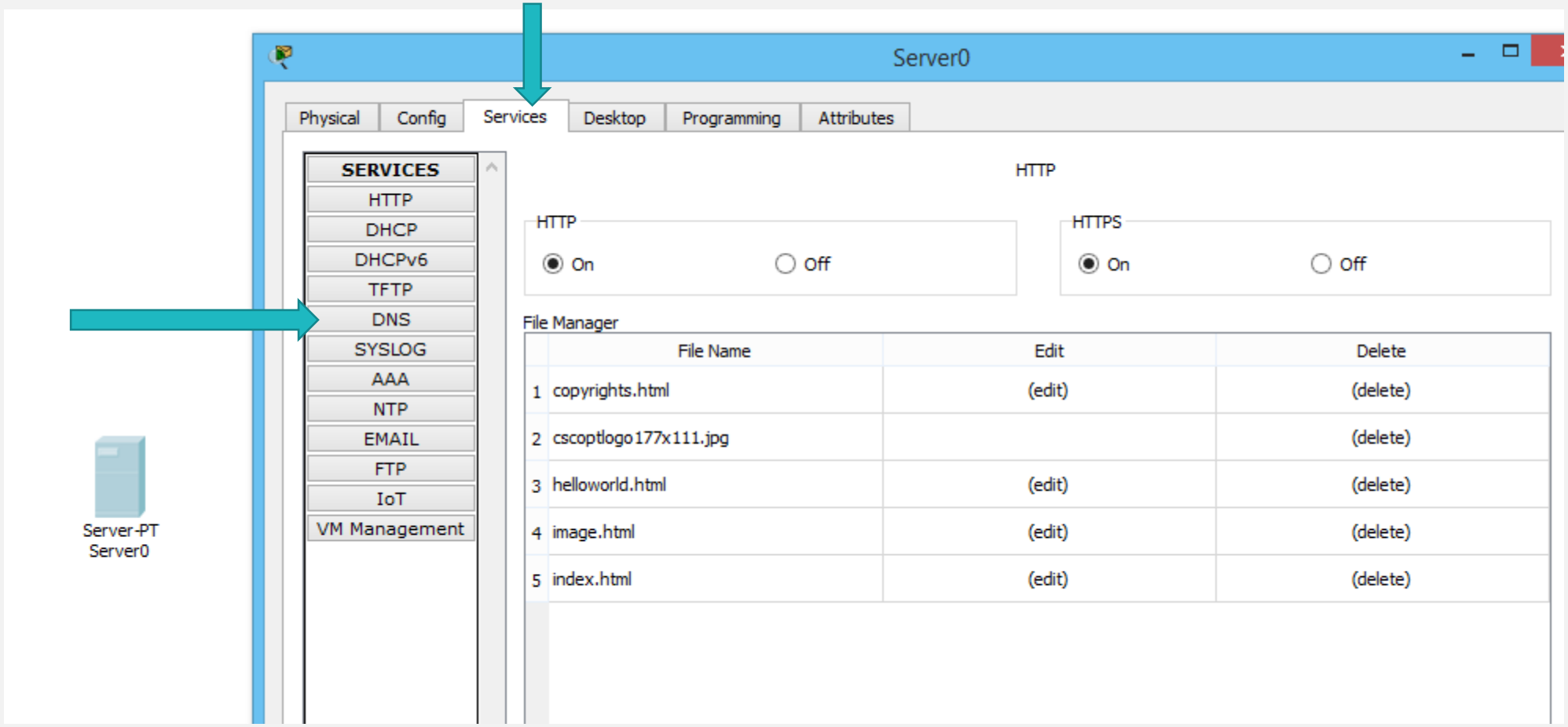
How To

Configure the Web Server





Configure the DNS Service



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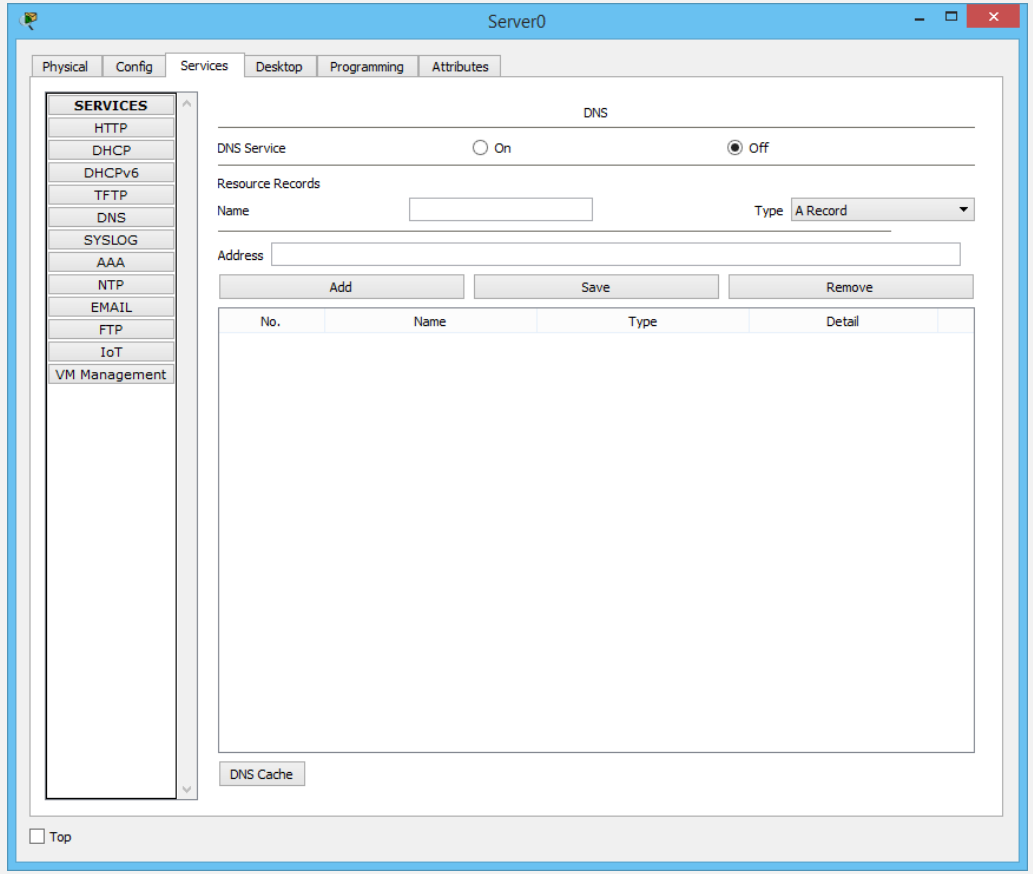

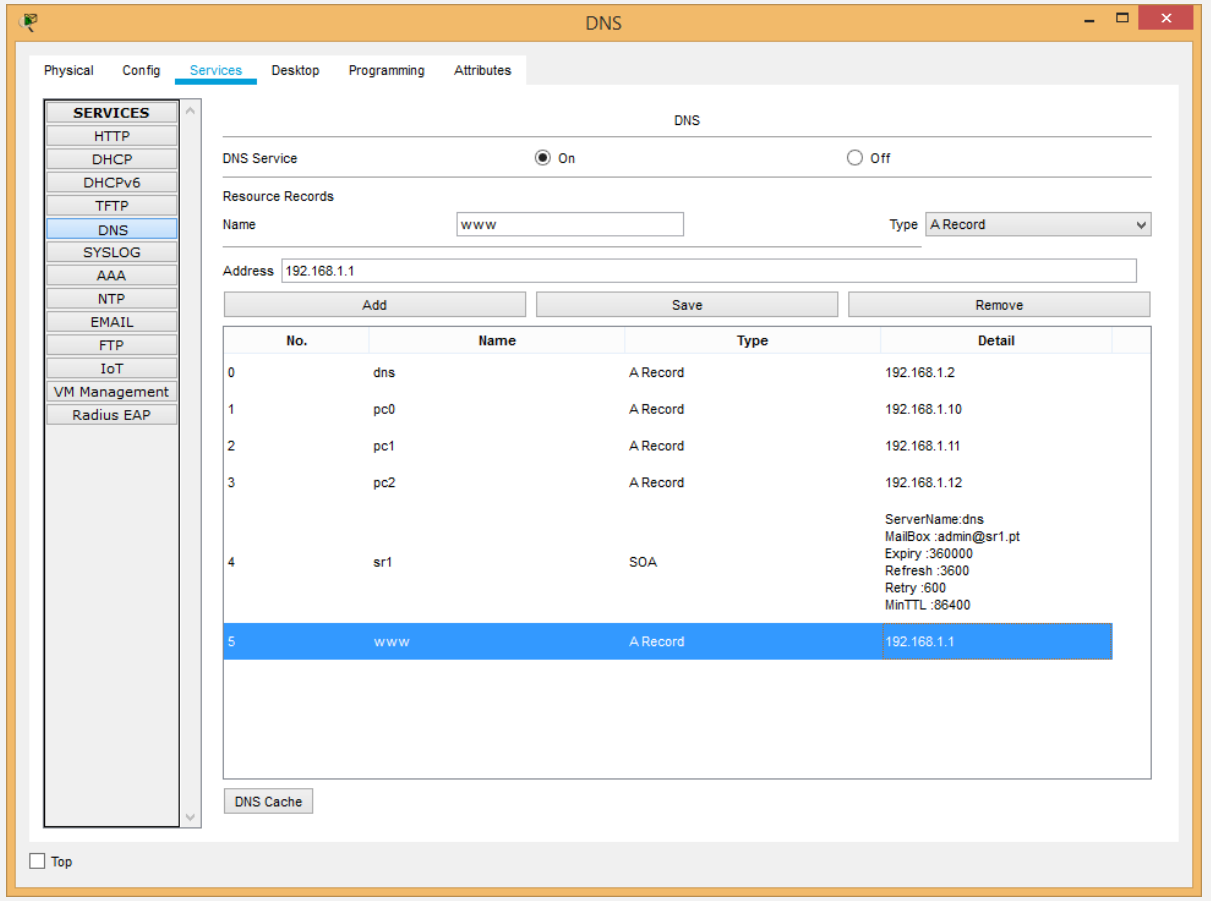

DNS records

- **SOA -** Start of Authority - defines the general characteristics of the zone
  - **NAMESERVER:** indicates the authoritative DNS server for that zone;
  - **MNAME -** domain name of the nameserver (eg isec.pt);
  - **RNAME -** email address of the zone administrator (domain);
  - **SERIAL -** version of the zone file. This value must be increased whenever any part of the information in the zone file is changed. The commonly used tacit is to write a number with the date format (year / month / day / version - 0..99): 2001053000.
  - **REFRESH - periodicity (in seconds) with which the secondary servers consult the primary to check the current version of the zone. Typical value: 3600 = 1h**
  - **RETRY -** Periodicity (in seconds) with which the secondary servers repeat the attempt to verify the serial number of the master file after failing a contact. Typical value: 600 = 10m
  - **EXPIRE -** Maximum limit (in seconds) for replica retention of the zone without being able to ascertain the serial number. After this value expires, the secondary can no longer answer for the zone. Typical value: 3600000 -> 42d;
  - **MINIMUM TTL -** defines how long the record for that zone must remain in the cache of a DNS server before an update is made. Typical value: 864000 -> 10d

DNS records

- **A -** host address - this is the basic type that matches a canonical name to an IP address (For IP V4)
- **AAAA** - same as above but for IP V6.
- **CNAME** - maps an alias name to a true or canonical domain name. It is particularly useful for providing alternative names that correspond to the different services of the same machine
- **MX** - Mail Exchanger - Informs the IPs of the SMTP servers of a domain. This type of record has as its particularity one more field, which informs the priority of the SMTP server. The lower the value, the higher the priority ..
- **PTR** - Pointer (IP => name) - Associates an IP address with a hostname for reverse DNS resolution.
- **SRV** - Service Location - used to identify computers hosting specific services
- **NS** - domain name - Informs the IPs of the authoritative DNS servers in a domain.
- **TXT** - You can store any information in text format. Initially created to store comments or information about the domain, today it is widely used by anti-spam tools.

nslookup

- It is a tool, which exists on Windows and Linux, and which is used to obtain information about DNS records for a given domain, machine or IP.
- In a standard query, the DNS server defined on the machine's network card is the one consulted, and responds with information about the domain or machine searched.
- The information "Non-authoritative answer" means that the DNS server used does not answer for this domain, in other words, this means that an external query was made to the DNS servers. Imagine that you are at your home making a query about an ISEC machine, if your server is to answer that question the answer will be Non-authoritative answer if it is the ISEC server it will be Authoritative answer.

nslookup

- The type of inquiry you want is defined by the command set q =
  - **A**
    - A simple inquiry requesting the IP address corresponding to a computer
  - **CNAME**
    - A given computer may have several DNS names. One of these is the canonical name (or canonical name).
  - **MX**
    - An inquiry concerning the mail exchanger.
  - **PTR**
    - A PTR survey, which demonstrates reverse resolution (inverse or reverse). Notice the somewhat odd way in which the survey was introduced, which is partly because IP addresses have the most significant part on the left side while DNS addresses have it on the right side of the address.

nslookup

```
C:\Users\Pedro Geirinhas>nslookup
Default Server:  vodafonegw
Address:  192.168.1.1

> sapo.pt
Server:  vodafonegw
Address:  192.168.1.1

Non-authoritative answer:
Name:    sapo.pt
Addresses:  2001:8a0:2102:c:213:13:146:142
          213.13.146.142

> www.isec.pt
Server:  vodafonegw
Address:  192.168.1.1

Non-authoritative answer:
Name:    www.isec.pt
Address:  193.137.78.72

> set q=Mx
> isec.pt
Server:  vodafonegw
Address:  192.168.1.1

Non-authoritative answer:
isec.pt MX preference = 20, mail exchanger = prxmx1.isec.pt
isec.pt MX preference = 30, mail exchanger = prxmx1.isec.pt
isec.pt MX preference = 10, mail exchanger = prxmx1.isec.pt
isec.pt MX preference = 40, mail exchanger = prxmx2.isec.pt

isec.pt nameserver = ns2.isec.pt
isec.pt nameserver = ns.isec.pt
prxmx1.isec.pt  internet address = 193.137.78.24
prxmx2.isec.pt  internet address = 193.137.78.26
ns2.isec.pt     internet address = 193.137.78.3
ns.isec.pt      internet address = 193.137.78.1
> set q=Mx
> sapo.pt
Server:  vodafonegw
Address:  192.168.1.1

Non-authoritative answer:
sapo.pt MX preference = 5, mail exchanger = mx.ptmail.sapo.pt

sapo.pt nameserver = ns.sapo.pt
sapo.pt nameserver = dns01.sapo.pt
sapo.pt nameserver = ns2.sapo.pt
sapo.pt nameserver = dns02.sapo.pt
mx.ptmail.sapo.pt       internet address = 212.55.154.36
ns.sapo.pt      internet address = 212.55.154.202
ns2.sapo.pt     internet address = 212.55.154.194
dns01.sapo.pt   internet address = 213.13.28.116
dns02.sapo.pt   internet address = 213.13.30.116
dns01.sapo.pt   AAAA IPv6 address = 2001:8a0:2106:4:213:13:28:116
dns02.sapo.pt   AAAA IPv6 address = 2001:8a0:2206:4:213:13:30:116
>
```

```
C:\Users\Pedro Geirinhas>nslookup
Default Server:  vodafonegw
Address:  192.168.1.1

> set q=SOA
> isec.pt
Server:  vodafonegw
Address:  192.168.1.1

Non-authoritative answer:
isec.pt
        primary name server = ns.isec.pt
        responsible mail addr = sysadmin.isec.pt
        serial  = 2020041501
        refresh = 28800 (8 hours)
        retry   = 3600 (1 hour)
        expire  = 604800 (7 days)
        default TTL = 86400 (1 day)

isec.pt nameserver = ns2.isec.pt
isec.pt nameserver = ns.isec.pt
ns.isec.pt      internet address = 193.137.78.1
ns2.isec.pt     internet address = 193.137.78.3
>
```

```
C:\Users\Pedro Geirinhas>nslookup
Default Server:  vodafonegw
Address:  192.168.1.1

>
> set q=A
> www.isec.pt
Server:  vodafonegw
Address:  192.168.1.1

Non-authoritative answer:
Name:    www.isec.pt
Address:  193.137.78.72
```

```
C:\Users\Pedro Geirinhas>nslookup
Default Server:  vodafonegw
Address:  192.168.1.1

> server ns2.isec.pt
Default Server:  ns2.isec.pt
Address:  193.137.78.3

> www.isec.pt
Server:  ns2.isec.pt
Address:  193.137.78.3

Name:    www.isec.pt
Address:  193.137.78.72
```

Questions