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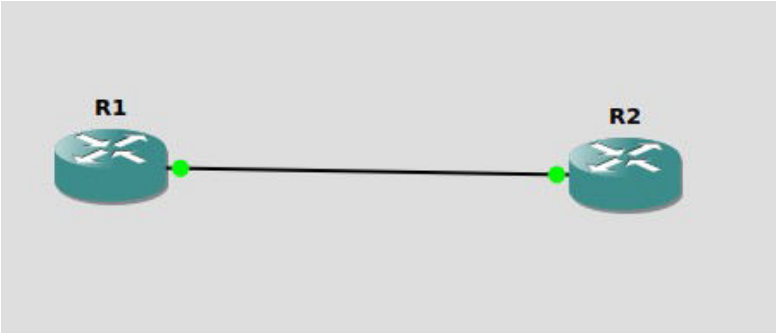
Computer Networks Lab 7:Study of Domain Name Server

1. Configure the below topology to setup DNS server. R1 will use R2 as DNS server to make DNS resolutions.
First, lets begin with R1. We'll setup hostname and IP related information.



R1 IP configurations:
Enable
configure terminal
hostname R1
interface e0/0
ip address 10.10.10.1 255.255.255.0
no shut
do wr
end

R2 IP and Hostname Configurations:
enable
config t
hostname R2
int e0/0
ip address 10.10.10.2 255.255.255.0
no shut
do wr
end
Setting up R2 as DNS Server
config t
ip dns server
ip host loopback.R2.com 2.2.2.2

```
R1(config)#interface f0/0
R1(config-if)#ip address 10.10.10.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#do w
*Mar  1 00:04:44.939: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state t
o up
*Mar  1 00:04:45.939: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/0, changed state to up
R1(config-if)#do wr
Building configuration...
[OK]
R1(config-if)#end
R1#
*Mar  1 00:04:53.203: %SYS-5-CONFIG_I: Configured from console by console
```

```
R2#enable
R2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#ip dns server
R2(config)#ip host loopback.R2.com 2.2.2.2
R2(config)#interface loopback 1
R2(config-if)#
*Mar  1 00:06:49.103: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1,
 changed state to up
R2(config-if)#ip address 2.2.2.2 255.255.255.255
R2(config-if)#end
R2#
*Mar  1 00:06:58.887: %SYS-5-CONFIG_I: Configured from console by console
R2#
```

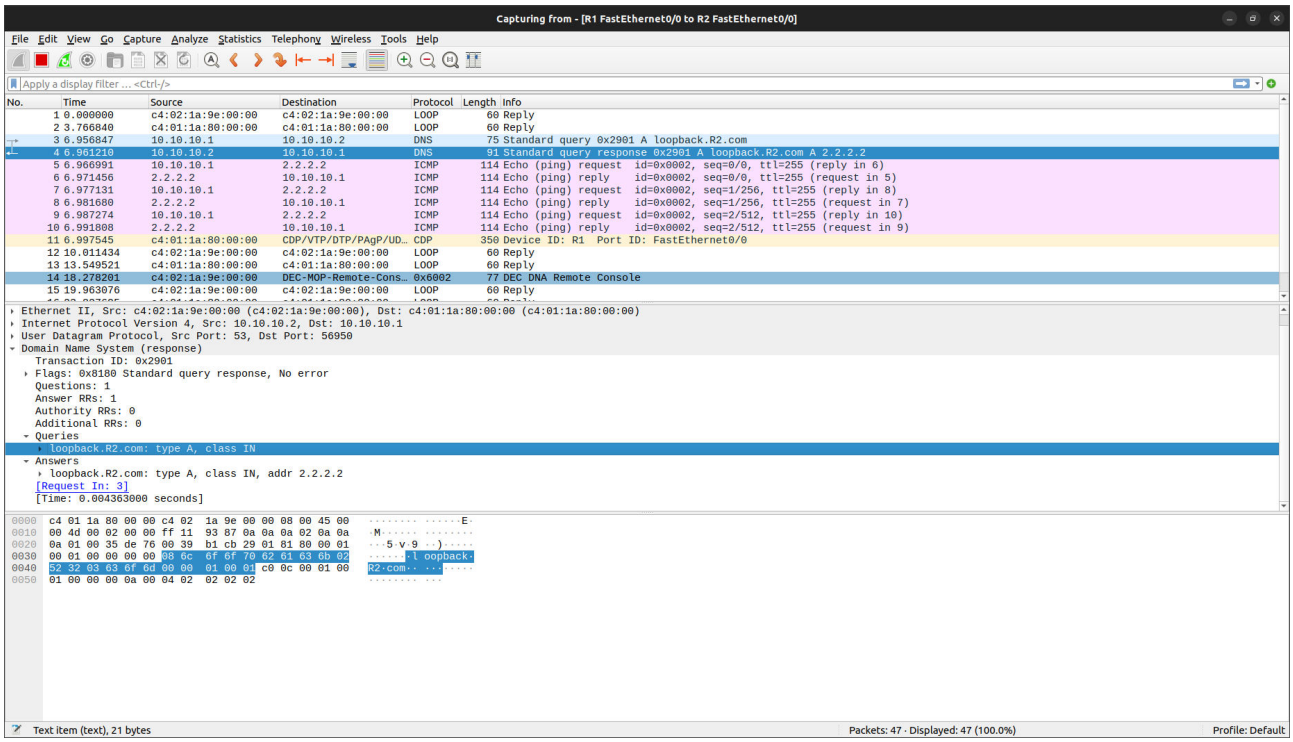
Let's verify that loopback interface we just created is working. This will show us that the hostname correctly setup locally on R2.
ping loopback.R2.com

```
R2#ping loopback.R2.com

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2.2.2.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
R2#
```

Now it's time to setup R1 to resolve hostnames using R2. On R1 type;
config terminal
ip domain lookup
ip name-server 10.10.10.2
Set R1 to use R2 as default gateway to get to loopback interface on R2. So that after R1 resolves loopback.R2.com, it can reach 2.2.2.2 through its default route (R2).
on R1 type:
config t
ip route 0.0.0.0 0.0.0.0 10.10.10.2
end
This tells our router that to get to any network not in it's routing table, it's next hop is 10.10.10.2 which is our router R2.
Now on R1, do a ping to loopback.R2.com and you should get a success message.
ping loopback.R2.com repeat 3

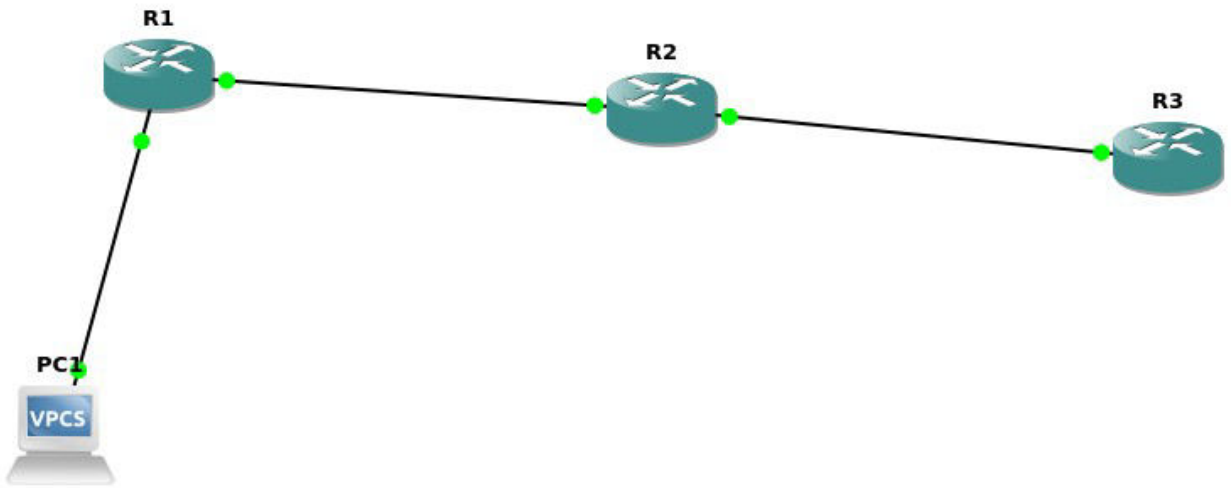
```
R1#ping loopback.R2.com repeat 3

Translating "loopback.R2.com"...domain server (10.10.10.2) [OK]

Type escape sequence to abort.
Sending 3, 100-byte ICMP Echos to 2.2.2.2, timeout is 2 seconds:
!!!
Success rate is 100 percent (3/3), round-trip min/avg/max = 60/61/64 ms
R1#
```

If you captured the traffic, you'll see DNS query and Answer as shown in Wireshark capture screen shot below.



III. LAB EXERCISE

Suppose you are connecting to www.mycsemit.com to read a page, you are a user sitting at a client's machine. You can access the www.mycsemit.com web server. The server machine finds the page you requested and sends it to you. Build a scenario using GNS3 to demonstrate the interaction of the DNS Server and DNS Client. Place DNS Server behind two routers.



Config for R1:

```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#t
% Ambiguous command:  "t"
R1(config)#int f0/0
R1(config-if)#ip addr 20.20.20.3 255.255.255.0
R1(config-if)#no shut
R1(config-if)#
*Mar  1 00:00:58.511: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state t
o up
*Mar  1 00:00:59.511: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/0, changed state to up
R1(config-if)#exit
R1(config)#int f0/1
R1(config-if)#ip addr 30.30.30.2 255.255.255.0
R1(config-if)#no shut
R1(config-if)#
*Mar  1 00:01:35.511: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state t
o up
*Mar  1 00:01:36.511: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/1, changed state to up
R1(config-if)#ip route 20.20.20.0 255.255.255.0 40.40.40.2
R1(config)#ip route 40.40.40.0 255.255.255.0 30.30.30.3
R1(config)#do wr
R1(config)#ip name-server 40.40.40.3
R1(config)#end
R1#
*Mar  1 00:40:07.743: %SYS-5-CONFIG_I: Configured from console by console
```

Config for R2:

```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#int f0/0
R2(config-if)#ip addr 30.30.30.3 255.255.255.0
R2(config-if)#no shut
R2(config-if)#exit
R2(config)#int f0/1
R2(config-if)#ip addr 40.40.40.2 255.255.255.0
R2(config-if)#
R2(config-if)#no shut
R2(config-if)#ip route 20.20.20.0 255.255.255.0 40.40.40.2
%Invalid next hop address (it's this router)
R2(config)#ip route 20.20.20.0 255.255.255.0 30.30.30.2
R2(config)#do wr
Building configuration...
[OK]
```

Config for R3:

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#int f0/0
R3(config-if)#ip addr 40.40.40.3 255.255.255.0
R3(config-if)#no shut
```

```
R3(config)#ip route 20.20.20.0 255.255.255.0 40.40.40.2
R3(config)#ip route 30.30.30.0 255.255.255.0 40.40.40.2
```

Setting up dns server on R3:

```
R3(config)#ip dns server
R3(config)#ip host www.mycsemit.com 40.40.40.3
R3(config)#end
R3#
```

Setting up PC!:

```
PC1> ip dns 40.40.40.3

PC1> show ip

NAME        : PC1[1]
IP/MASK     : 20.20.20.2/24
GATEWAY     : 20.20.20.3
DNS         : 40.40.40.3
MAC         : 00:50:79:66:68:00
LPORT       : 10016
RHOST:PORT  : 127.0.0.1:10017
MTU         : 1500

PC1> ping www.mycsemit.com
www.mycsemit.com resolved to 40.40.40.3

84 bytes from 40.40.40.3 icmp_seq=1 ttl=253 time=29.960 ms

84 bytes from 40.40.40.3 icmp_seq=2 ttl=253 time=25.348 ms
84 bytes from 40.40.40.3 icmp_seq=3 ttl=253 time=36.592 ms
84 bytes from 40.40.40.3 icmp_seq=4 ttl=253 time=26.213 ms
84 bytes from 40.40.40.3 icmp_seq=5 ttl=253 time=27.208 ms
```

Ping from PC1 to R3

```
PC1> ip 20.20.20.2/24 20.20.20.3
Checking for duplicate address...
PC1 : 20.20.20.2 255.255.255.0 gateway 20.20.20.3

PC1> ping 40.40.40.3

40.40.40.3 icmp_seq=1 timeout
40.40.40.3 icmp_seq=2 timeout
84 bytes from 40.40.40.3 icmp_seq=3 ttl=253 time=23.450 ms
84 bytes from 40.40.40.3 icmp_seq=4 ttl=253 time=28.021 ms
84 bytes from 40.40.40.3 icmp_seq=5 ttl=253 time=29.548 ms

PC1>
```

```
PC1> ping www.mycsemit.com
www.mycsemit.com resolved to 40.40.40.3

84 bytes from 40.40.40.3 icmp_seq=1 ttl=253 time=29.912 ms
84 bytes from 40.40.40.3 icmp_seq=2 ttl=253 time=38.297 ms
84 bytes from 40.40.40.3 icmp_seq=3 ttl=253 time=27.214 ms
84 bytes from 40.40.40.3 icmp_seq=4 ttl=253 time=25.264 ms
84 bytes from 40.40.40.3 icmp_seq=5 ttl=253 time=25.812 ms
```

No.	Time	Source	Destination	Protocol	Length	Info
16	32.976376	c4:01:17:b7:00:00	c4:01:17:b7:00:00	LOOP	60	Reply
17	33.739898	Private_66:68:00	Broadcast	ARP	64	Who has 20.20.20.3? Tell 20.20.20.2
18	33.743402	c4:01:17:b7:00:00	Private_66:68:00	ARP	60	20.20.20.3 is at c4:01:17:b7:00:00
19	33.744128	20.20.20.2	40.40.40.3	DNS	76	Standard query 0x690d A www.mycsemit.com
20	33.773592	40.40.40.3	20.20.20.2	DNS	92	Standard query response 0x690d A www.mycsemit.com A 40.40.40.3
21	33.774029	20.20.20.2	40.40.40.3	ICMP	98	Echo (ping) request id=0x6d91, seq=1/256, ttl=64 (reply in 22)
22	33.803809	40.40.40.3	20.20.20.2	ICMP	98	Echo (ping) reply id=0x6d91, seq=1/256, ttl=253 (request in 21)
23	34.804071	20.20.20.2	40.40.40.3	ICMP	98	Echo (ping) request id=0x6e91, seq=2/512, ttl=64 (reply in 24)
24	34.842249	40.40.40.3	20.20.20.2	ICMP	98	Echo (ping) reply id=0x6e91, seq=2/512, ttl=253 (request in 23)
25	35.843113	20.20.20.2	40.40.40.3	ICMP	98	Echo (ping) request id=0x6f91, seq=3/768, ttl=64 (reply in 26)
26	35.870194	40.40.40.3	20.20.20.2	ICMP	98	Echo (ping) reply id=0x6f91, seq=3/768, ttl=253 (request in 25)
27	36.870572	20.20.20.2	40.40.40.3	ICMP	98	Echo (ping) request id=0x7091, seq=4/1024, ttl=64 (reply in 28)
28	36.895725	40.40.40.3	20.20.20.2	ICMP	98	Echo (ping) reply id=0x7091, seq=4/1024, ttl=253 (request in 27)
29	37.896759	20.20.20.2	40.40.40.3	ICMP	98	Echo (ping) request id=0x7291, seq=5/1280, ttl=64 (reply in 30)
30	37.921593	40.40.40.3	20.20.20.2	ICMP	98	Echo (ping) reply id=0x7291, seq=5/1280, ttl=253 (request in 29)

```
▸ User Datagram Protocol, Src Port: 21019, Dst Port: 53
▾ Domain Name System (query)
    Transaction ID: 0x690d
  ▸ Flags: 0x0100 Standard query
    Questions: 1
    Answer RRs: 0
    Authority RRs: 0
    Additional RRs: 0
  ▾ Queries
    ▾ www.mycsemit.com: type A, class IN
        Name: www.mycsemit.com
        [Name Length: 16]
        [Label Count: 3]
        Type: A (Host Address) (1)
        Class: IN (0x0001)
      [Response In: 20]
```