

باسمہ تعالیٰ

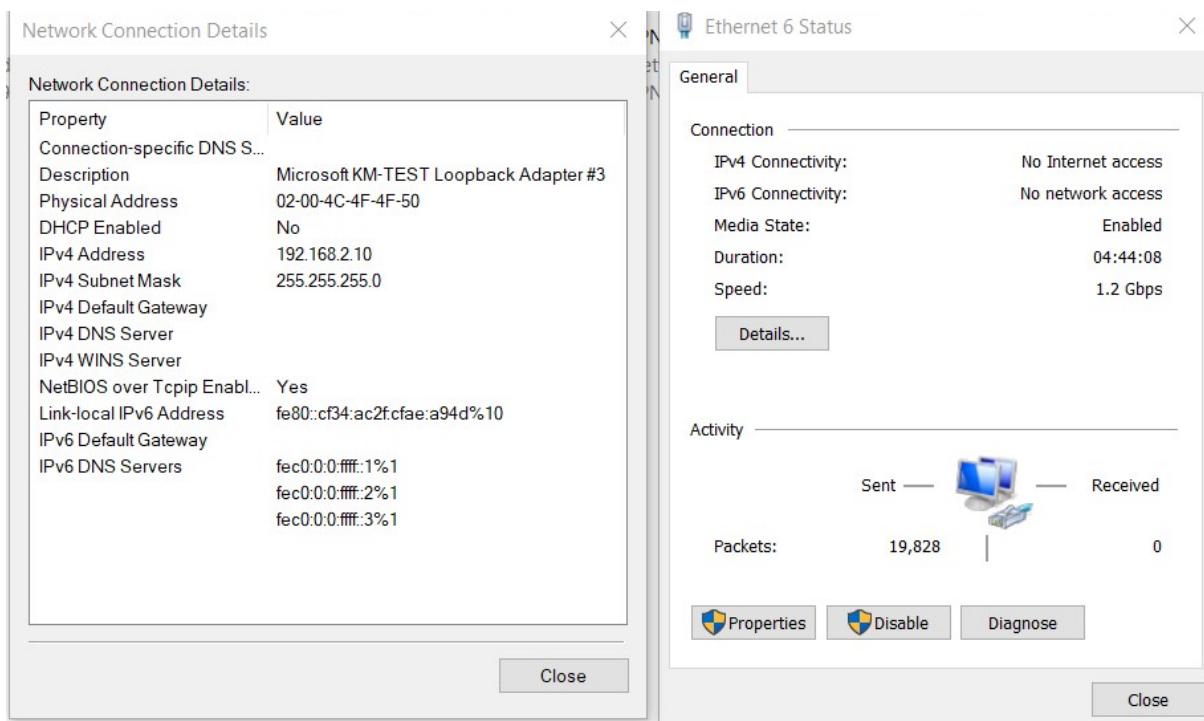
۹۹۱۳۱۶۰۲۸۱۸۴۲

علیرضا نودهی

محمد رضا میرزا یی

ابتدا یک لوپ در در سیستم خودمان میسازیم و به صورت دستی به آن ip می دهیم.

من 192.168.2.10 ip را انتخاب کردم.



سپس تنظیمات مربوط به ip gns vm را اجرا کردم. و به ان در رنج لوپ بکم دادم.

```

GNU nano 4.8                               /etc/netplan/90_gns3vm_static_netcfg.yaml
# This file describes the network interfaces available on your system
# For more information, see netplan(5).

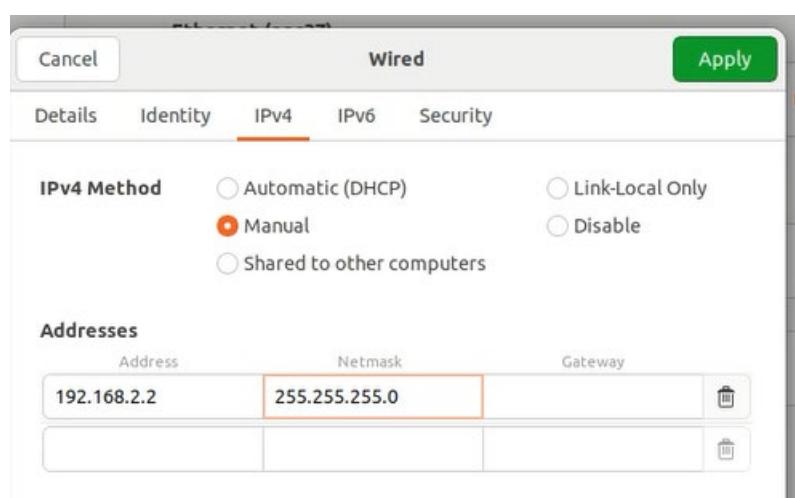
# Uncomment the following lines if you want to manually configure your network

network:
  version: 2
  renderer: networkd
  ethernets:
    eth0:
      #      dhcp4: no
      addresses:
        - 192.168.2.11/24
      #      gateway4: 10.10.10.1
      #      nameservers:
      #        addresses: [8.8.8.8, 8.8.4.4]

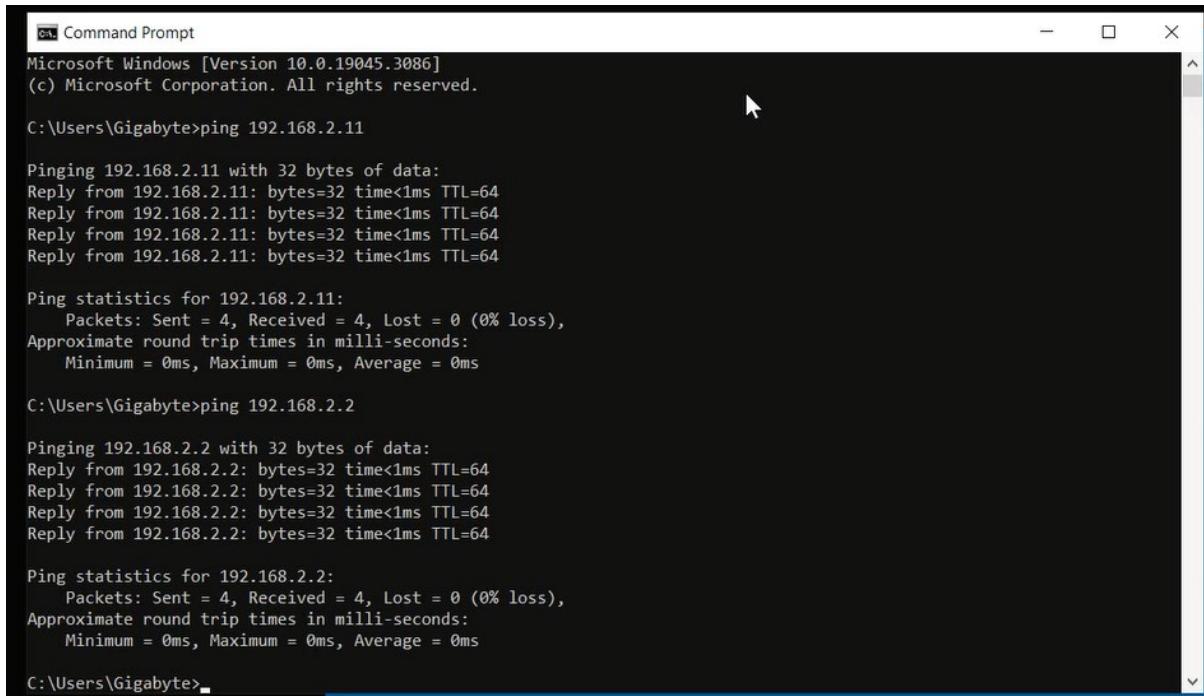
[ Read 16 lines ]
↑↓ Get Help   ⇧ Write Out   ⇤ Where Is   ⌘ Cut Text   ⌘ J Justify   ⌘ C Cur Pos   M-U Undo   M-A Mark Text

```

حال چراغ gns3 vm سبز شد. حالا اوبنتو را ران کرده و ip 192.168.2.2 را به صورت دستی به آن میدهیم.



اکنون میتوان هم gns و هم اوبنتو را پینگ گرفت.



```
Command Prompt
Microsoft Windows [Version 10.0.19045.3086]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Gigabyte>ping 192.168.2.11

Pinging 192.168.2.11 with 32 bytes of data:
Reply from 192.168.2.11: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.2.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\Gigabyte>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:
Reply from 192.168.2.2: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\Gigabyte>
```

حال هم dns و هم dhcp را در ابنتو نصب کرده و با تنظیمات گفته شده در متن پروژه کانفیگ میکنیم.



```
alireza@alireza-virtual-machine:~$ sudo apt install isc-dhcp-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libirs-export161 libisccfg-export163
Suggested packages:
  isc-dhcp-server-ldap policycoreutils
The following NEW packages will be installed:
  isc-dhcp-server libirs-export161 libisccfg-export163
0 upgraded, 3 newly installed, 0 to remove and 233 not upgraded.
Need to get 529 kB of archives.
After this operation, 1,546 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
0% [Connecting to ca.archive.ubuntu.com]
```

```
alireza@alireza-virtual-machine:~$ sudo nano /etc/dhcp/dhcpd.conf
```

```
GNU nano 6.2          /etc/dhcp/dhcpd.conf *
```

```
default-lease-time 600;
max-lease-time 7200;
option subnet-mask 255.255.255.0;
option broadcast-address 192.198.2.255;
option domain-name "alireza.org";
authoritative;

subnet 192.168.2.0 netmask 255.255.255.0 {
range 192.168.2.10 192.168.2.20;
option routers 192.168.2.254;
option domain-name-servers 192.168.2.2;
}

}
```

```
alireza@alireza-virtual-machine:~$ sudo nano /etc/default/isc-dhcp-server
```

```
GNU nano 6.2          /etc/default/isc-dhcp-server *
```

```
# Defaults for isc-dhcp-server (sourced by /etc/init.d/isc-dhcp-server)

# Path to dhcpcd's config file (default: /etc/dhcp/dhcpd.conf).
#DHCPDv4_CONF=/etc/dhcp/dhcpd.conf
#DHCPDv6_CONF=/etc/dhcp/dhcpd6.conf

# Path to dhcpcd's PID file (default: /var/run/dhcpcd.pid).
#DHCPDv4_PID=/var/run/dhcpcd.pid
#DHCPDv6_PID=/var/run/dhcpcd6.pid

# Additional options to start dhcpcd with.
#       Don't use options -cf or -pf here; use DHCPD_CONF/ DHCPD_PID instead
#OPTIONS=""

# On what interfaces should the DHCP server (dhcpcd) serve DHCP requests?
#       Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACESv4="ens33"
INTERFACESv6=""
```

```
^G Help      ^O Write Out  ^W Where Is  ^K Cut      ^T Execute  ^C Location
^X Exit      ^R Read File  ^\ Replace   ^U Paste    ^J Justify  ^/ Go To Line
```

حال dhcp با موفقیت ران میشود.

```
alireza@alireza-virtual-machine:~$ sudo systemctl restart isc-dhcp-server
alireza@alireza-virtual-machine:~$ sudo systemctl status isc-dhcp-server
● isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; vendor>
   Active: active (running) since Sat 2023-07-01 02:09:06 MDT; 14s ago
     Docs: man:dhcpd(8)
     Main PID: 6059 (dhcpd)
        Tasks: 4 (limit: 2264)
       Memory: 9.3M
          CPU: 42ms
        CGroup: /system.slice/isc-dhcp-server.service
                  └─6059 dhcpd -user dhcpd -group dhcpd -f -4 -pf /run/dhcp-server/d>

Jul 01 02:09:07 alireza-virtual-machine sh[6059]: Sending on    LPF/ens33/00:0c:>
Jul 01 02:09:07 alireza-virtual-machine sh[6059]: Sending on    Socket/fallback/>
Jul 01 02:09:07 alireza-virtual-machine dhcpd[6059]: Config file: /etc/dhcp/dhc>
Jul 01 02:09:07 alireza-virtual-machine dhcpd[6059]: Database file: /var/lib/dh>
Jul 01 02:09:07 alireza-virtual-machine dhcpd[6059]: PID file: /run/dhcp-server>
Jul 01 02:09:07 alireza-virtual-machine dhcpd[6059]: Wrote 0 leases to leases f>
Jul 01 02:09:07 alireza-virtual-machine dhcpd[6059]: Listening on LPF/ens33/00:>
Jul 01 02:09:07 alireza-virtual-machine dhcpd[6059]: Sending on    LPF/ens33/00:>
Jul 01 02:09:07 alireza-virtual-machine dhcpd[6059]: Sending on    Socket/fallba>
Jul 01 02:09:07 alireza-virtual-machine dhcpd[6059]: Server starting service.
lines 1-21/21 (END)
```

حال سراغ dns سرور میرویم:

```
alireza@alireza-virtual-machine:~$ sudo apt install bind9 dnsutils
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  bind9-dnsutils bind9-host bind9-libs bind9-utils
Suggested packages:
  bind-doc resolvconf
The following NEW packages will be installed:
  bind9 bind9-utils dnsutils
The following packages will be upgraded:
  bind9-dnsutils bind9-host bind9-libs
3 upgraded, 3 newly installed, 0 to remove and 230 not upgraded.
Need to get 425 kB/1,875 kB of archives.
After this operation, 1,824 kB of additional disk space will be used.
Do you want to continue? [Y/n]
```

```

alireza@alireza-virtual-machine:~$ nano /etc/bind/named.conf.options
alireza@alireza-virtual-machine:~$ sudo nano /etc/bind/named.conf.options
alireza@alireza-virtual-machine:~$ sudo nano /etc/bind/named.conf.options
alireza@alireza-virtual-machine:~$ sudo nano /etc/bind/named.conf.local
alireza@alireza-virtual-machine:~$ sudo cp /etc/bind/db.local /etc/bind/db.ali.com
alireza@alireza-virtual-machine:~$ nano /etc/bind/db.ali.com
alireza@alireza-virtual-machine:~$ sudo nano /etc/bind/db.ali.com
alireza@alireza-virtual-machine:~$ sudo nano /etc/bind/named.conf.local
alireza@alireza-virtual-machine:~$ sudo cp /etc/bind/db.127 /etc/bind/db.192
alireza@alireza-virtual-machine:~$ sudo nano /etc/bind/db.192
alireza@alireza-virtual-machine:~$ sudo systemctl restart bind9.service
alireza@alireza-virtual-machine:~$ sudo systemctl restart bind9.service
alireza@alireza-virtual-machine:~$ named-checkzone example.com /etc/bind/db.ali.com
zone example.com/IN: loaded serial 2
OK
alireza@alireza-virtual-machine:~$ named-checkzone 192.168.0.0/32 /etc/bind/db.192
zone 192.168.0.0/32/IN: loaded serial 2
OK
alireza@alireza-virtual-machine:~$ named-checkzone 1.168.192.in-addr.arpa /etc/bind/db.192
zone 1.168.192.in-addr.arpa/IN: loaded serial 2
OK
alireza@alireza-virtual-machine:~$ named-checkconf /etc/bind/named.conf.local
alireza@alireza-virtual-machine:~$ named-checkconf /etc/bind/named.conf
alireza@alireza-virtual-machine:~$ dig -x 127.0.0.1

```

```

GNU nano 6.2                               /etc/bind/named.conf.options *
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 {
        8.8.8.8;
        8.8.4.4;
    };
    //========================================================================
    // If BIND logs error messages about the root key being expired,
    // you will need to update your keys. See https://www.tsc.org/bind-keys
    //================================================================
    dnssec-validation auto;

    listen-on-v6 { any; };
};


```

```

GNU nano 6.2                               /etc/bind/db.ali.com *
;
; BIND data file for local loopback interface
;

$TTL    604800
@      IN      SOA     ali.com. root.ali.com. (
                      2           ; Serial
                      604800      ; Refresh
                      86400       ; Retry
                     2419200    ; Expire
                     604800 )    ; Negative Cache TTL

@      IN      NS      ns.ali.com.
@      IN      A       192.168.2.2
@      IN      AAAA   ::1
ns    IN      A       192.168.2.2

```

```
GNU nano 6.2                                     /etc/bind/db.192 *

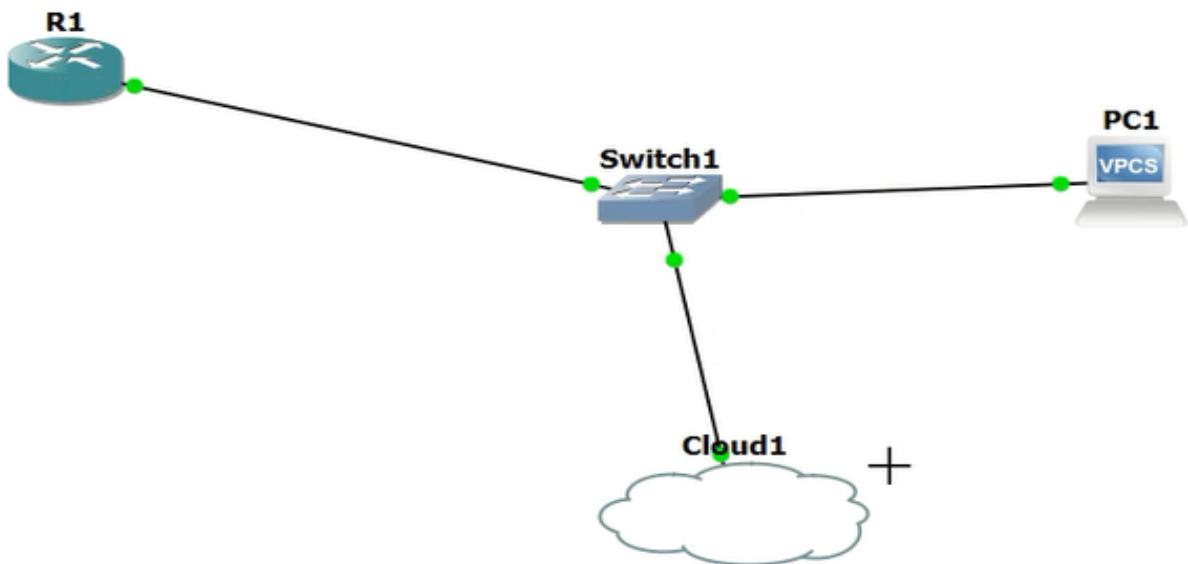
;
; BIND reverse data file for local loopback interface
;

$TTL    604800
@       IN      SOA     ns.ali.com. root.ali.com. (
                      2           ; Serial
                      604800      ; Refresh
                      86400       ; Retry
                     2419200     ; Expire
                      604800 )     ; Negative Cache TTL
;
@       IN      NS      ns.ali.com.
10     IN      PTR     ns.ali.com.
```

```
alireza@alireza-Virtual-Machine:~$ sudo systemctl status bind9.service
● named.service - BIND Domain Name Server
   Loaded: loaded (/lib/systemd/system/named.service; enabled; vendor preset: enabled)
   Active: active (running) since Sat 2023-07-01 03:18:58 MDT; 24s ago
     Docs: man:named(8)
  Process: 7389 ExecStart=/usr/sbin/named $OPTIONS (code=exited, status=0/SUCCESS)
 Main PID: 7390 (named)
    Tasks: 4 (limit: 2264)
   Memory: 5.8M
      CPU: 78ms
     CGroup: /system.slice/named.service
             └─7390 /usr/sbin/named -u bind

Jul 01 03:18:58 alireza-virtual-machine named[7390]: FORMERR resolving './NS/IN': 192.58.128.30#53
Jul 01 03:18:58 alireza-virtual-machine named[7390]: DNS format error from 192.112.36.4#53 resolving ./NS for <unknown>; non-improving referral
Jul 01 03:18:58 alireza-virtual-machine named[7390]: FORMERR resolving './NS/IN': 192.112.36.4#53
Jul 01 03:18:58 alireza-virtual-machine named[7390]: DNS format error from 192.203.230.10#53 resolving ./NS for <unknown>; non-improving referral
Jul 01 03:18:58 alireza-virtual-machine named[7390]: FORMERR resolving './NS/IN': 192.203.230.10#53
Jul 01 03:18:58 alireza-virtual-machine named[7390]: DNS format error from 193.0.14.129#53 resolving ./NS for <unknown>; non-improving referral
Jul 01 03:18:58 alireza-virtual-machine named[7390]: FORMERR resolving './NS/IN': 193.0.14.129#53
Jul 01 03:18:58 alireza-virtual-machine named[7390]: DNS format error from 198.41.0.4#53 resolving ./NS for <unknown>; non-improving referral
Jul 01 03:18:58 alireza-virtual-machine named[7390]: FORMERR resolving './NS/IN': 198.41.0.4#53
```

حال در gns فضای شبکه را شبیه سازی میکنیم و آن در gns vm ران میشود.



حال وارد کنسول روتر شده و ایپی طبق سوال به ان میدهیم.

```
R1
old start
*Jul 1 09:27:15.471: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is OFF
*Jul 1 09:27:15.475: %CRYPTO-6-GDOI_ON_OFF: GDOI is OFF
*Jul 1 09:27:16.279: %LINK-5-CHANGED: Interface FastEthernet0/0, changed state
to administratively down
*Jul 1 09:27:17.279: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to down
R1#
R1#cond f
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#inter
R1(config)#interface f0/0
R1(config-if)#ip address 192.168.2.1
% Incomplete command.

R1(config-if)#ip address 192.168.2.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#
*Jul 1 09:31:28.975: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
*Jul 1 09:31:29.975: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R1(config-if) #
```

حال ای پی روتر را پینگ میگیریم هم در cmd و هم در اوبنتو

```
Command Prompt
Microsoft Windows [Version 10.0.19045.3086]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Gigabyte>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:
Reply from 192.168.2.1: bytes=32 time=80ms TTL=255
Reply from 192.168.2.1: bytes=32 time=2ms TTL=255
Reply from 192.168.2.1: bytes=32 time=5ms TTL=255
Reply from 192.168.2.1: bytes=32 time=6ms TTL=255

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 80ms, Average = 23ms

C:\Users\Gigabyte>
```

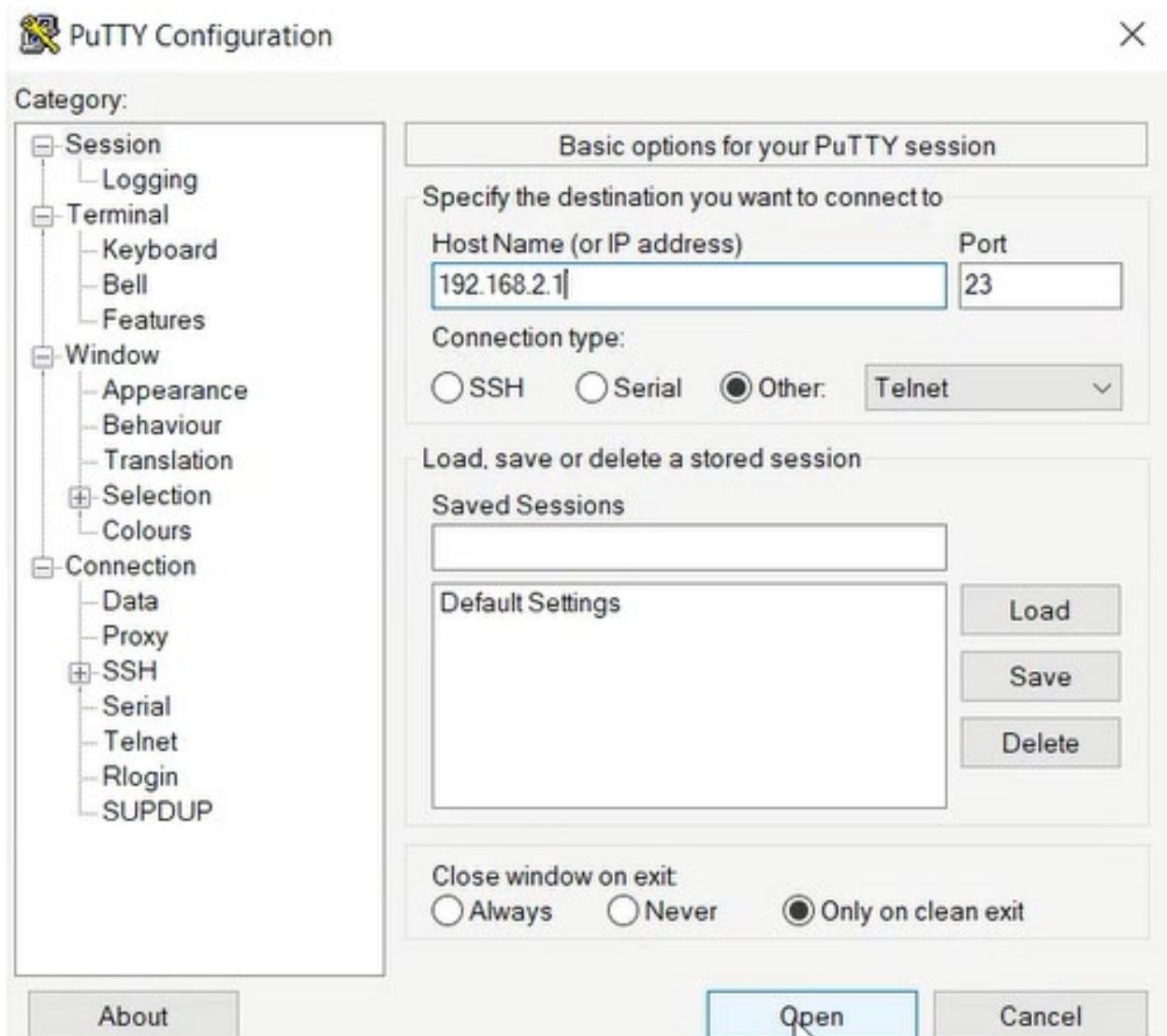
```
^CaliReza@alireza-virtual-machine:~$ ping 192.168.2.1
PING 192.168.2.1 (192.168.2.1) 56(84) bytes of data.
64 bytes from 192.168.2.1: icmp_seq=1 ttl=255 time=25.1 ms
64 bytes from 192.168.2.1: icmp_seq=2 ttl=255 time=6.13 ms
64 bytes from 192.168.2.1: icmp_seq=3 ttl=255 time=10.2 ms
64 bytes from 192.168.2.1: icmp_seq=4 ttl=255 time=6.91 ms
^C
--- 192.168.2.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 6.134/12.086/25.136/7.684 ms
```

حال برای روتorman یک یوزر نیم و پسورد انتخاب میکنیم تا با تلنت بتوانیم به ان متصل شویم

```
R1(config)#enable secret
R1(config)#enable secret class
R1(config)#enable secret class
R1(config)#use
R1(config)#usern
R1(config)#username nodahi privilage 15 secret 021
^
% Invalid input detected at '^' marker.

R1(config)#usern
R1(config)#username ali privilege 15 secret ali
R1(config)#line vty 0 4
R1(config-line)#login local
R1(config-line)#exit
R1(config)#[
```

حال با استفاده از پاتی به روتر تلنت میکنیم



حال لاگین کرده و اسم روتر را عوض میکنیم تا نشان دهیم به تنظیمات روتر
دسترسی کامل داریم

```
192.168.2.1 - PuTTY

User Access Verification

Username: ali
Password:
R1#
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#hostname router1
router1(config) #
```

حال وارد کنسول pc1 میشویم و به از ان پینگ گرفته و به ان ایپی میدهیم

```
PC1 - PuTTY
Copyright (c) 2007-2015, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

PC1> show ip

NAME      : PC1[1]
IP/MASK   : 0.0.0.0/0
GATEWAY   : 0.0.0.0
DNS       :
MAC       : 00:50:79:66:68:00
LPORT     : 20008
RHOST:PORT: 127.0.0.1:20009
MTU       : 1500

PC1>
```

```
PC1> ip dhcp
DDORA IP 192.168.2.13/24 GW 192.168.2.254

PC1> show ip

NAME      : PC1[1]
IP/MASK   : 192.168.2.13/24
GATEWAY   : 192.168.2.254
DNS       : 192.168.2.2
DHCP SERVER : 192.168.2.2
DHCP LEASE   : 559, 600/300/525
DOMAIN NAME : alireza.org
MAC       : 00:50:79:66:68:00
LPORT     : 20008
RHOST:PORT: 127.0.0.1:20009
MTU       : 1500

PC1>
```

حال pc1 را در cmd و اوبنتو پینگ میگیریم

```
\Users\Gigabyte>ping 192.168.2.13

Pinging 192.168.2.13 with 32 bytes of data:
    PING: bytes=32 time<1ms TTL=64
    PING: bytes=32 time<1ms TTL=64
    PING: bytes=32 time<1ms TTL=64
    PING: bytes=32 time<1ms TTL=64

Statistics for 192.168.2.13:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

```
alireza@alireza-virtual-machine: ~ $ ping 192.168.2.13
PING 192.168.2.13 (192.168.2.13) 56(84) bytes of data.
    64 bytes from 192.168.2.13: icmp_seq=1 ttl=64 time=0.556 ms
    64 bytes from 192.168.2.13: icmp_seq=2 ttl=64 time=0.744 ms
    64 bytes from 192.168.2.13: icmp_seq=3 ttl=64 time=0.755 ms
    64 bytes from 192.168.2.13: icmp_seq=4 ttl=64 time=0.577 ms
^C
--- 192.168.2.13 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3070ms
rtt min/avg/max/mdev = 0.556/0.658/0.755/0.091 ms
```

حال روتر را در pc1 پینگ میگیریم

```
PC1> ping 192.168.2.1

    84 bytes from 192.168.2.1 icmp_seq=1 ttl=255 time=101.690 ms
    84 bytes from 192.168.2.1 icmp_seq=2 ttl=255 time=10.614 ms
    84 bytes from 192.168.2.1 icmp_seq=3 ttl=255 time=9.680 ms
    84 bytes from 192.168.2.1 icmp_seq=4 ttl=255 time=7.093 ms
^C
PC1>
```

در ابتدا پی سی فاقد ایپی است پس بروڈکست میکند تا از دی اچ سی پی ایپی بگیرد و در نهایت میگیرد. با پینگ گرفتن ایپی های داده شده یه gns ، بسته های ارسالی ان ها در شبکه مشاهده میشود loopback router , pc

